PARK-ABOVE-PARKING DOWNTOWN:

A SPATIAL-BASED IMPACT INVESTIGATION

by

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DISSERTATION ABSTRACT

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Parking and parks are both crucial to downtown economic development. Many studies have shown that downtown parks significantly contribute to increasing surrounding property values and attract residents, businesses and investment. Meanwhile, sufficient available parking promotes accessibility to downtown that also contributes to increasing tax revenue for local government. However, both downtown parks and parking raise problems. Many downtown parks have become places for drug dealing, shooting and vandalism since the decline of downtowns in the 1960s. At the same time, residents and visitors alike oftentimes complain about the lack of parking while in fact parking spaces occupy a large amount of land in downtown. Parks and parking also compete for space in downtown where land value is higher than the rest of the city. To address these issues, several cities have begun to address the relationship between parking and parks by placing them in one place: park on the ground level and parking underneath. This typology is defined as a park-above-parking project in this research. However, this phenomenon has received little scholarly attention. To justify the existing situation of park-above-parking and to contemplate future projects, this research provides a spatial-based investigation to discuss the empirical relationships between social cultural and political-economic impacts, design quality, and related policy-making processes based on

four cases. A longitudinal study that traces the direct and indirect impacts of park-above-parking projects was conducted for each case through both qualitative and quantitative methods. This research provides a set of methods for the measurement of contributions of park-above-parking downtown, connections between park quality, social use and adjacent economic growth, recommendations for land use planning policy-making and guidelines for the design of park-above-parking projects.

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TABLE OF CONTENTS

Chapter Page

Chapter Page

Chapter Page

Chapter Page

Chapter Page

LIST OF FIGURES

Figure Page

Figure Page

4.21. Scores on Triangulation 104

4.22. Scores on Below Parking Access 105

4.23. Patterns of Below parking Access 106

4.24. Scores on Natural Surveillance 107

4.25. Scores on Adjacent Supporting Uses 108

4.26. Total scores 110

Figure Page

LIST OF TABLES

Table Page

Table Page

LIST OF DIAGRAMS

Diagram Page

CHAPTER I
INTRODUCTION

Background

The American downtown has been recognized as the heart of commerce, government, culture and leisure for a well-balanced, vibrant community (Fage, 2001). The downtown has undergone major transformations through its rise and fall in the last century (Fogelson, 2001). Nowadays, many cities continue to seek opportunities to redevelop their existing downtowns in response to population growth and in order to counteract urban sprawl. Renovated, rehabilitated, and improved or new parks can play a critical role in supporting downtown revitalization by providing a wide array of environmental, social, and economic benefits (Garvin, 1997).

American parks were originally considered a way for people to make contact with nature, and as gifts from people to themselves (Wylie, 2007; Cosgrove, 1984). Parks serve as "lungs" for compact urban areas. Vegetation greatly contributes to the reduction of air and noise pollution (Barrie, 1997). Trees help control urban stormwater runoff and reduce the urban heat island effect (Harnik, 2000, 2010). Much of the research literature has discussed the social benefits of parks. City parks provide a variety of outdoor places for people's gatherings, recreation and special social events (Benedict, 2008; Whyte, 1980). In recent decades, parks have been considered an economic engine of city development. Some scholars argue that adjacent property values can be increased dramatically after the construction of a new park or the renovation of an existing park (Harnik 2000; Burdick et al., 2002; Crompton, 2001a). At the same time, sales tax revenues can increase to pay for other projects or city debts (Troy et al., 2008; Dahl, 2003).

Due to the growing demands of the automobile, parking has become a key spatial element in downtown. Many studies have discussed the problems of downtown parking (Barr, 1997; Feehan, 2006; Fogelson, 2001; Shoup, 2005). Donald Shoup argues that the success of a downtown relies on the capacity of combing large amounts of capital and labor within limited amounts of lands. However, downtown parking requirements are the same with the rest of the city which "have accelerated the decentralization they were

supposed to have prevented" (Shoup 2005, 159). He suggests that shared parking that is available to the general public is a solution to maintain the density of downtown (159). According to Shoup, the parking garage is one form of shared parking that is often found downtown. A number of studies have discussed the garage's relationship with traffic congestion, operation and safety issues (Birch, 2005; McDonald, 2007; Robertson, 1999)

Research on downtown parks and parking falls into two unrelated fields. Park related research is often provided by historians or designers from a design background while parking related research is usually conducted by economists or engineers. When parks and parking come together, it requires researchers who have knowledge and skills in both fields. Peter Harnik, the Director of the Center for City Park Excellence, has published several articles and books on parks and economic development. Few studies have discussed park-above-parking projects until his article: the Park at Boston's Office Square. Harnik introduces the transformation of Norman B. Leventhal Park at Boston's Office Square: a multi-story garage has been replaced with a park on the ground and a garage underneath (Harnik, 1997). This renovation brings significant economic benefits. It is the first park-above-parking project built without using any public funds. The underground garage covers 30% of the parking market of downtown Boston and it generates an average of $8 million per year after five years of operation. However, Harnik only studied the economic performance of Park-above-Parking projects within the site; its economic impact on the adjacent neighborhood remains unknown.

Park-above-Parking Projects

In this research, a park-above-parking project is defined as a park on the ground level with a parking structure directly under the park. The Park-above-Parking designation does not apply when a garage entrance or exit is located in the park but the majority of the garage structure is under an adjacent building. For example, in downtown Boise Idaho, the entrances and exits of an underground garage are located in a small park but the major structure is under the high-rise US Bank building (City of Boise).

Green roofs on parking structures are also excluded from this research. Even though a green roof may be considered a park, its accessibility is problematic. Many green roofs are open to the public, but cannot be seen from the street. For example, a

16,866 square foot green roof on a free-standing parking garage at North Michigan Avenue, in downtown Chicago was finished in 2008, but few parking users know of it. It has become the showcase for surrounding skyscrapers. The 18,200 square feet green roof on the Portland Building is fully accessible to the public, but, people have to pass a security check in the building before they can access the green roof. The design and use are significantly different from park-above-parking. Hence, green roofs on parking structures are not included in this research. In this research, park-above-parking projects refer to a below-grade parking garage with a park above at ground level.

In this research, park-above-parking projects focus on those sites that have had one or more major renovation(s) since establishment because new or renovation(s) have stronger impacts (Crompton, 2001). Those park-above-parking projects which have undergone only minor improvements, such as adding new play equipment or repaving pathways, are excluded from this research. Park-above-parking projects have been built nationwide since the 1940s. In 1942, a 1,700-car underground parking was installed under Union Square in San Francisco (Berglund, 2007). Inspired by Union Square, an 1800-car garage beneath Pershing Square in Los Angeles opened to the public in 1952; Mellon Square was built with underground parking in Pittsburgh in 1953; an 1,100-car garage was added to Travis Park in San Antonio Texas in 1954; underground parking was added to Portsmouth Square in San Francisco in 1963; a self-park 236-car parking garage was added to Market Square in Alexandria, Virginia in 1967; and O'Bryant Square was dedicated to the city with 90 underground parking spaces in 1971 (Fisher, 1996; Harnik, 1997, 2000, 2010).

More recently, many communities have recognized park-above-parking projects as an economic necessity to future downtown life. Memorial Plaza in Cleveland, Ohio was redeveloped with a 900-car parking garage underneath in 1991. Located under Millennium Park, the newest one of the four Millennium Garages provides 2,126 parking spaces. Together these parking garages constitute the largest downtown underground public parking system in the United States. The parking garage underneath Discovery Green in Houston, Texas was an important part of the park master plan and opened in 2007 before the opening of the park (Litt, 2010; Kent, 2011; Savage, 2012). With an underground parking garage, Ellis Square in Savannah, Georgia opened in 2010 aiming

to contribute to downtown revival (Mobley, 2010). Simon and Helen Director Park (Known as Director Park) opened in 2009 with a 700-car parking garage underneath in downtown Portland, Oregon (Beaven, 2009). Several park-above-parking projects such as Columbus Commons in Columbus, Ohio and Washington Park in Cincinnati, Ohio will open in the next few years (3CDC.org; Columbus Commons Website).

While cities continue to build new park-above-parking projects, some of them have failed. The garage under Travis Park in San Antonio TX no longer exists while the park above remains (Fisher, 1996). The park above of Patriots Square Park in Phoenix AZ, which was originally built in 1976, was demolished in 2009. The underground garage remains and is in use (Kats, 2010). The renovated Pershing Square has been included in the "Hall of Shame" of failed urban design projects (Project for Public Spaces). What can we learn from both successful and unsuccessful park-above-parking projects? How can we guide future projects? At this point, park-above-parking projects are open for exploration.

Tracking the performance of park-above-parking projects is important from all perspectives. Downtown stakeholders—city councils, businesses, property owners, financial institutions, residents, urban planners/landscape architects, non-users, and the media, have a series of concerns regarding park-above-parking projects. For city councils that are responsible for economic policies and land use planning decision-making, the primary question is, how much value generated by parks can be added to the local economy in terms of contributions to the tax base, number of jobs created, and benefits to local tourism, against the cost of land acquisition, design, construction and maintenance (Lockwood, et al., 1995). However, park values are difficult to measure, because they are not part of the real estate market. Thus these answers are uncertain. Without specific dollar values in hand, city councils often have to exclude parks from downtown to the "least cost" locations to make room for new buildings or roads which can directly generate economic value.

Businesses, such as restaurants, stores, and theaters seek increased customer flow potentially brought by places that support a range of civic events. Proximity to attractive parks provides a competitive advantage to downtown businesses. The more people flow, the more cash flows. For property owners, as well, proximity to a beautiful park is an

important selling or renting point which can influence their property values (Crompton 2001). For financial institutions, whose focus is to maximize profits against their investments, investing in parks is not convenient, unless the parks will generate positive returns (Crompton, 2001).

For downtown residents, having both physical and visual access to a beautiful park is desirable (Tate, 2001). However, park safety is a potentially serious problem. Many downtown parks spiraled into decay along with general downtown decline in the 1960s (Cranz, 1982), when they became afflicted by drug dealing, shooting and vandalism. The fear of potential illegal activities limited other groups' access to parks. Urban planners and landscape architects are also concerned with the safety of downtown parks. Jane Jacobs, a well-known advocate of neighborhood parks, was against adding more parks downtown based on her observations in major cities such as Philadelphia, New York, and Boston, where she identified several little-used, unloved downtown parks. She asked, "More open spaces for what? For mugging?"(Jacobs, 1961). Meanwhile, she noted that if a park was well-used, it was a safe and successful park. Oscar Newman (1972) also pointed out people felt safer when surrounded by other people in parks and the surrounding areas.

Thoughtful landscape design plays a major role in responding to residents' varied needs by providing vegetation, open space and a variety of park facilities (Fischer, 1976). However, for urban planners and landscape architects, there are many questions regarding the quality of downtown parks in a complicated urban context. Where is the appropriate location? What must be provided and how should downtown parks meet a variety of demands from users and downtown stakeholders?

Non-park users may live far from the downtown, but they may be still concerned with what is going on in the park. The park must be able to answer the fundamental marketing question: what is in the park for non-park users (Crompton, 2001b)? The more attractions non-users can find in the park, the more likely is that they will become park users.

For the media, there is a growing consideration of downtown parks as new showcases not only for the downtowns themself, but for the whole community. In particular, the media is seeking information from successful precedents of downtown

parks that can be applied to the local situation (Sourek, 1999). The question is where does this information come from?

Decision makers need ways to measure, in monetary terms, the value of creating and maintaining parks downtown. Also, the more economic contributions of downtown parks can be measured; the more likely parks can stay downtown. To justify preserving and renewing existing park-above-parking projects, and to contemplate new park-above-parking projects, decision makers should be in a better position to make recommendations, from policy-making to landscape design, based on an economic valuation model that shows relations among park quality, social uses and economic benefits. Furthermore, given efforts displayed by cities to revitalize their downtowns, it would stand to reason that these cities could have a tracking devise for measuring progress in their efforts on park-above-parking projects.

Purpose

This research is a spatial-based investigation designed to assess the contributions of park-above-parking projects and explore the relationships between impacts, design quality, and related policy-making processes. Its purpose is to explore the impact of park-above-parking projects through spatial transformation, which aims at helping decision makers and designers better understand the pros and cons of combining open space and parking in the urban core. For this research, the author conducted a national inventory to explore the existing situation of park-above-parking projects. Then the author analyzed socioeconomic data of surrounding neighborhoods, which connected previously unrelated design quality and economic impact together; finally, the author examined design quality and assessed economic impact.

Research Questions

The research aims to answer the following question: Under what land use policies, management approaches, and design strategies can downtown park-above-parking projects generate positive economic impact that contributes to downtown vitality?

This question consists of four sub-questions:

1. What is the social, cultural and economic context of park-above-parking projects downtown?

2. What is the design quality of park-above-parking projects and how can it be measured?

3. What are the economic impacts of park-above-parking projects and how can these impacts be measured?

4. How does design quality affect the economic impacts of park-above-parking projects?

Significance

This research is expected to provide:

• A set of methods for the measurement of park-above-parking project's value to downtown redevelopment;

• Connections between park quality, surrounding land use and economic impact;

• Recommendations for land use planning and policy-making;

• Guidelines for the design of downtown park-above-parking projects.

Summary of Chapters

Chapter II examines literature on downtown, downtown vitality, downtown parks and parking, and park-above-parking projects, Chapter III outlines the research methodology. This phased research adopts and modifies a variety of evaluation methods. Phase I was a national inventory of existing downtown park-above-parking projects. In this phase, the author identified 25 existing park-above-parking projects based on several national downtown parking surveys, as well as analyses of downtown population and census data. Phase II examined whether these park-above-parking projects were newly built or significantly renovated. The author identified thirteen park-above-parking projects that are newly built or recently renovated. Phase III measured the design quality of park-above-parking projects considered in Phase II. Phase IV assessed the economic

impact of park-above-parking projects considered in III. Phase V categorized park-above-parking projects by their design quality and economic impacts identified in Phase IV. Finally, Phase VI deeply investigated two case studies illustrating overall findings in Phase V through on-site methods.

Chapter IV explores the design quality and economic impacts of thirteen park-above-parking projects. The chapter is divided into three parts: the first is a discussion of design quality; the second is an examination of thirteen projects' economic impacts; the third is the classification of park-above-parking projects with design quality and overall economic impact.

Beyond overall findings drawn from all thirteen park-above-parking projects, two case studies-- Fountain Square in downtown Cincinnati and Pershing Square in downtown Los Angeles—are analyzed in greater depth in Chapter V to illustrate the findings. Fountain Square is chosen from the category of high design quality and high economic impact while Pershing Square is chosen from the category of design quality and low economic impact. Comparing these two cases will help us better understand how design quality and economic impact affect each other.

The author concludes this dissertation with a discussion of supporting roles of park-above-parking projects such as contributions to economic returns and how planners can facilitate socio-economic encounters and vibrancy. This chapter discusses the overall findings and provides a range of recommendations, from land use policy to design. However, one project does not solve all problems. Planners must see downtown redevelopment as a whole package and at the same time, recognize the key role of park-above-parking projects.

CHAPTER II
LITERATURE REVIEW

Introduction

Parks and parking are crucial to downtown development. Previous studies have demonstrated that parks bring valuable environmental, social and economic benefits. At the same time, sufficient parking spaces help to accommodate various events downtown. However, downtown parks and parking raise problems. Since the 1960s, many downtown parks lost their vitality due to downtown decentralization. These downtown parks have become a center for criminal activities such as drug dealing, shootings and persistent vandalism. Due to the difficulty of establishing the dollar value of parks, some downtown merchants and shopkeepers believe downtown parks are as waste of lands that could be put to more profitable use, such as parking facilities. Parking facilities, including surface parking lots, street parking, and stand-alone parking garages, have received many critiques from urban designers. Criticism especially focuses on surface parking because it brings little money and few activities. Beginning in the 1940s, a few communities started to add parking garages under parks to address a number of key problems. By combining parks and parking into one space, park-above-parking projects provide more green spaces and convenient parking spaces to surrounding businesses. While park-above-parking projects have been in practice for several decades, the volume of scholarly literature devoted to this topic has been surprisingly thin.

In this chapter, the literature review begins with the definition of downtown and downtown vitality, followed by discussion on downtown parks and parking. The literature review departs from history, and moves on to design significance, social struggles, and ends in economic impacts. The measurements of economic impacts are also examined. Similarly a literature review of downtown parking begins with history, and is followed by a discussion on the function and roles of downtown development. Based on issues raised from the literature review of downtown parks and parking, the review narrowed to park-above-parking projects. In park-above-parking projects, the

review focuses on history, roles, and methods of measuring the design quality and economic impacts.

Methods

Downtown parks have been discussed often in articles and books in the field of environmental design related studies while the arguments of downtown parking usually appear in urban design and economics researches. The majority of discussion on downtown parks and parking can be identified in peer-reviewed articles and published books. However, existing literature on park-above-parking projects is limited because they have not been systematically studied. Some park-above-parking projects have been discussed as downtown parks or parking structures separately in literature while the majority of information for park-above-parking projects can be found in non-academic resources[1]. In order to conduct a comprehensive literature review on downtown parks, downtown parking, and park-above-parking projects, both peer-reviewed articles and books and non-peer reviewed resources are included in this chapter.

First, a few key words[2] were searched in four major databases in the field of history, planning, architecture and landscape using the Avery Index to Architectural Periodicals, ArchiveGrid, Sanborn Maps, and Web of Science, which were selected according to their data credibility in the field. The results provided a list of articles[3] on related topics. Second, identify the arguments of downtown parks, parking, and park-above-parking projects in prominent publications which refer to books that have had profound influences in the field.[4] Third, beyond identified articles and books, a search of key words was also conducted through public search engines: Google search and Bing

[1] Non-academic resources often appear as articles in newspapers, government reports and documents. Due to the limited peer-reviewed articles on park-above-parking projects, these non-peer-reviewed articles provide valuable information.

[2] For general search terms including downtown development, urban parks, downtown parking were used in each database. Specific search terms were tailored to each database.

[3] Some books are also included in the results but the majority of references are articles.

[4] For example, many studies have discussed the design quality of downtown parks. In this research, the criteria of design quality of park-above-parking projects are adopted from books which have deep influences in park design, including *Oscar Newman's Defensible Space*, William Whyte's *the Social Life of Small Urban Spaces*, and Clare Cooper Marcus and Carolyn Francis' *People Places: Design Guidelines for Urban Open Space.*

search. The results from this search provided specific examples on downtown parks, parking and park-above-parking projects from public perspectives that might be missing from the previous search. For each identified park, parking facility or park-above-parking project, additional information was collected from the database of LexisNexis Academic[5], which led to multiple sources such as government records and local media. Finally the author scanned the results from previous searches to determine each case's relevance and significance to the current study. The final search results provided an index of each topic.

Downtown

Downtowns serve as the social, cultural, and economical center of cities and this has been widely discussed in urban development literature. Downtown was "the most powerful and widely recognized symbol of the American industrial metropolis," a "metaphor for the metropolis itself" (Fogelson, 2001, p.121). It is a place that is considered the heart of the city with a sense of bustle: compact and concentrated (Warner, 1972). It contains a wide range of activities that brings people to the center on various occasions (Whyte, 1988).

Being a widely used and recognized symbol, the term "downtown" was first used in New York in reference to the cardinal direction: south in the 1830s. When people said, "We are going to a bus stop downtown," that sentence referred to a specific geographic location (Loukaitou-Sideris, 1998). In urban planning, downtown refers to the center of the city where the population density, building density, and property values are usually higher than the rest of the city (Fogelson, 2001). Downtown is also a word that the government uses often. Local governments use the term, "downtown" to refer to a city core that attracts developers, businesses and visitors (Liston, 1968; Paumier, 1988; Urban Land Institute. & Basile, 1980; Whyte, 1988). For many cities, downtown is the place where urban development began.

Downtowns typically have no formal boundaries, it is a difficult entity to define (Ford, 2003). There are no precise lines showing where downtown starts and where it ends (Fogelson, 2001). The lack of definitive boundaries can become apartment when one collects maps of various downtown associations: rarely do they overlap. Many

[5] The reason of choosing LexisNexis Academic is that LexisNexis links to premium legal, news, and business sources date back to the 19th century.

downtowns may be defined by geographical boundaries, usually a river, a lake or highways (Frieden, 1989; Loukaitou-Sideris, 1989, 1998). It is possible that the downtown maps provided by a Downtown Neighborhood Association and those provided by other resources are different from each other.

Even though there are few clear boundaries of downtowns, they are usually easy to locate (Ford, 2003). It is the place that many local residents call downtown (Fogelson, 2001; Whyte, 1988). Downtown bears a strong public identity, positive or negative, among local residents it is the place where the most important buildings of the city are found including city halls, theatres, banks, post offices, courthouses, hotels, and libraries (Isenberg, 2004; Liston, 1968). It is the location of the Amtrak Station, Greyhound station, and the Regional Bus Station (Fogelson, 2001; Vesperi, 1985). In major cities, it is also the site of Macy's, Marshall Field's and other large department stores. The above mentioned downtown characteristics such as public identity, social and business centers, can be commonly found in cities of all sizes, encompassing areas as large as many districts and as small as a small town's main street.

Downtown Vitality

Vitality has often been employed in a wide range of contexts. Examples include cultural, economic and urban vitality. Cultural vitality refers to "evidence of creating, disseminating, validating, and supporting arts and culture as a dimension of everyday life in communities" (Tepper, 2008). Economic vitality covers a variety of economic activities that bring economic growth to the local community (Chen, 2010). Urban vitality focuses on the quality of everyday life based on good urban space which refers to "a balance of a reasonably ordered legible city form, and places of many and varied coming and goings, meetings and transactions" (Montgomery, 1998, p. 98). Kevin Lynch also suggests that an urban sense of place should be built on a certain form that accommodates activities and improves imageability (Lynch, 1960). In this research, downtown vitality is adopted from the concept of urban vitality and blended with the concept of cultural vitality and economic vitality. It is defined as a balanced downtown form that aims at improving cultural identity, encouraging social interaction, and

supporting economic growth.

A balanced downtown form refers to a variety of places that accommodate civic activities in medium-high density areas. Ford (2003) discusses the spatial organization of traditional downtown functions such as offices, retailing, hotels and convention centers in the form that attract many users. Robertson (1999) points out, "the healthiest downtowns contain a wide range of activities that serve to bring different types of people downtown for different reasons at varied times of the day and week" (P.14). These activities seek to bring people to the downtown from the rest of the city. Freden and Sagalyn's Downtown, Inc. (1989) also discusses how major downtown projects such as Boston's Fanueil Hall, Seattle's Pike Place Market, and San Diego's Horton Plaza have changed downtown forms. He explains that these places accommodate a variety of activities in the hope of attracting large numbers of visitors.

A balanced downtown form should include a core district, such as the Central Business District (CBD). Whyte (1988) indicates that many successful downtowns have cores of no more than four square blocks. Within this area, people can easily access everything; shops, services and entertainment facilities. Donald Shoup, an advocate of CBD development, argues downtown vitality is contingent with the capacity of combing large amounts of capital and labor within limited amounts of land (Shoup, 2005). He explains that a prime advantage of a CBD is it offers proximity to many social, cultural, and economic activities. A successful downtown would balance a variety of land uses including the clustering of museums, theaters, restaurants, stores, and offices. These uses can be found in many areas of the city but in downtown they are all mixed-in and are represented by a large number of each use.

Beyond the clustering of functions, parks and parking are two key elements contributing to downtown vitality (Fogelson, 2001). Parks and parking are discussed in every downtown master plan, but what are their roles in downtown development? How should decision makers and designers consolidate parks and parking in order to improve downtown vitality?

Downtown Parks

When people think of downtown parks, many visualize a park that is located in downtown surrounded by public buildings including a city hall, museum, theater, public library, church and post office (Crankshaw, 2009). These downtown parks usually can be found in most early American cities and the are open to the public- everyone is welcome, rich or poor (Jackson, 1984). Many downtown parks are located in the geographical center of downtowns, but not always (Cranz, 1982). Together with parks in central locations, parks located in the rest-areas of downtowns play a fundamental role in downtown vitality.

The History of Downtown Parks

American downtown parks have a rich history. Many downtown parks were established prior to downtown development. In downtown Jacksonville, Florida Hemming Park (1.54 acres) was the first city park (Crooks, 1986). In downtown Vancouver, Washington, Esther Short Park (5-acre) is the oldest town square in the Pacific Northwest (Gillem & Ren, 2010). In downtown St. Petersburg Williams Park Florida, a one-block open space founded in 1888, was also the first city park. The major reason that these parks could be built in downtowns was inexpensive land acquisition. Czerniak (2007) writes, “It was easy and relatively inexpensive to acquire (park) land in the early stages of America’s urbanization” (p.224). In 1861, Hemming Park was deeded to the city from the Hart family for $10 (Warner, 1966). In 1853, Esther Short Park was dedicated to the City of Vancouver (Hewitt, 1998). At the time these parks were established, adjacent areas were not developed yet. Central Park in New York City was established before the surrounding areas were developed. A key factor in choosing this site was its relatively low price (Olmsted, 1971).

These parks became centers of downtowns when surrounding urban development took place. The 16-acre New Haven Green was located in downtown New Haven, Connecticut in 1638. Since then, municipal, commercial and university structures have been constructed, encompassing the park (Meinig, 1979). Around Hemming Park, urban development was initiated quickly after park establishment. In 1869, the grand St. James

Hotel was built across the street. In 1870, Windsor Hotel was built on the other side of the park (Ward 2006). The opening of Esther Short Park in 1855 was followed by residential and commercial development in the surrounding areas (Smith, 2009). Rittenhouse Square is one of the four original squares planned by William Penn and Thomas Holme in the late seventeenth-century. Rittenhouse Square has helped promote development of the surrounding area since the early nineteenth century (Jacobs, 1961). In 1811, the first townhouse, Harper's House, was built on the north frontage. In the following years, the neighborhood grew steadily with hotels, luxury apartments, stores and popular restaurants (Warner, 1968). Unlike Rittenhouse Square, many downtown parks lost their vitality to downtown decentralization and have been through social struggles since 1960s.

The Social Struggle of Downtown Parks

In addition to regular park uses such as recreational uses and passive uses, downtown parks serve as the center for public gathering, as well as social and cultural events. However, decentralized downtowns limited the uses of downtown parks. With the development of suburbs, much of the employment and associated facilities has moved to the suburbs. In 1970, only 25 percent of offices square footage was located in suburbs; by the 1990s, the number increased to 60 percent (Squires, 2002). The loss of job opportunities and unstable incomes left the lower-class downtown. When social isolation became the norm in downtowns, downtown parks turned out to be places for drug dealing, shooting and vandalism (Fussell, 1992). Jane Jacobs (1961) argued, "unpopular parks are troubling not only because of the waste and missed opportunities they imply, but also because of their frequent negative effects" (p.95). While Rittenhouse Square has been popular since it was established, the other three squares have had troubles. For example, Washington Square, in downtown Philadelphia (built at the same time as Rittenhouse Square) lost its users to single land use around: there were only office buildings in the area since the 1930s (Jacobs, 1961). Washington Square lacked the essential diversity that Rittenhouse Square offered— apartments, restaurants and services surrounding it. Only office workers used the park on a regular basis (Warner, 1968). Under this context, safety became a major concerns and urbanists turned against

downtown parks. Jane Jacobs is a well-known advocate of neighborhood parks. However, she was against adding more parks downtown based on her findings in major cities such as Philadelphia, New York, and Boston. She pointed out there were several little-used, unloved spaces called parks in the downtowns of several major cities. She asked, "More open spaces for what? For mugging?"(Jacobs, 1961). The fear of potential illegal activities limited other civic groups' access to the park and prevented people from using the park. The "undesirables", as Whyte (1980) discussed, became the dominant user groups in many downtown parks. Only one significant group of users spent time in Washington Park in downtown Cincinnati Ohio since 1970s: the homeless (Cincinnati Parks Website).

In contrast to unpopular downtown parks, some downtown parks provided stages for various political activities from civic rights protests to presidential debates. They are places where "democracy meant conformity and a means to create a unified nation" (Ward Thompson, 1998, p.4). On August 27, 1960 in Hemming Park, downtown Jacksonville, Florida, sit-in protesters were attacked by over 200 people with baseball bats and ax handles, which is known as "Ax Handle Saturday" (Ware, 1977). On October 18, 1960 presidential candidates John F. Kennedy and Richard Nixon both gave speeches in Hemming Park (Cranz, 1982). In 1964, Richard Nixon delivered a speech in Williams Park, downtown St. Petersburg, Florida (Sunquist, 2008).

Downtown parks have experienced social struggles since the 1960s. Many of them were misused and abandoned by the public. However, some of them have survived and served as political centers. In response to social issues associated with downtown parks, city officials began to renovation as a tool to reclaim the public use of downtown parks.

The Design and Renovation of Downtown Parks

The original intent of downtown parks was generally to provide an open space for early urban settlements. This can be traced to Vitruvius's principles of town planning-- a rectangular plaza as the focal point of the urban settlement (Loukaitou-Sideris, 1998). In American downtown park design, a variety of amenities such as bandstands, fountains, and gardens were informed by European parks. The basic layout of a downtown park usually is a square or rectangle enclosed by public buildings. It includes a central

fountain or statue that indicates the history of the town, and pathways from the center to the four edges. Gardens, lawns or clusters of trees filled in the rest space (Warner, 1968; Heckscher & Robinson, 1977). These park amenities attracted many users: farmers, housewives, poor seamstress and journeymen along with the rich and powerful, drawing them downtown (Jackson, 1984). The original park design encouraged “social freedom, and an easy and agreeable intercourse of all classes” (Olmsted, 1971, p.23). As historian Stephen Duncan Walker wrote, “(the central park was) a commonwealth, a kind of democracy, where the poor, the rich, the mechanic, the merchant and the man of letters, mingle on a footing of perfect equality” (cited in Schuyler, 1986a, p.32).

Many parks were well-used over man years but slowly lost their vitality due to poor maintenance and downtown neighborhood deterioration. The City of Detroit proposed a sale of small parks, including many located downtown due to significant budget cuts on park maintenance and declining neighborhoods (Saulny, 2007). Fountain Square in downtown Cincinnati, Ohio, Bryant Park in midtown Manhattan, New York City, and Esther Short Park in downtown Vancouver, Washington faced the similar issues such as overgrown vegetation, large clustered trees blocking the visual connections, and park facilities were old dysfunctional. They were considered a dangerous place with few visitors and even fewer sponsored activities (Heckscher & Robinson, 1977; Gillem & Ren, 2010; Tate 2001).

Moreover, there might be contexts in which parks exert a negative image on the neighborhoods. This point was made by the Deputy Director of the Parks Council, a nonprofit advocacy organization in New York City who observed: "we have many poor neighborhoods in the South Bronx near parks. But the parks are not helping them. If you put money into a park, chances are that you will improve one portion of the neighborhood. But if the park does not have proper security and maintenance, it becomes a liability for nearby homes" (Tibbets, 1998, p. 9).

Renovations have become the priority for many downtown parks. Tate (2001) indicates that the refurbishment of Bryant Park in New York (1988-1992) symbolized the revitalization of midtown Manhattan in the 1990s. By both restoring landscape features and adding new entrances, sealed gravel walks, lighting and seating, the 9.6 acre park was transformed from a territory of drug dealers into the most user-friendly public open

space in midtown Manhattan. In Esther Short Park, the park and the peripheries were included in park renovation. The renovation also added a total of 82 on-street parking spaces around the park to support ground-floor retail uses planned for adjacent mixed-use buildings (Gillem & Ren, 2010).

Park use has significantly increased after renovation. The new carrying capacity of renovated Bryant Park increased to 5,000 visitors at lunch time every business day, compared to the records of the 1970s, which showed an average figure of 1,000 per business day (Tate, 2001). In the first nine months of 2004, the newly renovated Esther Short Park in downtown Vancouver, WA, accommodated 65 events including a Hawaiian Festival, concerts, plays, and other activities (Nelson, 2004). Beyond the advantages of central location, small downtown parks have become popular downtown destinations for people who work or live nearby. As Kaplan (1981) illustrates, "a number of small parks dotted the downtown area and they provide trees, flowers, benches, and sculptures - great for having lunch with a friend, reading a book, or relaxing" (p.5).

The original design of downtown parks provided a few simple features that attracted a variety of users. Renovation has been demonstrated as the key to regain the social vitality when the original design failed due to poor maintenance and downtown decline. More recently, there has been an emerging view that downtown parks play an essential role in supporting downtown revitalization by providing a variety of economic benefits.

The Economic Impact of Downtown Parks

Downtown parks provide valuable green space for to people in high density urban cores. They accommodate various events including celebrations as well as protests, which represent the essence of urban life (Francis, 2003; Harnik, 2010; Heckscher & Robinson, 1977). However, downtown business communities have done little to encourage new downtown parks due to land acquisition costs, perceived low economic returns, and safety concerns. Heckscher and Robinson (1977) argued, merchants and shopkeepers were often against downtown parks because they saw downtown parks as a waste of land that could be put to more profitable use. It is crucial to understand the economic benefits of downtown parks in order to maintain them downtown. The more

that the economic contribution of downtown parks can be measured, the more likely it is that parks can stay downtown.

The growing literature which focuses on the relationship between urban parks and economic development provides a valuable context and methodological reference for downtown park studies. The proximate principle is the fundamental theory in assessing the economic impact of urban parks. The test of the proximate principle can be traced back to Central Park in New York City. Central Park was considered the prominent example of a park generating positive economic impacts on adjacent property values. Since then, the proximate principle has been tested at all scales from large parks to neighborhood parks. However, few tests have been applied to downtown parks. The majority of literature on the economic benefits of downtown parks focuses on the parks' revenue itself. Downtown parks' economic impacts are rarely mentioned and lack substantial analysis. In order to measure the economic benefits of urban parks, three economic models have been widely used but none of them have been applied to downtown park-above-parking projects.

The Proximate Principle

Crompton (1999, 2001a, b) investigates the economic performance of a variety of parks such as attracting businesses, tourists, retirees and increasing employees, etc. He discusses a theory called the proximate principle through an in-depth review of previous empirical studies. The proximate principle refers to a theory that many people would like to pay a larger amount of money for a home close to parks and open space than a comparable home further away. The proximate principle indicates that additional revenues would be raised from property taxes of these close-to-park homes. This has been considered as one significant economic contribution of urban parks. He reveals that approximately 30 studies are supportive of the proximate principle while only five studies are not (Crompton 2001). Atypical results from these five studies may result from methodological deficiencies. In addition, Crompton's review of 30 studies concludes that property values of homes abutting or fronting a passive park area are usually 20 percent higher than those homes further away and 10 percentages two or three blocks away (Crompton 2001). Beyond a distance of 1,200 to 1,500 feet, parks have little economic

impact on property values (Boyle & Kiel, 2001; Crompton, 2001; Tse, 2002).
Home values are often used as the indicator of proximate principle. It can be traced back to Central Park in New York City (Fitzgerald, 2008; Germic, 2001; Olmsted, 1971, 1973, 1983; Rosenzweig, 1992). Olmsted provided empirical verification of the relationship between parks and adjacent property values (see Table 2.1.). In 1856, the assessed value of the property tax base of the three wards located near the park was approximate 26 million. In 1873, the assessed value had increased to $236 million.

The relationship between urban parks and economic development is complicated. In spite of Olmsted and the New York Parks Commission's claim regarding the high increase in the property values in three wards adjacent to the park, the park's economic influence might be exaggerated. The increase of property values may have been caused by natural population growth in these areas because during the same time period, the average property values in other parts of the city doubled (Germic, 2001). If this average rate of increase had been also applied to adjacent area of Central Park, their property values would have been approximately $53 million without the park; nevertheless they were $236 million with Central Park. The difference of $183 million shows the complex influences of the park as well as other factors such as schools and distance to the city. It is noteworthy that Central Park is not the unique reason for the increases in the adjacent property values; however, the park's influence is significant and remains considerable even after 200 years.

Assessed value in 1873	$236,081,515.00
Assessed value in 1856	$26,429,556.00
Showing an increased valuation of	$209,651,950.00
The total expenditure for construction from May 1st 1857 to January 1st, 1874, is	$8,873,671.50
The cost of land of the Park to the city is	$5,028,844.10
The cost of the Park to the city is	$13,902,515.06
The rate of tax for the year 1873 is 250, yielding on the increase of valuation as above stated, increase of tax amounting to $5,241,298.75	
Total increase of tax in three wards	$5,241,298.75
The annual interested on the cost of land and improvement of the Park, up to this time, at six percent	$834,150.94
Deduct one percent, on $399,300 of stock, issued at five percent	$3,933.00
Excess of increase of tax, in three wards, over interest on cost of land and improvements	$4,411,140.81

Table 2.1. The economic impact analysis of Central Park by Frederick Law Olmsted.
Source: Fox, T (1990); Crompton, J (2001)

Whether or not Central Park was a downtown park at its inceptions is disputed by scholars (Cranz, 1982; Cranz & Boland, 2004). Originally, the land chosen for Central Park was remote relative to New York's urban settlement (Taylor, 1999). After the park was established, the surrounding area began to be developed in the next decades. The Central Park model: using a park as the leading project for neighborhood development had a fundamental influence on later downtown park growth.

The first county park system in the U.S. was the Essex County Park in New Jersey, which was established in 1895. In 1915, the Park Commission hired a consultant to assess the impact on land values of four Newark parks--Eastside, Westside, Weequahic, and Branch Brook (Weir, 1928, see Table.2.2). This study shows that the adjacent property owners around these four parks paid increased taxes that were sufficient to pay all debts and maintenance costs over a 12 year period (Crompton 2001; Weir, 1928).

Park	Property Adjacent to Parks	Rest of Same Taxing District	Adjacent Taxing Districts
East Side	9 times	2.25 times	2.25 times
Westside	15 times	3 times	3 times
Weequahic	14 times	7 times	3 times
Branch Brook	5 times	2.5 times	3.7 times

Table 2.2. The economic impact of four Newark parks
Source: Fox, T (1990); Crompton, J (2001)

In 1971, one study reported on the impact of 15 parkland acquisitions made in Pennsylvania by the U.S. Army Corps of Engineers and Pennsylvania State Parks (Epp, 1971). Fifteen parks were grouped in two categories: area A where each park generated direct impacts on adjacent property values; and area B where the aggregate property values were not subject to the park's immediate influence. Data were drawn from the assessment which covers an 11-year period, starting five years before park land acquisition. The assumption is that "the control sites, comprised of the rest of the county, gave a good approximation of the land values that would have prevailed if the park sites had not been acquired" (p.4). Results show that at 80 percent of park sites, the total value of each township's taxable real estate was higher the year after parkland acquisition began. At the other three sites, the total value was higher in the second, fourth and fifth years. It indicated the parkland acquisition did not affect the tax rolls because the value remaining on the tax rolls was more than the cost of the parkland acquisition.

In 1974, another similar case in Philadelphia analyzed the impact on sales price of 336 properties in the vicinity of Pennypack Park (Hammer, Coughlin & Horn, 1974). The 1,294 acre stream-valley park is located in north-east Philadelphia and was surrounded by residential areas developed with a density of ten dwelling units per acre. The results also show the park had significant economic impacts on adjacent property values.

Impact Area

In order to estimate the economic impact of park-above-parking projects, it is necessary to understand the impact area of park-above-parking projects. Two definitions of parks' impact areas exist. One definition refers to the proximity around a park in which people can comfortably walk to access facilities (Groth et al., 2008; Bedimo-Rung et al.,

2005). In this study, the subject facilities include both the park above and the underground parking garage. A “comfortable” walking distance has been widely accepted as a distance of roughly 5 minutes walking. Applying this definition of 5 minutes walking distance to a downtown, translates into an approximately three block walk from a park-above-parking project in all directions because most cities blocks are 200 to 300 feet on a side.

Another approach to the same idea is derived from the proximate principle (Crompton 2001). A variety of studies have tested this principle that a park has little economic impact on the value of adjacent properties beyond a distance of 1,200 to 1,500 feet (Bairoch, 1991; Crompton, 2001; Dunse & Jones, 1998).This is roughly equivalent to three downtown blocks in most cities, which will be the distance adopted as the impact area in this study of park-above-parking projects. It should be noted that the size of three blocks varies from city to city. If there are major traffic barriers to pedestrians within the park impact area, such as railroads or highways, the part between the major traffic barriers and the outer boundary should be excluded.

Measuring the Economic Contributions of Parks

Since the 1930s, regression analysis has been used in economic studies of urban parks. Three models have been widely used, though none of them have been applied to downtown parks. Understanding these models, including their advantages and limitations, provides a methodological context for how to develop a different method appropriate for this research.

Model I: Travel Cost Model

A Travel Cost model is aimed at measuring the on-site benefits that are produced directly by using the park for recreational purposes. The activities include both active uses such as participation in active sports, and passive uses, such as resting or doing nothing. All kinds of activities benefit the economic value of the park. The basic form of the model is to ask users, or directly measure, how far they traveled to the park (Dwyer et al., 1977).

This model is arguably based on an assumption that all users have the same

economic value for a purpose of measurement so the consumer surplus value of the estimate is equal to the cost of travel (More et al., 1988). The user who traveled the greatest distance to visit the park is the marginal user. Beyond this greatest distance, people do not normally use the park because the costs exceed the benefits. Within this distance, the closer to the park that people live, the more "consumer surplus" is produced; because the benefits are the same, but the travel costs are lower (Henderson et al., 1999). The accumulation of all users' consumer surpluses represents the total economic value of the park (Lockwood et al., 1995).

The Travel Cost model, with a variety of modifications, has been applied widely to examine the economic value of urban parks (Groth et al., 2008; Siderelis et al., 2000). This model is adequate for parks where users travel longer distances to visit, such as trails, community parks, and regional parks that are located on the edge of the city or further. This model is not appropriate for neighborhood parks because there are predominantly very small differences in users' travel routes; thus the variation in travel costs is typically small.

Model II: Contingent Valuation Model

A Contingent Valuation model is also widely applied to assess consumer surplus. The consumer surplus can be understood as the difference between what the park users would be willing to pay and what they pay now. The basic form of this model is asking users what they would like to pay under a wide array of contingencies. As mentioned earlier, the total economic value of the park is equal to the accumulation of all users' consumer surpluses. The concern of this model is its validity, because users may not recall or state what they paid in each contingency correctly. Plus, the attitudes that users express may not be in compliance with their behavior (More et al., 1988). Thus this model is often applied with Model III, the Hedonic Model, which will be discussed in the following section. The most recent study revealed that per-household consumer surplus increases by $160 associated with a 20% increase of the average size of parks from the current level (Poudyal et al., 2009). Neither a travel model nor a contingent valuation model assesses the parks' impact on the economic value of the surroundings.

Model III: Hedonic Model

To estimate the complete economic value of parks, the Hedonic Model has been adopted in many studies. Economists use Hedonic Models to estimate the value of non-market items through the prices of associated or analogous goods and services that can be transacted in the market (More et al., 1988). One approach to apply this model to parks involves examining the property values that are adjacent to the park (Hendon, 1967). A park improves the neighborhood ambiance and vitality, which can be reflected in the prices of surrounding real estate. This model provided the theoretical foundation for the previous mentioned proximate principle. This model has been widely used in recent decades (Dupuis, 1999; Floyd et al., 2008; Kemperman et al., 2000; Nicholls et al., 2005; Sibthorp et al. 2004; Tyrväinen et al. 2007; Weicher et al., 1973). The majority of studies still focus either on the proximate principle or measuring other economic benefits in surrounding neighborhoods. Brander and Koetse (2011) reviewed 52 hedonic pricing studies that address valuation of open spaces (primary in urban parks). The dependent variable is defined as the change in house price for a 10 m decrease in distance to open space in 2003 US$ (p.2771). The results show home values increase rapidly as homes get closer to open space (Brander & Koetse, 2011).

The Hedonic Model is the only model that is able to measure both on-site values and off-site values of parks (More et al., 1988). This model is based on actual property value data. It can often be more reliable than a Contingent Valuation model, which is based on public surveys (Dupuis, 1999). This model is most applicable for neighborhood parks where the park surroundings are mostly residential properties. However, in previous studies this model only looked at house values related to measurements within certain distances. These studies did not capture information about other types of property, such as commercial uses, offices, services, parking and so on. Measuring other value effects requires full sets of property-value data that may not be available.

In general, all three models are not readily applicable for park-above-parking projects. In Model 1: the Travel Cost Model, downtown parks are in the city core and the majority of users are usually from adjacent neighborhoods. Thus, there are very small differences in users' travel distances. As for Model II: the Contingent Valuation Model,

this method only measures the park revenue itself rather than the park impact on adjacent neighborhoods. Model III: the Hedonic Model, when only based on adjacent residential data, cannot assess the park's diverse economic development impact on downtown areas. Furthermore, no systematic data gathering process is in place to help measure park-above-parking project benefits using these methods. As a result, cities lack hard evidence to show how their economic development efforts are making a difference due to the success of park-above-parking projects. It is therefore necessary to evaluate the economic impact of park-above-parking projects by adopting and modifying the Hedonic Model.

Index Method

Three evaluation models of economic impacts of parks have been introduced in the previous literature review. None of these models can be directly applied to this research due to deficiencies in methods, however, they provide a methodological context for this research. This research adopted the Index Method that was developed based on Hedonic Model. The Index Method uses a variety of real measurements to approximate a quantitative measurement of conceptual object such as air or water pollution. The Index method has been commonly used in environmental research, and has recently been introduced to the design fields. Similar to the Hedonic Model, the Index Method also follows the proximate principle, which measures the distance effect on property values. The Hedonic Model is only based on adjacent residential data, the Index Method allows employing various data to measure the quality or effect of the object. For example, Natalie Ellis (2012) developed an environment preference index to measure the quality of office settings through the following measurements: employee physical comfort, perception of control, flexible/adaptable furniture components, impact of noise, and levels of privacy.

This research adopted the index method to measure the direct economic impact of park-above-parking projects. As noted earlier, park-above-parking projects have externality spin-off benefits that are non-market items and their comparative magnitude of value can be estimated by their impact on surrounding property values. This has been discussed earlier as the proximate principle. The relationship between park-above-parking projects and their potential direct economic impact on surrounding land uses are

complex— park-above-parking projects are not the only contributors to the change of surrounding property values, but they might be considered as major contributors. Under such circumstances, the Index Method is the most efficient way to estimate the direct economic impact of park-above-parking projects. The index is structured by a variety of indicators, such as property values and the leasing rate of certain uses within the impact area.

As discussed above, the proximate principle has been tested through a variety of urban parks at all scales. Home values have been adopted as the indicator. The studies' results show that parks can generate positive impact of up to20 percent on property values on the immediate periphery of the park. Unlike quantitative economic studies on urban parks, discussions of economic benefits on downtown parks are more often rooted in qualitative studies.

Economic Benefits of Downtown Parks

In the most recent two decades, downtown parks have been considered again as economic engines for downtown economic development. Fox (1990) argues "increasing the value of a new real estate project by including open space isn't limited to residential development. Many times open spaces have been used to brighten the image and boost the marketing of corporate real estate in cities" (27). The early example he employs is Rockefeller Center, established in 1931. He reveals that a central open space and four roof gardens enhance the desirability of Rockefeller Center, which results in attracting tourists and businesses.

Fage (2001) shows a new model of downtown park development based on Centennial Olympic Park in downtown Atlanta, Georgia. The new model helps to answer the question on land acquisition process of downtown parks. Fage reveals that contemporary downtown parks require fewer investments from the government. The State of Georgia began with establishing a state agency, the Georgia World Congress Center Authority (GWCC). The GWCC was authorized to initiate the downtown park project (50). The expenditure of land acquisition for Centennial Olympic Park was raised by the GWCC while using no public money. This is substantial evidence showing that the government can help initiate a downtown park project by political encouragement:

establishing an agency which is responsible for the downtown park project from fundraising to management.

Harnik (1997) examines the economic performance of Post Office Square in Boston MA. He points out that the park/garage model brought a variety of economic benefits to the city. First, the city received $1 million for its ownership interest in the site (Harnik, 1997). Second, it required no public money for the maintenance and operation of the park or the garage. The annual $225,000 operating cost for the park is paid by the profits from the garage. Moreover, net cash around $500,000 after debt service goes to the city for maintenance of neighborhood parks.

Lassar (1997) discusses the fact that Downtown Park in Bellevue Washington spurs additional park development. He notes that people in the local community strongly believed that development of the park would have positive economic impacts on residential development in the adjacent area (76). One property owner said that the presence of the park was instrumental in his decision to purchase the land. McKee at Parkside, the condo complex, located directly across from Downtown Park and around the corner from Main Street in Old Bellevue, is proud of its proximity to the park (Garvin, 1997).

Martin (2006) discusses Lake Shore East Park, a six-acre park opened in downtown Chicago in summer 2005. The park was the centerpiece of Lakeshore East, which is the largest urban high-rise residential development in the country. The park played an essential role in attracting neighbors to return to the downtown. By June 2006, 55 percent of all of those who had purchased a condo were from Chicago's suburbs. Urban parks provide both direct and indirect economic values (Fage, 2001; harnik, 1997; Lassar, 1997; Martin, 2006). The fact that urban parks have positive economic impacts on adjacent poverty values has been measured under the proximate principal and by three models. Since the 1990s, downtown parks have been re-considered as economic engines for downtown economic development. Recent economic research projects have also employed qualitative narratives of relevant policy-making and design process. The research presents deeper understanding of downtown parks and their economic values.

Downtown Parking

Parking is a key spatial element in downtown form due to the rapid development of the automobile. “No place to park” became a popular topic of discussion among city planners and the general public in the 1950s. Downtown business owners anticipated that more parking would bring more businesses (Eno Foundation for Transportation. & Weant, 1978; Fogelson, 2001; Ford, 2003; National Trust for Historic Preservation in the United States. & Collins, 1991; Redstone, 1976; Robertson, 1994). Under such pressure, city planners began to consider converting any possible leftover land into parking. William Phelps Eno, the planner who set America’s first parking codes, suggested taking down trees for parking (McDonald, 2007; Robertson, 1994). Andrew Mellon, secretary of the treasury, told Colliers magazine, “It would be great if we could move the Washington Monument for more parking lots” (Witheford, 1972). In 1954, the city of Savannah tore down its historic market building in Ellis Square to build a multi-story parking garage (City of Savannah and Cooper Carry, n.d.). These early discussions and actions related to automobile parking had a profound influence on downtown form in the following decades. Surface parking lots and parking garages now consume a large portion of valuable land downtown and affect downtown vitality (McDonald, 2007a).

Off-Street Parking and Traffic Congestion

Off-street parking is one primary reason for traffic congestion downtown. Off-street parking includes surface-parking lots, multi-story, stand-along parking garages and attached underground parking garages. Shoup (2005) discusses the relationship between off-street parking requirements and traffic congestion through a comparable case study of downtown Los Angeles and downtown San Francisco. The zoning of Los Angeles encourages car-oriented development because the city’s off-street parking policy, which requires one car parking space per person while San Francisco has no such minimum requirement. With this requirement, higher density simply brings more cars and more congestion, (more air pollution) thus prevents people from going to downtown.
In contrast to requiring off-street parking, downtown San Francisco limits it. Shoup (2005) explains it through the parking requirement of a downtown concert hall. The minimum parking spaces required for Disney Hall in downtown Los Angeles is 50 times

higher than it would if the same building had been built in San Francisco. As a result, concertgoers are encouraged to drive to Disney Hall and back home but never spend any time in downtown Los Angeles. In San Francisco, people may drive to the concert hall, but they have to park a few blocks away. So they stop by restaurants, bars, or bookstores on their way to and from the performance. People in downtown San Francisco are involved in downtown life much more than people in Los Angeles, even if they go downtown for the same purpose (Shoup, 2005). As Shoup argues, "Higher density leads to a higher quality of life only in cities that restrict rather than require off-street parking" (159).

Parking and Function Disconnections

Surface parking often leads to disconnection of downtown functions. Urbanists argue that parking alone does not attract people downtown. Jacobs (1962) wrote, "the more downtown is broken up and interspersed, with parking lots and garages, the duller and deader it becomes in appearance… The only reason people come downtown or set up business downtown at all is because downtown packs so much into such a compact area" (19) . Whyte (1972) explains, "The worst discontinuity is parking" (314). Parking means no people, no activity and no function. He notes, "The daytime storage of vehicles is not a highest and best use but it is treated as if it were" (314). He also demonstrates how downtown parking lots are great separators through an example of City Hall Plaza in Dallas.

> "In Dallas, one of the reasons City Hall Plaza is underused, people will tell you, is how far away it is from downtown. But it isn't; it is in fact quite close – only three blocks from Main Street. But it seems much farther. There is a sharp break in continuity as high rise abruptly gives way to low rise and to those great separators, parking lots. Until there is substantial infill the plaza will continue to feel too far away" (313).

Surface parking lots and stand-alone parking garages bring little aesthetic value to downtowns. They are widely considered to be eyesores (Eno Foundation for Transportation. & Weant, 1978; Ford, 2003; van Ommeren, Wentink, & Dekkers, 2011; Witheford, 1972). Shoup (2005) also argues that parking lots are asphalt holes in downtown. He cites, "They (parking lots) make driving easier, but walking more difficult

and less rewarding" (162). McDonald (2007) provides a fresh look at innovative parking garages. She argues that some modern parking garages could contribute to city aesthetics through various forms. However, these parking garages either cost more in construction or the techniques have not yet matured to apply for mass construction.

Parking is also financially damaging to the surrounding area. Shoup (2005) explains that, cars constantly entering and exiting parking facilities often impede pedestrian circulation. Parking consumes large portions downtown land, which reduces downtown densities and produces less revenue than most alternate uses, such as offices and residential uses. Usually little aesthetic value lies in parking, especially in surface parking.

Voith, (1998) points out the conflict between high density and cheap parking in the Central Business District (CBD):

> "This density gives CBDs a unique market niche that is difficult to replicate in other parts of the metropolitan area. Abundant, inexpensive parking would make the CBD more attractive if it had no other consequences; however, plentiful, low-cost parking may be at odds with the very aspect that makes a downtown area unique – high density" (159).

To provide sufficient parking as a supporting role in downtown vitality, some parking alternatives have been proposed over years. Shoup (2005) suggests that cities should limit rather than require parking spaces and limit the construction of stand-alone parking garages. Whyte (1988) demonstrates that one alternative too downtown surface parking is underground parking to allow more attractive uses on the street level. He discusses the site selection for Seattle's convention center as an example. One site was located in the center of downtown; the other was on the edge of downtown. At a public meeting, the site selection committee chose the center location according to seventeen convention center experts' opinions. The parking requirements were fulfilled through an underground parking garage with plenty of room on the ground level for public transportation.

Downtown parks and parking are both beneficial to downtown vitality. However, they are often discussed separately. The design significance, social outcomes and economic impacts of parks have been well demonstrated. Meanwhile, the roles of parking in downtown development have been widely discussed. However, when park and parking

spaces are combined, they are still being discussed in different categories. For a few park-above-parking projects, including Union Square in San Francisco, Fountain Square in Cincinnati, and Pershing Square in Los Angeles, they are studied either as parks in open space related research or listed as garages in parking reports. The benefits of creating park-above-parking projects downtown have not yet been clearly identified. Their roles in downtown development as an integrated space remain unknown. In the following section, the history of park-above-parking projects is briefly introduced. The design challenge, social uses, and economic significance are also discussed.

History of Downtown Park-above-Parking Projects

Proposals to add underground parking garages to existing parks were envisioned as early as 1913 for Grant Park in Chicago and University Park in Indianapolis (McDonald, 2007; Osmundson, 1999). In 1926, Philadelphia built the Garden Court Garage, an underground parking structure topped by a garden. During the late 1920s, underground parking garages were being constructed under office and other building types (Robertson, 1994). However, park-above-parking projects did not become a common building type until Union Square in the 1940s. In 1942, a 1,700-car underground parking garage was installed under Union Square in San Francisco (Berglund, 2007). It was the first park-above-parking project in the nation. Inspired by Union Square, an 1,800-car garage beneath Pershing Square in Los Angeles opened to the public in 1952; Mellon Square was the first new park-above-parking project. It was built in downtown Pittsburgh in 1953; a 1,100-car garage was added to Travis Park in San Antonio Texas in 1954; underground parking was added to Portsmouth Square in San Francisco in 1963; a self-park 236-car parking garage was added to Market Square in Alexandria, Virginia in 1967; and O'Bryant Square, Portland, OR was dedicated to the city with 90 underground parking spaces in 1971 (Fisher, 1996; Harnik, 1997, 2000a, 2010).

More recently, many communities have used park-above-parking projects as a solution to meet downtown parking shortages and preserve existing parks above or to create new parks. Memorial Plaza in Cleveland, Ohio was redeveloped with a 900-car parking garage underneath in 1991. After the addition of its newest garage, which can

accommodate 2,126 parking spaces, the system of four parking garages located underneath Millennium Park in Chicago, IL, became the largest underground parking system in the US (Harnik, 1997, 2000, 2010). A stand-alone, multi-story parking garage was replaced by park-above-parking projects in Boston Post Office Square in 1993 and in Ellis Square in Savannah, Georgia in 2009; that same year, a surface parking lot was also replaced by park-above-parking project in Director Park, Portland, Oregon. There are also several park-above-parking projects currently being completed such as Columbus Commons in Columbus, Ohio and Washington Park in Cincinnati, Ohio.

The Design of Park-Above-Parking Projects

The design of park-above-parking projects shows little difference from the other types of urban parks in literature. Among all the park-above-parking projects in the US, Union Square, the first park-above-parking project has been studied extensively. Marcus & Francis (1990) evaluated the design of Union Square from the users' perceptive. They discovered varied activities occurring in the square reflect the differences of user's ages and spaces. Their findings consist of a list the successful features and unsuccessful features of Union Square.

The design of Mellon Square was a result of in-depth site analysis. Mellon Square in Pittsburgh, PA was conceived by R. K. Mellon after visiting Union Square in San Francisco in the 1950s (Heckscher & Robinson, 1977). It was the first brand new park-above-parking project in the US. During the design stage, Simonds and Simonds landscape architects conducted a thorough site analysis of its topographical features, open space and structural framework, pedestrian generation factors and resources, and projected traffic volumes, (Osmundson, 1999). This analysis was the key element to the success of Mellon Square.

The 1992 renovation of Pershing Square is recognized as the most arguable redesign of park-above-parking projects. It was designed by architect Ricardo Legorreta and landscape architect Laurie Olin and has received many architectural awards. The square features a landmark 10-story purple bell tower, a walkway resembling an earthquake fault, a concert stage and a seasonal ice rink. At its dedication, then-Mayor

Richard Riordan praised the park as "a breath of fresh air, a vision of hope" (Rasmussen, 2007). However, the renovation was also criticized. “Its chief fault, for me,” Thomas S. Hines, Professor of History and Architecture, Emeritus, UCLA told the reporter of the Bunker Hill Magazine, “is that it includes too much ‘architecture’, especially the tower which overwhelms the small site. I wish [Legorreta] had reserved more space for trees, plantings, and seating.” (Goss, P.1)

While the park design ignored the underground parking garage, engineers focused on how to construct the garage and carry the weight of the park above. To preserve the integrity of the structure of Union Square, the garage walls expanded from a thickness of 14 inches to a thickness of 16 inches at the foundation. The columns on the lowest floors were 30 inches in diameter while the upper ones were 22 inches in diameter. For the ground park, a 12-inch thick slab was covered with two or more feet of topsoil (McDonald, 2007; Osmundson, 1999).

The Social Use of Park-above-Parking Projects

Similar to downtown parks, park-above-parking projects also have experienced social struggles. While Union Square in downtown San Francisco has been well-used by a variety of users, Pershing Square in downtown Los Angeles has received many critiques on its social isolation (Herzog, 2006; Loukaitou-Sideris & Banerjee, 1998; Marcus & Francis, 1998). Loukaitou-Sideris (1998) argues,

> “the irony of reinventing Pershing Square is that while the park has been rebuilt according to Legoretta’s postmodern “Latinismo” design, and the denizens have been shooed away under careful surveillance of the Los Angeles police, the plaza, although colorful—in fact, somewhat phantasmagoric—is basically a brooding and empty space. There are occasional noon concerts organized by agencies responsible for the reinvented square, but they lack the spontaneity, verve, and bustle of the multiethnic crowd of the Broadway corridor. ” (p.158)

One reason why park-above-parking projects were established was to encourage people to come back downtown and spend time there. Norman B. Leventhal Park at Boston’s Post Office Square was transformed from a multi-story garage to a park-above-parking project (Harnik, 1997). Similar to Norman B. Leventhal Park, Ellis Square in downtown Savannah, Georgia replaced an old stand-alone parking garage with a park-

above-parking project. As mentioned earlier, downtown business owners were often against downtown parks. At Savannah, during the 1950s, they consistently sent city the message that they wanted more parking lots to attract more clients and customers who always complained of not enough parking spaces downtown. As a result, in 1954 the city signed a fifty-year lease with the Savannah Merchants Cooperative Parking Association to allow the association building a multi-story parking garage on Ellis Square (Mobley 1). This transformation angered many citizens. On Oct. 31, 1953, the day before demolishing of the market building, a Beaux Arts Ball was held in the market as a farewell to the Old Market. More than 700 People dressed in various costume, such as fertilizer sacks, carrots, celery and lettuce that referenced the market they tried to save (Mobley 1). Shortly thereafter the parking garage opened. The memory of Ellis Square as market was gone. “We feel it is like the end of an era,” people told reporter Chuck Mobley, “the Old Market has been replaced by a parking garage” (Mobley 1).

The restoration of Ellis Square aimed to attract people to the square. During the dedication ceremony (March 11, 2010), Ed and Billie Hale, a couple that attended the 1953 Beaux Arts Ball, revisited Ellis Square. They told journalist Chuck Mobley “it was a terrible sad thing and citizens of Savannah thought my lord how can they tear down the market. But today we have it back” (Mobley 1).

The design and use of park-above-parking projects has been discussed usually in park design related literature. However, one important user group: the parking users are often ignored in studies. In addition, the design and usage of the underground parking garage remains unclear. In order to evaluate park-above-parking projects, it is crucial to establish design criteria.

Ranking Systems of Design Criteria

A reasonable rating system would help us better understand the role of design in the park-above-parking project’s economic impact. There are two major ranking systems of design quality that have been discussed in the literature. One ranking system is defined as design-based ranking system. It examines the design quality through design characteristics that are based on the observations and experiences of researchers and designers. The other ranking system is defined as behavior-based ranking system. It is

developed through the correlations between built environment and physical activity which is usually based on aggregate data. Principles are adopted from each ranking system to establish this study's ranking system for park-above-parking projects.

Design-Based Ranking System

The majority of literature on how to evaluate urban public space and parks is based on pedestrian-oriented behaviors. Many design ranking systems are drawn from this. Successful urban public spaces can be found in association with a variety of such behaviors at large (Alexander, 1977; B. B. Brown, Werner, Amburgey, & Szalay, 2007; Freeman, 2003; A. Jacobs, 1993; Lang, 1974; Low, 1997; May, 1974; Porteous, 1977; Rapoport, 1982, 2008; Zeisel, 2006). Newman (1973) proposed the theory of defensible space. He explains how natural surveillance can be applied to improve the safety of urban residential neighborhoods. His research employs a variety of datasets including physical characteristics, police crime data, and tenant data. His findings have influenced the future design of residential neighborhoods. In the classic book, A Pattern Language, Alexander (1977) discusses several design principles for public spaces based on activities they accommodated.

While Alexander's study is more centered on his personal experience, Whyte (1980) moves forward to empirical research. He led a group studying how people use urban plazas. He found that successful plazas are "sociable places with more people in groups, more people meeting people, or exchanging goodbyes" (p.17). His methodology includes observations, image analysis, and camera recording. He developed design principles for small urban plazas such as sitting space, sun, wind, trees, water, food, the street connection, and the triangulationTo measure design quality, Whyte used a few indicators such as density of use, amount of sitting space, and the ratio of usage per section. Whyte's findings have been applied and tested through many projects and have been widely cited in studies since then. These principles have been well recognized as the foundation of urban plaza design. In Thomas More's book, Central Parks: a Behavioral Perspective (1980), a variety of behaviors and perceptions were found in two central parks: Boston Public Garden and Bushnell Park. Behaviors such as conversing, affection, eating, as well as problematic behaviors were found significantly correlated to physical

settings of the park including the presence of grass, pavement, and dirt. He applied multiple regression to examine the correlations between specific physical sector attributes and major behavior categories.

While Newman and Whyte conducted their case studies in New York City in the 1960 and1980s, many designers and researchers have evaluated the design quality of urban open space nationwide since the 1990s. Marcus and Francis (1998) provide design guidelines for urban open space. They include urban plazas in the first chapter and created a design review checklist for urban plazas. 118 questions are listed in the checklist based on a few case studies nationwide. Many of these questions are drawn from Newman and Whyte's studies. Union Square in San Francisco, the first park-above-parking project in the nation was one of their case studies. But they ignore the design and usage of underground parking garages. Furthermore, many of these questions are not useful for measuring the design quality of park-above-parking projects.

Designers or researchers with design backgrounds often discuss design quality based on a designer's intuition, observations, and personal experiences. These discussions rarely appear as a rigorous ranking system; instead they rely heavily on narrative descriptions. Many of these ranking systems are vague and subjective. However, they are generally accepted by the majority of designers.

Behavior-Based Ranking System

Behavior-based ranking systems are developed by evaluating design and physical activity (Addy et al., 2004; Atkinson et al., 2005; Ball, et al., 2001; Blanchard et al., 2005; Chad et al., 2005; Deshpande et al., 2005; Duncan et al., 2004; Fisher et al., 2004; Foster et al., 2004; Giles-Corti et al., 2005; Gordon-Larsen et al., 2000; King et al., 2005; Plaut, 2005; Zlot et al., 2005). A wide range of indicators including accessibility, availability, and number of facilities and so on are drawn from aggregate data. These studies also create ranking systems for urban parks.

These rigorous ranking systems are valuable for health-related or social research. Also, their indicators are easily measurable. However, these ranking systems are problematic to some extent. Most of the authors do not have a park design or recreation management background. Instead, their backgrounds were more likely planning or

health-related. Hence some indicators, i.e. the ratio of park area per neighborhood, and the tally of convenience which they choose cannot directly be applied to assess the design quality of individual urban open space. Furthermore, they often employ statistical models such as OLS Regression, Models for Categorical Dependent Measurement, Event History Analysis, Multilevel Models and Factor Model, which are difficult to understand for many designers. Their findings are not easy to translate to a design language.

Combined Ranking System

The ranking system for measuring design quality can be individualistic and arbitrary. In this research, the ranking system is rooted in both design-based and behavior-based ranking system. Larry Ford (2003) created a ranking system for 16 American downtowns in this way (Ford, 2003). He developed his downtown ranking system with objective data, such as amount office space, number of hotel rooms, and cultural venues offered, and subjective experience of observing the city and walking in these downtowns. Additionally, he developed 10 downtown measurements: physical site, street morphology, civic space, office/skyline, retail-anchors, hotels/convention facilities, major attractions, historic districts, activity and variety, and transit options. Every downtown receives ten individual “grades” and an overall composite score (1-10).

Design Quality Measurement

In this research, ten measurements are drawn from the design-based ranking system. Operational measurements are developed from both the design and behavior-based ranking systems:

1. Sitting Space
2. Sun Access/Shade
3. Water
4. Food
5. Street Connection
6. Elevation
7. Below Parking Access
8. Triangulation

9. Natural Surveillance
10. Adjacent Supporting Uses

Rating scale

The rating scale focuses on measuring the level of design quality. There are several scales available, i.e. the Likert scale, a five-point "strongly agree/like- strongly disagree/dislike" scale, that have often been used in coding perceptional data (Alfonzo, 2005; Brown, 2008; Field, 2000; Laven et al., 2005; Payne et al., 2002; Stemerding et al., 1999). In this research, the three-point scale is adopted to distinguish designs of park-above-parking projects into three categories: low quality (score = -1), medium quality (score= 0) and high quality (score=1). These three categories generalize design quality to some extent but do not eliminate the individuality of each park-above-parking project.

1. Sitting Space

The amount of sittable space is crucial to the success of public open spaces downtown. Whyte (1980) demonstrates that the most popular plazas tend to have more sitting space than the less well-used ones. He also suggests that sitting should be physically and socially comfortable, i.e. benches with backrests placed in the front, in back, to the side in the sun or shade, in groups and alone. Whyte's studies recommend that sitting space a 6-10% of total open space, which follows their observations in the best-used plazas in New York City. He concludes that amount of sitting space should be one linear foot of sitting space for every thirty square feet of plaza (p.39).

Marcus and Francis (1998) suggest that the amount of seating should either follow Whyte's one linear foot of sitting space for every thirty square feet of plaza or one linear foot of seating for each linear foot of plaza perimeter, a policy t that has adopted by the San Francisco Downtown Plan guideline. Results of approximately 15 studies on the relationships of park features and physical activities suggest many sitting options should be provided such as benches, chairs, steps, edges, ledges, and sitting walls (Whyte, 1980). However, the amount of sittable space is difficult to identify because people can sit almost everywhere if they need to. For example, paved pathways can be used as sitting spaces when there is a concert or it is a busy lunch time. In addition, as previous studies

argue, the diversity of sitting options is also a key to the success of urban parks. In this research, sitting space is counted as regular sitting space, paved pathways are not included in sitting space but soft paved areas such as grassy areas or open lawns are included. The author adopts two measurements in determining the quality of sitting spaces: the amount of and the options of sitting space. The sitting space in high quality park-above-parking projects is the amount of sitting space greater than 1 foot of perimeter of the park and has at least five sitting options. Low quality is when the amount of sitting space is less than 1 foot of perimeter of the park and has less than two sitting options. The medium quality falls in between.

2. Sun Access and Shade

Weather plays a fundamental role in the design of park-above-parking projects. A growing literature has explained the necessity of sun access as well as shade in public open space. Whyte (1980) argues that the value of sun and shade are difficult to measure directly; it is more perceived as a pleasurable experience. Several public health-related studies have revealed that too much or too little sun access and shade could have a negative impact on people's health in the long term (Brot et al., 2001; D. B. Buller, Buller, Beach, & Ertl, 1996; M. K. Buller, Loescher, & Buller, 1994; Poskitt, Cole, & Lawson, 1979). For much of the year, people seek a sunny or shaded spot depending on the local weather. According to previous studies, sunny or shaded areas between 11:30 am and 2:30 pm should receive the most attention. In this research, the author defines high quality sun/shade access as the 30-50% of the area in the sun or shade at noon. The design quality of sun/shade would fall in the low quality category if there was too little or too much sunlight or shade. The line of too little is drawn at less than 20% and too much is greater than 80%. Medium quality is defined as sun/shade area of 20-30% or 50-80% of the park area.

3. Water

Water is an element that has been used in many parks, plazas and squares. All sorts of water features have been provided such as fountains, pools, waterfalls and water

walls that range from small to large (Whyte, 1980). In earlier designs, water features tended to serve as focal points or landmarks with signs of “no touching” (Tate, 2001). In more contemporary designs, water features are more accessible and interactive. Whyte (1980) argues that one of the best things about water is “the look and feel of it” (47). The sound of it is another great aspect about water. The water wall is mentioned often when people explain why they find Paley Park, the most well-known downtown pocket-park, so quiet and restful: the sound of the water wall covers the noise of street traffic. Water features also serve as focal points.

In this research, water in high quality park-above-parking projects that have one or more than one big and playable water feature(s). The low quality is no water feature. Medium quality of water is a small water feature only for watching.

4. Food

Food is a fundamental reason why people come to open spaces. Whyte (1980) says, if you want to seed a place with activity, put out food. He also explains, vendors have a “good nose” for spaces that work. If business chooses one spot, a cluster of vendors would soon be around. In addition, food attracts people who attract more people. Whyte and his research group did an experiment in a newly built plaza. There was no food cart in the plaza first. A moderate number of people used it. An immediate success occurred when a food cart was brought to the plaza according to Whyte’s suggestion. More people came. Later a pushcart vendor set up in the plaza and then another. Business continued to grow while more people came. In this research, high quality park-above-parking project have multiple food carts and/or permanent food facilities are open for regular hours (Alexander, 1977). Low quality projects have no food facility or a food facility is not included in the design or allowed to operate in the park. Medium quality projects have part time food carts or permanent food facilities open for limited hours.

5. Street Connection

A core value of parks is openness (Cranz, 1982; Francis, 2003; Tate, 2001). Its periphery must be open to allow for pedestrian access. Many downtown parks lost vitality

because of a disconnection with the street. There are a few elements that separate the park from streets. One is the elevation change if the park is sunken or above street level; this will be discussed in the next design criteria. The other element is either structures or landscaping; the park is then separated by walls, facilities, or trees and bushes. However, the operational definition of high quality street connection is not fully covered in the literature. By reviewing studies that include street connection literature, there is a sign of high quality street connection if pedestrian access is equal to or above 60% of the perimeter (Metha, 2007;Thompson et al., 2008; Zacharias et al., 2004). Low quality is pedestrian access is less than 20% of the perimeter. The medium quality is pedestrian access to 20-60% of the perimeter.

6. Elevation

Level change often results in visual, functional and psychological consequences. Some modest but observable changes in level have more aesthetic value than completely flat topography for most observers. An upper level, for example, can serve as a temporary stage and a large plaza is usually subdivided into more human-scale open space through changes in level. Due to the parking garage underneath, none of the park-above-parking projects could be sunken. The majority of park-above-parking projects are elevated. In this research, the author defines a high quality elevation change as greater than 50% of the area raised within three feet above street level. This standard is drawn from previous literature (see Jacobs, 1993; Marcus & Francis, 1998) on personal experience, and objective measurements. Low quality is when the park sunken or 50% more of the area is above 3 feet. Medium quality is when 50% more of the area is at street level.

7. Below Parking Access

Fitting parking under the park is challenging. It requires careful selection of park features due to their weight on the structure below and the level of the water table. As more and more modern technologies are introduced to underground parking design, more options for park features are available because more weight can be carried by the top

deck of the garage (McDonald, 2007). However, the design of underground parking garages may interfere with park use (Francis, 2003; Garvin, 1997; Marcus & Francis, 1998; McDonald, 2007). Ramps to the garage can be visual and physical barriers that interrupt pedestrian movement around the square. Another criticism is that the garage administration often takes up too much space in the park (Harnik, 1997). Beyond these critiques, little evidence shows how to measure the interruption. According to the literature and subjective experiences, the author defines a high quality relationship between the park and parking when all ramps do not interfere in park use or pedestrian movement on sidewalks. Low quality is when parking interferes with park use or pedestrian movement on sidewalks while medium quality is one ramp to parking interferes with park use or pedestrian movement on sidewalks.

8. Triangulation

Triangulation is a process that encourages people to communicate in public places (Whyte, 1980). In a park, the process can be initiated by commenting on a physical object or sight line, i.e. a sculpture that draws people's attention (Marcus & Francis, 1998). People would stop to look at it and potentially talk to the people around it, even if they are strangers. Performances are another example that often draw people together. Many parks provide stages, amphitheaters, and platforms for this purpose. Whyte (1980) argues that the real show is usually the audience: they look at each other as much as what is on the stage. None of literature clearly describes how much triangulation is too much. Whyte (1980) indicates,

> "People have a nice sense of the number that is right from a place, and it is they who determine how many is too many. They do not, furthermore, seek to get away from it all. If they did, they would go to the lonely empty places where there are few people" (p.100).

Marcus & Francis (1998) recommend that the park design should include public art that speaks to a large proportion of the public. However, Alexander (1977) suggests at least a major focal point and a few sub-focal points should be included in park design. Considering the comfortable dimensions of a plaza/park, Lynch (1960) recommends 80 to 350 foot, and Gehl (2010) 250-350 foot as the maximum distance for seeing events. In

this research, taking into account both Lynch and Gehl's suggestions and applying to compact downtown, the author uses 100 foot as a radius for a comfortable area that people can see events. The size of the comfortable area from triangulation is approximately 2 focal points per acre. The author defines a high quality triangulation is greater than 2 focal points per acre. Focal points can be sculptures, water features, bell towers or stages/amphitheaters that prompt communication among people. These focal points can be permanent, temporary or seasonal. Low quality triangulation is no focal point or no park features that draw a crowd and medium quality is less than 2 focal points per acre.

9. Natural Surveillance

Safety is essential to any kind of public open space. Research shows most crime in public occurs in visually deprived semi-public spaces (Newman, 1972; Marcus & Francis 1998). Natural surveillance, defined as being under observation by others, has a significant effect in securing public spaces for appropriate and legal activities (Newman, 1972; Heckscher, 1977; Cranz, 1982). Marcus & Francis (1998) suggest visual and functional transition between the plaza and adjacent buildings. Applying this concept to park-above-parking projects evaluation refers to multiple visual connections between subspaces in the park. Visual connections between subspaces within the park have been proven to improve the perceived safety in the park (Newman 1972). In this research, the author defines high quality when there are visual connections between every subspace. Low quality is no or less than 50% of visual connections between subspaces while medium quality is visual connections between 50% of subspaces.

10. Adjacent Supporting Uses

Supporting uses include offices, retail-anchors, hotels, housing, theater and auditoriums, convention centers and sport centers, which provide either visual or functional connection with park-above-parking projects. Several studies show the correlation between park use and commercial activities is significantly high especially for

the peripheral ground floor (Feehan, 2006; Fogelson, 2001; Ford, 2003). Marcus & Francis (1998) suggest adjacent ground-level building uses should incorporate retail stores and cafes rather than offices or blanks walls. In addition, if a park-above-parking project is separated by busy traffic barriers, such as freeway or major roads, its connection to adjacent supporting uses would be limited to some extent. According to the design principles found in the literature, a high quality of adjacent supporting uses should have more than half of its perimeter with over five supporting uses, especially on the ground level. Furthermore, no more than two sides of a park-above-parking project should be surrounded by arterial barriers. Low quality is when less than one side of the perimeter has retail uses or high traffic arterials on all sides while medium quality is when 1-2 sides of the perimeter have retail uses or with arterial barriers on 1-2 side.

The Economic Contribution

Park-above-parking projects have generated positive economic impacts on adjacent buildings. Research shows that Mellon Square indirectly added $20 million to the city's coffers because of the higher assessments on the new surrounding developments. The project itself generated $2.3 million less in taxes than the buildings it replaced (Osmundson, 1999).

Few studies have discussed the economic performance of park-above-parking projects until Peter Harnik's article: *the Park at Boston's Post Office Square* (Harnik, 1997). Harnik introduces the transformation of Norman B. Leventhal Park at Boston's Post Office Square: a multi-story garage has been replaced with a park on the ground and a garage underneath. The park-above-parking project brought several economic benefits. First, the city received $1 million for its ownership interest in the site (Harnik, 1997). Second, it required no public money for the maintenance and operation of the park or the garage. The annual $225,000 operating costs for the park was paid by the profits of garage (Fox, 1990). Third, the annual property tax of $1 million was also paid by the profits of the garage (Harnik, 1997; Projects for Public Spaces, 2003). Fourth, all net cash after debt went to the city for maintenance of neighborhood parks. And fifth, the municipal ownership of the park and the garage will revert to the city when the debt and

equity are paid in 35 years (Fox, 1990).

Parking in Boston is so profitable that the park management agency — Friends of Post Office Square can afford the construction cost of the underground parking garage through the parking revenue. Parking fees in downtown range from $5 for less than 30 minutes to $34 for over two and half hours (Friends of Post Office Square, 2010). The cost of the underground parking garage was approximately $34,000 per space — more than three times as expensive as developing a surface parking lot aboveground. With 1,400 spaces, the garage covers 30% of the parking market of downtown Boston and it generates an average of $8 million per year. Despite these signs of success, Harnik's study was limited to the economic performance of the underground parking itself. The economic impacts of Norman B. Leventhal Park on adjacent neighborhoods remain unknown.

Conclusion

The roles of park and parking in downtown development have been well-demonstrated in literature. However, they fall into unrelated categories: the design, social use, and economic benefits have been primarily discussed in park design related studies while demands and problems of downtown parking often appear in the field of parking management and economics. At the beginning of this chapter, issues centered on downtown parks and downtown parks are reviewed. However, the separated discussion on parks and parking has resulted in a poor understanding of park-above-parking projects. Under what political-economic arrangements, social-cultural conditions and design strategies can downtown park-above-parking projects contribute to the vitality of their impact areas and the city?

This chapter introduced a brief history of park-above-parking projects. The design quality and economic benefits were examined in literature which provided a theoretical foundation for later research. In addition, three models of measuring economic impacts analyzed, which provided a methodological context for how develop a set of methods for this research. Park-above-parking projects have been built nationwide. However, they are rarely discussed in the literature. To better understand their functions and roles in downtown development, it is crucial to conduct research relying on the first hand

investigation. In the following chapters, the methods of this research, design quality and economic contributions of park-above-parking will be examined.

CHAPTER III

METHODOLOGY

Introduction

As discussed in the literature review, studies on park-above-parking projects are limited. For example, homes have been adopted as indicators of economic impacts of urban parks but this has not been applied to estimate any park-above-parking project's economic impact. In addition, the relationships between design quality and economic impacts have not been examined. These issues lead to the research question: under what political-economic arrangements, social-cultural conditions and design strategies can downtown park-above-parking projects contribute to the vitality of their impact areas and the city? This question can be further expanded to address the following sub-questions:

1) What is the social, cultural and economic context of park-above-parking projects downtown?

2) What is the design quality of park-above-parking and how can it be measured?

3) What are the economic impacts of park-above-parking and how can these impacts be measured?

4) How does design quality affect the economic impacts of park-above-parking?

This chapter focuses on methods that can be applied to both measure design quality and estimate the economic impacts of park-above-parking projects. A set of quantitative and qualitative evaluation methods were adopted and modified throughout this research. In Phase I, a national inventory of existing downtown park-above-parking projects was conducted. Phase II examined whether these existing park-above-parking projects were newly built or renovated. Phase III measured design quality of park-above-parking projects considered in Phase II. Phase IV assessed the economic impact of park-

above-parking projects selected in Phase III. Phase V categorized park-above-parking projects by their design quality and economic impacts identified in Phase IV. Finally, Phase VI investigated two case studies in order to illustrate the findings outlined in Phase V (see Fig.3.1). This research was enabled by a collection of information from archival research, data and statistics from city and county records, and case studies.

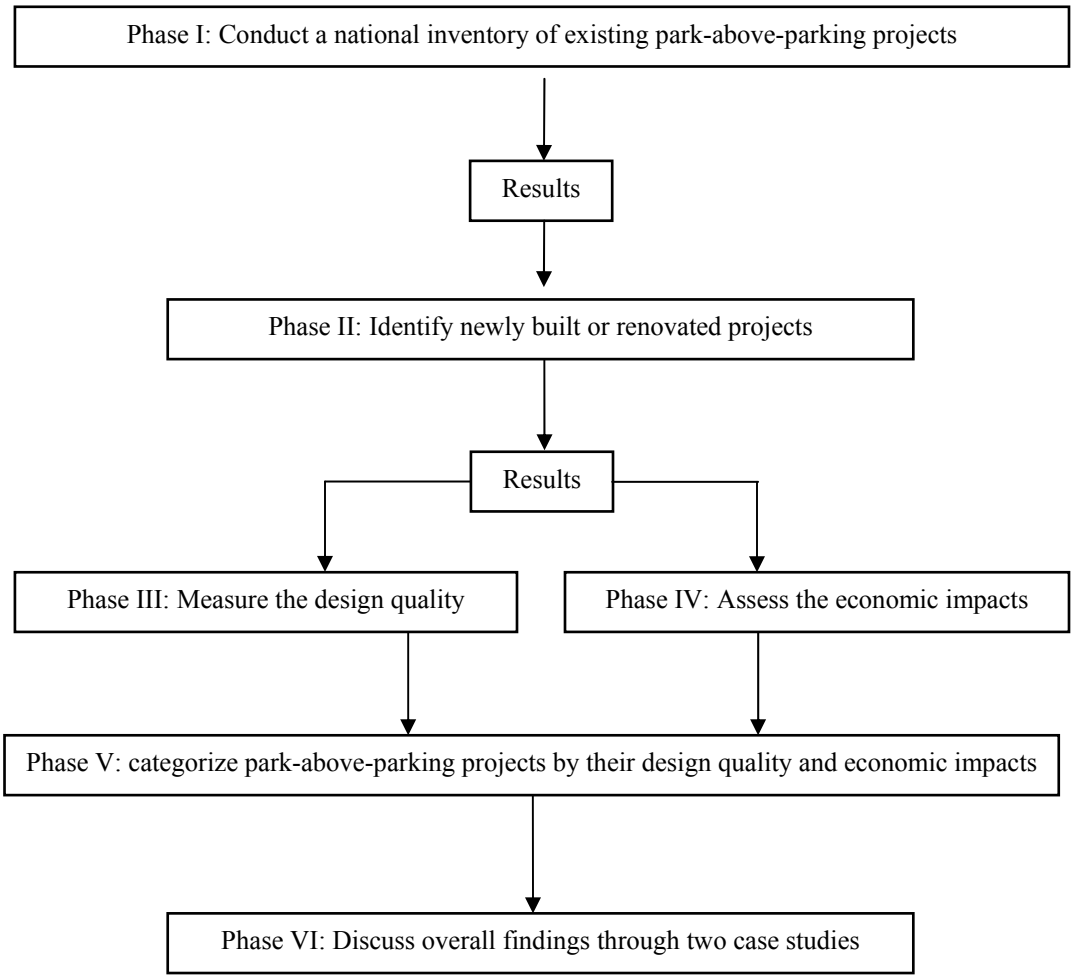


Figure 3.1. Process flowchart of the research

Phase I: A National Inventory

The goal of this phase was to create an inventory of existing downtown park-above-parking projects throughout the US. The national inventory provided a case study pool for later detailed investigations.

Park-above-parking projects are more often seen in large cities[1] than in small cities because downtowns in large cities usually require more parks and parking spaces. Downtown population density and downtown parking needs may significantly influence on park-above-parking projects (Birch, 2005; Ford, 2003; Moore, 2010).

Some medium and small sized cities with high downtown population density or high downtown parking demand also established park-above-parking projects. For example, the population of San Antonio, TX is nine times larger than the city of Savannah GA. However, the downtown population density of Savannah (5,967 people per square mile) is three times higher than San Antonio (1,873 people per square mile) (city-data.com). A new park-above-parking project, Ellis Square, known as an economic magnet of downtown redevelopment, opened in downtown Savannah in 2010, while the parking facility under Travis Park in downtown San Antonio no longer exists. Park-above-parking projects exist not only in large cities but also in medium or small cities depending on downtown population density and downtown parking demands.

This national inventory began with looking for park-above-parking projects in the 100 largest U.S. cities by population.[2] In response to the influence of downtown population density upon parking demand for park-above-parking projects, the list of the 100 largest cities was used as a base layer. The list was cross referenced with several studies, which helped identify smaller cities that have park-above-parking projects but might not appear on the list of the 100 largest cities (Garvin, 1997; Birch, 2005; Moore, 2010).

To identify park-above-parking projects in large and medium-size cities, I overlaid the downtown open space and parking map, Google Earth, Google map, and Bing map. A park-above-parking project was pre-identified when a green space and a parking facility icon were shown at or close to the same location in downtown. Then I searched the name of the park, parking facility or park-above-parking project found

[1] In this research, a large city refers to a city with a non-agricultural population of more than 500,000, a city with a non-agricultural population of between 200,000 and 500,000 is a medium city, and a city with less than 200,000 non-agricultural population is a small city (Birch, 2005; Davis, et al., 2003).

[2] It should be noted that different agencies or organizations provide different population rankings due to their own specific data collecting criteria and methods. However, the differences between different rankings are not significant. The current list of the 100 largest cities in the United States is generated from the 2010 Census data.

through the maps to verify its presence. The findings identified a total of 24 park-above-parking projects in 21 cities (see Table 3.1.). The list includes 19 park-above-parking projects in 17 large cities and 5 park-above-parking projects in medium-size cities (see Table 3.1.)[3]

City Rank by Population	City	State	Park-above-Parking Projects
2	Los Angeles	CA	Pershing Square
3	Chicago	IL	Millennium Park
4	Houston	TX	Discovery Green
11	Detroit	MI	Grand Circus Park Garage
12	San Francisco	CA	Portsmouth Square, Union Square
18	Charlotte	NC	The Green Uptown
20	Boston	MA	Norman B. Leventhal Park
21	Baltimore	ML	100 W Fayette St
25	Nashville-Davidson	TE	Public Square
26	Milwaukee	WI	Plaza East underground parking
30	Portland	OR	O'Byrant Square, Director Park
34	Albuquerque	NM	Civic Plaza
35	Kansas City	MO	Barney Ellis Plaza
43	Cleveland	OH	Memorial Plaza
57	Cincinnati	OH	Fountain Square, Washington Park
61	Pittsburgh	PA	Mellon Square
68	Newark	NJ	Milltary Park
99	Akron	OH	Cascade Plaza
110	Salt Lake City	UT	Main public library square
161	Savannah	GA	Ellis Square
165	Alexandria	VA	Market square

Table 3.1. Existing park-above-parking projects downtown

[3] The list may not include all existing park-above-parking projects. The ones identified contain a variety of characteristics that ensure the validity of subsequent analysis.

Phase II: Examine Newly Built or Renovated Cases

The status of each park-above-parking project can be found through the city's website, park department's website, or local media sources. Some park-above-parking projects have their own websites, which provide detailed information, such as Discovery Green Park in Houston. Seven park-above-parking projects were found to have received major renovations since 1989 and six are newly built since 1992. In this research, major renovations are defined as large scale renovations including new arrangement of park layout or parking structure updates. Previous studies have shown that newly built or renovated parks have stronger economic impact on surrounding areas (Beaven, 2009; Gillem & Ren, 2010; Harnik, 2000). According to this principle, park-above-parking projects with no major renovations but regular maintenance such as park facility or parking space repairing are excluded from this research. In total there are thirteen park-above-parking projects, which have been renovated or newly built (see Table 3.2.). All of the following analyses are based on these thirteen park-above-parking projects.

Park-above-Parking Projects	City	State	Established in	Underground parking garage added in or built in	Recent renovation finished in
Barney Allis Plaza	Kansas City	MO	1985	1985	2006
Civic Plaza	Albuquerque	NM	1972	1974	1999
Director Park	Portland	OR	2009	2009	
Discovery Green	Houston	TX	2008	2008	
Ellis Square	Savannah	GA	1733	2009	2009
Fountain Square	Cincinnati	OH	1871	1971	2005
Memorial Plaza	Cleveland	OH	1971	1971	1991
Millennium Park	Chicago	IL	2004	2004	
Norman B. Leventhal Park	Boston	MA	1992	1992	
Pershing Square	Los Angeles	CA	1850s	1952	1994
Portsmouth Square	San Francisco	CA	1847	1989	2001
Public Square	Nashville-Davidson	TE	2006	2006	
Union Square	San Francisco	CA	1850	1941	2002

Table 3.2. Newly built or renovated park-above-parking projects

Phase III: Measure the Design Quality

It is difficult to define design quality for the thirteen park-above-parking projects because each of them is unique. However, a reasonable rating system may help us better understand the role and impact of design in a park-above-parking project. Two major ranking systems of design quality: design-based and behavior-based ranking systems have been discussed in previous literature review. In this research, the ranking system is rooted in both design-based and behavior-based ranking system (see Ranking Systems of Design Criteria, Chapter II: Literature Review, p.35-37).

Rating Scale

In this research, the three-point scale is adopted to place designs of park-above-parking projects into three categories: low quality (score = -1), medium quality (score= 0) and high quality (score=1). These three categories generalize design quality to some extent but do not eliminate the individuality of each park-above-parking project.

Design Quality Measurements

As discussed previously, the following measurements of design criteria are:

1. Sitting Space
2. Sun Access/Shade
3. Water
4. Food
5. Elevation
6. Street Connection
7. Triangulation
8. Below Parking Access
9. Natural Surveillance
10. Adjacent Supporting Uses

Specific characteristics in each category have been discussed in the previous literature review .Ten measurements, the rating scale, and sources are list in the Table 3.3. Each variable was examined in the thirteen park-above-parking projects through site analyses and verified by archives, government documents, and newspapers.

Measurement	Score		
	-1	0	1
Sitting Space	the amount of sitting space ≤ 1:1 perimeter of the park and has ≤ 2 sitting options	either the amount of sitting space ≤ 1:1 perimeter of the park or provide 2-5 sitting options	the amount of sitting space ≥ 1:1 perimeter of the park and has > 5 sitting options
Sun Access/Shade	11:30 am - 2:30 pm: sunny area or shade ≥80% or ≤ 20% of the park area	11:30 am - 2:30 pm: sunny area or shade: 20-30% or 50-80% of the park area	11:30 am - 2:30 pm: sunny area or shade: 30-50% of the park area
Water	no water feature	small and only for watching	≥ 1 playable water feature and in scale to the site
Food	no food facility or food facility is not included in the design or allowed to operate in the park	part time food carts or permenant food facilities but open for limited hours	multiple food carts and permanent food facilities open for regular hours
Elevation	Sunken or ≥ 50% of the area is above 3 feet	≥ 50% of the area is at street level	≥ 50% of the area is above street level but <= 3 feet
Street Connection	pedestrian access ≤ 20% of the perimeter	pedestrian access 20-60% of the perimeter	pedestrian access ≥ 60% of the perimeter
Triangulation	no focal point or none park features that draw a crowd	<2 focal points/acre	≥ 2 focal points/acre
Below Parking Access	parking interfere swith park use or pedestrian movement on sidewalks	one ramp to parking interferes with park use or pedestrian movement on sidewalks	two or all ramps do not interfere with park use or pedestrian movement on sidewalks
Natural Surveillance	No or less than 50% of visual connections between subspaces	visual connections between 50% of subspaces	visual connections between every subspace
Adjacent Supporting Uses*	< 1 side of the perimeter has retail uses or high traffic arterials on all sides	1-2 sides of the perimeter has retail uses with arterial barriers on 1-2 side	≥ 3 sides of the perimeter has retail uses with arterial barriers on 1-2 side or no traffic barriers

Table 3.3 Measurements and rating scale of design quality

* supporting uses include offices, retail-anchors, hotels, housing, theaters and auditorium, convention center, and sport center, etc.

Categorization Based on Design Quality

Each park-above-parking project received a total score between -10 to 10 based on 10 measurements. A park-above-Parking project was placed in high design quality category when its final score was greater than five because its design was successful in more than half of ten measurements. Score 3-5 was defined as medium design category because its design was only successful in less than half of ten measurements. When a park-above-Parking project received a final score lower than three, it was placed in low medium category. According to their final scores, thirteen projects were placed in three categories: high, medium, and low design quality as follows:

High design quality: final score is equal or greater than five

Medium design quality: final score is greater than three and lower than five

Low design quality: final score is equal or lower than three

Phase IV: Assess the Economic Impact

In this phase, the impact area was defined. The Index Method was applied to estimate the economic impact of park-above-parking projects. The property value of each land use around the park-above-parking project was employed as indicators through comparing Impact Blocks and Control Blocks.

Impact Area

To determine whether or not the park serves as an economic engine for downtown development, observing a positive impact on the immediate periphery is not necessarily enough. It is necessary to examine the economic impact of the park in a larger area where the benefits may also be present. The literature suggests that the impact area for this type of park should include three downtown blocks in all directions. If major traffic barriers to pedestrian movement were found within the impact area, such as railroads or highways, the areas beyond the traffic barriers were excluded from analysis. In this study, the impact area contains three blocks: Impact Block I is the block on the immediate periphery of a park-above-parking project, Impact Block II is the second block further down of a park-above-parking project; and Impact Block III is the third block from a park-above-parking project to all directions. The block located out of the impact area is Control

Blocks (see Diagram 3.1.).

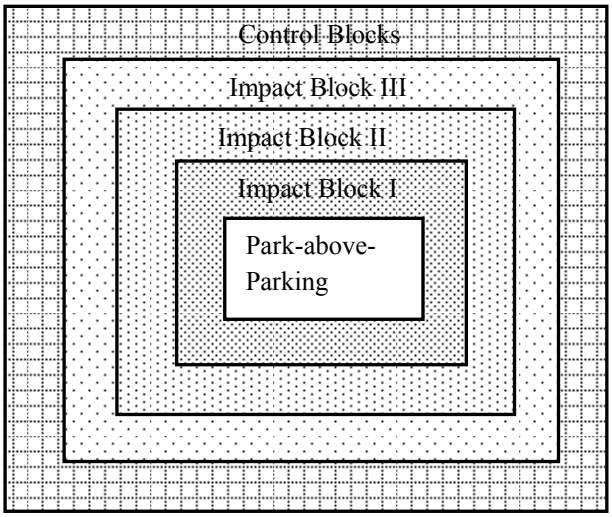


Diagram 3.1. The locations of Impact Blocks and Control Blocks

Index Method

Three evaluation models of parks' economic impacts have been introduced in the previous literature review. None of these models can be directly applied to this research due to their deficiencies, however, they provide a methodological context for this research (see Measuring the economic contributions of parks, Chapter II: Literature Review, p23-26). This research adopted the Index Method that was developed based on the Hedonic Model (see Model III: Hedonic Model, Chapter II: Literature Review, p25-26). The Index method uses a variety of real measurements to approximate a quantitative measurement of conceptual objects such as air or water pollution. The Index method has been commonly used in environmental research, and has recently been introduced to the design fields. Similar to the Hedonic Model, the Index Method also follows the proximate principle, which measures the distance effect on property values. The Hedonic Model that is based on adjacent residential data, but the index method allows employing various data to measure the quality or effect of the object. For example, Natalie Ellis (2012) developed an environmental preference index to measure the quality of office settings through the following measurements: employee physical comfort, perception of

control, flexible/adaptable furniture components, impact of noise, and levels of privacy.

This research adopted the index method to measure the direct economic impact of park-above-parking projects. As noted earlier, park-above-parking projects have externality spin-off benefits that are non-market items and their comparative magnitude of value can be estimated by their impact on surrounding property values. This has been discussed earlier as the proximate principle. The relationship between park-above-parking projects and their potential direct economic impact on surrounding land uses are complex— park-above-parking projects are not the only contributors to the change of surrounding property values, but they might be considered as major contributors. Under such circumstances, the index method is the most efficient way to estimate the direct economic impact of park-above-parking projects. The index was structured by a variety of indicators, such as property values and the leasing rate of certain uses within Impact Blocks I-III and Control Blocks.

Conceptual Model for Index Method Employed

According to the proximate principle, the economic impact of a park-above-parking project can be shown by the property values of same use, identical buildings within the Impact Blocks I-III and Control Blocks. The property values of these buildings can be comparable when the distance to a park-above-parking project is the only factor that affects the changes in property value. Multiple factors could affect property values in many ways. Location, infrastructure improvements, regional economic status, crime rate, and even local weather, etc., could affect property values to some extent. In order to apply indicators of property values along the distance to park-above-parking projects, other factors need to be controlled.

To control other factors, the first step is to identify identical buildings within Impact Blocks I-III and a Control Block. However, the chance is close to zero of finding buildings that are identical in their physical characteristics and the only difference is their locations. It might be possible in a suburb where all the houses are the same, but in downtowns, under different ownerships and complicated land use situations, it is nearly impossible to find identical buildings. However, in order apply the index method of estimation to the park-above-parking projects, the criteria of finding comparable

buildings would need to be adjusted from "exactly the same" to "similar". The Index method will be accomplished through the following steps.

1. Identify Comparable Properties

In order to control the similarity of properties in Impact Blocks and, Control Blocks, ten categories of land uses are defined: general commercial, office, residential use, parking facilities, public buildings, light industry, hotel/convention center, school, service and vacancy (see Table 3.4.).[4]

Land Use Categories	Descriptions
General Commercial	Restaurants, cafes, theater, retail, convenience, large grocery store, shopping mall
Office	Leasing Class A-C
Residential	Multifamily or Single Detached Family
Parking	Parking garages or structures, paved lot for adjoining building, unattached parking
Public Building	Owned or used by government or non-profit organizations
Light Industrial	Distribution warehouse, storage warehouse, light manufacturing building
Hotel/Convention Center	Hotel
	Convention Center
School	Churches, synagogues, temples, Sunday school buildings, vocational, commercial, trade and specialized schools

Table 3.4. Land use categories in Impact Blocks and Control Blocks

[4] These land use represent the majority land uses in downtowns (Ford, 2003; Gillem & Ren, 2010).

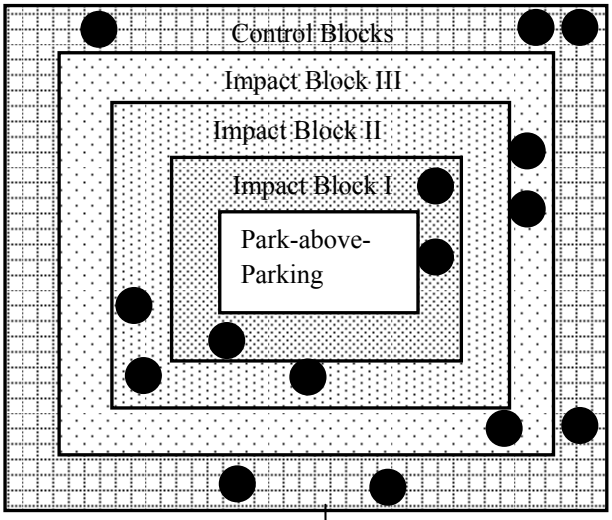
Within Impact Blocks and Control Blocks, in each land use, properties must share several key characteristics such as building use, age, height, and floor area to be considered as comparable properties. The more similar characters each group of properties shares, the more reliable comparisons across them will be. Then comparable buildings in each land use category within Impact Blocks and Control Blocks can be identified. As mentioned earlier, it is impossible to find buildings that are identical in their physical characteristics and the only difference is their locations to park-above-parking projects. So this study defines a range for each building characteristic. If the properties in each land use category fall in the same range, then they can be considered as comparable.

Three building ranges were identified in each land use category. These are (1) historical buildings that were built before World War II; (2) modern buildings that were built between World War II and the 1980s; and (3) contemporary buildings were built between the 1980s and 2011. Buildings in Impact Blocks and Control Blocks that fall in the same range are considered to be similar enough to be comparable. To locate comparable buildings, Google Maps, Google Earth, Bing Maps, and Zoning Maps of downtowns were examined. Diagram 3.2 shows an example of the process of how to identify comparable buildings in Impact Blocks and Control Blocks in General Commercial. In the bottom of Diagram 3.2, for example, buildings of modern, 3-9 stories, area footage≥1000 sf are identified in Impact Block I-III and the Control Blocks. These buildings are comparable buildings. The amount of comparable buildings must be greater than 10% of all the buildings in the General Commercial category.[5] For this study, this process is repeated until comparable buildings are identified in each land use category.

To be noted, the search was intended to be conducted through the property dataset (GIS) of each city. However, no current GIS dataset includes all above mentioned criteria, thus requiring that the search be conducted manually. Preliminary search results were verified through individual property reports available at the city or county assessor's office website.

[5] If more than one group of buildings has a sample size greater than 10%, this study chose the one with the highest percentage in sample size.

Identify buildings of General Commercial in Impact Blocks I-III and in Control Blocks



Examine the similarity of these buildings according to the following criteria

Building Age			**Stories**			**Area Footage (sqft)**		
Historical	Modern	Contemporary						
buildings were built before World War II	buildings were built between World War II and 1980s	buildings were built between 1980s and now	1-2 storey	multi-storey (3-9)	Tall buildings (≥ 10-storey)	< 5,000	5,000 -10, 00 0	≥ 10, 000

Note that other factors might have significant impacts on property values, exclude these properties from comparing.

Identify comparable buildings: buildings of modern, 3-9 stories, area footage≥1000 are identified in Impact Block I-III and Control Blocks.

Diagram 3.2. Sample process of identifying the comparable properties

2. Find Indicators

As discussed in the literature review, property value has been widely accepted as one of the indicators of measuring the direct economic impact of open space (Crompton, 2001; Francis, 2003; Garvin, 1997; Gastil, 2004). Increasingly, scholars alleges that parks significantly contribute to increases in surrounding property values. In this research, property values of selected land uses are employed as indicators.

The hypothesis is that Impact Blocks potentially receive positive economic impact from park-above-parking projects while Control Blocks receive no economic impact from park-above-parking projects (see Diagram.3.3).

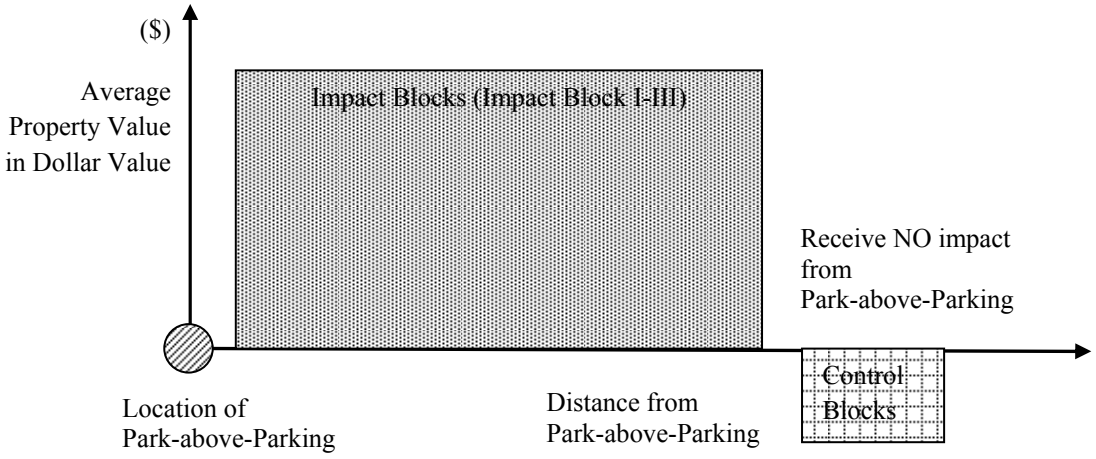


Diagram 3.3. The hypothesis of property value

Since the property values in Control Blocks were not affected by park-above-parking projects, the average property value in Control Blocks was set up as the baseline. As a point of departure, the baseline value was converted from dollar value to percentage as 100%.[6] Average property values in Impact Blocks would be shown as percentage higher or lower than 100%. The purpose of defining a difference between Impact Blocks

[6] Comparing results in percentages in Impact Blocks I-III and Control Blocks to make results comparable across all thirteen projects because the dollar value of properties in each city is different. By converting dollar value in Control Blocks to 100%, each project has the same baseline for comparing across thirteen projects.

and Control Blocks is to show to what extent park-above-parking projects could generate economic value in their surroundings. To ensure comparison validity, the minimum sample size of each group of comparable buildings is defined as 10% of all properties of the same use. According to the proximate principle, the hypothesis is:

Within Impact Blocks, Block I would have higher average property value than Block II and Block II would have higher property value than Block III (see Diagram 3.4).

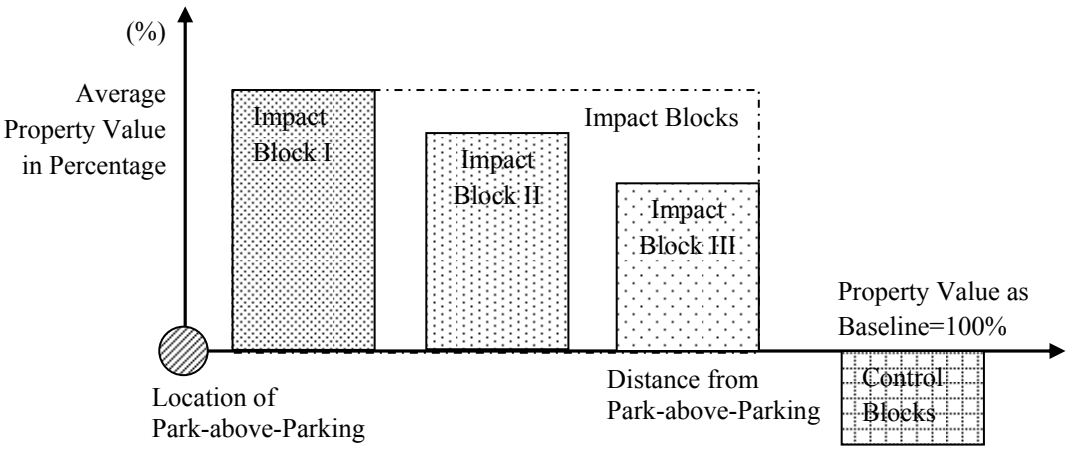


Diagram 3.4. The hypothesis of property value in Impact Blocks I-III.

As noted earlier, nearby property values have been well accepted as an indicator of the economic impact of open space. Two types of indicators are employed in this research. One indicator for property value is defined as average total market dollar value per square foot for the year 2011. Property values were obtained from city's or county assessor's office websites once the address or parcel number of a building was known. The property value usually is formatted in three categories: land value, improvement value (or building value) and total property value. The other indicator employed was average leasing rate per square foot per year. Leasing rates, especially for offices, are also an accepted indicator (Crompton, 2001; Eng, 2003; & Ren, 2010; Vandell & Lane, 1989). Leasing rates for office spaces can be found by geographic location through

commercial real estate marketplace websites.[7] Rent values for residential buildings can be extracted from a variety of national and local real estate websites. Information about leasing rates for office and rents were verified where possible by government reports and news reports from local media.

Table 3.5 shows the index table of Millennium Park as a sample index. In Millennium Park, surrounding buildings of Multifamily, Office, and General Commercial were found in Impact Block I-III and Control Blocks. A group of most comparable buildings were identified in each use. The average property value of comparable buildings in Control Blocks was converted to 100%. The average property value of comparable buildings in Impact Blocks I-III was shown in percentages based on the baseline of 100% in Column 4-6 in index Table 3.5.

In Table 3.5, for example, in Mutifamily use, comparing to the baseline of 100% in Control Blocks, the total value of Mutifamily use in Impact Block I and III are 122% and 106% while it is not available in Impact Block II. The net change between Impact Block I and Control Blocks is Impact Block I (122%)-Control Blocks (100%)=22%. It indicates the average property value of Mutifamily in Impact Blocks I is 22 percentages higher than the average property value in Control Blocks. The net value change in each land use of Millennium Park is listed in Table 3.6.

In Table 3.6, the column of Impact I, II, and III show the net value change of each Impact Block minus Impact Blocks. For the same example of Mutifamily use, the net change of total value between Impact I and Control Blocks is 22% and the net change of total value between Impact III and Control Blocks is 6%. It indicates the average property value of Mutifamily in Impact Blocks I and III are 22 percentages and 6 percentages higher than the average property value in Control Blocks. In the bottom row of Table 3.6, it is the average % change which shows the result of average each column: Impact Blocks I, II, and III. It is the all-index for Millennium Park which all identified surrounding land uses were taken into consideration except data which are not available. Applying this process to the rest twelve projects, an all-index table for all thirteen projects was created and shown in Table 3.7.

[7] Leasing rates of offices are identified primarily by "LoopNet," a website that is widely recognized as the most reliable commercial real estate marketplace online.

Millennium Park, Chicago, IL						
Surrounding Building Uses	**Indicators**		**Location**			
			Impact Block I	**Impact Block II**	**Impact Block III**	**Control Blocks**
Multifamily	Property Value (Average % change of $/Square Foot)	Land Value	121%	N/A*	105%	100%
		Impact Value	123%	N/A*	107%	100%
		Total Value	122%	N/A*	106%	100%
Office		Land Value	131%	129%	114%	100%
		Impact Value	127%	129%	117%	100%
		Total Value	129%	129%	116%	100%
General Commercial		Land Value	112%	106%	98%	100%
		Impact Value	112%	107%	98%	100%
		Total Value	112%	105%	0	100%
Office	Rental Lease Rate (Average % change of $/Square Foot/Year)	Rent	117%	112%	103%	100%
Multifamily		Rent	115%	N/A*	99%	100%

*N/A: Not Available

Table 3.5. Sample index table including Control Blocks

Millennium Park, Chicago, IL					
Surrounding Building Uses	**Indicators**		**Location**		
			Impact Block I	**Impact Block II**	**Impact Block III**
Multifamily	Net Change of Property Value (Average % change of $/Square Foot)	Land Value	21%	N/A*	5%
		Impact Value	23%	N/A*	7%
		Total Value	22%	N/A*	6%
Office		Land Value	31%	29%	14%
		Impact Value	27%	29%	17%
		Total Value	29%	29%	16%
General Commercial		Land Value	12%	6%	-2%
		Impact Value	12%	7%	-2%
		Total Value	12%	5%	0
Office	Net Change of Rental Lease Rate (Average % change of $/Square	Rent	17%	12%	3%
Multifamily		Rent	15%	N/A*	-1%
Average All % Change: All-in Index			20%	17%	8%

*N/A: Not Available

Table 3.6. Sample index table without Control Blocks

3. Calculate All-in Index and Individual Indexes

Each park-above-parking project varies greatly with regard to its surrounding land uses. Taking every land use into consideration, an average change rate of all values will make park-above-parking projects comparable to each other in terms of overall economic impact. For each park-above-parking project, an all-in index includes the average change rate of all values in Impact Blocks I, II, and III as shown in Table 3.6. Beyond all-in index, individual land use indices would also indicate the economic impact of park-above-parking in that land use. Individual indices would be used when certain indicators could be found consistently through all thirteen cases. The estimated overall economic impact, and the impact on individual land uses, could be evaluated using these all-in index and individual indexes.

4. Categorize Park-above-Parking Projects according to Their Economic Impact

Similar to categorizing the design quality, thirteen park-above-parking projects were also placed into three categories according to their relative levels of all-in economic impact: high, medium, and none-low. Diagram 3.5 shows the classification process based on overall economic impact.

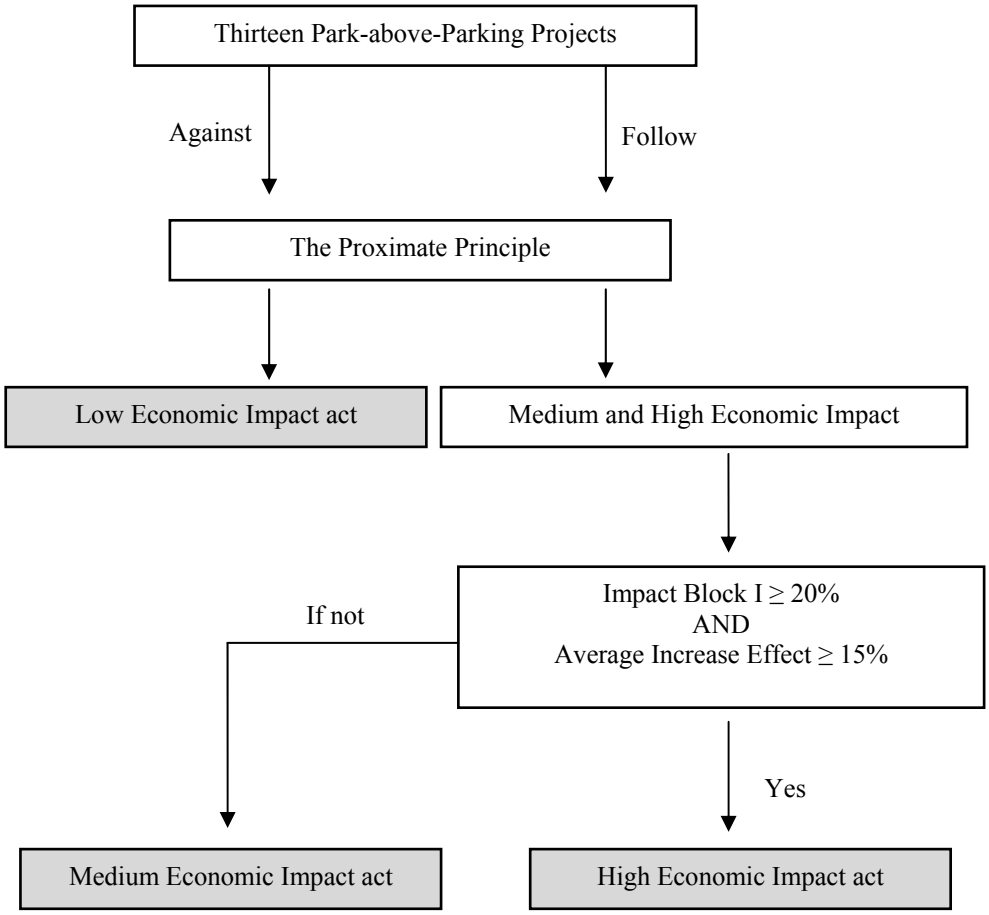


Diagram 3.5. The classification process based on overall economic impact

Table 3.7 shows the percentage changes in property value in Impact Blocks I-III comparing to the Control Blocks. In Table 3.7, thirteen park-above-parking projects are shown in rows 1-13. Average property value change of Impact Blocks I-III comparing Control Blocks are listed in Column B, C, and D. The Control Blocks is omitted in the list because its property value was set up as the baseline 100%. For example, Row 1 is Union Square, San Francisco, CA. 28% in Column B1 means the average property value in Impact Block I is 28 percent higher than the average property value in the Control Blocks. Row 13 is Pershing Square, Los Angeles, CA. -1% in Column B13 means the average property value in Impact Block I is 1 % lower than the average property value in Control Blocks. Column E1-13 Average Increase Rate lists the average property value change in percentage for Impact locks I-III.

Average Increase Effect = (Impact Block I + Impact Block II + Impact Block III)/3

For example, for Union Square, San Francisco, CA in Row 1: 23% in Column E means the average property value of Impact Blocks is 23 percent higher than Control Blocks. The average increase effect 23% = (28% + 24% + 18%)/3. Thirteen park-above-parking projects and their values in Column B-E are listed in Table 3.7.

Column	A	B	C	D	E
Row	**All-in index of economic impact**	**Impact Block I**	**Impact Block II**	**Impact Block III**	**Average Increase Effect**
1	Union Square, San Francisco, CA	28%	24%	18%	23%
2	Norman B. Leventhal Park, Boston MA	28%	22%	1%	17%
3	Portsmouth Square, San Francisco, CA	24%	22%	17%	21%
4	Ellis Square, Savannah, GA	22%	18%	11%	17%
5	Millennium Park, Chicago, IL	20%	17%	8%	15%
6	Fountain Square, Cincinnati, OH	20%	16%	12%	16%
7	Director Park, Portland, OR	14%	11%	6%	10%
8	Public Square, Nashville-Davidson, TN	4%	4%	2%	3%
9	Barney Allis Plaza, Kansas City, MO	3%	2%	3%	3%
10	Discovery Green, Houston, TX	2%	2%	5%	3%
11	Memorial Plaza, Cleveland, OH	2%	4%	1%	2%
12	Civic Plaza, Albuquerque, NM	1%	2%	1%	1%
13	Pershing Square, Los Angeles, CA	-1%	2%	2%	1%

Table 3.7. All-in index table

To be considered as positive economic impact, the average property value change in percent in Impact Blocks I-III of every park-above-parking project must follow the proximate principle:

Impact Block I>=Impact Block II>=Impact Block III>Control Blocks

If the average property value change in Impact Blocks I-III of every park-above-parking project does not follow the proximate principle, that park-above-parking project is categorized as having low-none economic impact. This indicates that the property

value change from Impact Blocks I to III is not affected by the park-above-parking project. In Table 3.7., Rows 9-13 do not follow the proximate principle: Barney Allis Plaza, Kansas City, MO; Discovery Green, Houston, TX; Memorial Plaza, Cleveland, OH; Civic Plaza, Albuquerque, NM; and Pershing Square, Los Angeles, CA. This places these park-above-parking projects in the low-none economic impact category. The rest eight park-above-parking projects are in the category of medium or high economic impact as shown in Table 3.8.

Column	A	B	C	D	E
Row	**All-in index of economic impact**	**Impact Block I**	**Impact Block II**	**Impact Block III**	**Average Increase Effect**
1	Union Square, San Francisco, CA	28%	24%	18%	23%
2	Norman B. Leventhal Park, Boston MA	28%	22%	1%	17%
3	Portsmouth Square, San Francisco, CA	24%	22%	17%	21%
4	Ellis Square, Savannah, GA	22%	18%	11%	17%
5	Millennium Park, Chicago, IL	20%	17%	8%	15%
6	Fountain Square, Cincinnati, OH	20%	16%	12%	16%
7	Director Park, Portland, OR	14%	11%	6%	10%
8	Public Square, Nashville-Davidson, TN	4%	4%	2%	3%

Table 3.8. Medium to high economic impact index table

To distinguish medium to high economic impact projects one must look at Column B: Impact Block I and Column E: Average Increase Effect. In this research, 20% was chosen as a point of departure. If values in Column B are equal or greater than 20% and Column E is equal or greater than 15%, that park-above-parking project would be placed in the category of high economic impact. If either Column B is lower than 20% or the figures in column E are lower than 15%, the corresponding park-above-parking projects could be considered as having medium economic impact (as noted in Chapter II: Literature Review, the Proximate Principle, p20). However, none of previous research has established standard average increase effect of Impact Blocks I-III. The reported increase rate varies case-by-case. According to Crompton's (2001) analysis, the standard average increase effect could be calculated as:

Average increase effect of Impact Blocks I-III= 20% (Impact Block I) + 15% (Impact Block II) + 10% (Impact Block I) = 15%

Also, the 20% standard increase rate of Impact Block I and 15% average increase effect of Impact Block I-III are identified in previous studies where these two numbers are shown as indicators of higher economic impact (Crompton, 2001; Li and Brown 1980; Gillem & Ren 2010). The same criteria also apply to categorize the economic impact on individual land uses.

Phase V: Categorization Based on Design Quality and Economic Impacts

To examine the relationship between overall economic impact and design quality, thirteen park-above-parking projects were placed in a 3×3 table with X-axis of design quality the Y-axis of economic impacts. X-axis of design quality is listed as low, medium, and high from left to the right as well as Y--axis of economic impacts of low, medium, and high from bottom to the top (see Table 3.9). This categorization was also applied to categorizing design quality and economic impact as indicated by individual land uses.

Economic Impact	**Design Quality**		
	Low	Medium	High
High			
Medium			
Low			

Table 3.9. Categorize park-above-parking projects

According to Table 3.9, park-above-parking projects' design quality and economic impact were recognized. Then average increase effect in Impact Block I-III of high, medium, and low design quality park-above-parking projects. In the way, high, medium, and low design park-above-parking projects' contributions to economic impact

would be measured. Then run one-way ANOVA to test the correlation between design quality and economic impact for the projects that fall in the upper right box of Table 3.9, high design quality and high economic impact.

Dependent Variables:

Impact Block I, Impact Block II, Impact Block III, and Average Increase Effect.

Independent Variable:

Total Design Score.

Phase VI: Case Studies

As mentioned earlier, thirteen park-above-parking projects were placed in a 3×3 table (Table 3.8) based on their design quality and economic impact classifications. Two representative park-above-parking projects were chosen from this table: Case Study I was chosen from the category of high design quality and high economic impact in the upper right box of the table (shown in green color in Table 3.10). Case Study II was chosen from the category of low design quality and low economic impacts in the lower left of the table (shown in red in Table 3.9). Other criteria were applied in selecting projects in these boxes of Table 3.9 include similarity in location, history, and scale of renovation. Interviews of owners and tenants and on site-visits provided us with the subjective evaluation that is missed when using the objective data analysis described so far.

Economic Impact	**Design Quality**		
	Low	Medium	High
High			Case Study I
Medium			
Low	Case Study II		

Table 3.10. Case study selection

Conducting Case Studies

Beyond quantitative analyses, information on safety, overall economic and cultural impact, and people's attitudes towards the case studies were collected through the following methods.

Archives and Documents

Looking at archives and documents on selected projects is the first step when conducting case studies. Design related issues were found in literature, government minutes, online-resources and local media especially in local newspapers. Safety related arguments were found in local newspapers. Overall economic impact, culture impact, and attitudes were verified in later interviews since they occasionally appeared in archives and documents.

Interviews

In order to understand people's perceptions, opinions, and attitudes towards park-above-parking projects, designers, park and parking managers, and business leaders were interviewed either by phone or in person. Respondent groups were recruited by emails. The author sent emails introducing the research and inviting respondents to participate the interview.

For respondents who were interested, the author made phone calls, or emailed the questionnaire, or visited respondents in person depending on respondents' availability. Each phone interview and in-person interview was less than 30-minutes. The answers were recorded and analyzed but respondents' names were removed due to the confidentiality requirements of the Office of Human Subjects.

The interview questions were open-ended and were meant to help explain the results of spatial-based economic performance and its relationships with social use and design quality (see Table 3.11).

Respondent Group	Questions
Designers (1-person)	What drives the design? What are the most important lessons you've learned from this project?
Park and parking managers (2-3 persons)	Is this place safe? What is the usage of park and parking? What are your concerns?
Business leaders/City Managers (1-2 persons)	How do you evaluate the role of parking under the park in downtown development?
Business Owners/Employees (3-4 persons)	How does the nearby park-above-parking affect your business?

Table 3.11. The Questionnaire

On-site Visits

On-site visits were also instrumental in verifying the earlier economic investigation and information learned in previous archives and document searching. The methods employed during on-site visits included observations, behavioral mapping and photography. The on-site visits included three parts:

1. Visited city hall and local libraries to find information that was not available online or could be requested remotely.

2. Conducted in-person interviews that were mentioned earlier.

3. Visited two sites and adjacent neighborhoods.

The author spent 12 days on each case study in two visits. Case Study I: the first visit was May 29-June 03, 2011, and the second visit was March 22-28, 2012. Case Study II: the first visit was July 09-12, 2009, and the second visit was March 22-Apr 02, 2011.

Observation & Behavioral Map

On-site observation contains two parts. Part I is observing how people use the park and parking garage. Part II is observing the connections between park-above-parking projects and surrounding neighborhoods. Observation results were recorded through behavior maps and specific notes.

First, a map of park-above-parking projects was divided into four sections to record observation: center, sub-areas,[8] on the periphery, and parking garage (see Diagram 3.6).

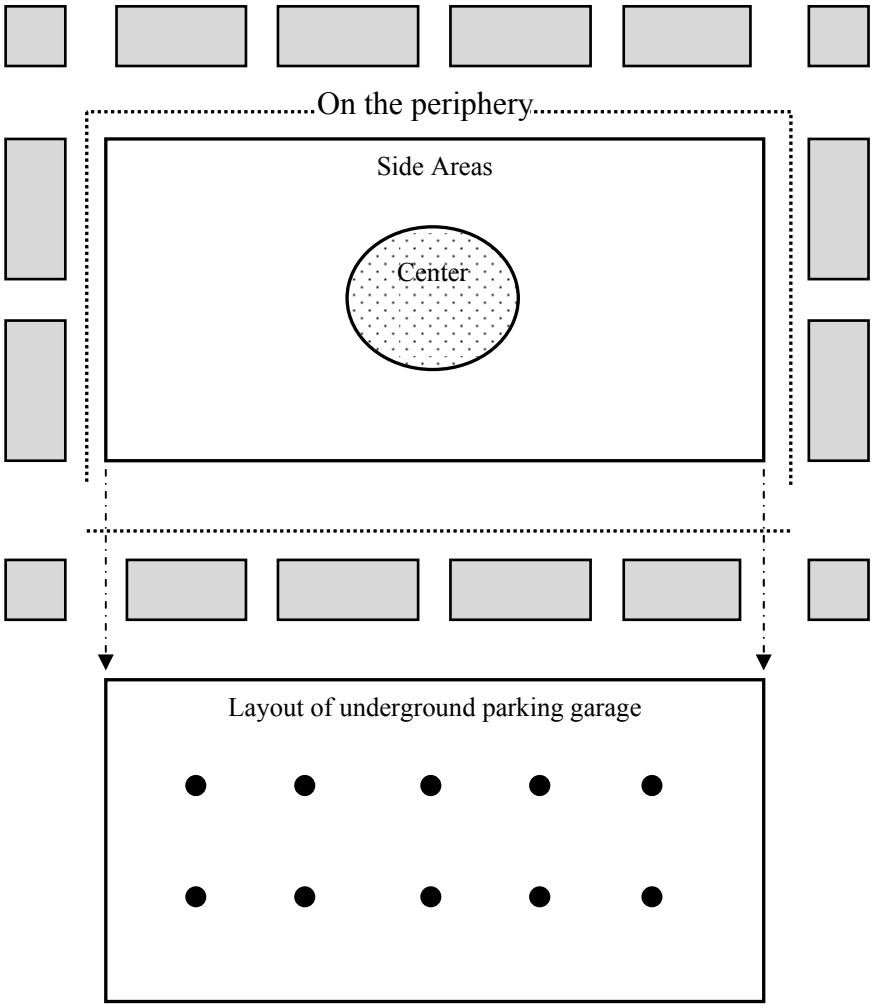


Diagram 3.6. Observing sections

Second, a spreadsheet was created to record people's activities in association with each section during four times of the day: in the morning, noon, afternoon and night. Specific observation notes were written along with the observer's interpretations (see Table 3.). Behavior maps were also created based on the previous map. Numbers of

[8] Sub-areas are the areas between center and the borders. They were divided into a few areas according to each park-above-parking project's layouts such as playground, pathways, and seating areas.

people were shown on the behavior maps by four colors of sticky dots assigned to each time of the day. [9] Each dot represents five users. The pattern of the dots on the map helped explain how people use the park (see Diagram 3.7). Diagram 3.7 shows a sample behavior map: in the morning, people stay on the periphery waiting for buses or walking around park and rarely spend time in the park. On a separate sheet, a portion of the park and parking plan including the most popular and problematic area were enlarged. Types of activities, physical settings, and numbers of persons were recorded.

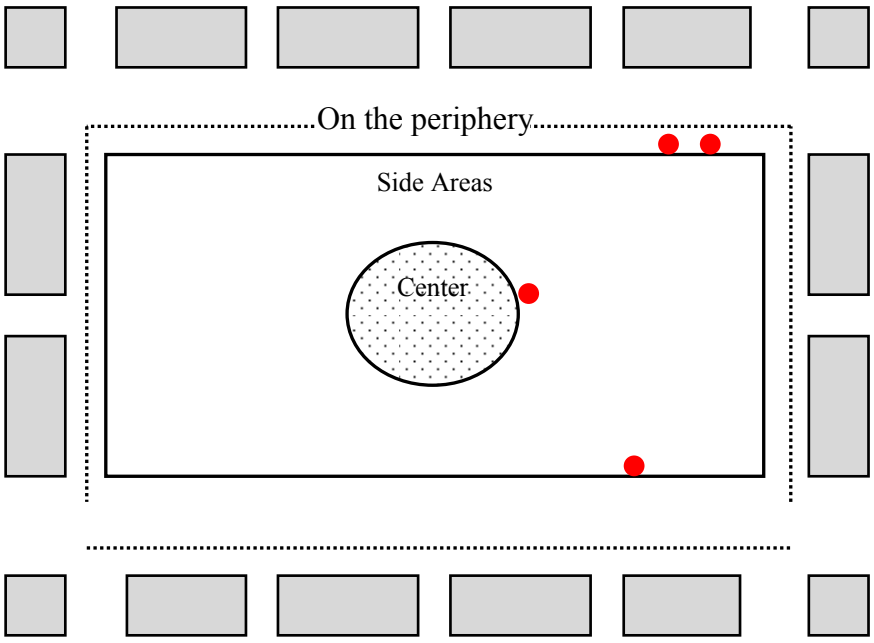


Diagram 3.7. Using behavior map recording park use patterns

Photograph

Photos can provide visual data for verifying the connections between design quality and economic impacts. Photos of each observation section were taken to record the activities and behaviors in the park and the use of the underground parking garage. Each picture was labeled with date, time, and location. Selected photos were placed in the following

[9] Morning: red dots; noon: green; evening: blue; and night: black.

spreadsheet with previous discussed methods. Together, on-site data were collected for a comprehensive discussion of two case studies (see Table 3.12).

Observation Sections	**Associated activities/User Groups/# of users in each group**				**Notes**	**Images of activities**
	in the morning	at noon	in the evening	at night	Weekday/weekend (check one)	
Center						
Sub-areas						
Sub-area I						
Sub-area II						
Sub-area III						
Observation Sections	**Percentage of occupied parking spaces**				**Notes**	**Images of usage**
Underground Parking Garage	in the morning	at noon	in the evening	at night	Weekday/weekend (check one)	
Level I						
Level II						
Level III						
Observation Sections	**Percentage of people in the park is from adjacent neighborhoods or stop by adjacent uses before or after using the park/parking garage**				**Notes**	**Images of activities**
On the periphery	in the morning	at noon	in the evening	at night	Weekday/weekend (check one)	
Northern side						
Southern side						
Western side						
Eastern side						

Table 3.12. Recording users and activities on site

Justifying the Cost and Economic Impact

A key question that decision makers often confront is whether it is worth it to build a park-above-parking project from an economic point of view. As discussed in the Literature Review, the success of Norman B. Leventhal Park in Boston, MA demonstrated a park-above-parking project could generate enough revenue to cover the construction related expenditure (Harnik, 1997). However, the high cost of underground parking may prevent the establishment of park-above-parking projects (Shoup, 2005).[10] This research provides some economic justifiability. The author tested the cost and revenues generated from park-above-parking project under two circumstances: when a park-above-parking project performs well in both design quality and economic impact (as in case study I); and when a park-above-parking project has low performance in both design quality and economic impact, such as in case study II.

By comparing expenditure to their overall direct impact on surrounding properties, this research established the relationship between project costs[11] and economic impact. The "revenues" figure includes revenue I, i.e. the annual revenue generated from park and parking through park rental fees and parking fees and revenue II, which indicates the average incremental value on surrounding property attributed to the park-above-parking project. The formulas are shown as follow:[12]

1. Calculate the total cost:

   Cost I = soft costs + construction cost

   Cost II = average operational cost / year

2. Convert the average incremental value from percentage value to dollar value:

   Revenue I = park revenue + parking revenue

[10] The construction of an underground parking garage is approximately ten times more than a surface parking lot which provides the same amount of parking spaces (McDonald, 2007; Shoup, 2005).

[11] Project costs include both one-time costs—design fees, land acquisition fees, construction and other miscellaneous costs, and constant costs, i.e. the operational costs upon completion. Data relative to these costs were gained from documents, reports, and interviews of park and parking managers.

[12] Revenue I and II are based on the revenue of year 2011

Revenue II = average increase effect × 3× average property value in dollar value in Control Blocks × average numbers of buildings in each block

3. Compare the costs to the revenues:
    1) Result 1 = Revenue I - Cost I
    2) Result 2 = Revenue II - Cost II
    3) Result 3 = Revenue II – Cost I
    4)

If the result 1 is positive, it shows the park-above-parking project can financially support itself. Result 2 shows if the operational cost can be covered by the economic impact. Result 3 indicates how long the construction-related cost can be paid through increased tax on properties values that are impacted by the park-above-parking projects.

Conclusion

This chapter discussed the methods used to measure both design quality and the economic impacts of park-above-parking projects. The research was completed in six phases by employing both quantitative data and qualitative interviews and observations. Criteria for design quality were drawn from literature. Measurements of economic impacts were adopted from the Hedonic Model and combined with the Index Method. These measurements were verified through documents, reports and media. The next three chapters discuss the findings that have been drawn from these methods.

CHAPTER IV
DESIGN QUALITY AND ECONOMIC IMPACT ANALYSES

Introduction

Design plays a fundamental role in the success or failure of park-above-parking projects. A new design may help a park-above-parking project become a popular destination with significant social and economic benefits; a major renovation can transform an old, unused park-above-parking project into an updated and well-used urban oasis. Alternatively, an inappropriate design may result in an empty space with little social outcomes and no economic impact. At the same time, finding a way to measure, in monetary terms, the value of maintaining downtown park-above-parking projects is a key issue that concerns all stakeholders. This research was conducted through six phases. In this chapter, findings from Phase III: Measure the design quality; Phase IV: Assess the economic impacts; and Phase V: Categorize park-above-parking projects by their design quality and economic impacts are reported.

Park-above-Parking Projects: History and Description

Phase II of this research identified thirteen newly built or renovated park-above-parking projects. Each project is unique from a design point of view and features a variety of above and below grade amenities for pedestrians and automobiles. Many of these park-above-parking projects have long and rich histories. The project data of thirteen park-above-parking projects is listed in alphabetical order in Table 4.1. Each park-above-parking project was descried in details in the following sections. In addition, their impact areas, site plans were shown in Figures 4.1- 4.13.

Park-above-Parking Projects	City	State	Established in	Underground parking garage added in or built in	Recent renovation finished in	Park Area (acre)	Total Parking Spaces
Barney Allis Plaza	Kansas City	MO	1985	1985	2006	2.5	900
Civic Plaza	Albuquerque	NM	1972	1974	1999	4	900
Director Park	Portland	OR	2009	2009		0.5	700
Discovery Green	Houston	TX	2008	2008		12	630
Ellis Square	Savannah	GA	1733	2009	2009	2	700
Fountain Square	Cincinnati	OH	1871	1971	2005	2	635
Memorial Plaza	Cleveland	OH	1971	1971	1991	2	900
Millennium Park	Chicago	IL	2004	2004		24	2,126
Norman B. Leventhal Park	Boston	MA	1992	1992		1.7	1,400
Pershing Square	Los Angeles	CA	1850s	1952	1994	5	2,150
Portsmouth Square	San Francisco	CA	1847	1989	2001	1	500
Public Square	Nashville-Davidson	TE	2006	2006		7.5	1,069
Union Square	San Francisco	CA	1850	1941	2002	2.6	1,700

New*: These park-above-parking projects are brand new: park on the ground level and parking garage underneath were built at the same time.

Table 4.1. The project data of newly built and renovated park-above-parking projects

Barney Allis Plaza, Kansas City, MO

Barney Allis Plaza is located in the heart of downtown Kansas City at 13th and Central. It is a 2.5-acre public park and is surrounded clockwise by Kansas City Convention Center, Kansas City Marriott, Crown Plaza Kansas City Downtown and the Municipal Auditorium. Today it is the home of the Kansas City Explorers, Kansas City's Tennis Team. In the center of the plaza is a tennis court with 2,550 seats. A major redesign effort was completed in 1985 by landscape architect SWA Group and architect Marshall and Brown (Osmundson, 1999). The plaza can be accessed at street level on its east side and via stairways on the west, southeastern and southwestern corners. The underground parking garage provides 1,000 parking spaces (Fig.4.1).

BARNEY ALLIS PLAZA
Kansas City, MO

Park Area 2.5-Acre

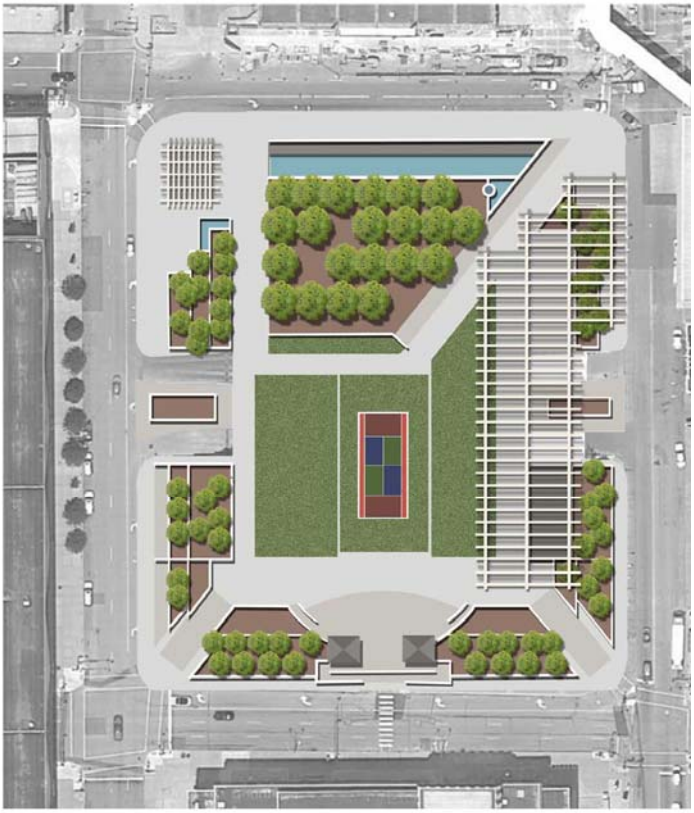
Underground Parking Spaces 900

Total Cost $4 Million

Impact Area

Before

After



Site Plan 0 100'

Figure 4.1. Barney Allis Plaza, Kansas City, MO
Impact Area. Author. Redraw from Google Map.
Before. Retrieved Apr.3, 2012, from VisitKC.com
After. Retrieved Apr.3, 2012, from VisitKC.com
Site Plan. Author

Civic Plaza, Albuquerque, NM

Civic Plaza was part of a redevelopment project in the late 1960s, the Tijeras Urban Renewal Project. It received a $10 million three-year long renovation in 1996. A new 40 by 90 foot stage with dressing rooms, and improved sound and lighting systems were installed at the middle of the north end. A new shaded trellis area along the east and west side can accommodate 50 vendors for outdoor events. Several structures included on the trellis are painted turquoise. The concrete surface has also been repaved with new benches, more planters and a few small patches of lawns. The fountain remains on the site. The 900-space underground parking garage was renovated due to its leaking problem (Fig.4.2).

Director Park, Portland, OR

Director Park is a half-acre park with a 700- space underground parking garage. Originally the park land was used for surface parking and the Snow White House Creperie food stand (Fig.4.3). The park is bounded by Southwest Park and Ninth avenues and Yamhill and Taylor streets, which connect Fox Tower and the incomplete Park Avenue West Tower. The park was opened in 2009. A 1,000 square foot glass canopy for a cafe is the major feature in the park, which complied with investor Moyer's requirement that 30% of the space be devoted to commercial activity (Libby, 2010).

Discovery Green Park, Houston, TX

Discovery Green was the vision of Mayor Bill White and the Discovery Green Conservancy to turn what was once concrete parking lots and minimal green space into a thriving amenity (Jost, 2009). Hargreaves Associates' San Francisco office was selected to organize the design team for the park (Fig.4.4). The west end of the site serves as the gateway to the park from downtown because of its proximity to the Houston Center and Four Seasons Hotel. An existing hill, play area, interactive water feature, lawn and fenced dog runs are arranged in this area (Discovery Green Website.). Groups of red oaks planted 20 years ago have been preserved along with the new park features.

CIVIC PLAZA
Albuquerque, NM

Park Area: 4-Acre

Underground Parking Spaces: 900

Total Cost: $10 Million

Impact Area

Before

After

Site Plan 0 200'

Figure 4.2. Civic Plaza, Albuquerque, NM
Impact Area. Author. Redraw from Google Map.
Before. Retrieved Apr.13, 2012, from http://www.itsatrip.org
After. Retrieved Apr.3, 2012, from http://www.virtualalbuquerque.com
Site Plan. Author

Figure 4.3. Director Park, Portland, OR
Impact Area. Author. Redraw from Google Map.
Before. Retrieved Apr.13, 2012, from http://www.portlandonline.com
After. Retrieved Apr.13, 2012, from http://www.portlandonline.com
Site Plan. Author

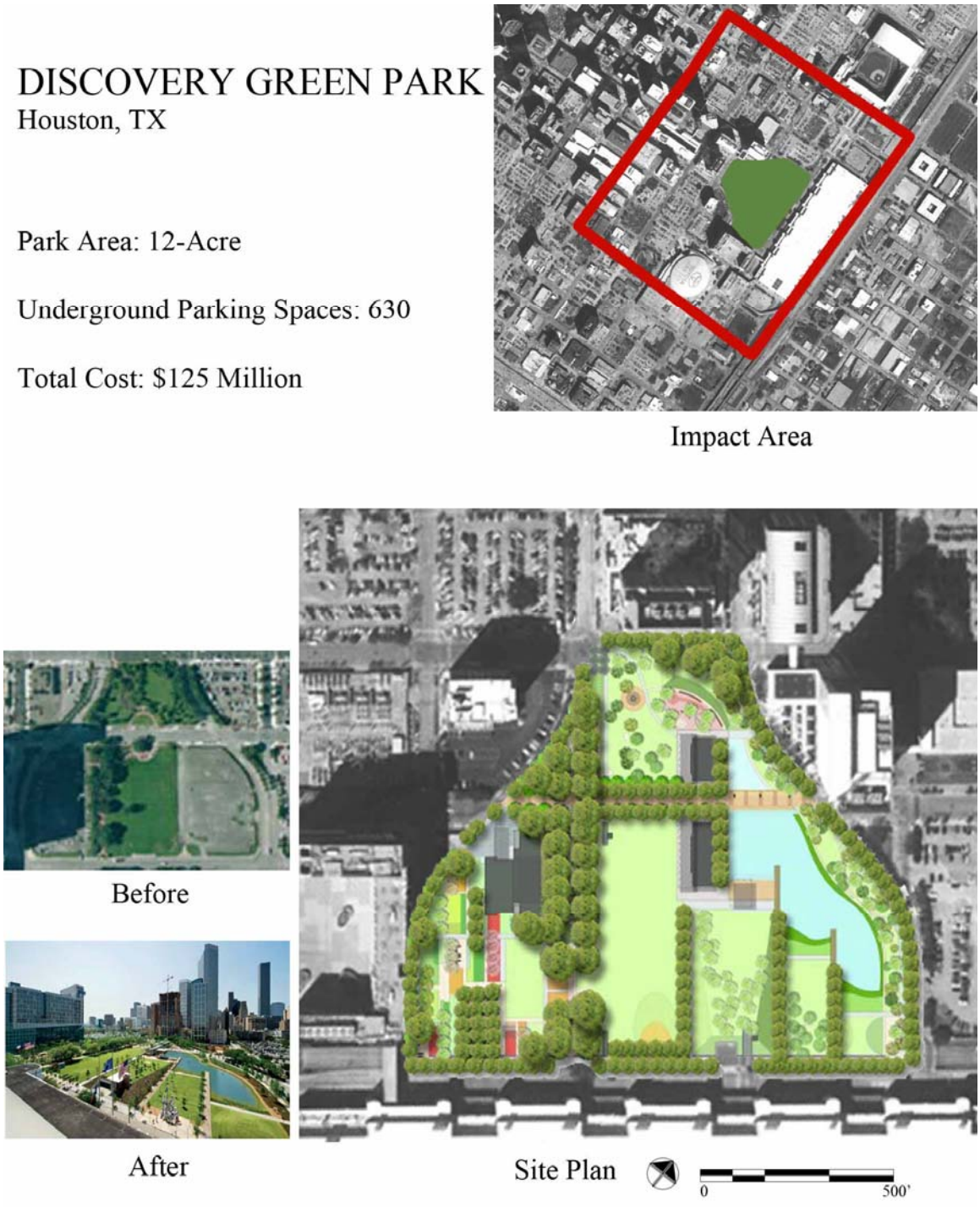


Figure 4.4. Discovery Green Park, Houston, TX
Impact Area. Author. Redraw from Google Map.
Before. Retrieved Apr.12, 2012, from http://www.visithoustontexas.com
After. Retrieved Apr.12, 2012, from http://www.visithoustontexas.com
Site Plan. Author

Ellis Square, Savannah, GA

Ellis Square was one of four squares planned by James Oglethorpe for the city of Savannah in 1733. In 1954 the city signed a fifty-year lease with the Savannah Merchants Cooperative Parking Association to convert Ellis Square to a parking garage. The restoration of Ellis Square began when the garage's lease expired in 2004. The new design features a glass-walled visitor center, an interactive fountain, a life-sized chess board, public restrooms with a green roof, a variety of seating options and space for music and other performances. These park features are connected by an oval walking-pathway (Fig.4.5). It is the most pedestrian-oriented and environmentally friendly square in downtown Savannah (Simpson, 2010).

Fountain Square, Cincinnati, OH

Fountain Square has been an icon of Cincinnati since 1871. A major renovation occurred in 1971 and included new skywalks and elevated platforms. A recent renovation finished in 2005 (3CDC) relocated the fountain to the middle of the square and removed the skywalk bridge. On this occasion, new granite pavers and curbs, restrooms and landscaping and a water wall for children and a permanent stage were also added. The structure of the underground garage was repaired; and new lighting and ventilation systems were added (Fig.4.6).

Memorial Plaza, Cleveland, OH

Memorial Plaza has a rich history that is associated with the development of the Cleveland Mall. The Memorial Plaza is known as Mall C of the Cleveland Mall. The plaza has lawn and diagonal cross pathways. The centerpiece is a statue and fountain: the Fountain of Eternal Life was designed by Marshall Fredericks and dedicated on May 30, 1964 (Harnik, 1997). The 900-space underground parking garage was added to the plaza in 1991 (Fig.4.7).

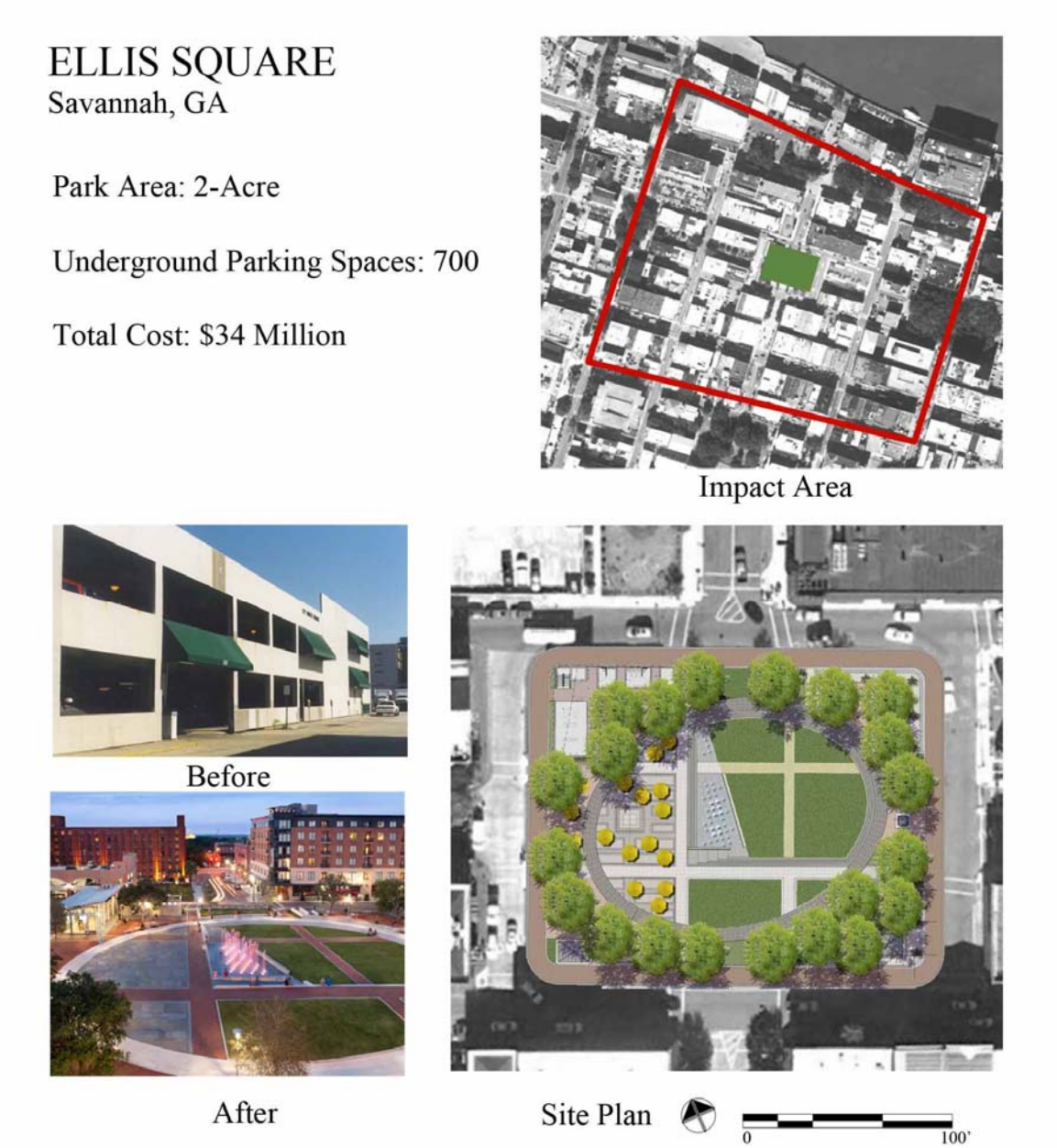


Figure 4.5. Ellis Square, Savannah, GA
Impact Area. Author. Redraw from Google Map
Before. Retrieved Apr.9, 2012, from http://www.visit-historic-savannah.com
After. Retrieved Apr.9, 2012, from http://www. savannahnow.com/news
Site Plan. Author

FOUNTAIN SQUARE
Cincinnati, OH

Park Area: 2-Acre

Underground Parking Spaces: 635

Total Cost: $43 Million

Impact Area

Before

After

Site Plan

0 200'

Figure 4.6. Fountain Square, Cincinnati, OH
Impact Area. Author. Redraw from Google Map
Before. Retrieved Apr.9, 2012, from http:// www.3cdc.org/about-fountain-square
After. Retrieved Apr.9, 2012, from http:// www.3cdc.org/about-fountain-square
Site Plan. Author

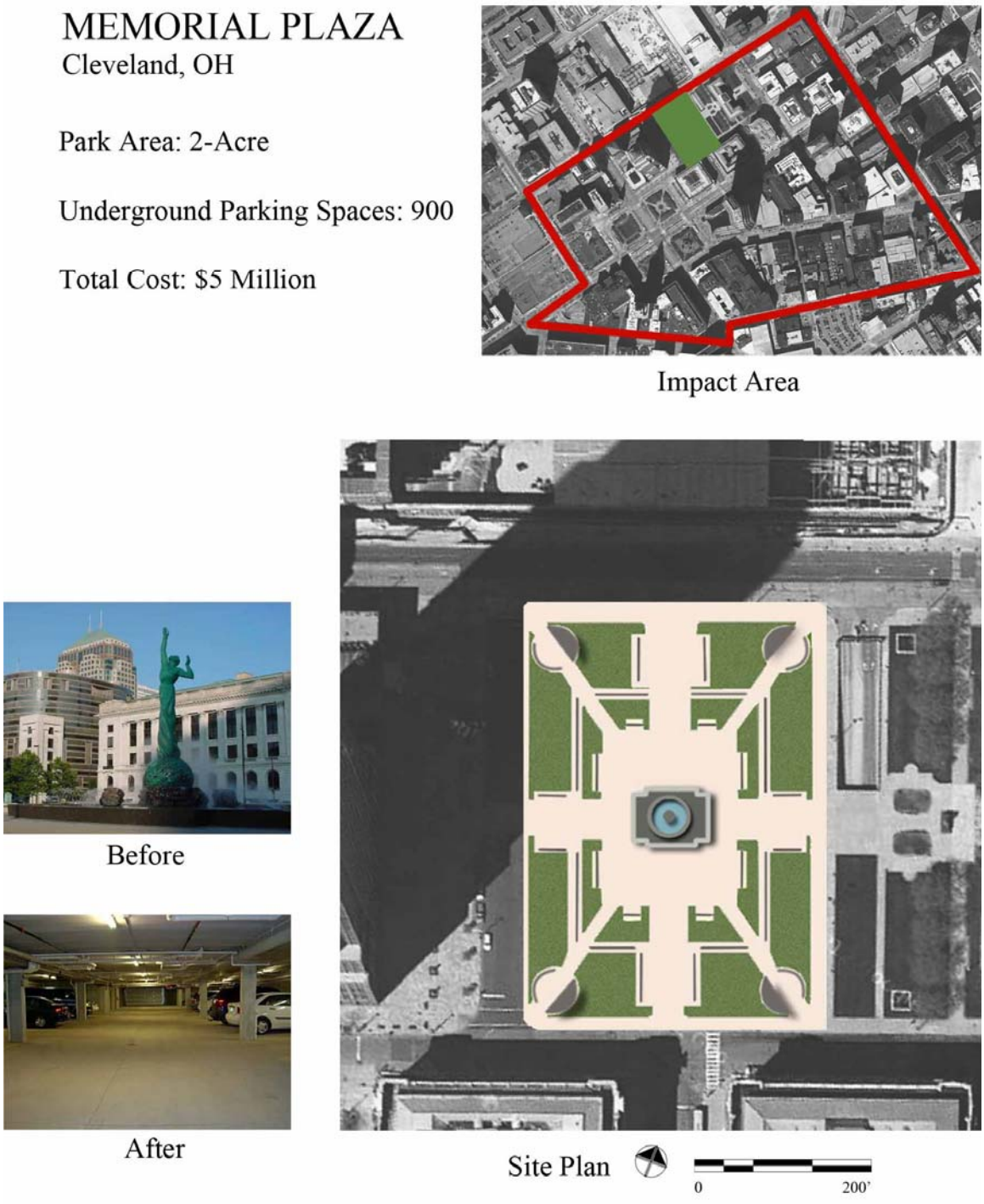


Figure 4.7. Memorial Plaza, Cleveland, OH
Impact Area. Author. Redraw from Google Map.
Before. Retrieved Apr.6, 2012, from http:// www.clevelandvetsmemorial.org
After. Retrieved Apr.6, 2012, from http:// www.clevelandvetsmemorial.org
Site Plan. Author

Millennium Park, Chicago, IL

Millennium Park is located in downtown Chicago, bounded by E. Randolph Street on the north, E. Monroe Street on the south, N. Michigan Avenue on the west and S. Columbus Drive on the east. It is a $475 million urban redevelopment project that resulted from a collaboration between the City of Chicago and a number of planners, architects, designers and artists. Planning of the park began in 1997. Construction began in 1998 and the park opened in 2004. A 24-acre riverfront area including parking lots, Illinois Central rail yards and parkland was transformed into a modern park with a 2,126-space parking garage underneath. It is considered the world's largest park-above-parking project (Fig.4.8).

Norman. B. Leventhal Park, Boston, MA

Norman Leventhal was named after Norman B. Leventhal, who led the renovation of Boston Post Office Square. A multi-story, stand-alone parking garage was converted into a beautiful park with a1400-space underground parking garage. The park features a 143-foot-long formal garden trellis. An open dome is located in the center. The Great Lawn covers the majority area of the park. More than 125 different species of plants, flowers, bushes and trees form a unique horticultural display though four seasons (Fig.4.9).

Pershing Square, Los Angeles, CA

In the 1940s, to meet the shortage of downtown parking and inspired by San Francisco's Union Square, Pershing Square was demolished and excavated in 1952 for an underground parking garage. A more recent renovation was completed in 1993. The park is divided into two plazas. A circular pool is located at the center of the lower plaza. The upper plaza consists of a grassy area framed in a few rectangles. A concert stage is located at the end of the upper square on the side of W. 5th Street. A 10-story, 125 feet purple campanile located in the middle of the park serves as the landmark (Fig.4.10).

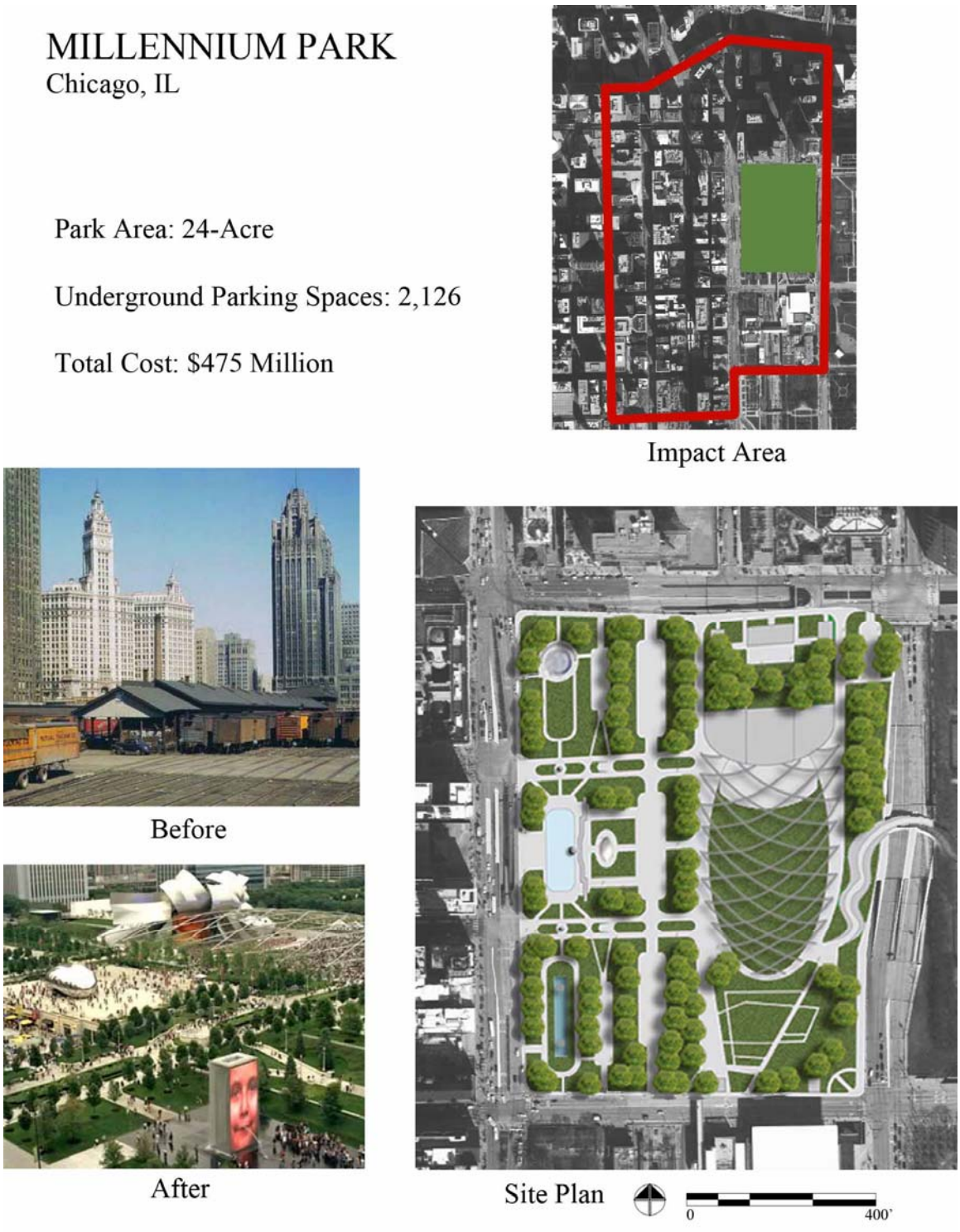


Figure 4.8. Millennium Park, Chicago, IL
Impact Area. Author. Redraw from Google Map.
Before. Retrieved Apr.18, 2012, from http:// www.millenniumpark.org
After. Retrieved Apr.18, 2012, from http:// www.millenniumpark.org
Site Plan. Author

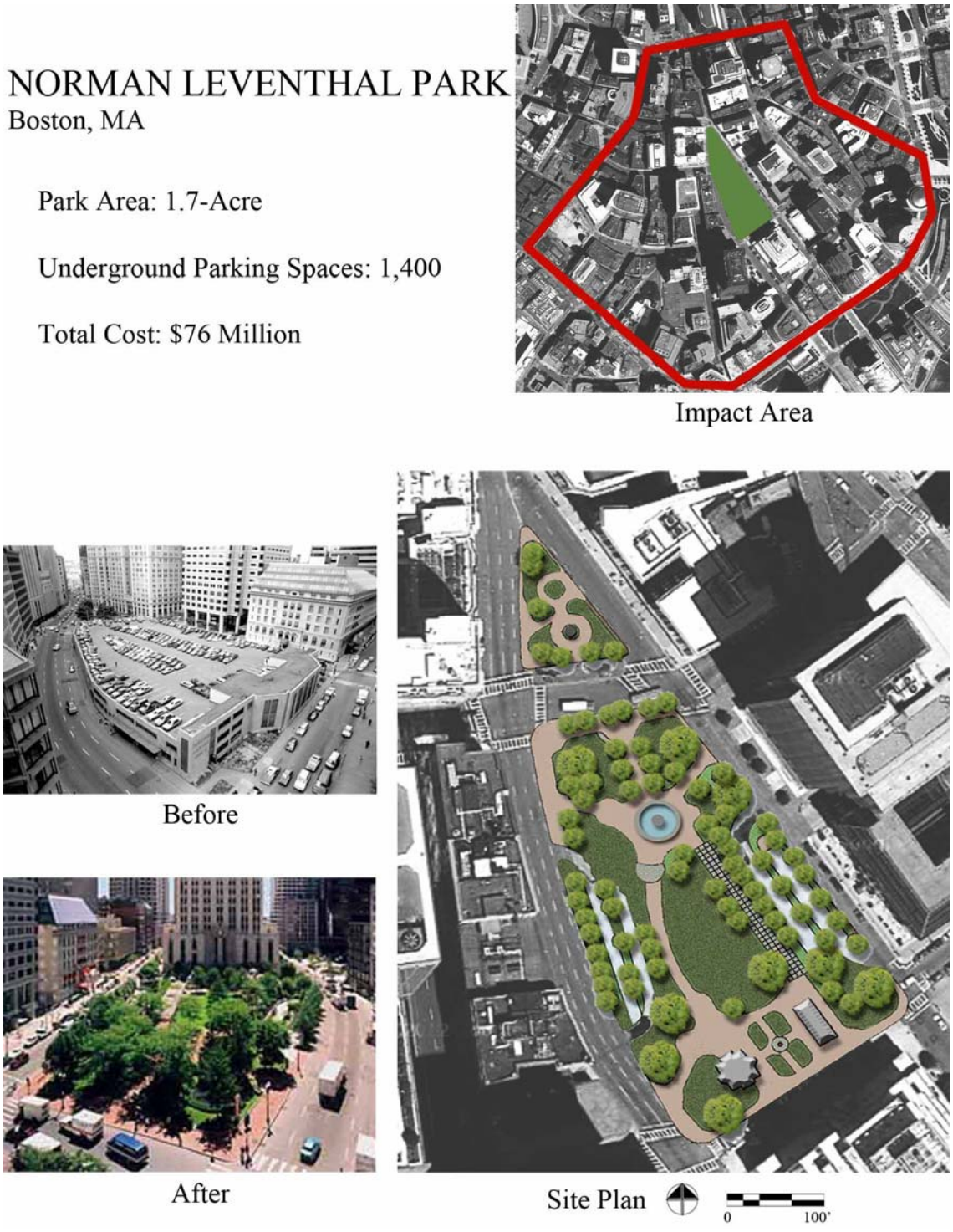


Figure 4.9. Norman B. Leventhal Park, Boston, MA
Impact Area. Author. Redraw from Google Map.
Before. Retrieved Apr.18, 2012, from http://www.normanbleventhalpark.org
After. Retrieved Apr.18, 2012, from http:// www.normanbleventhalpark.org
Site Plan. Author

Figure 4.10. Pershing Square, Los Angeles, CA
Impact Area. Author. Redraw from Google Map.
Before. Retrieved Apr.22, 2012, from http://www.laparks.org/pershingsquare
After. Retrieved Apr.22, 2012, from http:// www.laparks.org/pershingsquare
Site Plan. Author

Portsmouth Square, San Francisco, CA

Portsmouth Square was planned as a one-block park in what was then the Mexican community of Yerba Buena. The plaza has received several renovations over the years. In 1987, new elevators to the underground 500-space parking garage and bathrooms were installed. In 1994, child play structures, Chinese chess tables, benches and trees were added. In 2001, the $3.9 million, fourteen-year-long renovation was completed. Its identity is reinforced by the traditional Chinese Architectural style, i.e., the Ting-like community room, curved roofs, and red columns and beams. Today Portsmouth Square is one of the busiest parks in downtown San Francisco and it is used by a variety of ethnicities (Fig.4.11).

Public Square, Nashville-Davidson, TN

Public Square is a 7.5-acre park in downtown Nashville-Davison, TN. The park, with a 5-storey underground parking garage was transformed from a surface parking lot in front of the Courthouse. The design aimed at creating a truly civic space more suited to the term "Public Square," with a variety of park amenities and new pedestrian connectivity to the surrounding area. The park design is also a response to the stewardship of the environment. A 57,000 gallon below-grade deck was installed to collect the stormwater. After filtration, the collected water is recycled within the high-efficiency irrigation system (Fig.4.12).

Union Square, San Francisco, CA

Union Square was built and dedicated in 1850 and has received many renovations in the following decades. In 1942, a 1,700-car underground parking was installed under Union Square in San Francisco (Berglund, 2007). It was the first park-above-parking project in the nation. The park reopened in 2002 after a major renovation. Today the name Union Square also refers to the central business district that surrounds the plaza for several blocks. The square is located on a south-facing slope. While the majority of the square has changed from its original layout, it has preserved its formal symmetrical layout, with a central plaza surrounded by an outer belt of lawn areas bounded by hedges (Fig.4.13).

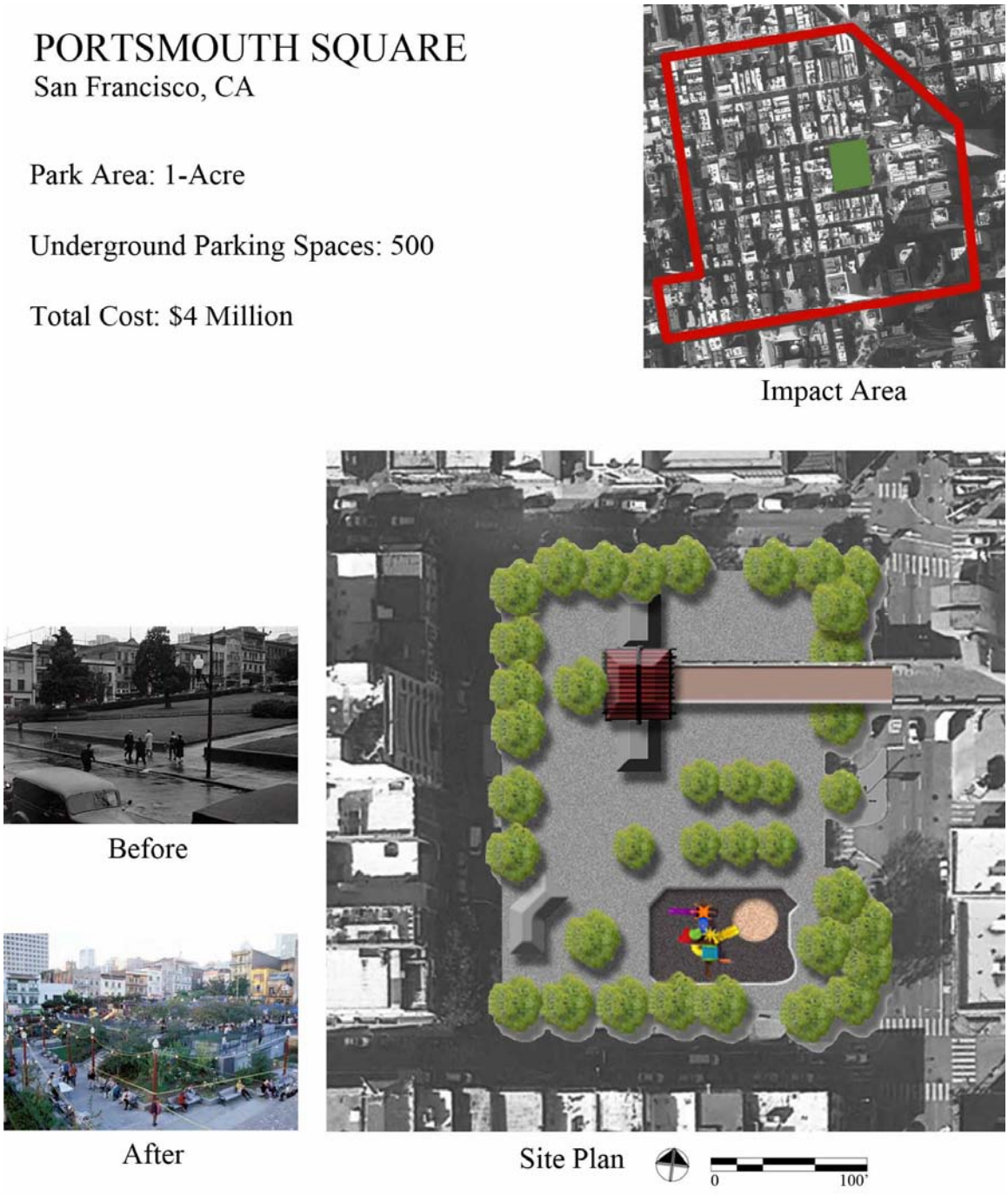


Figure 4.11. Portsmouth Square, San Francisco, CA
Impact Area. Author. Redraw from Google Map.
Before. Retrieved Apr.22, 2012,
from http://www.friscovista.com/film/lady-from-shanghai/portsmouth-square.jpg
After. Retrieved Apr.22, 2012, http://www.pps.org/images/stories/sf_portsmouth.jpg
Site Plan. Author

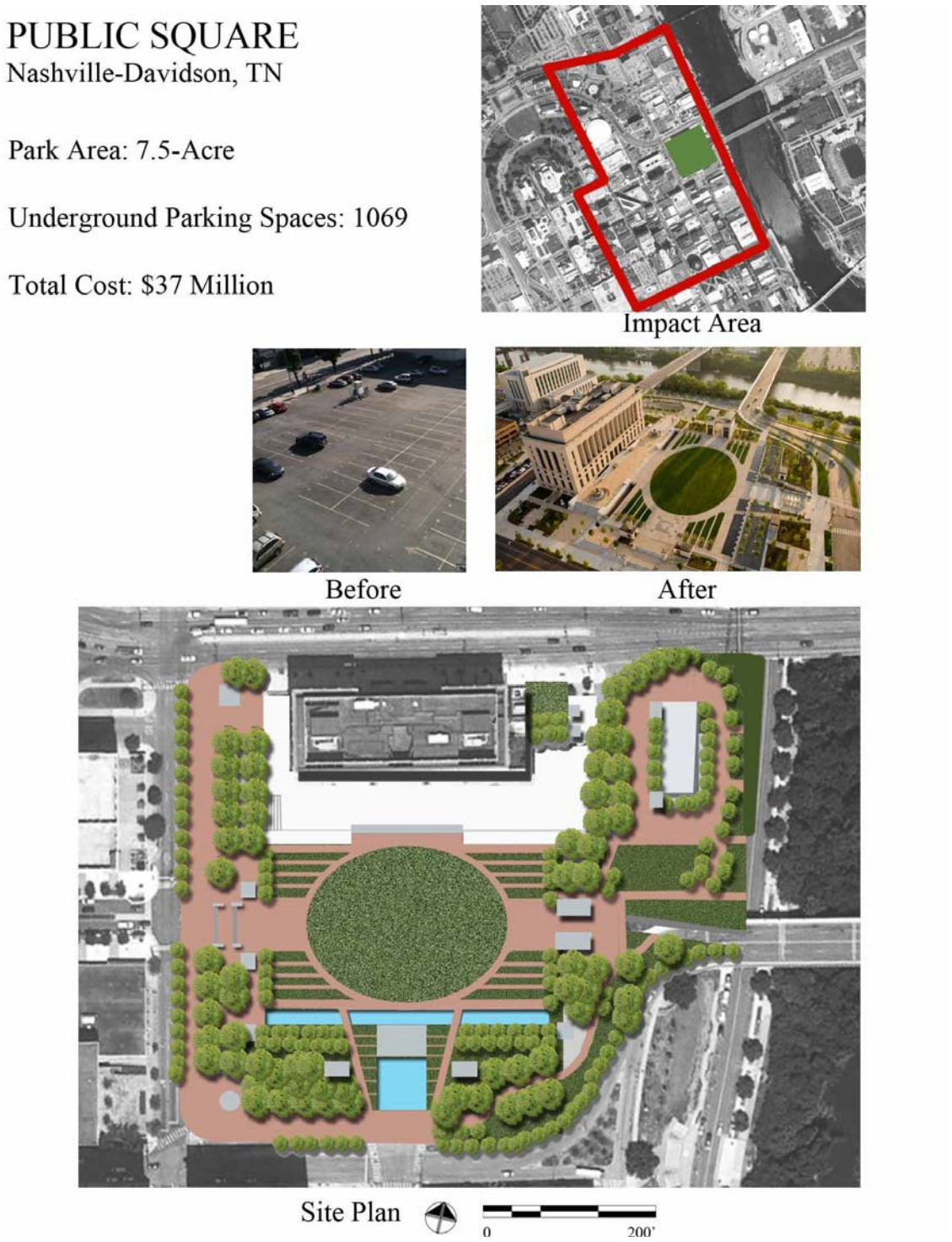


Figure 4.12. Public Square, Nashville-Davidson, TN
Impact Area. Author. Redraw from Google Map.
Before. Retrieved Apr.3, 2012, from http:// www.nashvilledowntown.com/go/public-square-park
After. Retrieved Apr.3, 2012, from http:// www.wrtdesign.com/files/large/351
Site Plan. Author

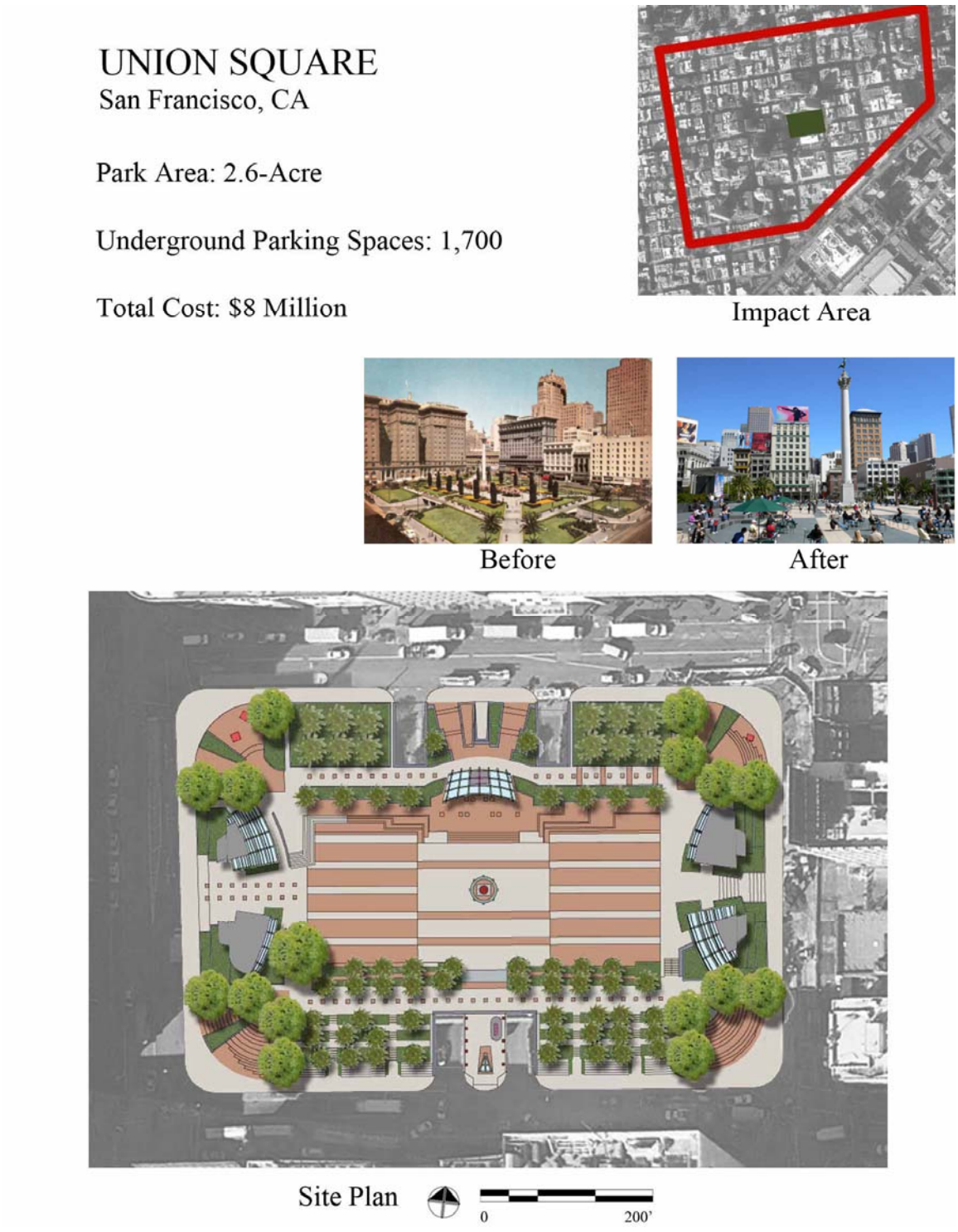


Figure 4.13. Union Square, San Francisco, CA
Impact Area. Author. Redraw from Google Map.
Before. Retrieved Apr.3, 2012, from http:// www.unionsquarepark.us
After. Retrieved Apr.3, 2012, from http://www.sanfrancisco.about.com
Site Plan. Author

Design Quality Analysis

As discussed in the Methodology Chapter III, the design quality of thirteen park-above-parking projects was measured through ten measurements. In each measurement, the author assigned score 1= high quality, score 0= medium quality, and score -1=low quality. Descriptions of measurements are listed in Table 3.3.

Sitting Space

Ten of thirteen park-above-parking projects score of 1 in this measurement. They provide multiple sitting places. The design of sitting spaces in Norman B. Leventhal Park was motivated by the users' requests, "basically, we showed them how we would give them everything they wanted," said Chuck Kozlowski, a designer atthe Boston's Halvorson Design Partnership. "They [park program/design review committee] wanted lots of different types of seating. We gave them wood, steel, the granite wall, places far from the street and places near it. They wanted a feeling of rooms. They wanted places to meet people and to avoid people" (Harnik, 1997, p. 151) (see Fig.4.14).

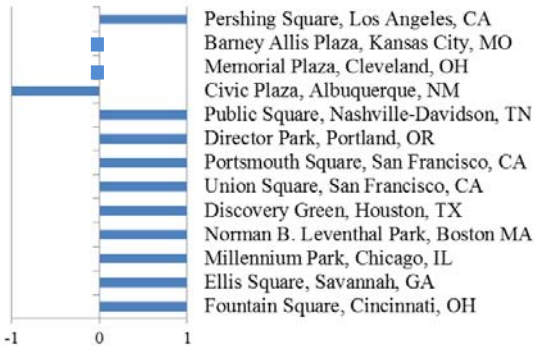
Scores on Sitting Space	Example
	 People sitting on the Lawn at Norman B. Leventhal Park, Boston, MA. Retrieved Apr.26, 2012, from http://boston.grubstreet.com/2009/03/sip_cafe_replaces_z_square_in.html

Figure 4.14. Scores on Sitting Space

However, as shown in Fig.4.14, three of thirteen park-above-parking projects score from -1 to 0 in this measurement: Civic Plaza (-1), Memorial Plaza (0) and Barney Allis Square (0). They provide limited sitting spaces and options. In Civic Plaza, there are

few benches and edges that people can sit on, but most of the plaza consists of hard surfaces and is exposed to the sun for most of the day, thus making it uninviting to people. In Memorial Plaza the sitting options are limited; benches are arranged on the edges of the lawn, but are limited to one per side. In Barney Allis Square, thousands of seats are provided in the summer for the tennis games that take place there, but permanent sitting spaces are limited the rest of the year.

Sun Access and Shade

In this measurement, seven park-above-parking projects received score of 1 and the other six received scores from -1 to 1 (see Fig.4.15). Millennium Park is surrounded by skyscrapers but separated by N. Michigan Ave. and E. Randolph St, therefore the shade of the skyscrapers would not have a significant impact on the park. The sun access in Millennium Park is plentiful and this attracts many users, especially on a windy day. Many trees and structures make a large shaded area in Discovery Green Park that helps people escape from Houston's long and hot summers. Norman B. Leventhal Park is shaded by the skyscrapers on the borders all year long, while Civic Plaza and Barney Allis Square, have shade along their edge of what is otherwise a site in full sun.

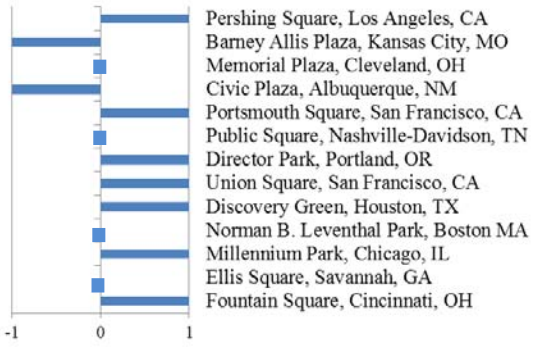
Scores on Sun Access/Shade	Example
	 Civic Plaza is Albuquerque is exposed to the sun. Retrieved Apr.2, 2012, from http://0.tqn.com/d/albuquerque/1/0/X/0/-/-/CivicPlaza.jpg

Figure 4.15. Scores on Sun Access and Shade

Water

Seven of the thirteen park-above-parking projects provide large and interactive water features while only two park-above-parking projects have no water features on site (see Fig.4.16). In Millennium Park, Crown Fountain draws crowds all day long; the shallow pools in Ellis Square, Director Park and Discovery Green have reached the status of landmark. Fountains are a popular element that four park-above-parking projects share: Fountain Square, Civic Plaza, Memorial Plaza and Barney Allis Square. These fountains are mainly for aesthetic purposes; they are touchable but not interactive. Due to Boston's long and cold winter, a fountain was not approved in the renovation.

Due to the underground parking structure, water features can be problematic. Leaking is one of the most common problems in park-above-parking projects. It is the major reason for renovation of some park-above-parking projects, including Fountain Square, Pershing Square and Civic Plaza. After a multimillion dollar renovation in 1998, Civic Plaza still suffered major leaks. A document reported that drenching rains seeped through some of the new planters and the fountain, which left sizable puddles on the upper deck of the underground parking garage (City of Albuquerque).

Scores on Water	Example
	 Pool at Director Park, Portland, Oregon. Retrieved Apr.2, 2012, from http://media.oregonlive.com/portland_impact/photo/directoronejpg-0bc4d021153a5d79.jpg

Figure 4.16. Scores on Water

Food

Five park-above-parking projects provide permanent food vendors and cafes (see Fig.4.17). There are cafés in Director Park, Discovery Green Park, and Ellis Square that are open during regular park hours; there is usually an outdoor seating area associated with the café. A large area for vendors is located close to the Cloud Gate at Millennium Park. It is so popular that people can hardly find a seat during the lunch hour. Similar to Millennium Park, Fountain Square reserves space for temporary food carts. A café was placed in the design of Pershing Square, but it is today an empty space. To attract daily users a Farmer's Market with a few food carts is open for four hours a day in the park. A restaurant is located on the northern edge of Fountain Square; its outdoor seating space expands into the square. There are no food facilities in Union Square or Portsmouth Square, but they are popular during the lunch hour because of the many restaurants located on their perimeter.

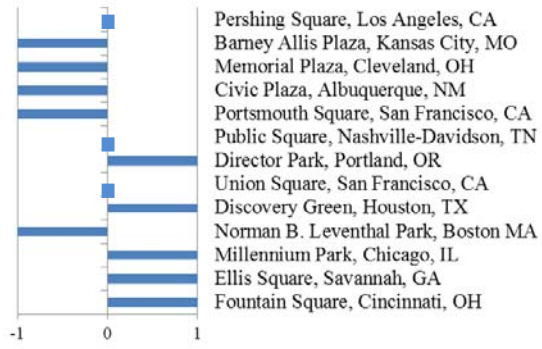
Scores on Food	Example
	
	Food at Fountain Square, Cincinnati, Ohio. Author

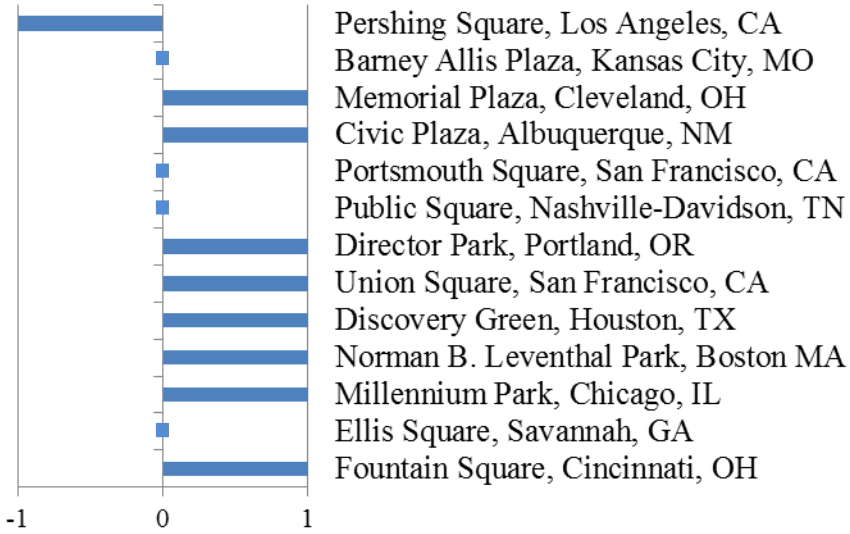
Figure 4.17. Scores on Food

Street Connection

Overall, the park-above-parking projects observed through this study maintain a good connection with the streets. Eight of thirteen park-above-parking projects have more than 60% of their borders open to the street (Fig.4.18). Pedestrians can easily locate the entrances through clear signage and maps. Pershing square is the only park-above-parking projects with a negative score in this measurement because its street connection

only exists at the corners. The rest of the periphery is enclosed by walls and vegetation. The literature has shown that the more people can see the park from the street, the more likely they are to come in and use the park (Kent, 2011; Tate, 2001). But in Pershing Square, the limited street connection lowers people's desire to enter the park.

Scores on Street Connection



Example

The south side of Pershing Square, Los Angeles, CA (photo by author).

Figure 4.18. Scores on Street Connection

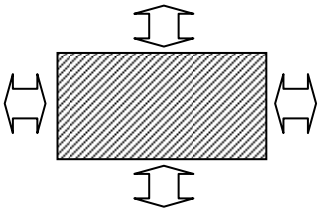
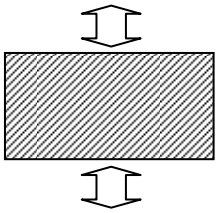
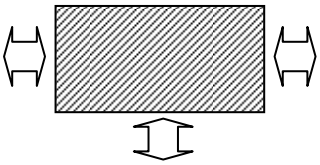
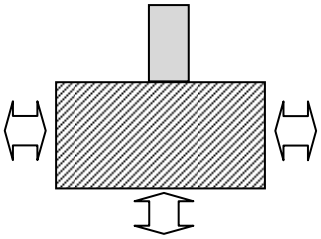
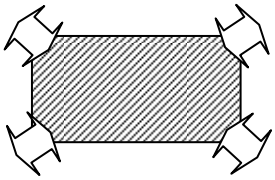
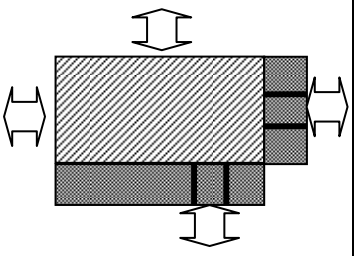
Patterns of Pedestrians Access to Park-above-Parking Projects		
Access on four sides	Access on two sides	Entrances/exits on four sides
		
Park-above-parking projects are wide open to pedestrians on all sides	Access on two sides of streets (the other two sides are primarily for automobile access)	Park-above-parking projects are wide open to pedestrians on three sides, the other one side is primarily for automobile access
Director Park Discovery Green Park Ellis Square Memorial Plaza	Barney Allis Square Civic Plaza Norman B. Leventhal Park	Public Square Union Square
		
Park-above-parking projects are wide open to pedestrians on three sides, the other one side has a pedestrian bridge due to elevation change	Pedestrians access on the corners when four sides are primarily for automobile access	Pedestrians can access a park-above-parking project on two sides and access it through adjacent buildings on the other two sides
Millennium Park Portsmouth Square	Pershing Square	Fountain Square

Figure 4.19. Patterns of Pedestrians Access

Elevation

Every park-above-parking project is raised to some level due to the underground parking garage. Research on Union Square shows that sitting in a raised plaza, not too many steps up retaining the visual connection with the rest part of the park or street can be a pleasing experience (see Fig.4.20). For some park-above-parking projects that are elevated more than 3 feet, the level that people can see from the street, the visual connection is weak. To reduce the elevation effect, both Millennium Park and Portsmouth Square provide a pedestrian bridge across the streets.

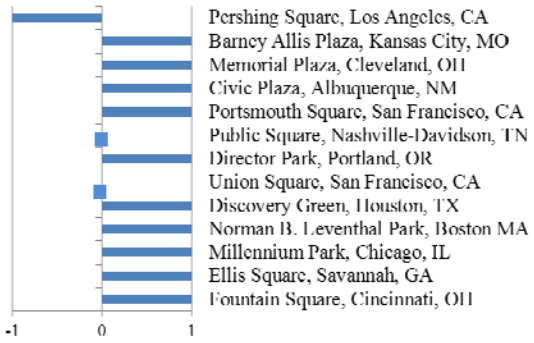
Scores on Elevation	Example
	 People sit on steps at Union Square, San Francisco. Retrieved Apr.2, 2012, from http://www.soulofamerica.com/phpwcms/picture/upload/image/us_cities/SF-Union-Square-sitters.jpg

Figure 4.20. Scores on Elevation

Triangulation

In this measurement, eight park-above-parking projects received a score of 1 and the other five received scores from -1 to 1 (see Fig.4.21). Usually an urban park/plaza has 1-2 focal points or areas that draw people (Whyte, 1980). Only two park-above-parking projects received a positive score of 1, which accounts for their ability to frequently draw crowds through more than three focal points. Millennium Park provides the best triangulation among the thirteen park-above-parking projects. The Crown Fountain is both an interactive fountain and a video sculpture. It displays digital videos of people's faces on a pair of transparent glass brick towers. The image is timed to correspond to the spouting of water into a reflecting pool. Daily, the fountains draws thousands of visitors and tourists who touch it, play in it and converse by it. It explains triangulation, it greatly encourages the communication among people who do not even know each other. Similar to the Crown Fountain, the Stainless steel bean-like shape Cloud Gate as well as the Lurie Garden also draw a number of visitors.

Other than providing large scale public art, the approach to triangulation that has been applied in Portsmouth Square relies on a smaller scale feature: a playground. Portsmouth Square is the only park-above-parking project that designates an area for children to play. Although Portsmouth Square is located in downtown San Francisco, it is

more like a neighborhood park serving Chinatown residents. Parents talk to each other while their children play together. This is a daily event that makes the park alive. Playgrounds have not been approved in many park-above-parking projects because these projects are usually designed to serve the business district. To stimulate triangulation in these business-oriented park-above-parking projects, public art, i.e. sculpture is often displayed. However, the focus on historic events or figures of many of these sculptures leads to more to contemplation, rather than triangulation.

Scores on Triangulation	Example
	 Crown Fountain at Millennium Park, Chicago draws a crowd every day. Retrieved Apr.2, 2012, from http://t3.gstatic.com

Figure 4.21. Scores on Triangulation

Below Parking Access

Eleven park-above-parking projects receive a score of 1 in this measurement (see Fig.4.22). Parking facilities include car and people entrances and exits and ventilation which might consume a large amount of park area. In Norman B. Leventhal Park, to limit the impact of the underground garage, the two auto ramps (two up and two down) into the garage are located on the edge of Pearl and Congress streets. They are almost invisible at ground level, due to multiple layers of landscaping and an ornamental iron fence. Ramps are usually located along the long edges of the park while people entrances and exits, including stairs or elevators are located at the corners of the park. Civic Plaza is the only park-above-parking project to provide access to the underground garage through a staircase located in the middle of the plaza. Although ramps are usually hidden, they

often interfere with park use or pedestrian movement on sidewalks when cars enter or exit the garage. In Pershing Square, four sides of the park are surrounded by ramps which significantly affect the pedestrian movement from the park to the sidewalks.

Scores on Below Parking Access	Example
	 Underground parking garage entrance at Public Square, Nashville-Davidson, TN. Retrieved Apr.2, 2012, from http://www.nashvilledowntown.com/_files/images/metro-courthouse-garage.jpg

Figure 4.22. Scores on Below Parking Access

To minimize such interruptions, several solutions have been applied in a few park-above-parking projects. In Millennium Park, ramps are located in the middle lane of Michigan Avenue, which is far from the pedestrian entrance. Ramps are also located on S. Columbus Drive where pedestrian access is provided by the BP Pedestrian Bridge. The horizontal distance and vertical separation ensure both park and parking can be used without interruption. The arrangement of ramps in a few of the newer designs strengthens the connection between park-above-parking projects and their surroundings. In Portsmouth Square, parking entrances and exits are all located on Kearny Street, which maintains the minimum interruption of pedestrian movement around the square. In Fountain Square, one ramp is located in Fifth Third Center on the perimeter. In recently completed Director Park and Ellis Square, ramps are located in nearby office buildings, while only pedestrian entrances and exits are directly opening onto the park. Fig.4.23 shows the patterns of underground ground parking Entrances/Exits of thirteen park-above-parking projects.

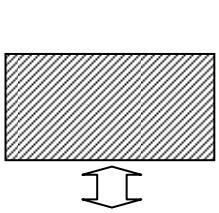
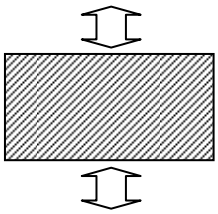
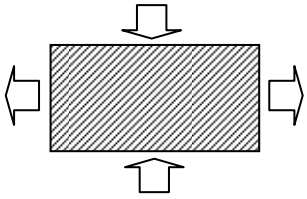
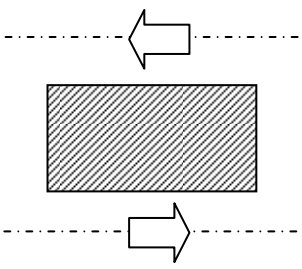
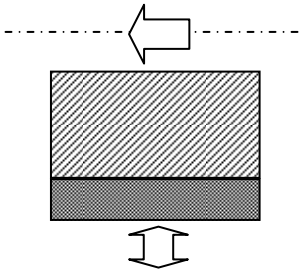
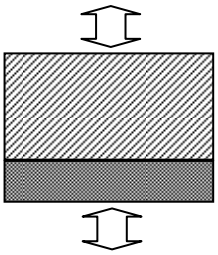
Patterns of Underground Ground Parking Entrances/Exits		
Entrances/exits on one side	Entrances/exits on two sides	Entrances/exits on four sides
		
Entrances/exits in the middle of one side of streets	Entrances/exits in the middle of two sides of streets	entrances/exits on four sides
Memorial Plaza	Barney Allis Square Civic Plaza Discovery Green Park Norman B. Leventhal Park Portsmouth Square Public Square Union Square	Pershing Square
		
Entrances/exits in the middle of two streets	One entrance/exit in the middle of a street or other entrances/exit in the adjacent building	One entrance/exit on one side and other entrances/exit in the adjacent building
Millennium Park	Director Park Ellis Square (in the building and in street)	Fountain Square

Figure 4.23 Patterns of Below parking Access

Parking facilities can be integrated with park amenities and made less visible. In Ellis Square, the pedestrian entrance is located in the same structure as the visitor center. In Fountain Square, the pedestrian entrance shares the same building as the public restrooms. In Discovery Green Park, the garage stairs are an artwork designed by Margo Sawyer. In addition, for park-above-parking projects as large as Discovery Green Park, the flexibility of garage space below is higher than in small park-above-parking projects.

Its garage occupies the area under the Great Lawn and adjacent Amphitheater, thus avoiding any connection to the pond area and water features.

Natural Surveillance

Visual connections allow park users to observe those subareas which they consider to be part of their responsibilities. The findings are overwhelmingly positive for this score. Ten park-above-parking projects provide high levels at natural surveillance within the park, except for Pershing Square (Fig.4.24). Benches around the lawn or raised subareas help people observe activities around them. There are a few elevated subareas in Pershing Square, but the degree of natural surveillance is still low because visual connections are blocked by trees and structures. As a result, these subspaces are occupied by homeless people and natural surveillance is cut off. Civic Plaza is an important counter to Pershing Square, because everything can be seen without visual interruption. It received a score of 1.

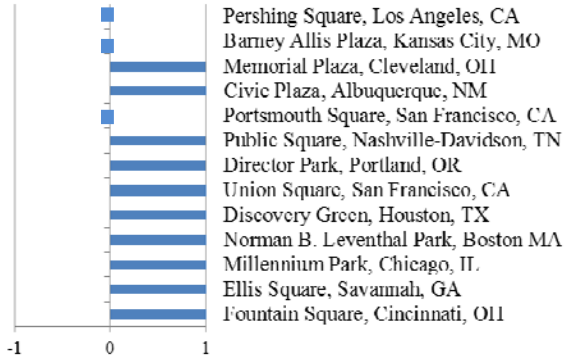
Scores on Natural Surveillance	Example
	 No visual block at Civic Plaza in Albuquerque, New Mexico. Retrieved Apr.2, 2012, from http://albuquerquerealestatetalk.com/wp-content/uploads/postphotos/Downtown_Albuquerque_Civic_Plaza.jpg

Figure 4.24. Scores on Natural Surveillance

Adjacent Supporting Uses

In this measurement, eight park-above-parking projects received score of 1 and the other five received scores ranging from -1 to 1 (see Fig.4.25). There is no solid, empirical evidence that clearly indicates whether users come to the area because of the park presence or because of surrounding uses. However, the diversity of surroundings matters in terms of daily use. For park above parking projects such as Union Square, Portsmouth Square and Fountain Square, which all have retail-anchors, restaurants and residential buildings around their immediate periphery, the average number of daily users per acre is higher than other park-above-parking projects.

For Pershing Square, Civic Square, and Memorial Plaza, which have a low density of uses on immediate periphery, the average number of daily users are 3-5 times lower than the above mentioned park-above-parking projects (Loukaitou-Sideris & Banerjee, 1998; City of Albuquerque; City of Cleveland). While park-above-parking projects cannot assure by design improvement to deteriorated neighborhoods, the visual and physical connections to the parks' surroundings can be established by design through the provision of pedestrian entrances facing windows on ground floors in adjacent buildings.

Scores on Adjacent Supporting Uses	Example
	 Union Square in San Francisco is surrounded by a variety of stores. Retrieved Apr.2, 2012, from http://images.oyster.com/san-francisco/areas/union-square/photos/union-square-union-square-2812-v43006-w902.jpg

Figure 4.25. Scores on Adjacent Supporting Uses

Score on each measurement of thirteen park-above-parking projects are listed in Table 4.2, while the total scores are shown in Fig.4.26. The thirteen projects are divided into three categories according to their total scores in design quality: high, medium, and

low (see Table 4.3). Low design quality includes park-above-parking projects which receive total scores less than three. These projects are Memorial Plaza; Civic Plaza; Barney Allis Plaza; and Pershing Square. Medium design quality includes park-above-parking projects which receive total scores between three and five. The project is Public Square. High design quality includes remaining eight park-above-parking projects which received total scores equal to or greater than five. These projects are Fountain Square; Ellis Square; Millennium Park; Union Square; Director Park, Discovery Green Park; Norman B. Leventhal Park; and Portsmouth Square.

Park-above-Parking Projects	**Measurements and Scores**										
	Sitting Space	Sun Access/Shade	Water	Food	Street Connection	Elevation	Triangulation	Below Parking Access	Natural Surveillance	Adjacent Supporting Uses	Total Score
Millennium Park	1	1	1	1	1	1	1	1	1	1	10
Director Park	1	1	1	1	1	1	1	1	1	1	10
Fountain Square	1	1	0	1	1	1	1	1	1	1	9
Ellis Square	1	0	1	1	0	1	1	1	1	1	8
Norman B. Leventhal	1	0	1	-1	1	1	1	0	1	1	6
Discovery Green	1	1	1	1	1	1	0	0	1	-1	6
Union Square	1	1	-1	0	1	0	1	1	1	1	6
Portsmouth Square	1	1	-1	-1	1	1	1	1	1	1	6
Public Square	1	0	1	0	0	0	1	1	1	-1	4
Civic Plaza	-1	-1	0	-1	1	1	1	0	1	1	2
Memorial Plaza	0	0	0	-1	1	1	1	0	1	-1	2
Barney Allis Plaza	0	-1	0	-1	0	1	1	0	1	0	1
Pershing Square	1	1	1	0	-1	0	0	-1	0	0	1

Table 4.2. Score on each measurement

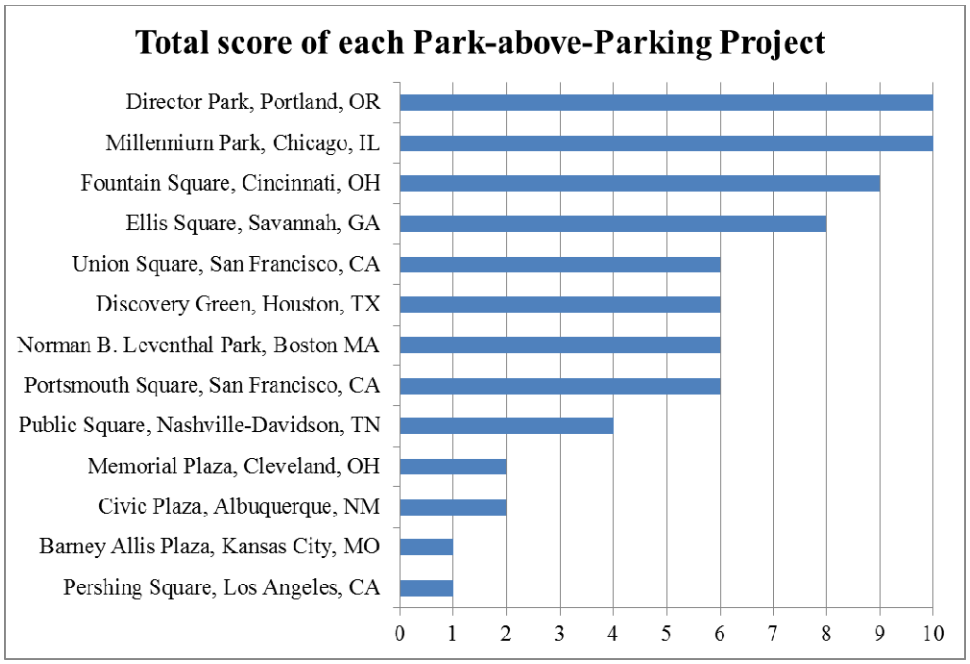


Figure 4.26. Total scores

Design Quality	Park-above-Parking Projects
High	Fountain Square, Cincinnati, OH Director Park, Portland, OR Ellis Square, Savannah, GA Millennium Park, Chicago, IL Union Square, San Francisco, CA Discovery Green Park, Houston, TX Norman B. Leventhal Park, Boston MA Portsmouth Square, San Francisco, CA
Medium	Public Square, Nashville-Davidson, TN
Low	Memorial Plaza, Cleveland, OH Civic Plaza, Albuquerque, NM Barney Allis Plaza, Kansas City, MO Pershing Square, Los Angeles, CA

Table 4.3. Design quality of park-above-parking projects

The Impact of Design Quality on Social Use

High design quality usually leads to more diverse, high frequency of social use. Union Square hosts many cultural events that define San Francisco. The 2011 Christmas Tree Lighting attracted more than 2,000 people; approximately 12,000 people attended

the concerts at Jay Pritzker Pavilion in Millennium Park every day during the Musical Festival in the summer of 2011; and exhibitions, tours, and the Seasonal Art Exhibit at Discovery Green Park brought suburban residents back to downtown. Based on their event calendars alone, all park-above-parking projects seem to function well, including those that rank very low in design quality.

Beyond scheduled events, design quality really makes a difference for spontaneous, leisurely daily use. Primarily park-above-parking projects are intended to serve downtown office workers. This is the fundamental reason to renovate an existing park-above-parking project or to build a new park above parking project. The renovation is often considered a "cleanup," whose intent is to bring an increased sense of safety, clarity and order (Ford, 2003; Herzog, 2006). Many park-above-parking projects work quite nicely for their target groups, and words like "comfortable" and "safe" are often used in people's descriptions of many park-above-parking projects (Ford, 2003; Marcus and Francis, 1998; author, Personal Interview, Author, 2010). However, users of a few park-above-parking projects have reported feelings of "emptiness" and "discomfort," particularly associated with those that rank low in design quality (Ford, 2003; Loukaitou-Sideris & Banerjee, 1998; Personal Interview, Author, 2011).

Two social use patterns are found in association with a few park-above-parking projects where design quality falls in the category of very low and low: a low number of daily users and the presence of homeless populations. As discussed earlier, in Memorial Plaza and Civic Plaza, these designs lack attractions and things to do in the park or its surroundings, thus making them favorite destinations for the homeless.

Homelessness in downtown parks has been a national problem for years (Loukaitou-Sideris & Banerjee, 1998). The term "undesirables" suggests that when homeless become the dominant user, the rest of the public is afraid to use the park. The recent "occupy" movement[1] has made this situation worse. Some of the occupiers are homeless; they have settled down in public open spaces downtown for months, thus deterring access by other user groups.

[1] The Occupy movement is an international protest movement against economic injustice. It began in Mar. 2011 as "Occupy Wall Street" in New York City. It quickly expanded to many cities where occupiers often stay in the central open space of the city.

The question of what constitutes “public” in public space is one that planners and designers have grappled with for years. It led to many renovation efforts with the not so hidden intent to “keep bums away” (Whyte, 1980; Loukaitou-Sideris & Banerjee, 1998; Marcus & Francis, 1998). On July 25, 2002, Union Square reopened after a major renovation. "Use it; it is your square", said then Mayor Willie Brown in the ceremony (Jenkins, 2008). Pershing square is another example. While its redesign was intended to “clean up” the park, it did not address the presence of many small subspaces that can be easily occupied, trees that block views and long benches that people can sleep on, thus the homeless have returned (Herzog, 2006; Personal Interview, Author, 2011).

However, a few park-above-parking projects that rank from medium to high in design quality are less likely to be troubled by activities associated with panhandling and homelessness because they are frequently used by a wide range of users. Millennium Park and Director Park are both filled with people who read, eat, walk, talk or people-watch on a daily basis. The design provides spaces that accommodate the daily passive use, as well as scheduled events. In general good design of park-above-parking projects is associated with good social use.

Beyond the impact on the social use in the park, design quality also significantly affects the use of underground parking garages. Better design attracts more people and a higher parking usage. The weekend usage of the garage under Union Square is estimated to be 70-80%, while the one under Pershing Square is only 20-30% occupied (Marcus & Francis, 1998; Author, 2011). People drive to Union Square in San Francisco for business, shopping and entertainment while people in Los Angeles look at Pershing Square more like a “parking garage,” and demonstrates that parking alone cannot make a space successful.

Economic Impact of Park-above-Parking Projects

Economic impact of thirteen park-above-parking projects was examined through comparing property values of similar buildings in same uses within Impact block I-III and within Control blocks. Results and findings are shown as the following.

Findings of Indicators

Two indicators could be compared consistently for all thirteen cases. Two indicators were dollar value per square foot of office property value and leasing rate per square foot per year for offices. The other indicators such as general commercial, residential, parking, etc. was not found sufficiently across cities.

Overall Economic Impact

As shown in Fig.4.27, using the proximate principle eight of thirteen park-above-parking projects were found to have positive economic impacts on surrounding neighborhoods, while five of them do not according to the proximate principle. These eight park-above-parking projects are located at the upper section in Fig.4.28: Union Square, San Francisco, CA; Norman B. Leventhal Park, Boston MA; Portsmouth Square, San Francisco, CA; Ellis Square, Savannah, GA; Millennium Park, Chicago, IL; Fountain Square, Cincinnati, OH; Director Park, Portland, OR, and Public Square, Nashville-Davidson, TN. As discussed in the previous Methodology Chapter III, these eight park-above-parking projects are placed in the category of medium-high economic impact. The remaining five park-above-parking projects show low to no overall economic impact on their surroundings land uses.

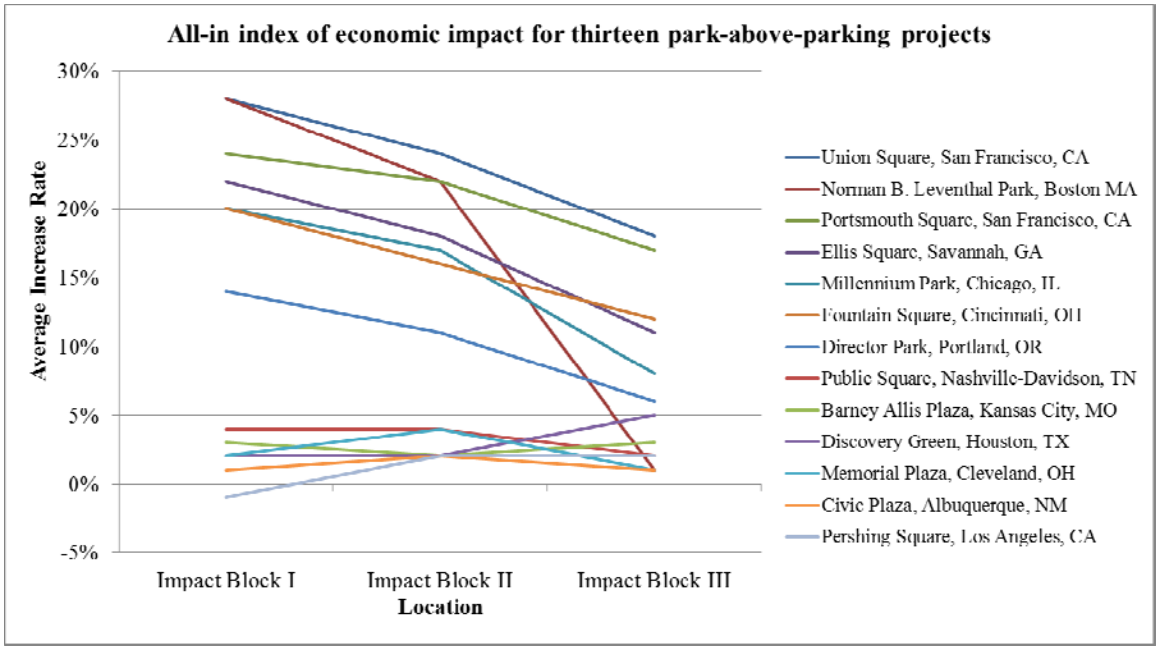


Figure 4.27. All-in index of economic impact

Fig.4.28 shows the results of averaging the overall economic impact of seven park-above-parking projects which have significant positive economic impact. Within one block, the overall real estate value increases 22%; 19% between one and two blocks; and10% between two and three blocks (see Fig.4.28). The average overall economic impact shows that a park-above-parking project has a significant effect on its immediate periphery, and the impact linearly decreases as the distance to park-above-parking project increases. The overall economic impact of park-above-parking projects decays slowly and linearly within three blocks.

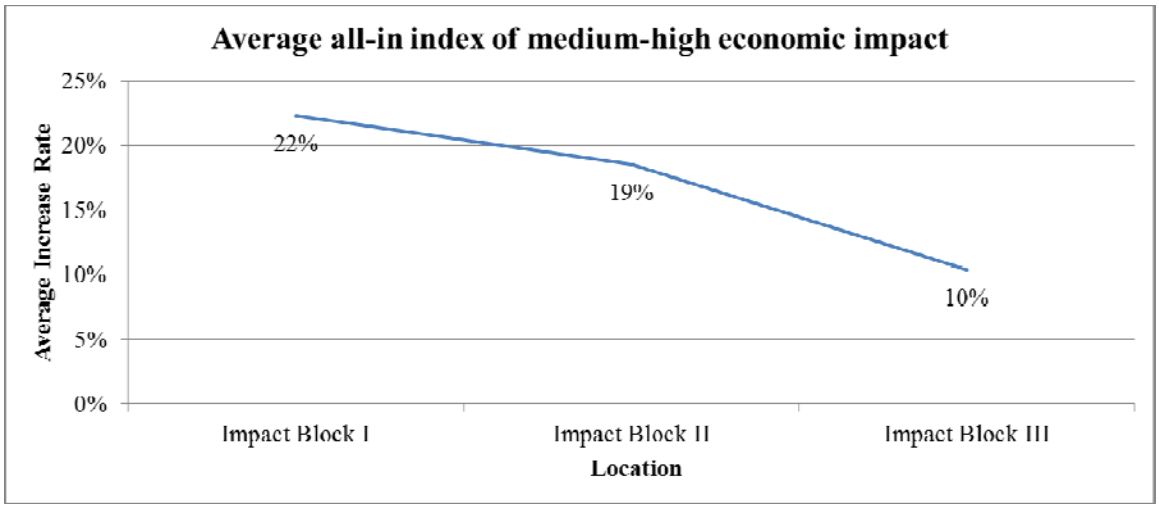


Figure 4.28. Average all-in index of medium-high economic impact

Classification of Design Quality and Economic Impact

As mentioned in the previous Methodology Chapter III, thirteen park-above-parking projects were also categorized according to their levels of all-in economic impact: high, medium, and none-low. Park-above-parking projects were considered as low economic impact if they did not follow the proximate principle. In Table 4.4, Row 9-13: Barney Allis Plaza, Discovery Green Park, Memorial Plaza, Civic Plaza, and Pershing Square were categorized in low economic impact because their percent in property values were against proximate principle. Row 1-8 followed the proximate principle and they were placed in the category of medium-high economic impact. Then comparing to the

standard of 20% in Impact Block I (Column B) and 15% in Average Increase Effect (Column E), Row 1-6: Union Square, Norman B. Leventhal Park, Portsmouth Square, Ellis Square, Millennium Park, and Fountain Square were placed in the category of high economic impact because their percentages in property values were higher than 20% in Column B and higher than 15% in Column E. For Row 7: Director Park, Column B7: 14% is lower than 20% and column E7: 10% is lower than 15%, therefore Director Park was placed in the category of medium economic impact. Similar to Director Park, Row 8 Public Square was also placed in the category of medium economic impact. The category of high, low and medium is shown in Table 4.5:

Column	A	B	C	D	E
Row	**All-in index of economic impact**	**Impact Block I**	**Impact Block II**	**Impact Block III**	**Average Increase Effect**
1	Union Square, San Francisco, CA	28%	24%	18%	23%
2	Norman B. Leventhal Park, Boston MA	28%	22%	1%	17%
3	Portsmouth Square, San Francisco, CA	24%	22%	17%	21%
4	Ellis Square, Savannah, GA	22%	18%	11%	17%
5	Millennium Park, Chicago, IL	20%	17%	8%	15%
6	Fountain Square, Cincinnati, OH	20%	16%	12%	16%
7	Director Park, Portland, OR	14%	11%	6%	10%
8	Public Square, Nashville-Davidson, TN	4%	4%	2%	3%
9	Barney Allis Plaza, Kansas City, MO	3%	2%	3%	3%
10	Discovery Green, Houston, TX	2%	2%	5%	3%
11	Memorial Plaza, Cleveland, OH	2%	4%	1%	2%
12	Civic Plaza, Albuquerque, NM	1%	2%	1%	1%
13	Pershing Square, Los Angeles, CA	-1%	2%	2%	1%

Table 4.4. All-in index table

Overall Economic Impact	Park-above-Parking Projects
High	Union Square, San Francisco, CA Fountain Square, Cincinnati, OH Ellis Square, Savannah, GA Portsmouth Square, San Francisco, CA Norman B. Leventhal Park, Boston MA Millennium Park, Chicago, IL
Medium	Director Park, Portland, OR
None-low	Barney Allis Plaza, Kansas City, MO Pershing Square, Los Angeles, CA Memorial Plaza, Cleveland, OH Civic Plaza, Albuquerque, NM Public Square, Nashville-Davidson, TN Discovery Green, Houston, TX

Table 4.5. Overall economic impacts of park-above-parking projects

Economic Impact on Property Values of Offices

Two indicators are found to be performing consistently across thirteen park-above-parking projects. The first is the property values of offices. Office buildings are essential to every downtown. Previous studies show that downtown office space can generate the most profit per square foot of land compared to other uses (Harnik, 2000; Burayidi, 2001; Crompton, 2001). An all-in index of property values of offices was created for all thirteen park-above-parking projects (See Fig.4.29).

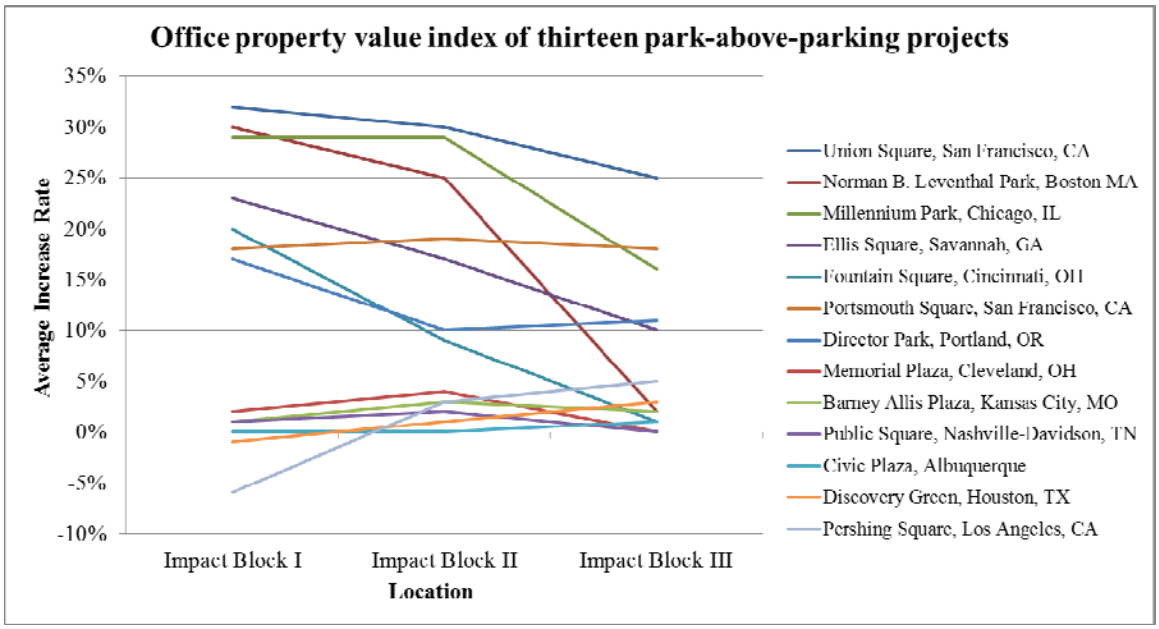


Figure 4.29. Office property value index

Similar to overall economic impact, seven of thirteen park-above-parking projects were found to have positive impacts on surrounding office property values. These seven park-above-parking projects are located at the upper section in Fig.4.28: Union Square, Norman B. Leventhal Park, Millennium Park, Ellis Square, Fountain Square, Portsmouth Square, and Director Park, Portland, OR. These park-above-parking projects have medium-high economic impact on office property values. By using the indicator of average dollar change per square foot, the average property value of office buildings of seven park-above-parking projects was found to be 22% more than the office buildings three blocks away (see Fig.4.30). The property value experiences a 4% decrease as the distance from the park increases from one to two blocks, and an 8% decrease from two to three blocks.

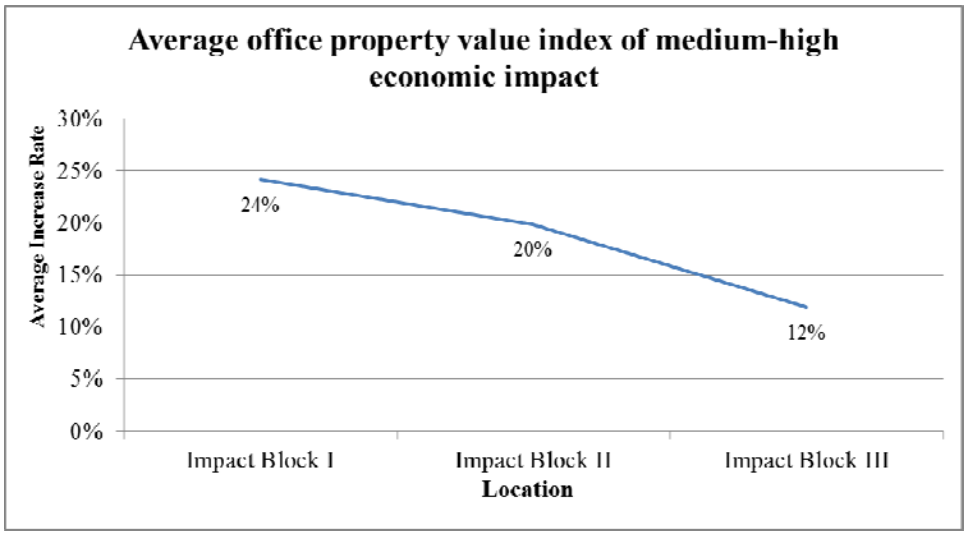


Figure 4.30. Average office property value index

Economic Impact on Office Rents

Office rents are another indicator that can be found in every downtown. In addition to office property values, office rents quickly respond to the variances of market demands (Dunse & Jones, 1998; Wheaton & Torto, 1988). Similar to property values of offices, eight of thirteen park-above-parking projects were found to have significant positive impact on surrounding office rents (see Table 4.6). Eight park-above-parking projects are located at the upper section in Fig.4.31: Union Square; Fountain Square; Ellis Square; Portsmouth Square; Norman B. Leventhal Park; Millennium Park; Director Park; and Public Square. By using the indicator of average dollar value change per square foot per year, the average rent of office buildings facing eight park-above-parking projects was found to be 21% more than the office buildings three blocks away (see Fig.4.30). This indicates that office rent decreases more rapidly than office property value for the small sample studied in this research, by 3% from one to two blocks; and by 9% from two to three blocks. Similar to office property values, the trend of office rents exhibited roughly a linear decrease ratio. The findings show that office rents are sensitive to distance to park-above-parking projects within two blocks.

Column	A	B	C	D	E
Row	**Index of Economic Impact on Office Rents**	**Impact Block I**	**Impact Block II**	**Impact Block III**	**Average Increase Effect**
1	Union Square, San Francisco, CA	29%	17%	15%	20%
2	Fountain Square, Cincinnati, OH	25%	15%	4%	15%
3	Ellis Square, Savannah, GA	23%	20%	12%	18%
4	Portsmouth Square, San Francisco, CA	22%	21%	17%	20%
5	Norman B. Leventhal Park, Boston MA	22%	18%	6%	15%
6	Millennium Park, Chicago, IL	17%	12%	3%	11%
7	Director Park, Portland, OR	19%	17%	14%	17%
8	Public Square, Nashville-Davidson, TN	15%	7%	10%	11%
9	Discovery Green, Houston, TX	13%	11%	7%	10%
10	Barney Allis Plaza, Kansas City, MO	7%	4%	5%	5%
11	Pershing Square, Los Angeles, CA	1%	3%	1%	2%
12	Memorial Plaza, Cleveland, OH	0%	3%	4%	2%
13	Civic Plaza, Albuquerque, NM	-2%	-1%	0%	-1%

Table 4.6. Office rent index

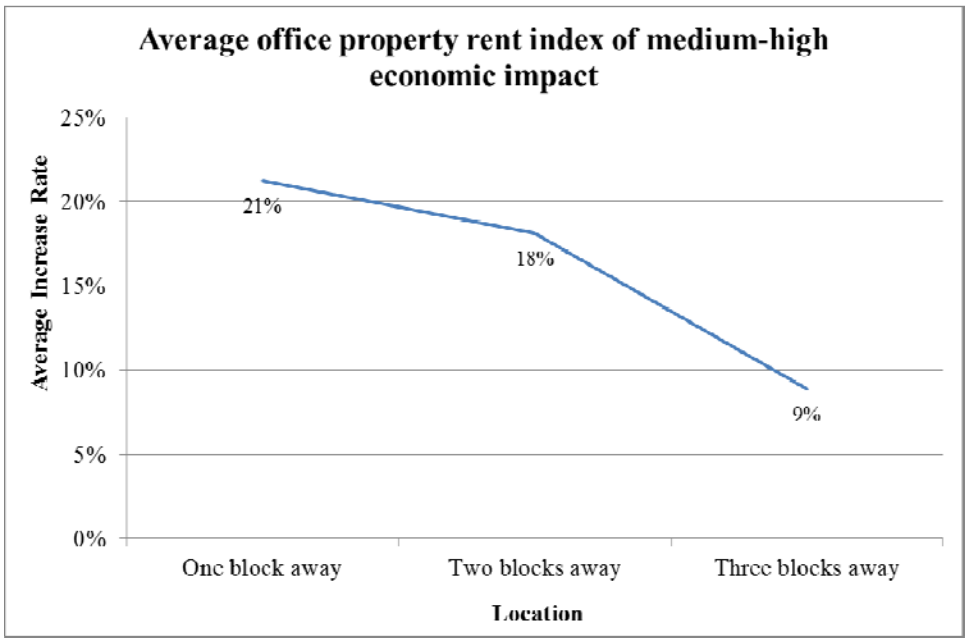


Figure 4.31. Average office property rents of medium-high economic impact

Thirteen park-above-parking projects were also categorized according to their levels of economic impact on office rents: high, medium, and none-low. The criteria of the classification of office rents are the same with the classification of overall economic impact. The category of high, low and medium of office rents is shown in Table 4.7:

Economic Impact on Office Rents	Park-above-Parking Projects
High	Union Square, San Francisco, CA Fountain Square, Cincinnati, OH Ellis Square, Savannah, GA Portsmouth Square, San Francisco, CA Norman B. Leventhal Park, Boston MA
Medium	Director Park, Portland, OR Millennium Park, Chicago, IL Discovery Green, Houston, TX
None-low	Barney Allis Plaza, Kansas City, MO Pershing Square, Los Angeles, CA Memorial Plaza, Cleveland, OH Civic Plaza, Albuquerque, NM Public Square, Nashville-Davidson, TN

Table 4.7. Classifications of economic impact on office rents

Economic Impact on Property Values of General Commercial Uses

This research defined general commercial uses as restaurants, cafes, theater, retail, convenience, large grocery store, shopping mall. General commercial uses have been recognized as a very effective way to keep downtowns viable and livable (Birch, 2005; Feehan, 2006; Ford, 2003). However, data in this category is not available in five of the cases considered: Discovery Green Park, Civic Plaza, Memorial Plaza and Barney Allis Plaza, and Public Square. This is due to either a lack of general commercial uses along park-above-parking projects immediate periphery or to a lack of data to conduct a distance effect comparison. However, where the comparative data is available, it shows that park-above-parking projects can generate significant proximate economic impacts on property values of general commercial uses up to 19% within one block, 15% between one and two blocks, and 8% between two and three blocks. This result illustrates that

park-above-parking projects and general commercial uses benefit each other. Customers and clients of general commercial establishments may become the users of park-above-parking projects, and the users of park-above-parking projects are more likely to spend time in surrounding commercial uses. Under such circumstances, the finding suggests that a flow of people related to park-above-parking project can correlate to a flow of money.

Economic Impact on Property Values of Surface Parking

Surface parking refers to parking lots at the street level. Seven park-above-parking projects have surface parking in their immediate peripheries. However, no significant relationship was found between property values of surface parking and distance to park-above-parking projects. The average property value of seven park-above-parking projects shows that surface parking lots receive a 5% increase in value within one block, but no increase between one and two blocks, and 3% between two and three blocks. This land use type is the only category that is not supportive of the proximate principle. Despite the small sample size, the finding shows surface parking alone brings few people and little function related to park-above-parking projects and therefore no monetary effects. It also suggests that surface parking maintains a weak connection to park-above-parking projects because surface parking is a competitor to underground parking garages.

Park-above-Parking Projects and Housing

In recent years, downtown residential market has rapidly grown. Many cities have recognized the advantages of having people live downtown (Birch, 2005; Burayidi, 2001; Loukaitou-Sideris & Banerjee, 1998), Thus providing a consistent human presence and a market for downtown businesses. Over two-thirds of small cities in Robertson's 1999 national survey show that downtown housing is a strategy in downtown revitalization (Robertson, 1999). In addition, as mentioned in the literature review, the direct measurement of a parks' economic impact is usually drawn from home values (Boyle & Kiel, 2001; Crompton, 2001). Research found that park-above-parking projects currently maintain a loose connection with housing. Only four park-above-parking projects have

housing in their immediate periphery. Due to the small sample size and diversity of housing types and data availability, this research is not able to test park-above-parking projects' direct impact on housing. However, a few of the park-above-parking projects studied have served as magnets for nearby housing developments. For example, One Park Place, a 37-story high-rise luxury apartment residence was opened right after the inauguration of of Discovery Green Park, the first high-rise residential project in downtown Houston in 40 years (Speck, 2008). It requires future research.

Park-above-Parking Projects, Hotels and Convention Centers

Hotels and convention centers together can form a strong feature and greatly benefit downtowns. They provide a full range of services for conventioneers to share information about a business, review new products, or socialize. Eleven park-above-parking projects have one or more hotels on their immediate periphery and three park-above-parking projects have convention centers on one side. However, the diversity in hotel size and the fact that cities usually have one convention center makes it difficult to draw comparisons across neighborhoods. This makes their direct impact impossible to examine.

Hotels maintain multiple relationships with park-above-parking projects. In Kansas City, the summer tennis game in Barney Allis Plaza often attracts guests from the Marriott Hotel and Crown Plaza, which are located on the periphery of the plaza (Osmundson, 1999). In San Francisco, the Westin St. Francis and the Fitzgerald Hotel have a close connection with Union Square. Guests can enjoy views of the park from their room windows and they often cross the square to go to shopping malls, restaurants or museums. Similar to San Francisco, in Portland OR, the Paramount Hotel across SW Taylor Street has the best view to Director Park. In Los Angeles, the Millennium Biltmore Hotel whose style and layout are similar to the Westin St. Francis lost its connection with Pershing Square. The view from lower levels, such as a high-class restaurant at the ground level, to the square is blocked by tall trees and structures and hotel guests rarely step in Pershing Square.

Three convention centers are located on the periphery of park-above-parking projects: Discovery Green Park, Civic Plaza, and Barney Allis Plaza. Studies show

convention centers almost never make direct profits in spite of being busy (Whyte 1988, 1980). The overall economic impact of these three park-above-parking projects is close to the lowest among all projects (the overall economic impact of Pershing Square is the lowest). Many of these convention centers and park-above-parking projects are located in downtowns lacking a diversity of land uses and density, leaving their attendees very little to do on an already tight conference event schedule.

Design Quality and Economic Impact

As discussed in the literature review, design quality plays a fundamental role in determining the economic impact of park-above-parking projects. According to previous studies, good design often leads to high economic impact while poor design tends to result in the opposite. To examine the relationship between overall economic impact and design quality, thirteen park-above-parking projects are placed in nine categories and are discussed in next chapter using two comparable projects: Fountain Square and Pershing Square as cases in point.

CHAPTER V
DISCUSSION

Introduction

This chapter focuses on the relationship between design quality and economic impact of park-above-parking projects. As mentioned in the Methodology Chapter III, this research was conducted in six phases. In this chapter, findings from Phase VI are reported through two comparable case studies: Fountain Square and Pershing Square. Fountain Square was chosen from the category of high design quality and high economic impact while Pershing Square was chosen from the category of low design quality and low economic impact. Comparing these two cases will help us better understand how design quality and economic impact affects each other in the context of downtown park-above-parking projects.

Overall Findings from the Classifications

To classify park-above-parking projects with design quality and economic impact on office rents, thirteen park-above-parking projects are placed in nine categories. Table 5.1 and 5.2 outline the relationships between design quality and economic impact. As can be seen in a great majority of other cases, the level of economic impact is correlated with design quality. In Table 5.1, the majority projects follow the trend from low design quality, low economic impact to high design quality, high economic impact. Only two projects: Director Park and Discovery Green Park, falls out of this correlation. Similar to Table 5.1, In Table 5.2, nine projects follow the trend but four projects: Director Park, Discovery Green Park, Millennium Park, and Public Square were not included in the correlation (Table 5.2).

Overall Economic Impact	Design Quality		
	Low	Medium	High
High			Fountain Square, Cincinnati, OH Ellis Square, Savannah, GA Millennium Park, Chicago, IL Union Square, San Francisco, CA Norman B. Leventhal Park, Boston, MA Portsmouth Square, San Francisco, CA
Medium		Public Square, Nashville-Davidson, TN	Director Park, Portland, OR
None-low	Memorial Plaza, Cleveland, OH Civic Plaza, Albuquerque, NM Barney Allis Plaza, Kansas City, MO Pershing Square, Los Angeles, CA		Discovery Green Park, Houston, TX

Table 5.1. Classifications by economic impact and design quality

Economic Impact on Office Rents	Design Quality		
	Low	Medium	High
High			Fountain Square, Cincinnati, OH Ellis Square, Savannah, GA Union Square, San Francisco, CA Norman B. Leventhal Park, Boston, MA Portsmouth Square, San Francisco, CA
Medium			Director Park, Portland, OR Millennium Park, Chicago, IL Discovery Green Park, Houston, TX
None-low	Memorial Plaza, Cleveland, OH Civic Plaza, Albuquerque, NM Barney Allis Plaza, Kansas City, MO Pershing Square, Los Angeles, CA	Public Square, Nashville-Davidson, TN	

Table 5.2. Classifications by office rents and design quality

Design Quality and Economic Impact: Not Correlated

Of the thirteen park-above-parking projects included in this research, Discovery Green Park, Millennium Park, and Public Square show no direct relationship between design quality and economic impact. Discovery Green Park and Millennium Park have high design quality but medium economic impact on office rents. Public Square has medium design quality but no overall economic impact is found on its surroundings. It shows that design alone might have been a small factor in economic development. For example, under the current land use, Discovery Green Park tends to be the center but its linkage to the surroundings is poor. The current automobile-oriented land uses may lower the park's economic impact (see Fig. 5.1).

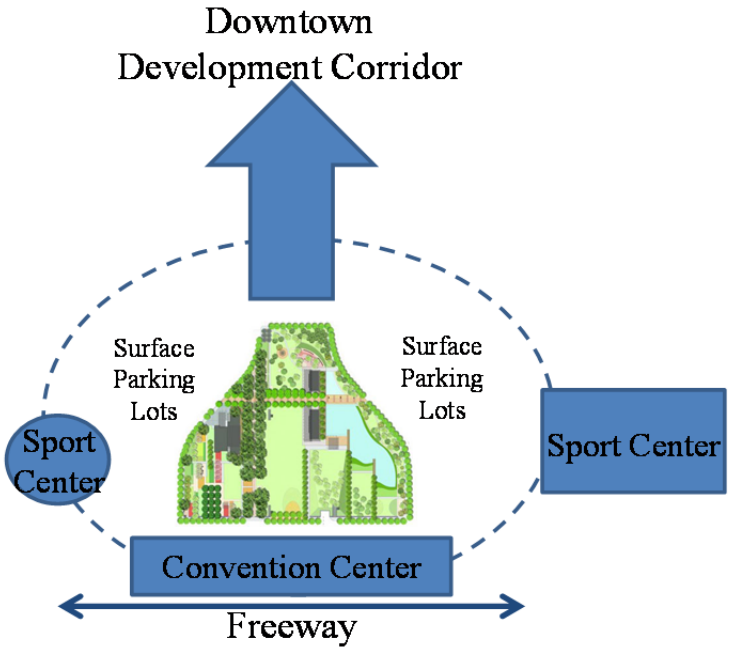


Figure 5.1. Discovery Green Park and its surrounding. Author

For Discovery Green Park, office rent around the park reaches the bottom of medium economic impact. This can be explained by the new development on the periphery. When it opened in 2009, the 37 story One Park Place was the first new downtown high-rise luxury apartment residence in Houston in 40 years (see Fig.5.2).

This $170 million building offers 200,000 square feet of office and 360,000 square feet of retail space including the House of Blues, Lucky Strike Lanes, and other soft-goods retailers (The One Park Place). Several projects have been proposed for the perimeter of Discovery Green, including a second major convention headquarters hotel, Discovery Tower and a new Class A office building (Sheridan, 2009). The increase in office rent shows companies are willing to pay more to have their offices close to the park-above-parking projects.

Figure 5.2. Look at One Park Place from Discovery Green Park, Houston, TX. Retrieved Apr.3, 2012, from http://www.houstontomorrow.org

Design Quality and Economic Impact: Highly Correlated

As shown in In Table 5.1, eleven park-above-parking projects show strong correlations between design quality and overall economic impact. As shown in Table 5.2, nine park-above-parking projects show strong correlations between design quality and economic impact on office rents. In total, eleven of thirteen have proven that design

quality is associated with economic impact. As shown in Fig.5.3, high design quality park-above-parking projects can help to bring 20% more property value in average within a block, 17% more in the second block, and 10% in the third block, comparing to average property value three blocks away. However, low design quality park-above-parking projects can barely bring economic impact: it is only 2% within a block. It is nine times less than well designed park-above-parking projects. It shows design quality and economic impact are associated and it suggests high design quality of park-above-parking projects can contribute to downtown economic development at large.

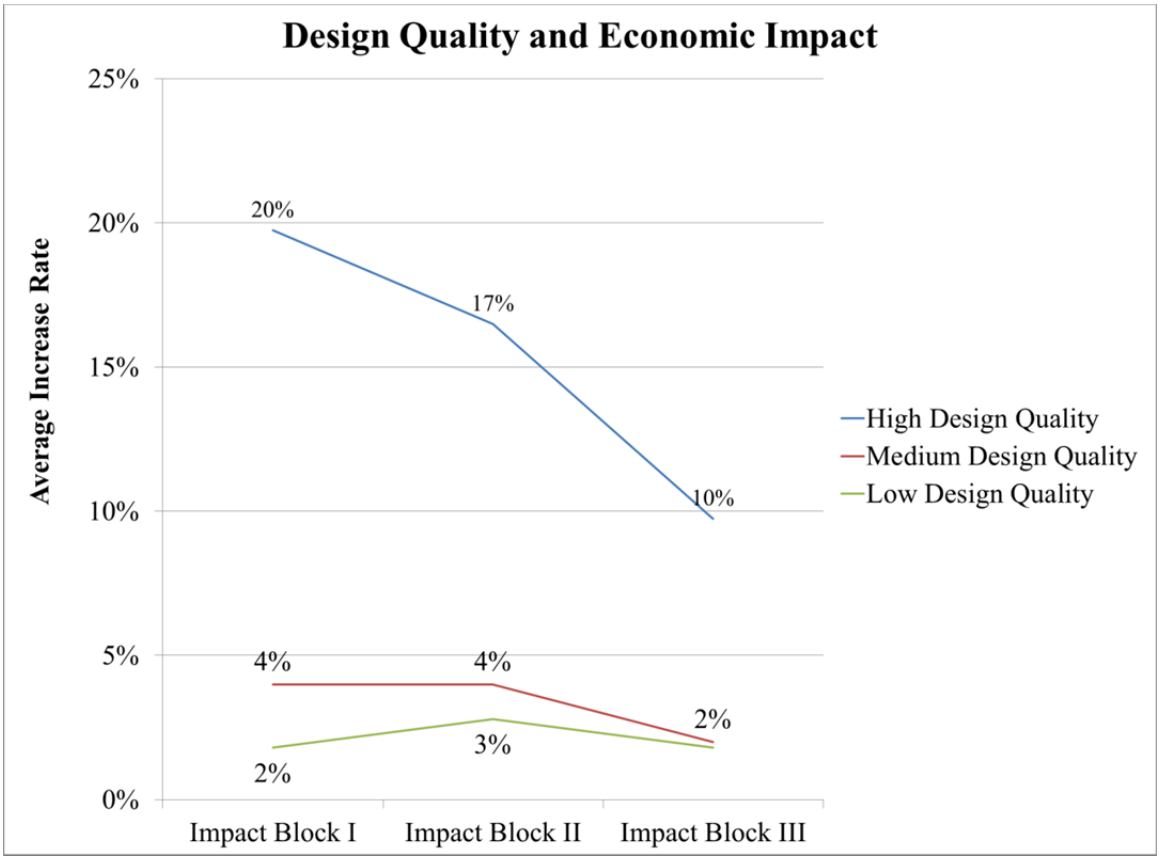


Figure 5.3. Relationships between design quality and economic impact

Findings

The author has selected Fountain Square from the category of high design quality and economic impact and Pershing Square from the category of low design quality and economic impact to illustrate the overall findings related to design and economic impact. These two cases are both located in downtowns of large cities; both of them have a long history and received a major renovation in recent years. However, their similarities end here, as their renovations led to opposite results: Fountain Square ranks the highest in design quality and its overall economic impact is high. On the contrary, Pershing Square ranks the lowest in design quality and its overall economic impact is close to zero. Because of their paradigmatic role, these two park-above-parking projects may represent all park-above-parking projects. The following discussion is based on these two comparable cases and highlights some of the key findings:

Finding 1

Good design contributes to high economic impact while low design quality is associated with low economic impact. Fountain Square and Pershing Square rank respectively the highest and lowest in design quality. Since 2005, the completed renovation of Fountain Square began to attract people back to downtown. A large paved plaza was replaced with an intricate, granite-clad plaza and green spaces featuring groves of native deciduous trees and planters with native and adapted shrubs, perennials and seasonal flower displays. Fountain Square received the second highest score among all thirteen park-above-parking projects in this study's assessment of design quality. Except for water, Fountain Square received scores of 1 on the rest of variables (see Fig.5.4).

Pershing Square ranks the lowest in terms of the design quality. It received a positive score for only three of the design variables considered, variables, sitting space, sun access and shade, and water, while the author scored negatively or neutrally for the remaining seven measurements, thus suggesting that the redesign does not function well (see Fig.5.4).

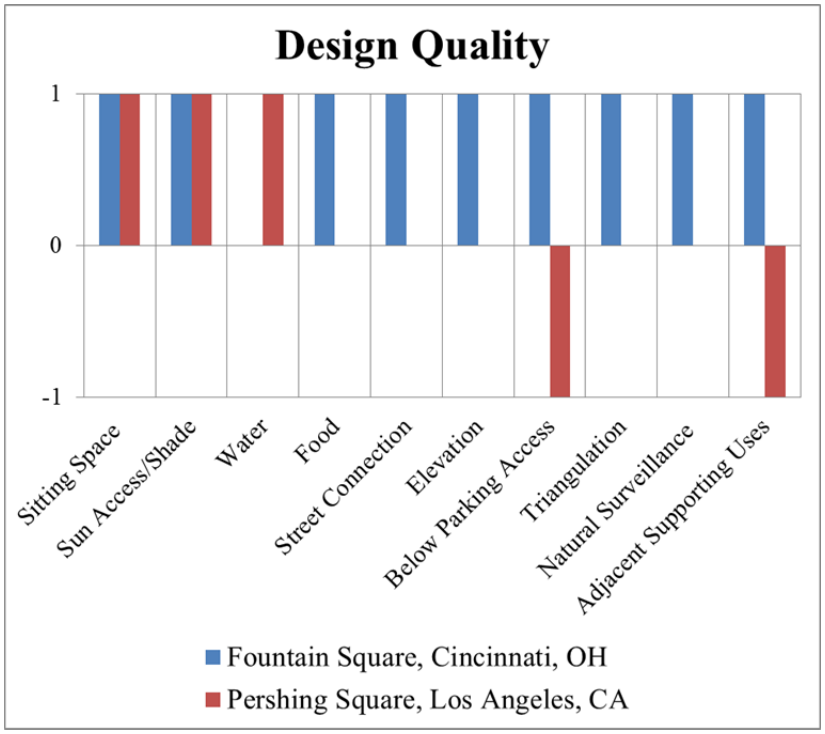


Figure 5.4. Design quality of two case studies

My most recent visit to Fountain Square, Cincinnati, OH began on March 22, 2012. It was a sunny day and the temperature was around 90 degrees. In the morning, the square was in the shade of the skyscraper. The breeze attracted people to the square because it was cooler than the streets. More than 50 people were using the plaza on this weekday morning. They sat around the fountain, and in the sandy gravel area. The sitting was well designed — wherever one sat, one could see and hear the fountain. At the same time, the underground garage was well used and 80-90% full during the visit.

As time went by, the square received more and more sunshine. The square was enclosed by the shadow cast by the Fifth Third Center. At lunch time, half of the square was under the sun and was very busy. From 11:30-1:30 pm, it was very difficult to find a seat in the square because all the tables and chairs were occupied by hundreds of downtown office workers. These people could be seen either eating at the restaurants surrounding the square, bringing their food to the square, or walking across the square to get food. When they could not find a chair or a table, they found other places to sit while eating. This is the time that people in suits and shorts, businessmen and families, share an

open space that we call “public.” The design of Fountain Square is divided into four sub-areas, and the designers did not have to do much— the users fill their park.

The park amenities make the square even more popular. Restrooms are located on the west side of the square next to the pedestrian entrance to the underground garage. The signs for the restrooms are big and easy to recognize. Restrooms were clean and functioned well, but they are only open from 11:00 to 2: 00 pm and during events, while the square and parking garage are open 24/7. “We wanted the restrooms open longer,” said a staff member of 3CDC, which manages and operates Fountain Square, “but we have to close it early” (the Interview, 2011). The staff explained that restrooms had become a place where undesirable or illegal activities happen so the park managers decided to close the restrooms earlier. This explains why many public squares do not provide restrooms. The limited restroom hours do not seem to be a major issue in Fountain Square, because people can find restrooms in nearby Macy’s or office buildings.

Beyond the park features, people are often concerned with the safety of the underground parking garage. The parking garage under Fountain Square is well used on weekdays and weekends. On a regular workday, there was an average of 10 cars entering and exiting per 15 minutes on the west side of the square. This is because Fountain Square is close to many attractions and its parking rate is relatively low. It does interrupt the pedestrian movement on the sidewalk but the car entrance and exit is only on one side of the square. Another car entrance/exit is located behind the Fifth Third Center, thus it does not interfere with the square use. According to the garage manager and Cincinnati Police, few accidents and illegal activities were reported in last three years (the Interview, 2011).

Similar to the site visit of Fountain Square in Cincinnati, I visited Pershing Square twice over twelve days. I first learned about Pershing Square in 2003, when I was a graduate student in architecture. At that time, I read an article about the redesign of Pershing Square in the Chinese version of the book: *Ricardo Legorreta, architects* (Mutlow 1997). I was impressed by its symbolic structure and imageability. But I did not visit Pershing Square until 2009. It was a short visit on a sunny summer day. The symbolic structure was still there but there were few people in the square, just like the images in the book revealed. I revisited Pershing Square in March 2011, looking for clues

regarding its design, social use, and economic impact. I spent 12 days in Pershing Square witnessing its daily use and special events; interviewing people who know its stories; and visiting its surrounding neighborhoods to ascertain the economic impacts of the project on its context.

On the morning on March 22, 2011, a typical cloudy weekday, I arrived at the corner of W.5th and S. Olive Street after an hour-long bus ride from UCLA. From a distance, a sign clearly indicated "Pershing Square Garage" and its parking rates. I walked into the square, and I saw the 125-foot tall purple bell tower. My first instinct was that it was too tall, making it difficult to take a picture with the entire bell tower in the park. Not far, a few homeless people were there sleeping on a shady bench in the elevated area in the lower plaza, which made me almost afraid to venture into that area. The pool did not attract any people. As I sat on a concrete bench and looked around, still no people were visible. "Maybe it is too early for a public plaza," I told myself before deciding to visit the underground parking.

Compared to the empty park above, the underground garage was well used. Level 1 is reserved, and level 2 and 3 are open to the public. The majority of parking users are people who work in surrounding offices-60% of whom are "monthly" users (Personal Interview, 2011). There is a patrons-only restroom at the entrance to the underground parking garage. The key is held by security. The garage is open 24/7. Security called it a safe garage, and described it as "boring" because they do not have much to do other than patrol the garage on bicycles. I decided to come back early the next morning to see if any parking users engaged with the park above.

Back in the park, a few vendors were setting up the Farmer's Market. During the lunch hour, office workers and a few tourists came to the park. They lined up to get lunch and fresh produce. Some of them sat around the table in the lower plaza close to the pool. They left as soon as they finished their lunch. The Farmer's Market stayed open until 2:00 pm. At 2:30 pm, the park was quiet again.

In the late afternoon, I visited the square again. The park was busier than in the morning. More homeless had gathered there; three people were reading on the grass area; and two security staff patrolled the park. The busiest areas were several bus stops on each side of the square – people, mostly Latinos, were waiting for the bus to get home.

I then visited Pershing Square every day for the next 11 days from morning to night. Since the first day of my visit, park staff, LAPD, and security were preparing for a rally against the anti-union laws passed in Wisconsin a few days earlier. 5-10 staff worked in the park every day one week prior to the rally. This was the biggest event I witnessed in Pershing Square. According to the *Los Angeles Times*, police estimated that between 5,000 and 8,000 teachers, nurses, Teamsters, electricians and others marched to oppose organized-labor restrictions in Pershing Square on March 26, 2001(Streeter, 2011). The surrounding roads were closed for the rally. This was the only time I saw Pershing Square full of people.

Scholars argue, and many precedents have demonstrated, that the core value of a public square is its openness to the surroundings and its visibility from street level (Cranz, 1984; Tate 2001). However, I only found that approximately 15-20 people on average use Pershing Square on weekdays which might be due to the lack of openness. Being enclosed by structures and trees, its visual connection from the street is completely cut off. On S. Olive Street, the square is lined by the purple wall and Palm trees; along W.5th and W.6th Street, the square is separated from sidewalks by the presence of car entrance and exit ramps. Along S. Hill Street the square is lined by the structure and trees. People walking along the street have no clue what is inside the square. No matter how perfect the design may be, people have no desire to enter it and use it if they cannot see it.

The square is divided into two plazas, each with several elevated small areas. While these small spaces greatly contribute to the picturesqueness of this landscape, they are problematic as they are usually occupied by homeless. There are benches where they can sleep, and the areas are raised and sheltered from the public eye. From here, the homeless population can oversee most of the square and see if anyone is approaching their territory. While the majority of homeless are harmless, the public keep as far away from them as they can. This is especially true of the well-dressed white collars— they do come to the square to get food at the Farmer's Market, but they sit in the chairs across the pool from the "undesirables."

Although they account only for a small percentage of the typical downtown population, the homeless are a big presence in Pershing Square, contributing to an

unpleasant image that prevents downtown office workers and fellow citizens from using the square. As discussed early in previous Design Analysis Chapter IV, this is a national problem. Ford (2003) argues that to solve such a problem "cities may thus have two types of open space—one for white-collar workers and well-heeled shoppers and the other for the less affluent masses" (127). I think this would worsen the segregation. Instead, I embrace William H Whyte's suggestion (1988) that the best way is to make a place attractive to everyone. Are there any park features that attract everyone?

Whyte (1988) argues that public art—sculptures, performances, street vendors, informal concerts—can encourage triangulation. While there are a few sculptures at the corner of S. Hill St. and W.5th Street, this mini art walk is isolated from the rest of Pershing square and fails to attract many visitors. While the park features the occasional noon concert, or Saturday Rally, for the most part it is the case of events that exploit its downtown location and are not showcasing the design of a square lacking park features that can attract "the spontaneity, verve, and bustle of the multiethnic crowd" (Loukaitou-Sideris 1998, 158).

The relation between the square and underground parking garage is awkward, and accentuated by the presence of car and two pedestrian entrances/exits on all sides of the perimeter. These interrupt the pedestrian movements along the sidewalks. The designers explained the reasoning behind this arrangement as the need "to manage the car flow and people flow in a limited space" (Researcher Director at Olin Studio, 2011). However, alternative designs may exist that could encourage parking users to spend time in the park other than just come here for its parking garage.

Pershing Square achieved in a picturesque landscape more than anything else which provides high aesthetic values. The Picturesque evolved from mid-18th century English landscape theory, where it was used to evoke natural landscape appearance (Andrews, 1989; Copley & Garside, 2010; Swaffield, 2002) and the imagination and pleasures derived from the connection to nature (Czerniak & Hargreaves, 2007). Pershing Square provides a variety of abstract elements that remind people a Mexican plaza and associated activities. In spite of it is location in the urban core, it still shares the spirit of the picturesque and landscape experience.

From a social use point of view, the redesign is problematic, as it tries to balance limitations and challenges of various kinds. “There is not much we can do,” said the Research Director at Olin Studio. Designers cannot physically bring people downtown, but their designs should welcome people and attract them there by relying on the diverse surroundings’ power of inducing a natural, continuing flow of life and use (Jacobs 1961). What are Pershing Square’s surroundings and on what level do they affect or are affected by Pershing Square?

Fountain Square generates significant economic impact on surrounding uses. The results of the economic impact analysis of Fountain Square show that the overall real estate value within one block increases up to 20%; up to 16% between one and two blocks; and up to 12% between two and three blocks. The average increase effect of three impact blocks is 16%. However, Pershing Square countered the proximate principle. Results show that within one block, the overall real estate value drops 1% while the increase rate between one and two blocks and between two and three blocks is only 2%. The average increase effect of three impact blocks is only 1%. In short, Pershing Square barely generates any economic impact. Its problematic design is one of the reasons. The site inventories of Fountain Square and Pershing Square are shown in Figure 5.5-5.12.

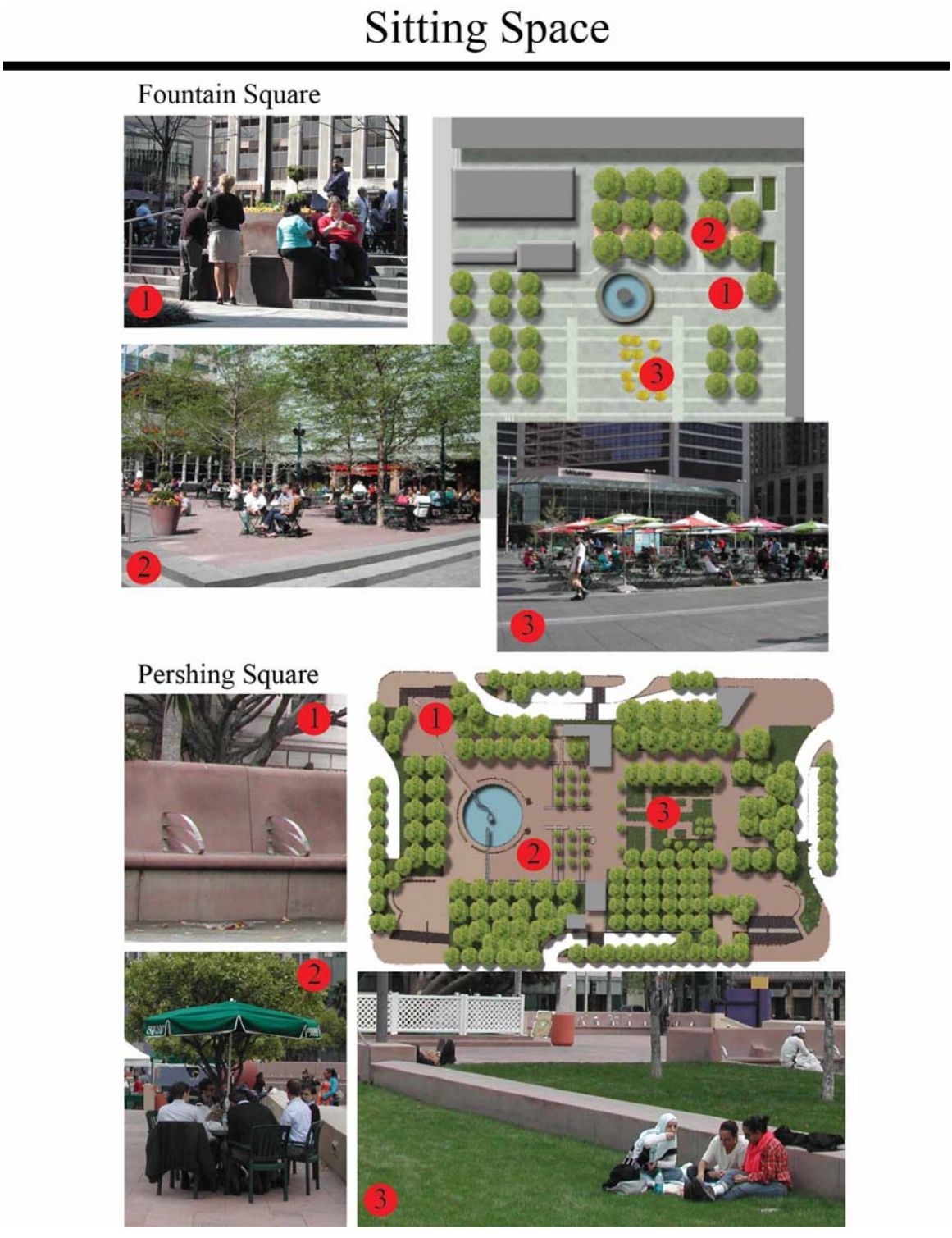


Figure 5.5. Analysis of Sitting Space. Author

Sun Access/Shade

Fountain Square

During 11:30-2:30 pm, shaded area is mainly provided by vegetation on site.

Pershing Square

Figure 5.6. Analysis of Sun Access/Shade. Author

Water and Food

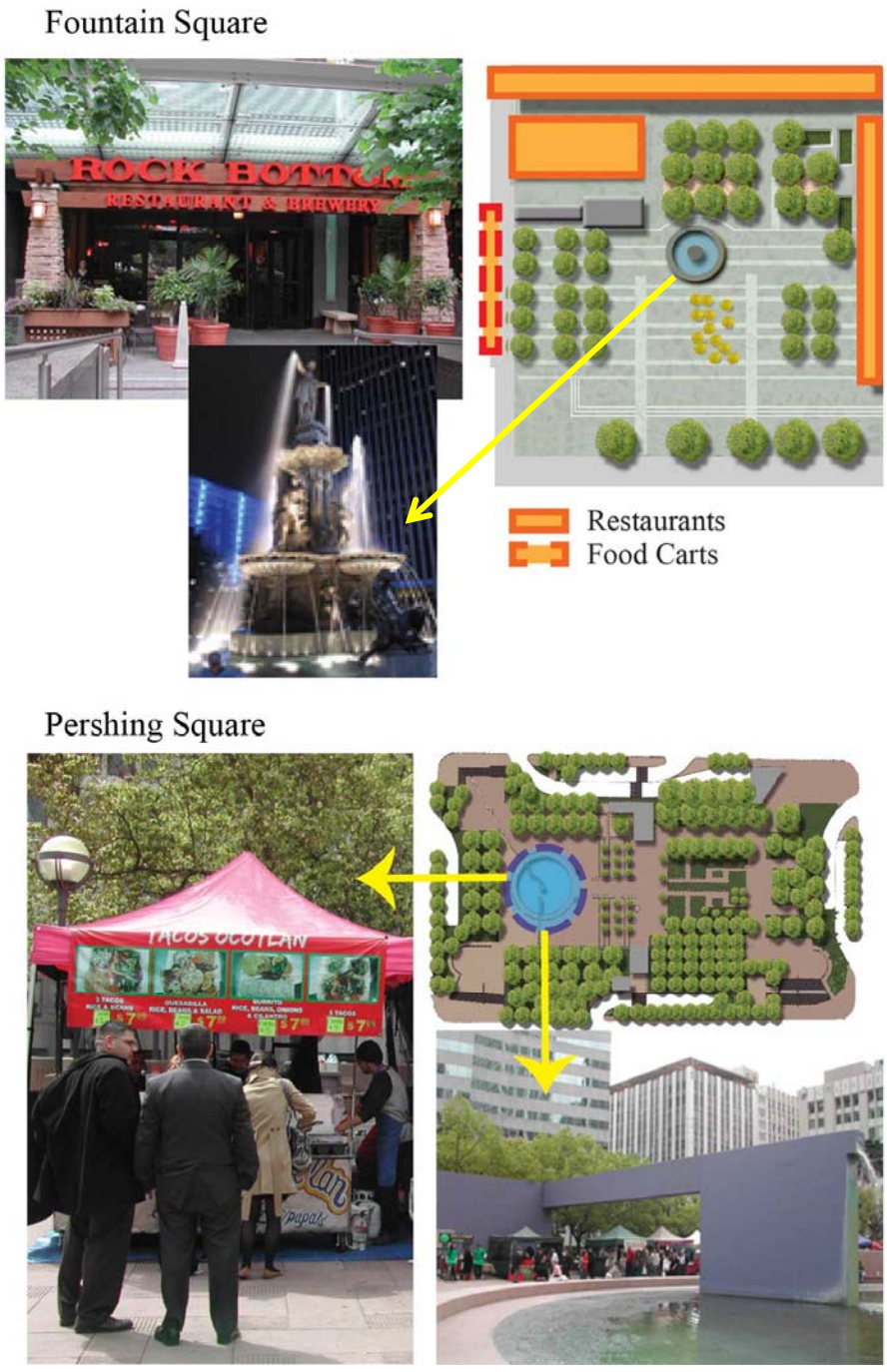
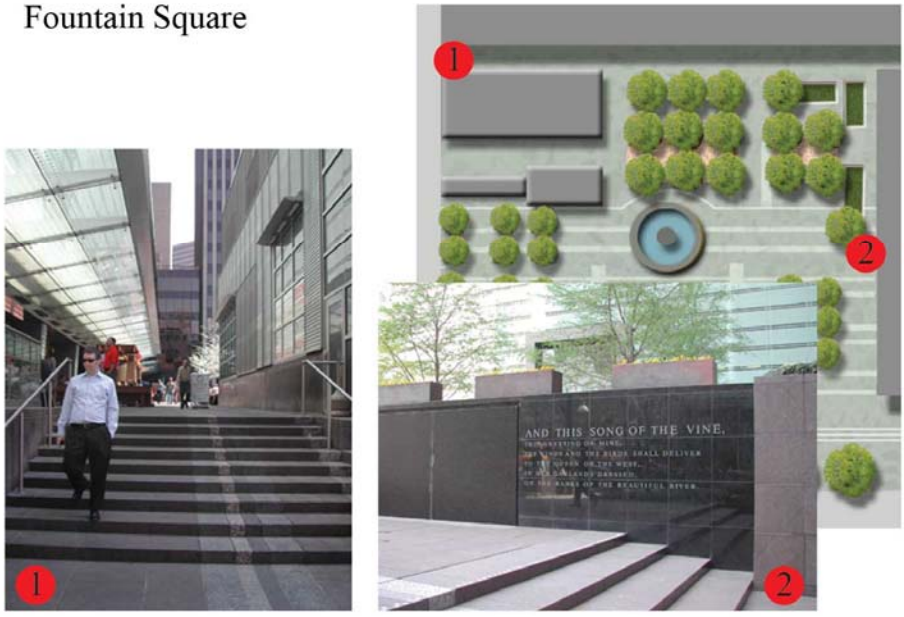


Figure 5.7. Analysis of Water and Food. Author

Elevation

Fountain Square



Pershing Square

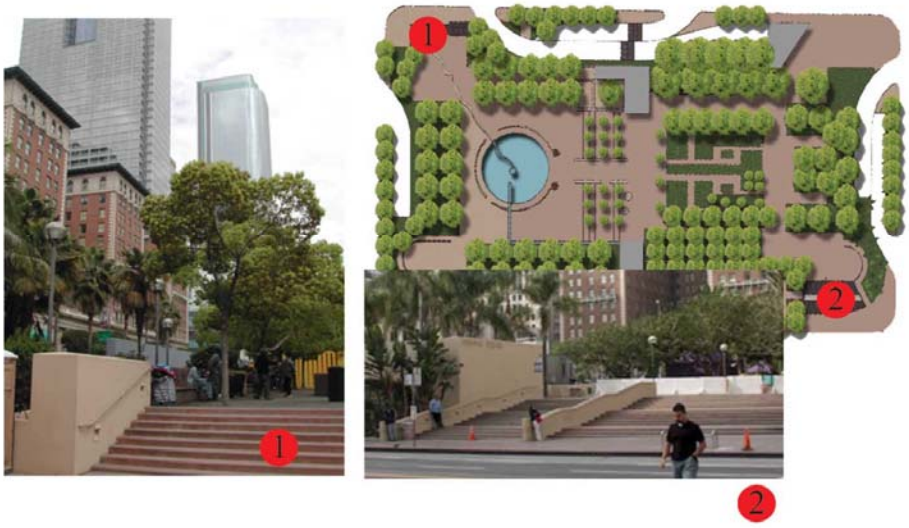


Figure 5.8. Analysis of Elevation. Author

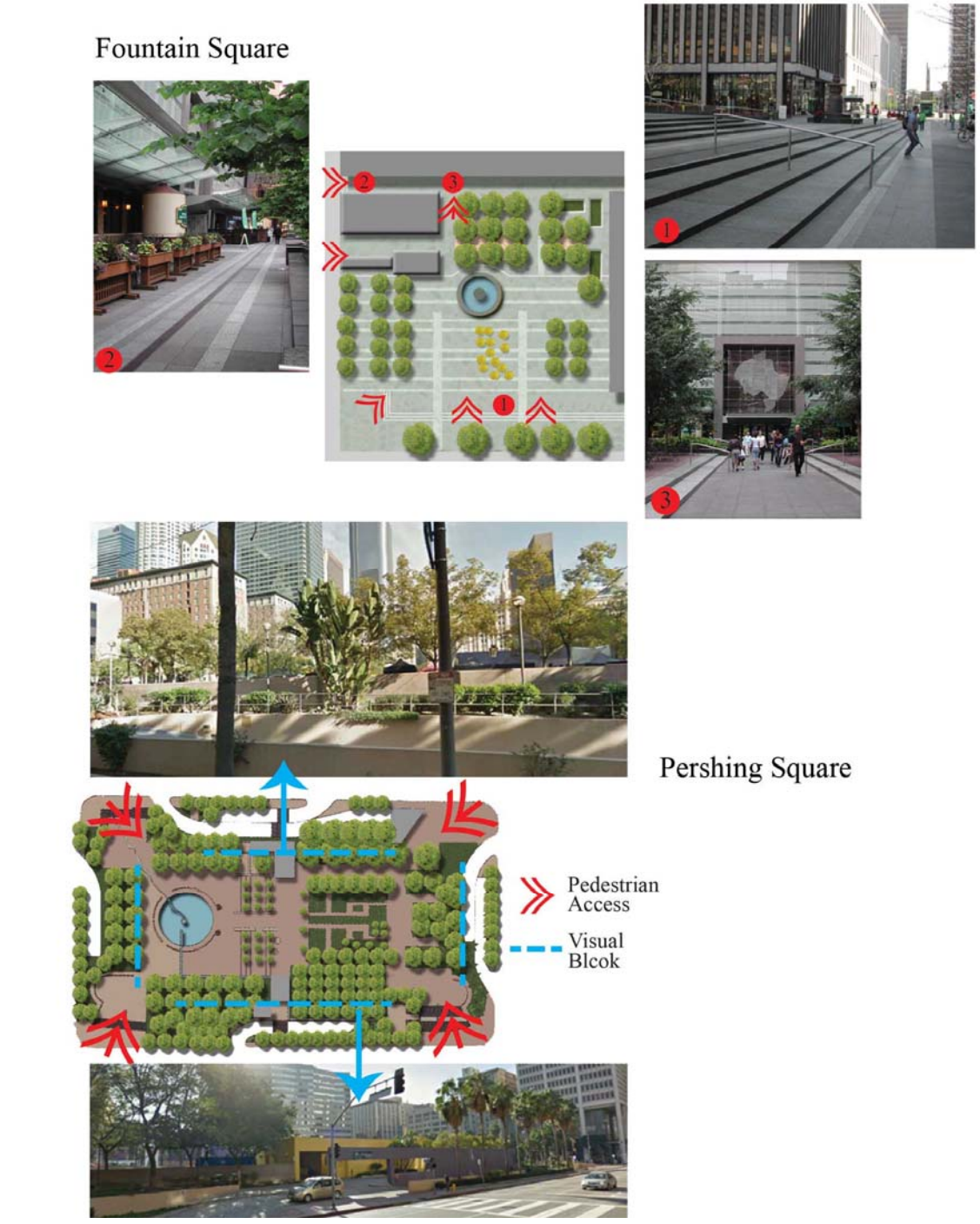


Figure 5.9. Analysis of Street Connection. Author

Figure 5.10. Analysis of Triangulation. Author

Figure 5.11. Analysis of Below Parking Access. Author

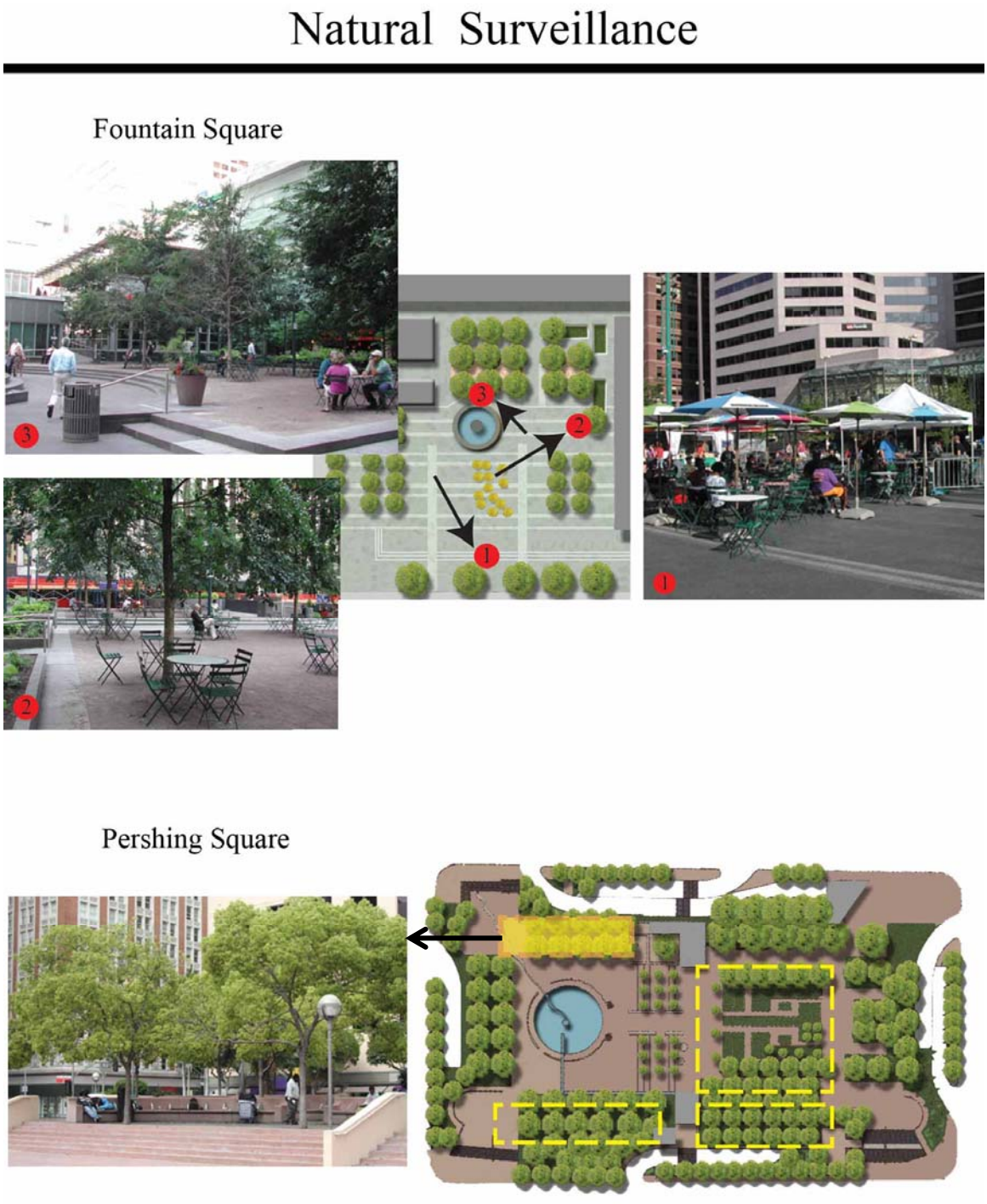


Figure 5.12. Analysis of Natural Surveillance. Author

Finding 2

High diversity and density of surrounding land uses are major factors associated with high economic impact while low diversity of surrounding land uses leads to low economic impact. Economic impact is affected not only by design quality, but also by surrounding land uses. Fountain Square maintains a close relationship with the surrounding businesses (see Fig.5.13). The first floor of the Fifth Third Center, which is located on the east end and its annex on the north end of the square, is occupied by many food related businesses with outdoor seating right on the square. Across the street to the west and south side of the square are a Macy's department store, the Westin Hotel and US Bank. The second and third of these buildings have elegant restaurants facing the square. In the afternoon, many people come to the square for happy hour at Rock Bottom and Mynt Martini. Others line up at Graeter's for a local ice cream. Fifth Third Center also has its main entrance and serves as a shortcut to East 6th Street on the square.

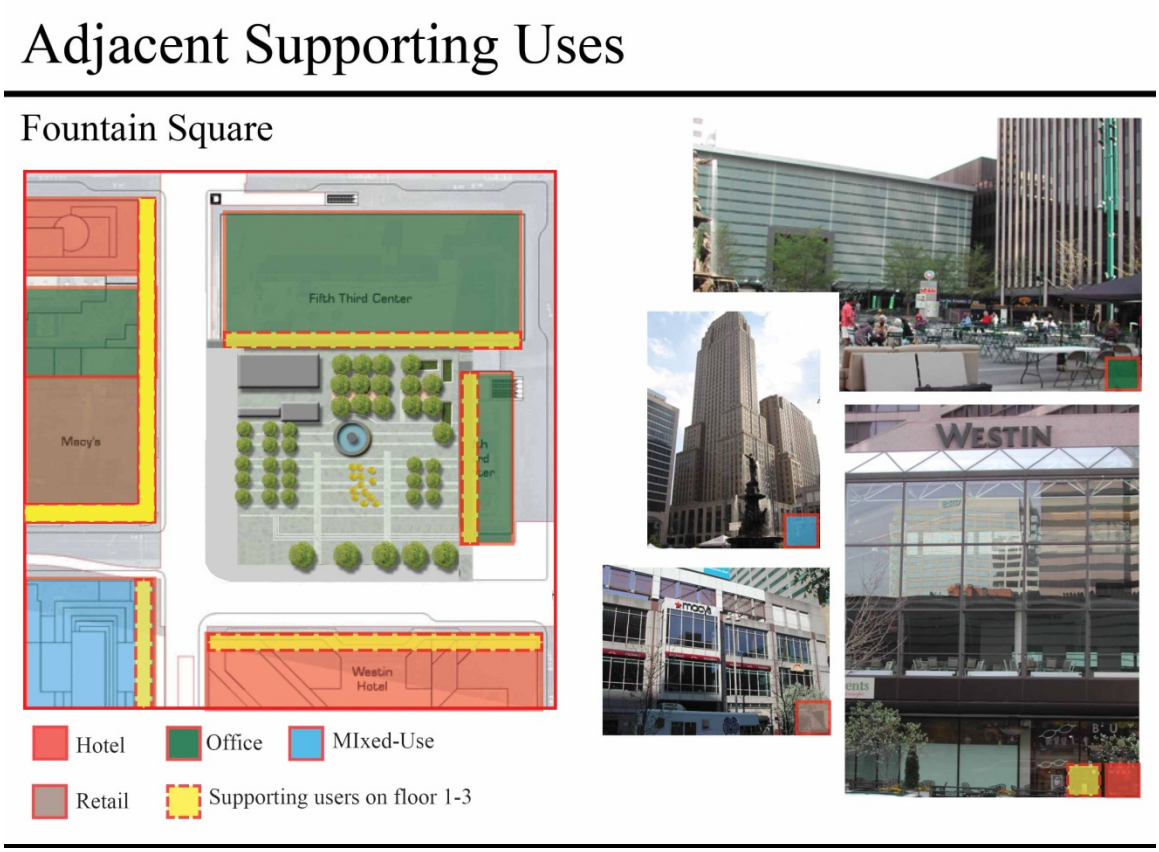


Figure 5.13. Adjacent uses around Fountain Square. Author

People visit downtown Cincinnati regularly and many of them live downtown. Fountain Square provides a valuable open space that connects the shopping, entertaining, and business together, “We live downtown, three blocks away from Fountain Square,” said a staff member at the Cincinnati Visitor Center, which is located on the square between Chipotle and Rock Bottom. She said “We use to live at Indian Hill (a suburb in Greater Cincinnati), but my husband works downtown. When the kids grew up, we sold our house and moved back to downtown.” (Personal Interview, 2011) She worked in the Cincinnati Visitor Center after she retired as a volunteer, 3 hours per shift. The new Cincinnati Visitor Center opened in 2010 and its office space was donated by the Fifth Third Center. When I asked how much change the renovation of Fountain Square has brought, she said, “It is tremendous. I used to only go to shopp downtown, now I live here. People thought it was ridiculous to put that much money into renovation, now everyone is amazed.” The renovation cost $43 million and only $ 4 million—10% of the total cost— came from the city, while the rest came from private contributions.

There is not much diversity of land uses around Pershing Square: one hotel, two surface parking lots; and six office buildings constitute its immediate surroundings (see Fig.5.14). A luxury hotel, the Millennium Biltmore Hotel was built during the peak of downtown development in 1920s. Architect Schultze & Weaver designed a synthesis of the Spanish-Italian Renaissance Revival, Mediterranean Revival, and Beaux Arts styles. It is also known for having been home to the Academy Award Ceremony for the Oscars during those early years. The hotel has an entrance and a restaurant facing the square but their view is blocked by trees and traffic. According to my observations, guests who stay there are rarely seen visiting the square. During the Saturday Rally, some of the tourists walked out of the hotel and tried to avoid the rally crowd. While The Biltmore was originally located here because of Pershing Square, its connection to the plaza has been lost.

The Title Guarantee and Trust Company building and five other office buildings are also located on the square’s edge. The ground floor of these office buildings is occupied by general commercial, i.e. restaurants, salons, and flower shops, etc. The commercial uses are similar to the rest of downtown. Beyond their views from tall office buildings to the square, the only connection between the office buildings and the square

is the underground parking garage, which serves many office workers. This group of individuals parks in Pershing Square and disappears in the office buildings during weekdays, and rarely comes here on weekends. They may spend some time in the park on some occasions, i.e. Farmer's Market. They are a big percentage of the typical downtown population but a tiny percentage of the population in the park in contrast to the homeless and other citizens.

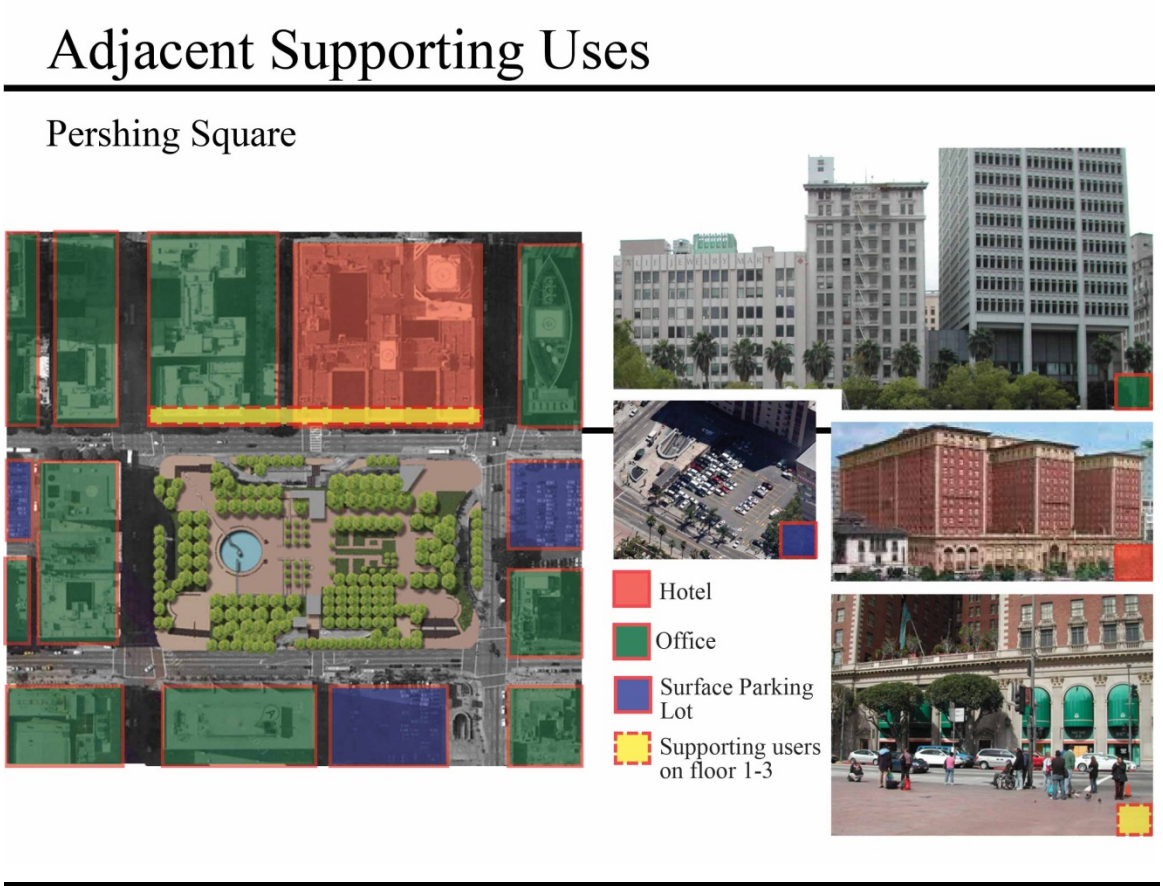


Figure 5.14. Adjacent uses around Pershing Square. Author

This can also be found in the remaining projects. For example, Union Square and its immediate neighborhood have become the central shopping area of San Francisco since the renovation. A variety of retails, restaurants, and other services are located around the square. These high density high diversity land uses bring a large amount of users to the square and the underground parking garage. According to MJM Management

Group, Union Square receives 10,000 to 15,000 visitors per day in the summer months. In the winter months, the estimate is 8,000 to 10,000 visitors per day on average (MJMMG, n.d.). In general, high diversity and density can help park-above-parking projects archive high economic impact.

Finding 3

Management is a key to high economic impact. Fountain Square is unique among all thirteen park-above-parking projects in terms of management. While all other park-above-parking projects are owned and managed by their respective municipalities' parks departments, Fountain Square is owned by the City of Cincinnati but managed and operated by 3CDC: Cincinnati Center City Development Corporation, a private non-profit corporation, a unique model of public-private partnership in park management.

3CDC was formed in July 2003 according to the recommendations from a City of Cincinnati Economic Development Task Force. Then Mayor Charlie Luken and members of the Cincinnati corporate community recognized that the economic future of Cincinnati "depended first and foremost on a strong and vibrant downtown business and entertainment district" (3CDC). Its operations are funded through corporate contributions.

The successful renovation of Fountain Square relies on team effects. I spent two days reviewing archives of Fountain Square including drawings, agreements, and reports. These archives are drafted and collected by seven full time staff that are responsible for Fountain Square management and operation. Unlike other park-above-parking projects, 3CDC had been involved in the renovation design process. The current Fountain Square manager was one of the architects. By 2003 the nearly 40-year-old underground parking garage became unusable. The ground level plaza was unwelcoming and harsh, without proper landscaping. As a manager, he was also aware that, due to budget constraints, the new plan had to be affordable. Being an architect and manager, he and his teammates avoided spending tremendous time on swaying between design and cost. In contrast, the design process of Pershing Square had to start over because the winning scheme was too expensive to implement.

Beyond its own team efforts, 3CDC also worked with the state, the city and local neighborhoods to make Fountain Square a welcoming public space. One significant improvement was made to Fountain Square was the large amount of green space. The green space, located on the northern and eastern perimeter, creates a buffer between the commercial space and the square. It is managed by the Greenspace Program which is part of the Cincinnati Park Board (Simes, 2010).

The Greenspace program is responsible for the design, installation and maintenance of three seasonal displays every year. The work begun at Fountain Square has led to other opportunities, and the program has expanded into eight of Cincinnati's neighborhood business districts. Green space is often limited in many park-above-parking projects due to its duality: the roof of the underground garage is also the load carrying structure for the ground park. But new construction methods such as the ones used in its renovation allow more green space in the park, which in return will help facilitate new initiatives like the Greenspace Program to better maintain green spaces in the highly urbanized city core (see Fig.5.15).

Figure 5.15. Landscaping at Fountain Square is managed by Greenspace Program.
Retrieved Apr.26, 2012, from http://t3.gstatic.com/images

3CDC also manages many of the events occurring at Fountain Square. Anyone interested in organizing concerts, exhibition, festivals, or protests can apply online at 3CDC's website. Every year, two hundred events are held at the renovated Fountain Square including PNC Summer Music Series, and a Christmas Tree Lighting.

Fountain Square was the first 3CDC project in downtown Cincinnati. As a master developer, 3CDC realized that one project does not change all, so it now overseeing new efforts to enlarge the benefits of Fountain Square. Since 2004, 3CDC has invested over $324 million in redevelopment and new projects in downtown Cincinnati. These projects include new condominiums, updated commercial space and mixed-use development which greatly enhance the economic impact of places like Fountain Square. Washington Park is another park-above-parking project that follows the renovation model of Fountain Square. It is a historic downtown park located six-blocks from Fountain Square, and it has become a problematic place due to its deteriorated neighborhoods. In 2005, 3CDC began land banking abandoned, vacant, and dilapidated properties around Washington Park and converted them into offices and residential units. In 2010, the renovation of Washington Park began. The new 450-space underground parking garage was added to the park and completed in March 2012. The park will re-open to the public in June 2012, but over 80% of adjacent renovated properties have already been rented or sold.

Similar to 3CDC, MJM Management Group, a private company, oversees operation of Union Square, Friends of Post Office Square, a civic organization, is responsible for the development and management of the Norman B. Leventhal Park and the underground parking garage, Discovery Green, a non-profit organization, operates and manages Discovery Green Park. These private sectors dedicate more resources, higher budget, and more staff to long-term park management in contrast to park departments which are usually responsible for park operation. For 3CDC and MJM Management Group, they are not just oversees operation of Fountain Square and Union Square, they are responsible for multiple downtown districts redevelopment. In doing so, these private management organizations have a vision that considering park-above-parking projects as a part of downtown renewal. At the same time, they work closely with the cities to ensure their management strategies in support of local businesses and to

improve the urban experience of everyone, users and non-users of park-above-parking projects.

Finding 4

Park-above-parking projects support downtown redevelopment, which may lead to significant economic returns. The Fountain Square renovation has generated significant economic impact on its surroundings, and various meetings with the staff in 3CDC verified my findings. The restaurant Via Vita is located on Fountain Square and it pays 3CDC at least $1.5 million in rent per year. On the immediate periphery, improvements were applied to many other buildings because of the Fountain Square renovation, such as the Westin Hotel, Carew Tower, 525 Vine Street Building, and the Fifth Third Center. The headquarters of Fifth Third Center are located on the east border and its annex is located on the north border. During the Fountain Square renovation, Fifth Third Center renovated its first floor and rented it to a few well-known restaurants including Chipotle, Rock Bottom, Mynt Martini, and Graeter's Ice Cream (see Fig.5.16).

All these restaurants are facing Fountain Square and some of them, such as Rock Bottom and Mynt Martini, provide plenty of outdoor seating on the square. With less than $500,000 in investment, Fifth Third Bank receives more than $5 million rent per year. Fifth Third Bank also renovated its annex façade, which provides a modern architectural background for the north boarder of the square. According to the Vice President of Communications of 3CDC, this is all because of Fountain square's successful renovation. To maintain the strong economic impact of Fountain Square, the city has committed not to alter the current zoning designation of Fountain Square: DD-A[1] (Downtown Development Core), which was intended to promote the downtown area as a center for social, cultural, and economic activities.

Across Fifth Street, McCormick & Schmick's seafood chain became the first new signed tenant of the renovated Fountain Square. The restaurant opened in 2006 in the lobby of the Westin Hotel with many window seats facing Fountain Square. Overall, over

[1] Zoning DD-A allows residential, commercial, offices, entertaining uses, etc.

160, 000 square feet of restaurant and retail spaces was targeted for upgrades. This is one of an additional $30 million in private investments in building improvements.

The Barney Allis Square is leading the redevelopment of adjacent neighborhood even though its design quality is low. The recent renovation of the plaza was finished in 2006. In 2008 Marriott Muehlebach has been renovated which is a historic hotel on the north of the plaza. Each of the 983 rooms has been refreshed. Katy Ryan, the author of Moon Kansas City encourages visitors to book a room with a view of the Baryney Allis Plaza, she describe the plaza as “a greenspace that thrives in the heart downtown” (141). Also, Crowne Plaza is another hotel on the east side of the plaza. Over $13 million renovation was completed in July 2009.

Figure 5.16. Lunch hour at Rock Bottom. With less than half million in investment, Fifth Third Bank received more than 5 million rent per year on the first floor businesses around Fountain Square. Author

Finding 5

Poor follow-up land use planning is correlated with low economic impact. While good design and a variety of adjacent land uses led to high economic impact of Fountain Square in Cincinnati, no major follow-up land-use changes within the impact area of Pershing Square in Los Angeles had resulted in similar changes. Two surface parking lots are located across streets to Pershing Square (see Fig.5.17). The surface parking lot across S. Hill St. to the square has been in the place since 1981 according to its property record. This indicates that although the square has received multiple renovations over a 30 year period, no new development has followed that parcel. Parking lots are the worst culprits in terms of separation, traffic and lack of human activities. People just park in surface parking lots and leave for businesses without even experiencing the park. The parking lots also compete with the Pershing Square's underground garage. Replacing surface parking lots with other uses such as commercial or residential buildings could bring more people and activities to the neighborhood and could greatly improve the economic impact of these park-above-parking projects.

Figure 5.17. Two surface parking lots on the immediate periphery of Pershing Square. Author

Finding 6

Park-above-parking projects might result in social struggles and gentrification. Social sustainability is also an important part of the success of a park-above-parking project. As Garvin (2011) argues, “a park is socially sustainable if, throughout its existence, people of every age, ethnicity, and income want to be there” (p.198). As Fountain Square demonstrates, social sustainability depends on having a large enough user population that can easily get to the park and use the park. However, the “clean-up” may affect central city population, as in the case of the African-American population of downtown Cincinnati. According to the 2010 Census, close to half of the Cincinnati population is African-American and the majority of them live in the downtown area.

Now that 3CDC has purchased abandoned and vacant properties around Washington Park and converted them into offices and condominiums, there is the potential that gentrification might displace the poor African-American population. In the long run, gentrification does not only occur in Cincinnati, and it might indeed be unavoidable. 3CDC aims at providing more job opportunities through redevelopment projects, but all the projects are relatively new and the data is unknown yet. Providing affordable housing around the park-above-parking might offset some effects of gentrification.

Located on the border of the Jewelry and Bunker Hill downtown districts, Pershing Square in Los Angeles has also been the site of intense social struggles due to its context. The Jewelry District is the second-largest jewelry hub in the nation and it is one of the most vibrant and dynamic districts in downtown Los Angeles. Armenian, Persian, Latino, Chinese, and Japanese immigrants have settled in this area in waves, following civic wars and political crises in the early twentieth century. Today, the district accommodates more than 5,000 businesses on Hill Street, Olive Street, and Broadway between 5th and 8th Streets. Compared to little-used Pershing Square, the Jewelry District is full of activities. Commercial uses dominate the area, but their diversity makes the area alive. Many large and small jewelry shops, theaters, Mexican style restaurants, and 99¢ Stores are found everywhere in the district. Multiple functions are usually inhabited in old multi-story buildings, but those old buildings do not prevent people from

staying this area. They provide a central location for the spontaneity, verve, and bustle of the multiethnic crowd. They also provide housing. The majority of housing is multi-family and low-incoming housing. But the various uses welcome to everyone especially low-income local residents and tourists with cheap, delicious food, various entertainment options, and jewelry supplies.

Bunker Hill is located on the north end of Pershing Square towards the newer and wealthier part of downtown Los Angeles and it has received more redevelopment than the Jewelry District over the years. Developed as homes for the upper-class, Bunker Hill remained an exclusive residential suburb throughout the end of World War I, when the hill's wealthy residents began leaving due to rapid urban growth. By WWII, the construction of Pasadena Freeway pushed residents out, instead of bringing shoppers downtown. In 1955, a massive slum-clearance project was initiated as the first stage of the Bunker Hill Redevelopment Project. Modern high-rise buildings and plazas were built during this time. This project is the longest redevelopment project in Los Angeles history, which is scheduled to end in 2015.

The majority of the skyscrapers on Bunker Hill, (i.e. One California Plaza and Two California Plaza), were built in the 1980s. An Adaptive Re-Use Ordinance was passed in 1999, allowing the conversion of old, unused office buildings to apartments or lofts. A few residential buildings were developed thanks to this ordinance. Today, Bunker Hill is full of large scale office buildings, luxury hotels, and corporate plazas which are aimed at white collar workers and shoppers. For such a downtown population, what are their motivations to use Pershing Square? For entertainment, they drive to Walt Disney Concert Hall; for lunch break, they walk to McCormick & Schmicks Seafood Restaurant; and for outdoor social events, they spend time in the yard of the Public Library. For many of these middle-class users, Pershing Square is just a parking garage. They park here and walk to nearby offices where Bunker Hill is often depicted as an epitome of the inhospitable side of downtown Los Angeles as well as an example of the "evildoings in the name of urban design" (Ford, 2003, 128). The white-collar on the hill rarely have to interact with the users from the Jewelry District and other areas of downtown.

To prevent possible social struggles and gentrification, a few affordable housing projects have been constructed in Union Square and Portsmouth Square neighborhood.

Discussion

Justification of Park-Above-Parking Projects Cost and Economic Impact

Whether it is economically to build a park-above-parking project is a key question that this dissertation attempted to answer. Table 5.3 lists the total cost of thirteen park-above-parking projects, ranging from $ 475 million to $ 3.9 million. To test the economic justifiability, the example of Fountain Square and Pershing Square are employed.

Park-above-Parking Projects	Established in	Underground parking garage added in or built in	Recent renovation finished in	Total Cost (million)	Total Parking Spaces	Cost/Parking Space
Barney Allis Plaza	1985	1985	2006	$4	900	$6,000
Civic Plaza	1972	1974	1999	$10	900	$8,900
Director Park	2009	2009	New*	$10	700	$30,000
Discovery Green	2008	2008	New*	$125	630	$35,000
Ellis Square	1733	2009	New*	$34	700	$48,000
Fountain Square	1871	1971	2005	$43	635	$15,000
Memorial Plaza	1971	1971	1991	$5	900	$6,000
Millennium Park	2004	2004	New*	$475	2,126	$45,000
Norman B. Leventhal Park	1992	1992	New*	$76	1,400	$34,000
Pershing Square	1850s	1952	1994	$15	2,150	$6,500
Portsmouth Square	1847	1989	2001	$4	500	$5,000
Public Square	2006	2006	New*	$37	1,069	$35,000
Union Square	1850	1941	2002	$8	1,700	$5,000

New*: These park-above-parking projects are brand new: park on the ground level and parking garage underneath were built at the same time.

Table 5.3. The total cost

In November 2004, 3CDC accepted responsibility for overseeing the management of CNMF (Cincinnati New Markets Fund) and CEF (Cincinnati Equity Fund), two private loan funds targeted for downtown and urban redevelopment. With this money in September 2005, a $43 million renovation of Fountain Square began. Out of the $43 million investment, the City of Cincinnati only contributed $4 million, roughly 10% of total project cost. The majority of the remaining $39 million was from CNMF and CEF which are managed by 3CDC. The rest was from a State of Ohio loan and bank loans. Detailed financing structure is listed in (see Table 5.4). The financing structures show a

10 to 1 private to public funding ratio. A $4 million city investment was leveraged into an additional $39 million in private investment.

Financial Analysis of Fountain Square	Million
Uses of Funds	
Acquisition	8
Hard Costs	26
Soft costs*	9
Cost I: Construction total cost	43
Cost II: Operational cost	1
Source of Funds	
Loan from Fifth Third Bank	15
City Grant	4
Fountain Square, LLC Loan	4
New Market Tax Credits	11
Corporate/Philanthropic Contribution	5
State Urban Redevelopment Loan	4

* Soft Costs include A&E, legal, financing and interest, construction management and overhead, owner's contingency and other miscellaneous costs.

Table 5.4. Financial structure of Fountain Square

3CDC was hired to oversee and manage the Fountain Square plaza and the underground parking garage. In addition, the garage was leased to 3CDC for 40 years for an up-front fee of $7.5 million starting in October 2005. According to the lease, 3CDC was given the ability to renovate, manage and generate revenue from the garage. Revenue from the parking fee can only be used for garage maintenance and repayment of loans. Now the garage is managed by the Central Parking System and the gross revenue is estimated at $240,000 per year. In general, the City of Cincinnati invested $4 million in Fountain Square renovation and leveraged $72 million in benefits for the surrounding neighborhoods.

As discussed earlier, Fountain Square generates significant overall impact on the impact blocks. The average increase effect of three impact blocks is 16%. According to the formulas discussed in the Methodology Chapter III,

Cost I = soft costs + construction cost = $43 million

Cost II = average operational cost / year = $1 million

Revenue I = park revenue + parking revenue = 2 million

Revenue II = average increase effect × 3× average property value in dollar value in Control Blocks × average numbers of buildings in each block = 76 million

Results are:

1) Result 1 = Revenue I - Cost I = - 41 million
2) Result 2 = Revenue II - Cost II = 75 million
3) Result 3 = Revenue II – Cost I = 42 million

Compared to its construction cost, the revenue from the park and underground parking is small. The negative Result 1 suggests that Fountain Square cannot financially support itself through its revenue. However, Result 2 shows the incremental value brought by Fountain Square is much more than its operational cost. Result 3 shows the construction cost can be entirely covered by the incremental value brought about by Fountain Square.

When we apply the same formulas and calculations to Pershing Square, we find:

Cost I = $14.5 million

Cost II = $2 million

Revenue I = $3 million

Revenue II = $6 million

Results are:

1) Result 1 = Revenue I - Cost I = $ -11.5 million
2) Result 2 = Revenue II - Cost II = $4 million
3) Result 3 = Revenue II – Cost I = $ -8.5 million

Similar to Fountain Square, the negative result in Result 1 indicates that Pershing Square cannot financially support itself through its revenue. Pershing Square does not follow the proximate principle, it generated low economic impact. Result 2 shows the incremental value brought by Pershing Square could barely cover its operational cost. However, result 3, the construction cost, cannot be covered by the incremental value brought by Pershing Square.

The results of economic justifiability of Fountain Square and Pershing Square suggest that it is worthy to build a park-above-parking project only when its design and surrounding land uses function well. However, park-above-parking projects could bring more social and cultural benefits that must be accounted beyond their mere economic benefit.

An Ideal Model of Park-Above-Parking Projects and Downtown Vitality

Before the underground parking garage was added to Fountain Square in the 1960s, a proposal of a totally malled downtown ringed by large parking garages was rejected (Heckscher, 1977). Instead, park and parking space were combined and it has significantly benefited downtown development in the following years. However, many American downtowns still lack green spaces and surface parking lots are everywhere. Existing open space plays a continuing role, but new parks are often placed outside the retail zones. A park-above-parking project can be an alternative to help a downtown recover its vitality to some extent. An ideal model of park-above-parking projects would be a well-designed park with adequate underground parking facilities in a central location of downtown. The park should provide various amenities to accommodate cultural and social activities. The underground parking garage should have at least one car entrance/exit located in adjacent buildings or streets to keep automobiles from interrupting the pedestrian flow along the surrounding sidewalks. Most importantly, park-above-parking projects should not be considered as isolated, individual projects—they should be a part of a large picture of downtown redevelopment. A well-designed park-above-parking project might not spontaneously bring significant economic returns. However, when surrounding land uses are updated to allow for great diversity and density, economic benefits begin to show.

Some people may argue that the cost of park-above-parking projects is relatively high. Others might be concerned that adding an underground parking garage might bring more cars to downtowns and reduce walkability. As discussed in previous chapters, the cost of park-above-parking projects could be justified through its economic benefits if the park-above-parking project functions well. Furthermore, the role of underground parking

garage is not only to accommodate automobiles, but also to improve downtown accessibility, which ultimately does contribute to walkability.

Walkability has been advocated over the past two decades. Best practices in urban design strive to increase the "walkability" of downtowns and suburbs (Whyte, 1980; Ford, 2003; Herzog, 2006). However, how can people reach the designations where they can walk around? Redevelopment of public transit systems are emerging in the United States. The State of California is considering developing high-speed railway system to quickly connect northern and southern California. The City of Cincinnati, Ohio provides express bus service that can quickly connect downtown and suburbs. Yet, many people still drive from place to place, and accommodating parking is still a challenge for many downtowns. To encourage public transit and improve parking efficiency, many communities have begun to limit parking spaces downtown. Nevertheless, we should primarily limit parking spaces such as surface parking lots and stand-free parking garages. Many urbanists and urban professionals are not fond of surface parking or stand-free parking garages due to their environmental, social, and economic problems. Under such circumstances, a park-above-parking project could offer a viable alternative.

A park-above-parking project does not only provide parking spaces underneath, but also, most important, it offers open space above. In addition, when the diversity and density of surrounding land uses improves, walkability consequently also improves. People can park at park-above-parking projects and walk to the surrounding neighborhoods. People, activities and related consumption enhance downtown vitality. As Herzog (2006) argues, "What is needed is a diverse downtown core: one that combines the commercial functions of skyscapers, with a human element, a sense of community, within a properly scaled pedestrian space, and amidst a built environment" (231). By combining open space and parking space, park-above-parking projects may offer an alternative format that can support a diverse downtown core.

CHAPTER VI

CONCLUSION AND REFLECTION

Introduction

This dissertation is a spatial-based investigation designed to assess contributions of park-above-parking projects and to explore the relationships between design quality, economic impact, and related policy-making processes. One goal of this research is to help decision makers and designers better understand the benefits and issues of combining open space and parking in the urban core. To answer this question, the author began with an examination of the literature. However, the author found the volume of scholarly literature devoted to this topic surprisingly thin. To measure the impact of park-above-parking projects, a variety of established evaluation methods were adopted and modified for this research. In order to measure the design quality of park-above-parking projects, a 10-variable ranking system was created, which included variables drawn from the literature on good open space design. A series of indicators were developed to determine whether or not park-above-parking projects serve as an economic engine for downtown development. Interviews and observations completed the methodology, which successfully bridged the issues of design quality, land use, and economics of park-above-parking projects. The following is summary of findings and conclusions, including areas that, in my view, call for more detailed investigation.

Design Quality and Economic Impact

All thirteen park-above-parking projects studied have been designed by important design firms, but not all of these designs have succeeded. The purpose of this research was to carefully assess design qualities of these spaces, and begin to identify which of these qualities contributed the most to those outcomes. Sitting space is crucial to the success of a public open space downtown. Sun access and shade is perceived as a pleasurable experience. Large, interactive and accessible water features attract people, especially children. Food is a fundamental reason why people go to a park-above-parking project. Good street connections improve the openness of park-above-parking projects

and set them above the bustle of the street. Elevation change can create a pleasing experience for people. Triangulation encourages people to communicate in public places. Multiple approaches have been applied in a few park-above-parking projects which minimize interruption from parking entrances and exits. Natural surveillance greatly improves the safety of any park-above-parking project. In addition, adjacent supporting uses stimulate both visual and functional connections with park-above-parking projects.

Notwithstanding the importance of all of these design measurements, I found Sitting Space, Below Parking Access, Natural Surveillance, and Adjacent Supporting uses to be the most important. People come to a park-above-parking project for various reasons, to take a break from work, to meet family and friends, or to park a car and go somewhere else. No matter why people come to park-above-parking project, in a high density urban area, plenty of sittable spaces and sitting options are the most appealing park feature. Beyond serving people, park-above-parking projects with appropriate location for the automobiles entrances/exits are more often correlated with high economic impacts. At Fountain Square, one car entrance/exit is on the west border and the other one is located behind the Fifth Third Center, which encloses the square on the east side. In this way, people notice there is a parking garage under the square but cars entering and leaving do not much interrupt the pedestrian movement. In addition, natural surveillance within park is essential. The visual connection between all parts of the park improves the safety and might prevent illegal activities. Finally, adjacent supporting use is key. The more diverse uses, the more likely a park-above-parking project can succeed economically. This highlights the importance of the connection between individual projects and their contexts. They can benefit each other, but they also harm each other.

The average overall economic impact of seven park-above-parking projects shows that these projects can help increase the overall real estate value within one block to 22%; up to 19% between one and two blocks; and up to 10% between two and three blocks. The average overall economic impact shows that park-above-parking projects generate significant economic impact on their immediate periphery; and the impact linearly decreases when the distance to park-above-parking projects increases.

As discussed in the literature review, the proximate principle suggests that a percent increase in home values could be attributed to park proximity. Seven of the

thirteen park-above-parking projects validate this theory while five of them do not. The positive result suggests that park-above-parking projects do indeed have an economic impact and that this economic impact can be explained both by design quality and adjacent land uses. For the other five park-above-parking projects, no typical results are found. The typical results may be attributable to methodological limitations because none of the cities have kept systematic data on all indicators.

Office buildings are perhaps the most important land use type in every downtown. By using the indicator of average dollar change per square foot, the average property value of office buildings facing park-above-parking projects was found to be 22% more than office buildings three blocks away. The results show that office buildings are more likely to benefit from park-above-parking projects nearby.

By using the indicator of average dollar value change per square foot per year, the average rent of office buildings facing park-above-parking projects was found to be 19% more than office buildings three blocks away. The result suggests that renters are more likely to be interested in the location of offices where they can easily access an amenity like a park-above-parking project.

Economic Impact on Property Value of General Commercial Use

General commercial use has been recognized as an effective way to keep downtowns viable and livable. However, data in this category is missing in four park-above-parking projects: Discovery Green Park, Civic Plaza, Memorial Plaza and Barney Allis Square. It is due to either to the fact that no general commercial uses exist on the immediate periphery or of that these projects have too little data to conduct the comparison. However, where comparative data exists, it shows park-above-parking projects generate significant economic impact on property values of general commercial use. On average, park-above-parking projects can provide benefits up to a 19% of the property value of general commercial use within one block, 15% between one and two blocks, and 8% between two and three blocks. The result illustrates that park-above-parking projects and general commercial use benefits each other.

Economic Impact on Property Value of Surface Parking

No significant relationship was found between property value and distance to park-above-parking projects for surface parking. It is the only category that is not supportive of the proximate principle. The finding once again proves that parking alone brings few people, few function, and little monetary effects.

Park-above-Parking Projects and Housing

Currently park-above-parking projects maintain a loose connection with housing. Only one third of the park-above-parking projects studied have housing on their immediate periphery. Due to the diversity of housing types and data availability, this research is not able to demonstrate a direct impact on housing. Additional research is needed.

Park-above-Parking Projects, Hotels and Convention Centers

Hotels and Convention Centers together are important facilities in most downtowns. Given several limitations such as hotel variation in class and size, the uniqueness of convention centers, the direct impact of park-above-parking projects on hotels and convention centers is not able to be examined but their empirical relationships with park-above-parking projects have been discussed. Hotels maintain multiple relationships with park-above-parking projects while convention centers maintain a lose connection with park-above-parking projects. The case of Fountain Square illustrates the type of multiple connections between hotels and the square. The Westin Hotel is located across the street from the south of the square. The first floor is general commercial use and the second floor is McCormick & Schmick's Seafood Restaurant. The restaurant has a great view to the square. In addition, the multiple events in the square attract many hotel guests. It represents the image of Cincinnati. However, convention centers show few connections with the park-above-parking projects. At Discovery Green Park, the nearby convention center does not bring many park users. Many attendees spend most of their time indoors.

Understanding the Relationships

The relationships between design quality and economic impacts of park-above-parking projects were tested in this research. Thirteen park-above-parking projects were placed in nine categories according to their levels of design quality and economic impacts. Findings of the research show:

Findings

1. Good design contributes to high economic impact while low design quality is often associated with low economic impact.
2. High diversity and density of surrounding land uses usually leads to high economic impact while low diversity of surrounding land uses is associated with low economic impact.
3. Management is a key to high economic impact.
4. Park-above-parking projects support downtown redevelopment, which may lead to significant economic returns.
5. Poor follow-up land use planning is correlated with low economic impact.
6. Park-above-parking projects may lead to social struggles and gentrification.

Recommendations on Land Use Policy Making

Park-above-parking projects downtown have been built nationwide. This research demonstrates their relationships with design quality and economic impacts. Over half of the thirteen projects studied in this research show strong connections between design quality and economic impact. One key to their success is having land use policy in mind. The following recommendations on land use policy making are supported by this research.

1. Decision-makers should acknowledge the value of park-above-parking projects while also realizing that those projects do not solve all problems.

2. Decision-makers must see downtown redevelopment as a whole package and recognize the key role of park-above-parking projects.

3. Successful park-above-parking projects receive financial and physical management from project initiation to long-term maintenance by public-private partnerships.
4. Land uses around park-above-parking projects must be updated to support needed diversity because new or renovated park-above-parking projects do not spontaneously generate positive economic impact.
5. The diversity and density of adjacent land uses should be increased.
6. Land uses such as office, retail, housing, and mixed-use should be emphasized.
7. Large scale, single-use building and surface parking should be limited on the periphery of park-above-parking projects.

Design Guidelines for Park-above-Parking Projects

Designs should provide full park features with a particular focus on how to deal with the needs of parking circulation. In this research, criteria of design quality 1-7 were drawn from previous prominent studies including William Whyte's *The Social Life of Small Urban Spaces* (1980) and Clare Cooper Marcus's *People Places: Design Guidelines for Urban Open Space* (1998). These criteria from Siting Space to Triangulation have been validated in park-above-parking projects design through previous design quality analyses. Design criteria 8-10 were adopted from previous studies and modified according to conditions of park-above-parking projects. Design guidelines were developed from design criteria and listed below:

1. Provide plenty of sitting space and make seating areas connect to each other, at least visually.
2. Allow for the presence of both sunny and shady areas with sitting space appropriately for the climate.
3. Build an interactive water feature in scale to the park.
4. Locate a permanent food facility, temporary food carts and areas for food consumption.

5. Park must visually open toward the street, with easy transitions between street level and the park.
6. Locate about half of the park-above-parking project above street level but avoid creating many subdivided elevated or sunken subareas.
7. Provide a few park features that can attract crowds such as sculptures, water features and other public art. Place these features in an open area, but avoid placing them at the corners of a space.
8. Locate separate parking entrances and exits for pedestrian and automobiles. Parking entrances and exits for pedestrian should be designed as a part of the park while parking entrances and exits for automobiles should be located on one or two sides to minimize the impact on pedestrians.
9. Ensure that no area in the park-above-parking project is isolated by structure, landscaping or level changes. Consistent visual connections should be kept everywhere in park-above-parking projects.
10. Integrate the design with adjacent supporting uses. While land use planning is usually not a part of park-above-parking projects, designers can and should make suggestions on supporting uses around park-above-parking projects.

Contribution to Knowledge

This research identifies the economic value of park-above-parking projects. Before this research, few studies focused on park-above-parking projects and their design and economic contribution has been discussed separately. Furthermore, not one direct economic impact of park-above-parking projects has been systematically measured. This research fills the gap between design and economics - designers often focus on the physical arrangement but when it comes to the value of design, the economic reference is limited. Economists provide concise statistical analysis but those results are not understandable to designers. This research is based on a national inventory of park-above-parking projects and adopts an index method to measure their economic impact. To understand the results, the research places park-above-parking projects in a broader context where design quality, land use, and economic impacts have been connected and discussed together. Two in-depth case studies broaden the validity of the results. These

findings have been translated into recommendations from land use policy making to design guidelines. This research contains rich information for a wide range of audiences from decision makers and designers, to the general public. This research also brings new knowledge to landscape architecture particularly in terms of the urban landscape.

Limitations

When searching for evidence of the economic impacts of park-above-parking projects, I discovered that none of the cities where my case studies were located kept systematic data on the range of indicators of economic performance. Given these limitations, only two types of indicators could be reported consistently for every park-above-parking project: property value of offices and office rents. Due to data availability, these were the only indicators used to justify the cost and economic impact of this type of improvement. On contrary to our initial goals, this study was not able to demonstrate park-above-parking projects' direct impact on residential uses in American downtowns due to limited availability and diversity of housing data. Future research should focus on collecting better data, and on modifying the index to better evaluate the overall performance of park-above-parking across a variety of economic sectors.

Reflection

In this research, I have connected design quality of park-above-parking projects to economic impact. The research shows a well-designed park-above-parking project can contribute to approximately 20% more property values on average in its immediate neighborhood than properties three blocks away. Comparing to its high construct cost, it is worthy to build a park-above-parking project in urban core. In this way, the large amount of surface parking lots can be replaced by more people-oriented land uses such as retails or mixed-uses. In doing so, our downtowns can provide more diverse functions that attract people to come. As Donald Shoup, the author of High Cost of Free Parking, mentioned to me in the interview, "People would like to pay $5-10 in the underground parking garage and walk to their destinations. The integration of open space and parking

can help to bring more dollar value to the neighborhood. Also (it can) put more money in city's pockets" (Personal interview, author, 2010).

Beyond the significant economic returns, park-above-parking projects also help to change people's perceptions on downtown. I stay with my Friend Yan when I visited Fountain Square Cincinnati. Her family lives in a typical middle class suburban neighborhood where provides no public transit. She refused to give me a ride to Fountain Square, she asked, "why you have to go to downtown? It is dirty and dangerous." Finally when she saw the renovation of Fountain Square and Washington Park, she was convinced that downtown Cincinnati had changed and she began to bring her two years old daughter to downtown. It might take a long time that people would change their perceptions on downtown, like my Friend Yan. But with the renovation or new park-above-parking projects and other urban refill projects, downtown vitality will be increased and become a welcoming place again.

APPENDIX

CORRELATION BETWEEN HIGH DESIGN QUALITY AND HIGH ECONOMIC IMPACT: ONE-WAY ANOVA RESULTS

Analysis of Variance (ANOVA) --- Impact Block I (Means) by Total Score (Groups)

Group Summary Statistics

Group	N	Mean	Std. Dev.
10	1	20.0000	0.0000
6	3	26.6667	2.3094
8	1	22.0000	2.3094

Analysis of Variance

	Sum of Squares	df	Mean Squares	F	p<
Between Groups	40.53	2	20.27	3.800	0.208
Within Groups	10.67	2	5.33		
Total	51.20	4			

Measures of Association

Eta	0.890
Eta Squared	0.792

Analysis of Variance (ANOVA) --- Impact Block II (Means) by Total Score (Groups)

Group Summary Statistics

Group	N	Mean	Std. Dev.
10	1	17.0000	0.0000
6	3	22.6667	1.1547
8	1	18.0000	1.1547

Analysis of Variance

	Sum of Squares	df	Mean Squares	F	p<
Between Groups	32.53	2	16.27	12.200	0.076
Within Groups	2.67	2	1.33		
Total	35.20	4			

Measures of Association

Eta	0.961
Eta Squared	0.924

Analysis of Variance (ANOVA) --- Impact Block III (Means) by Total Score (Groups)

Group Summary Statistics

Group	N	Mean	Std. Dev.
10	1	8.0000	0.0000
6	3	12.0000	9.5394
8	1	11.0000	9.5394

Analysis of Variance

	Sum of Squares	df	Mean Squares	F	p<
Between Groups	12.00	2	6.00	0.066	0.938
Within Groups	182.00	2	91.00		
Total	194.00	4			

Measures of Association

Eta	0.249
Eta Squared	0.062

Analysis of Variance (ANOVA) --- Average Increase Effect (Means) by Total Score (Groups)

Group Summary Statistics

Group	N	Mean	Std. Dev.
10	1	15.0000	0.0000
6	3	20.3333	3.0551
8	1	17.0000	3.0551

Analysis of Variance

	Sum of Squares	df	Mean Squares	F	p<
Between Groups	24.53	2	12.27	1.314	0.432
Within Groups	18.67	2	9.33		
Total	43.20	4			

Measures of Association

Eta	0.754
Eta Squared	0.568

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