UNIVERSITY OF CINCINNATI

05/28, 2003

I, MILIND PRABHAKAR SURVE,

hereby submit this as part of the requirements for the degree of:

MASTER OF COMMUNITY PLANNING

in SCHOOL OF PLANNING, DAAP

It is entitled STUDY OF PHYSICAL IMPACTS OF PROPOSED INTERCHANGE OF I-71 AND MARTIN LUTHER KING DRIVE INTERSECTION.

Approved by:

STUDY OF PHYSICAL IMPACTS OF PROPOSED INTERCHANGE ON I-71 AND M. L. K. DRIVE INTERSECTION

A thesis submitted to the

Division of Research and Advanced Studies

of the University of Cincinnati

in partial fulfillment of the

requirements for the degree of

MASTER OF COMMUNITY PLANNING

in the School of Planning

Of the College of Design, Architecture, Art and Planning

2003

by

Milind Surve

B.Arch, Dr. D.Y. Patil of Architecture, Navi Mumbai, University of Mumbai, 1999.

Committee Members:

Chair: Prof. Menelaos Triantafillou

Faulty Member: Dr. Roger Barry

Reader: K. Scott Enns

ABSTRACT

The Ohio Department of Transportation and the City of Cincinnati have proposed the addition of an interchange at the intersection of East Martin Luther King Drive and I-71 in Uptown Cincinnati. Based on the recommendation, the City appointed private consultants to develop designs for the interchange. The design proposes a full interchange at the intersection and modification to exit # 5 on I-71. However, the proposal was shelved for the past few years due to its location overlap with the north east corridor of regional light rail transit plan. With the defeat of the light rail issue in November 2002, the interchange is again considered as a viable option to ease traffic congestion in the area. The University of Cincinnati's Division of Architect hired Edwards and Kelcey, Inc. to investigate the feasibility of the interchange in the proposed location. The report submitted by the firm stated that the design proposed by the City's consultants, referred as 'Scheme D', meets the federal requirements and highway design guidelines. The report also stated that a further analysis is necessary to study the impacts of the interchange on surrounding areas.

This thesis proposal looks into the physical impact of the proposed interchange on the surrounding area. The study will focus on existing condition analysis and possible impacts by evaluating the proposed interchange design on the basis of GIS data of the area. The scope of this thesis is limited to the physical impacts only, which becomes a part of the overall impact assessment study for the proposed development.

To my family

ACKNOWLEDGEMENTS

I take this opportunity to thank my Committee members – Professor Menelaos Triantafillou, Dr. Roger Barry and K. Scott Enns for their suggestions and guidance throughout the process of research.

I dedicate this thesis to my parents who have made countless sacrifices to help me reach this stage. Without there support and love it was impossible for me to achieve my goals. My sister has been always a moral support to me and I owe her acknowledgement for waking me up every morning to get things done.

I want to thank my lovely wife, without whom everything seems difficult, including my thesis, in which she contributed intellectually and morally to a great extent.

I want to thank Deepika, Inradneel and Mayank and my other classmates for surviving my boring lengthy discussions and all my friends and cousins in India and the United States who have been my well-wishers all my life.

And thanks to God for giving me the strength to complete my master's degree and blessing me in all my endeavors.

LIST OF FIGURES

LIST OF TABLES & CHARTS

CHAPTER 1: INTRODUCTION

The city is a composite of various social, economic, and political institutions. It is a machine, which comprises of distinct pattern of lifestyle for people, highly specialized land uses, and a consortium of shared facilities and resources (Hartshorn, 1992, pg 3). These institutions have necessities, which create physical structure in form of buildings, roads, utility services, etc. Transportation is one such service, which connects different institutions and creates a network. The city lives on this arterial network and functions optimally with free flowing circulation. As the network circulates people, goods and information it also creates a movement pattern eventually influencing the development of the city.

Historically, urban spatial development of cities was related, if not completely dependent, to modes of transportation. The four eras of transportation development, namely, Walking/ Horsecar Era (1800-1890), Electric Streetcar Era (1890-1920), Recreational Automobile Era (1920-1945) and Freeway Era (1945-) coincide with development pattern of cities, which were compact initially, linear later and sprawling suburbs finally (Muller, 1986, in *The Geography of Urban Transportation*). Other socio-economic and political reasons also contribute to these phenomena, but relation of spatial development of cities to transportation improvement cannot be denied.

Today urban transportation is not only a service but also a determinant of existing urban form and future development. For example, a new transit line or highway stretch can change an area with low density population to a high density population just by providing access to that area. Accessibility increases property values and makes them favorable to multiple land uses because of its connectivity to other areas. New development increases the tax base, providing better services and brings more people to the area. The chain reaction affects the physical, social, economic, environmental, and political composition of the area.

The impacts of transportation projects vary from local to regional level mainly due to the scale of such projects. These projects also represent the urban scale (Canty, 1969). A study conducted by General Motors Corp. determines the requirements of transportation to different scales of urban area. This can also mean that physical expanse of urban area is related to transportation facilities. From transportation improvement perspective, this study implies that existing transportation and proposed improvement projects have boundaries of their impacts. Physical and environmental impacts are more local as compared to social, economic, and political, which are generally more at regional level. These impacts are positive to some and harmful to others raising issues of equity in the process of urban transportation planning (Hodge, 1986, in *The Geography of Urban Transportation*).

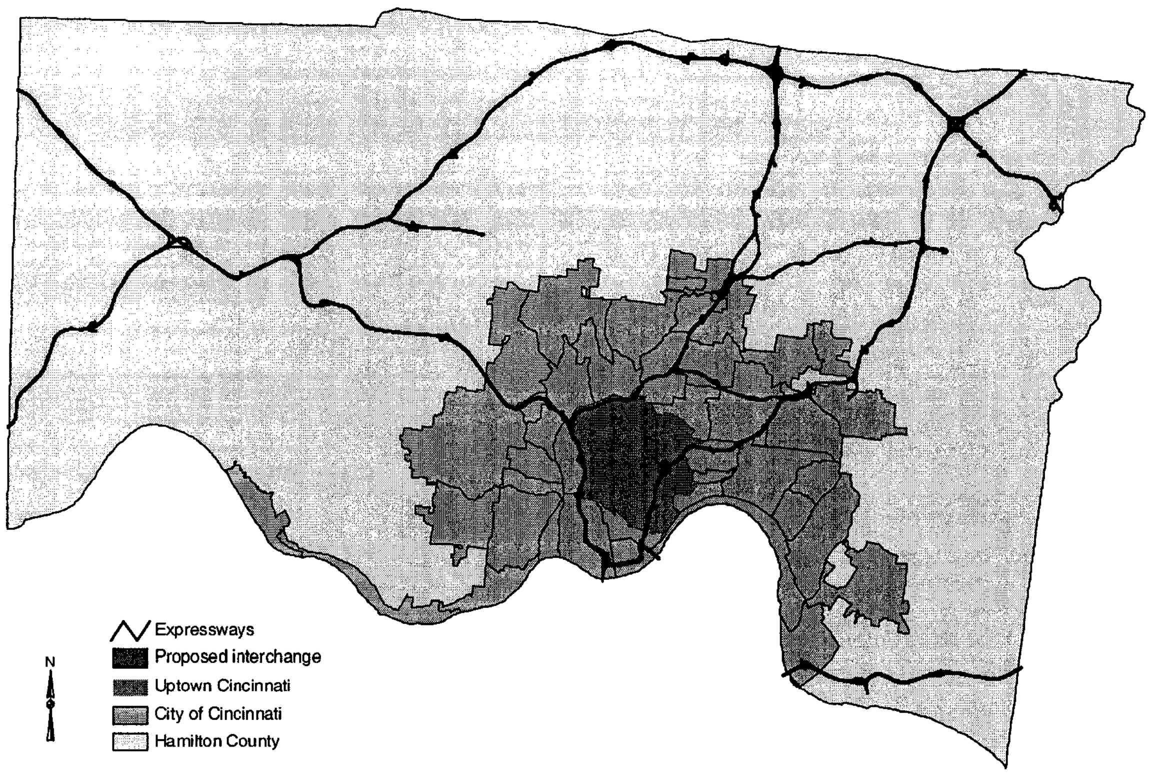
This thesis studies possible physical impacts of transportation improvements in an area by comparing pre-development and post-development potential of the area. The research focuses on determining the key elements of physical urban form and its relationship to transportation improvement projects. The methodology analyzes these key elements by evaluating the transportation projects in context with the surrounding area. The study is conducted in Uptown area of City of Cincinnati, where the City, the neighborhoods, and some major stakeholders are proposing a highway interchange. However, the analytical process can be applied to similar projects in urban areas to determine their physical impacts on the surrounding area.

CHAPTER 2: PROBLEM STATEMENT

The City of Cincinnati is facing population decline. Lack of vibrant downtown, inefficient transit systems, and economically distressed city neighborhoods are some of the reasons that contribute to this phenomenon. The existing infrastructure does not match with new development. Racial segregation further intensifies the problem where people of different communities struggle to come together to bring in change. City council and other public and private stakeholders, realizing these problems, have begun efforts to improve the city life. Hamilton County Regional Planning Commission's Community COMPASS, Metro Moves, Public Parks and Libraries, Cincinnati Public Schools are some major efforts to bring the community together.

Connectivity is one of the major issues in Cincinnati. Lack of efficient public transportation has led to dependency of private automobile. This leads to traffic congestion during peak hours and rest of the time the infrastructure is not used to optimum level. People dependent on public transportation are restricted to inner city area, where the bus routes are most efficient, but these are the areas with limited job opportunities. The suburbs, which have flourished over several decades, have taken major job opportunities out of the inner city, creating disproportional demand and supply of infrastructure. The inner city has roads, housing, utilities, and other supporting infrastructure but lacks in economic base to hold population.

Figure 2.1: **Location map of proposed interchange**

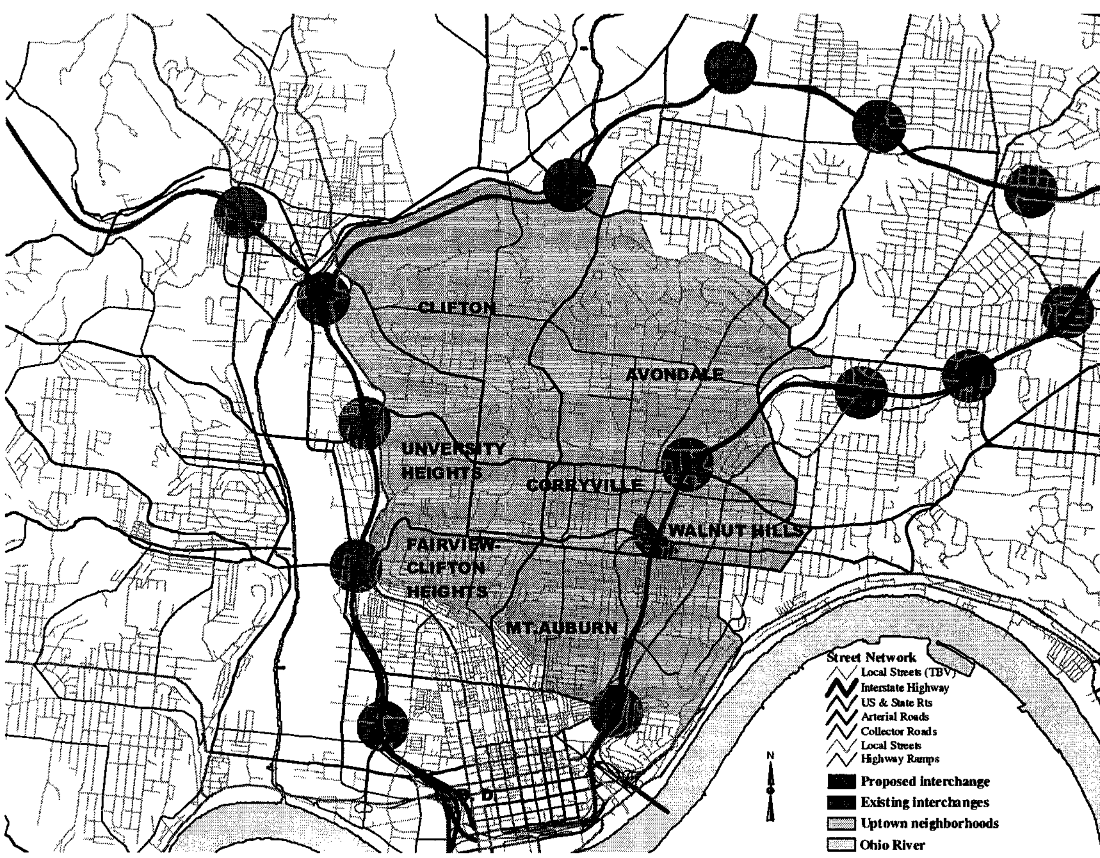


The neighborhoods of Avondale, Walnut Hills, and Corryville in Uptown area (*figure 2.1*), parts of which form the study area of this thesis, are some of the oldest neighborhoods of the city. These neighborhoods have seen economic affluence during the early twentieth century. The physical development that occurred during that period is an evidence of economic prosperity. But today both the physical form and economic base of these areas are in disarray. Revitalization efforts at various levels are done but with limited meaningful results. One major reason is lack of collaboration in all these efforts. Another reason is the public policy focusing on downtown revitalization that has led to dismissing these neighborhoods as potential development areas, which have almost equivalent infrastructure facilities and yet are not used to optimum level.

Some of the major employers are located in this part of the city. Statistics from Claritas, Economic Research Associates show that the area has 54,825 residents, 35,000 students, 14,600 faculty and staff, 177,975 visitors to UC campus and 48,860 immediate area workers. Proximity to downtown, large infrastructure and diversity in culture are some of the major assets of the uptown area. The area is also the second largest employment generator. But these areas are having accessibility problems as other parts of the city. Access to Uptown is mainly from Hopple Street and Mitchell Ave interchanges from I-75 and Taft Road interchange from I-71. Hopple Street interchange, coming from South of Cincinnati, is a left exit and is not very safe from design point of view. I-71 interchange is only north bound and adds at least 2-3 miles per vehicle to get on the highway, making it not very convenient (*figure 2.2*).

In order to increase access and ease traffic congestion, the City planning department, Ohio-Kentucky-Indiana (OKI) Regional Council of Governments, local neighborhood councils and other stakeholders like the University of Cincinnati and Hospitals are looking into the feasibility of adding an interchange on I-71 at Martin Luther King Jr. Drive junction. This interchange was included in I-71 corridor plan, but was never implemented. In 1980's Hazlet & Erdal, Inc. (H&E) were retained as consultants to develop possible concepts for the interchange. The firm came up with four options, out of which, one was accepted with modifications, referred as 'Scheme D' by the City and the consultants. The proposal did not make it to the priority list of projects as it conflicted with the northeast light rail project. But with the failure of the light rail issue in November 2002, the proposal is again considered as an option for the traffic congestion in the Uptown area. The University of Cincinnati and other major stake holders in the region are looking into the feasibility of this proposed design. Edwards & Kelcey, another consulting firm from Cincinnati, were appointed by University of Cincinnati's Division of Architect to review feasibility of the proposal. The firm, in its report submitted in December 2002, mentioned that the proposed design met the federal design standards and adheres to theories of transportation planning. The report also mentioned a need to carry out detailed analysis of possible impacts of the proposed interchange on the surrounding area (Edwards & Kelcey, 2002).

Figure 2.2: **Regional connectivity of proposed interchange**



CHAPTER 3: LITERATURE REVIEW

OVERVIEW

Since the thesis deals with an urban area for studying physical impacts of transportation improvements, it is necessary to understand the characteristics of the urban area and their relationship to such projects. The following literature explores the concept of urban form, its definition, and its key determinants. The study identifies the components that can be used to determine the overall physical impact of transportation projects on urban form and focuses on their relationship to changes in transportation network.

URBAN FORM

It is necessary to define 'form' and its context to 'urban' areas before exploring the concept of urban form. The word 'form' has many meanings such as shape, configuration, structure, pattern, organization, and system of relations (Whyte, 1968 in Batty & Longley, 1994; 42). It can also be described as "the outward appearance of things" (Arnheim, 1968 in Batty & Longley, 1994; 42). From a perspective of urban planning and design, form means shape that relates to the way urban places can be observed and understood in terms of their spatial pattern. D' Arcy Thompson explains form of an object as a 'diagram of forces' and according to Batty and Longley the study of form without these forces which give rise to it is meaningless (Thompson 1917, 1961 in Batty & Longley, 1994; 42). The forces that determine form have specific functions and the behavior of these determinants or forces and their functions can identify the resultant form (Batty & Longley, 1994; 42).

DETERMINANTS OF URBAN FORM

Notable research is done on physical environment of urban places. The urban form of various cities has been studied to find the key determinants that affects the physical form and can be observed to analyze the pattern of development, spatial relationships, and impacts of growth. Ideas discussed by authors like Kevin Lynch and M. R. G. Conzen, are most relevant to this study even though there are other authors who have done distinguished work in this area.

Kevin Lynch in his book, *Image of the City*, describes the physical form of cities as observed by its users. He raises issues of city image and elements that gives a particular image. He identifies the urban image and its physical form into five types of elements, namely, Paths, Edges, Districts, Nodes, and Landmarks. He defines these elements as follows;

<u>Paths</u>: These are connections or channels along which people move. These can be roads, walkways, canals, or railroads. People observe places as they move along these paths.

<u>Edges</u>: These are linear elements not used by people and are boundaries between two phases of urban image. These edges are barriers or seams that distinguish two regions.

<u>Districts</u>: These are medium to large section of the region that has two dimensional extents, and has a mental image of enclosure or "inside of", having recognizable characters.

<u>Nodes</u>: These are strategic spots in a region in which people can enter or leave and are focal points that are centers of movements. These are points of convergence or divergence and can be termed as cores of the region.

Landmarks: These are points of references in a region. These can be architectural monuments, public places or any physical entity that can be referred to in the region (Lynch, 1960; 46-48).

Based on these descriptions of urban image and components of physical form it is easy to categorize a region into areas that define the physical form. It also gives a mental image of the region and a broad categorization of the overall physical layout. But this categorization is based on individual interpretation and can be subjective to certain extent. Moreover, it does not specifically categorize single function or use that affect the overall image.

Geographer M. R. G. Conzen identifies three main analytic tools for townscape analysis, namely, street pattern, land subdivision, and building shapes and types. These tools directly relate to the density of the town, diversity of use of land and buildings and design of built form and street pattern. The development of streets, land use, and buildings, together with the cultural landscape of the region in which it lies, give an accumulated record of the present geographic condition of particular urban place. Street pattern can change incrementally with fragmented growth or drastically with major additions / alterations to existing network. The pattern of land use is most changeable as it responds relatively quickly to the physical and socio-economic changes in a region. An addition of railroad or highway interchange not only changes the road network, it also works as an impulse to change land use. But these new functions not necessarily induce new form in buildings. The existing built form adapts to new function and does not necessarily replace the old fabric (Conzen, 1960; 6).

CONCLUSION

Conzen identifies specific functions that affect the urban image whereas Lynch identifies areas or zones within an urban area that identifies uses or functions. Using both studies as a guide we can identify the following five determinants of urban form;

- Natural Environment
- Visibility
- Street Pattern
- Land Subdivision
- Built form

<u>Natural Environment</u>

Lynch discusses the image in terms of visible landscape of a city or an urban area. This visible landscape is composed of the natural landform and man-made landscape. The natural landscape becomes a key determinant as it becomes a backdrop, at least in urban setting where built form dominates nature. This determinant is also important also to understand the issue of sustainability of built form. Topography, natural vegetation, soil type, water run-off, living habitat, and other related aspects need to be addressed while considering any place for development.

Visibility

Another determinant that can be derived from Lynch's study is Visibility. We visualize an image of an area because it is visible. Its presence is noticed due to its presence in our visual vista. Physical development will be limited in success if it is not visible from strategic locations such as nodes, landmarks, and districts. A quick access accompanied with good visibility can become a driving force for a development to be successful.

Street Pattern

Both Lynch and Conzen state the importance of accessibility and its impact of development. Paths, as Lynch terms them, are the important 'connections' that bridge the gap between two geographically distinct points (Lynch, 1960; 46). These connections also determine the value of land adjacent to it. A well connected tract of land is more valuable – economically – than a tract that is remote from physical connections. The extent and network of these connections determine the spatial extent of any place.

Land Subdivision

Land use and Zoning are not only regulatory tools to control development; they also determine the physical form of an area. Understanding the interrelationship of different land uses can determine the density and diversity of buildings on a tract of land. Urban areas achieve their images from this density and diversity of built form and also by the population that is attracted to these areas. Hence land subdivisions and their uses become a determinant of urban form.

Built Form

The built form of urban area is a resultant of various overlays of natural geography and socio-economic needs. The core of built form exists in density, diversity and design (Cervero, 2002). The three D's together are often found in urban settings rather than suburban or rural surroundings. Space constraints in urban settings make the entire built form contextual to the part as well as whole area. Hence, development in urban areas addresses the context, identity, and direct and indirect impacts on the overall urban form.

IMPACTS OF TRANSPORTATION IMPROVEMENT ON URBAN FORM

Transportation projects are termed as economic necessities in urban areas. The ability of such projects to shape the urban structure cannot be denied. Hence some advocate transit oriented development for high density development and blame freeway construction for urban sprawl. The opinion on what is better may differ, but in both cases transportation is believed as a significant factor (Giuliano, 1986; 247). Highway construction has been one of the major development programs used in America since World War II. This program has made enormous impacts, both positive and negative, on several communities all over the country. Accessibility and connectivity was the primary objective of the program and did not look into the fine grains of compact communities through which these highways were constructed. Limited access, necessary rights–of–way, and construction barriers left a large area undeveloped along the highway. This was also a resultant of legislators' decision to avoid commercialization along the highway rights-of-way. This made the businesses at interchanges vital for motorists to serve their needs. This began the nodal development of interchanges, which continues until today (Corsi, 1999; 16). Thus interchanges became gateway for many communities. The overall identity of many urban areas was lost due to these prototypical developments which contributed only economically to the communities. The urban form was disrupted in many cities as the dense neighborhoods were wiped out to make way for highways. The connectivity of hinterlands with the inner city further reduced the density of in cities and specialized land uses and building types.

However, 1990s saw a change in the approach of highway and interchange designs, which became more sensitive to the urban form. Substantial completion of the interstate highway system changed the focus of transportation to congestion management and system preservation projects. This involved existing facilities around the highway system. Most of these facilities being substantially developed, any transportation improvement projects have its impact on this development (www.fhwa.dot.gov/csd/basic.htm). Hence new transportation improvement projects in urban areas are sensitive to the context. Public participation in planning process has further increased the social input in such development.

TYPES OF IMPACTS

Based on its location, the transportation improvement project can have various social, economic, physical, and atmospheric impacts. Hence the federal administration requires an Environmental Impact Assessment statement (EIA), which studies the need of such projects, possible alternatives for the project and probable impacts if the project is built. This document looks at the physical, biological, atmospheric, land use, historic, and socioeconomic environments and the secondary and cumulative impacts (I-95 interchange with Stillwater Ave. Environmental Assessment, 1999).

Social impacts

Highway construction has improved connectivity throughout America since World War II; however it also has torn apart numerous neighborhoods and their social fabric. The fine grain fabric of small neighborhood, usually occupied by low income group, was wiped out to build new highways. The interchanges of these highways developed into commercial nodes which were generally services for the highway users and did not conform to the community in which they were located. Population displacement, loss of sense of community and non-conforming land uses together contribute to the negative social impacts on the community. Highway construction has destroyed housing and divided communities and mostly the low income and minority population was on the receiving end raising the issue of equity (Hodge in Hanson, 1986; 301).

Ecological / Environmental impacts

These impacts include air quality, noise pollution, and effects on water resources, vegetation, and the plant and animal life. Among these, air and noise pollution have caused public concerns and have highly developed models to measure these impacts. The other impacts also have measuring models, but they are not as developed as air and noise pollution models. Noise pollution is best defined as an unwelcome sound that has negative effect on quality of life. Traffic noise is a major contributor to this unwelcome noise. Continued increase in population and consumer demand is directly related to air pollution. Increase in carbon monoxide, one of the major pollutants is created by vehicular transportation. Massive highway construction has also effect on surface water drains, watersheds, run offs and living habitat of the area. Together these impacts affect the natural balance of the area and can severely damage the landscape if not assessed properly (Stutz in Hanson, 1986; 328-343).

Economic impacts

Highways improve connectivity between areas and form a regional network, helping people and goods to move freely. Accessibility to an area increases its potential and can be subjected to multiple uses. This is a major economic benefit of highways. Providing an interchange in a rural or suburban area increases the economic activity in that area. The interchanges become economic nodes that are connected regionally and serve the population in the vicinity. The mobility gained by express connections increase the economic value. In an extreme opposite case, the areas adjacent to highways that fall in the right-of-way lose their value due to development restrictions along with other physical and environmental impacts.

Physical impacts

These are impacts on the physical form of the area. The change in built form and natural landscape and visual characters contribute to physical impacts. The direct physical impacts are change in grades of land for construction, deforestation or construction or demolition of buildings. The indirect impacts are associated with the possible development of the area after the transportation improvement. This related to increase or decrease of land value, land use changes, socio-economic forces, and existing conditions of the area. The new physical form shapes from these impacts and changes function and overall image of the area.

METHODS OF ASSESSING IMPACTS

Generally three methods are used to assess impacts of transportation developments. The first is to have an expert committee and use their general agreement on impact using checklists and rating matrices. This is least scientific method but most commonly used approach. The second is using suitability mapping or overlay technique. This method uses information or geographic facts of the area using geographic information systems. These overlays are weighted according to land attributes and location. The resultant maps show the highest and lowest impact areas. The third method is cost/benefit analysis which adds monetary framework to each impact. The last to methods are more scientific and predictable due to their format (Stutz in Hanson, 1986; 344). As this thesis focuses on physical impacts only, the second method is most relevant to analyze the changes in the study area. The method is reliable due to its scientific base and available data for the area.

CHAPTER 4: STUDY AREA – UPTOWN CINCINNATI

The study area considered for this thesis is discussed in context with three levels, namely, regional, local, and actual site for the proposed interchange. The regional level is the City of Cincinnati and the local level is the Uptown area. It is necessary to understand this context to determine the role of the proposed interchange in the development of the Uptown area as well as the City. Topography of the region had a major impact on the development of the City. Unaffordable cost of transportation to develop the hills limited the occupancy of the area to few wealthy people. The city population was restricted to the basin area before public transportation such as cable cars, inclines and street cars were developed. The transportation improvements not only moved the residential populations out of the basin, but also the industries and institutions moved to the suburbs, primarily along the Mill Creek Valley. The City however retained its population by annexing these first streetcar suburbs.

TRANSPORTATION HISTORY OF CINCINNATI

City of Cincinnati began as a market outlet for an extensive agricultural hinterland. The City was dependent on its hinterlands for raw materials and food and it supplied manufactured products and services in return to these hinterlands. At the beginning of the nineteenth century the Ohio River saw a rapid increase in traffic, bringing large amount of business to Cincinnati. However, the City and the State lacked sufficient communication and coordination to take advantage of this opportunity. To alleviate this problem, the state built the canal system which connected Cincinnati to other major cities and business centers (Brune, 1976; 24).

By 1830, the transportation focus changed from canals to railroads. Meanwhile the population of the City also increased dramatically. The growing congestion in the City encouraged people to move out of the central city. Railroads made this spill over possible developing suburban railroad communities such as Fulton and Mt. Lookout. The City continued to expand by annexing these railroad communities and by 1914 it had annexed Clifton (1896), Delhi (1910), Saylor Park (1911), Fernbank (1912), Pleasant Ridge (1912), Hartwell (1912), and Kennedy Heights (1914) (Brune, 1976; 25, 26). Simultaneously, in 1850's horse-drawn streetcars (omnibuses) ran through streets of the City. With the expansion of the City, five inclines were also built. These inclines developed the hills of the City into flourishing residential neighborhoods. The City grew from the basin to the hills. Suburbanization continued in form of residential neighborhoods, yet maintained a strong connection with the central city.

At the turn of nineteenth century, electric streetcars paved their way in Cincinnati. The Cincinnati Street Railway Company, formed in 1880, changed all its cars from steam to electric power to incorporate the changing technology. The electric trolley competed with the steam railroads in the inter-city business. The change of transportation medium from railroad to streetcars and trolleys did not last long as the invention of automobile changed the traveling scenario. Motor vehicle registrations increased dramatically from 1920 to 1945. The ratio of persons per vehicle dropped from 13.9 in 1920 to 3.9 in 1940 (Brune, 1976; 30). This statistical data displays the popularity of automobile over other modes of transportations prevailing during same time.

The post 1945 period does not show the incremental pattern of development in the City. The main reason was World War II and the political and social changes associated with it. But one of the significant factors is the building of nationwide freeways. The accessibility not only took the population out of central city, but also gave mobility to the economic base located in the inner city. This period also saw a decline in railroads and public transit system in the City. The expansion of the City from early nineteenth century to the twenty-first century has been influenced by tendency of people to move in search of better quality of life. Initially the movement started as a spill over of central city and later changing it to sprawling suburbs competing with the City. But in both cases, transportation was the main link to connect the steep hills and suburban land.

Today, Cincinnati is dependent of the interstate highways and airports for its regional connections for passenger travel. The intra-city travel is almost devoid of public transportation. The existing network of Metro buses is not sufficient to support the City and its travel demands. The voters within the City and the County defeated the Light Rail Transit and bus improvement plan. This has further deteriorated the intra-city travel. Private automobile is the only viable option generating numerous individual trips on roads. As a result, traffic congestion during peak hours along major arterials is a frequent occurrence.

UPTOWN CINCINNATI

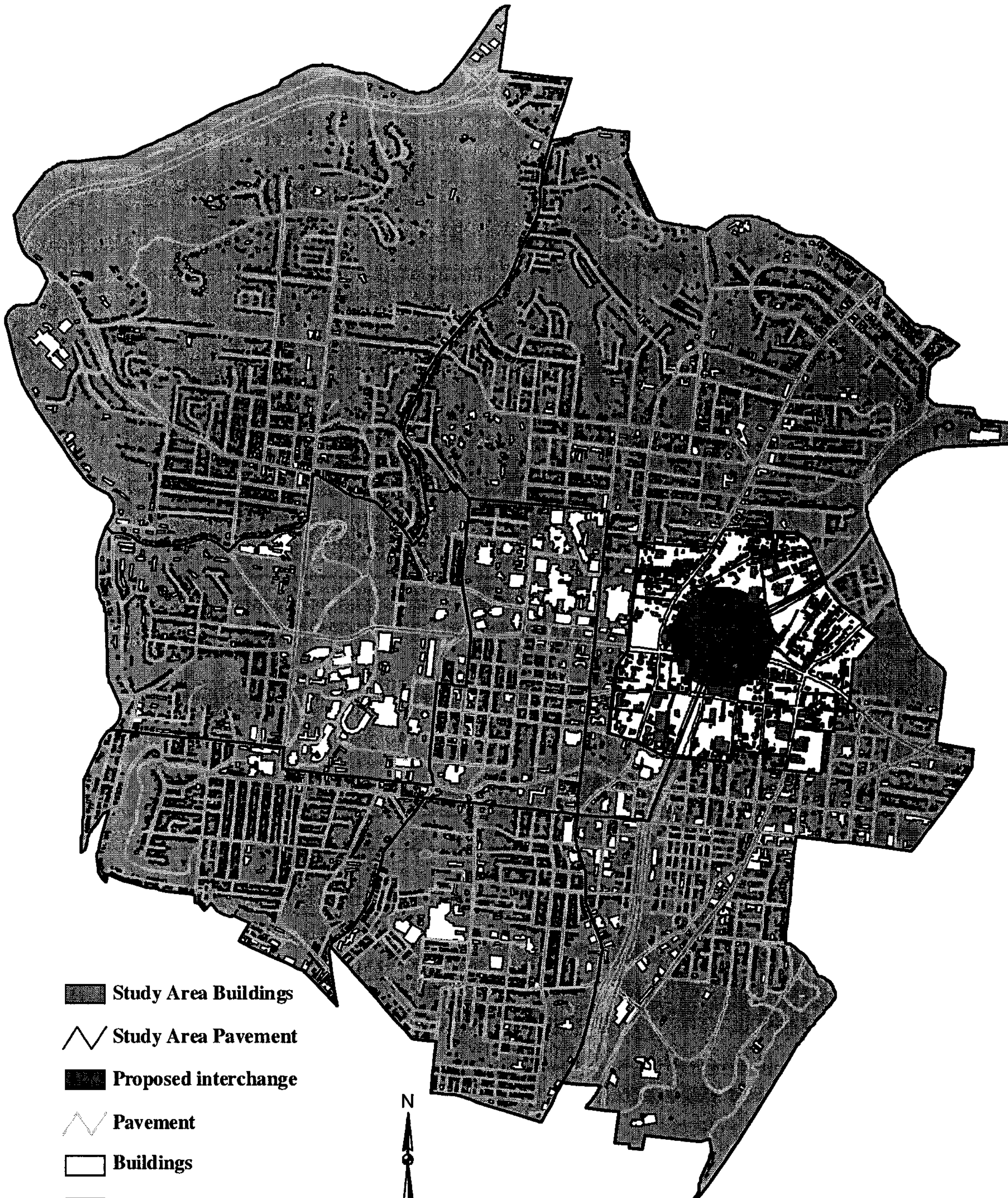
Uptown area of Cincinnati is located on one of the seven hills of the City. Seven neighborhoods – Avondale, Walnut Hills, Mt. Auburn, Fairview - Clifton Heights, Clifton, University Heights, and Corryville– together are referred as Uptown Cincinnati (*figure 4.1*). The area developed as a suburb of the City in the nineteenth century. The area, once a streetcar and railroad suburb, has flourished into residential and institutional neighborhoods. The area is a strong connection between the outlying suburbs and the Central Business District (CBD). Concentration of institutions such as hospitals and the university has made the area the second largest economic engine in the tri-state region, outperforming the C.B.D., second only to the Cincinnati - Northern Kentucky Airport (The Enquirer, August 02, 2000). The neighborhoods also have a wide range of housing stock starting from rental properties and apartment complexes to lavish single family houses. With all these opportunities located in the one place, the area gives a suburban quality of life and yet is located in the heart of the urban city.

PHYSICAL PROFILE OF UPTOWN CINCINNATI

Topography & Slope

The Uptown area covers about 8.64 sq. miles (10 % of the city). The area is located on a hill, which has steep slopes on the edges as compared to the central area. These edges are practically non-developable with slopes more than 25%. The eastern side of the region does not have as much steep slopes as the western edge. The development pattern in the region gives evidence of this feature. The western area has development that is more residential as opposed to the eastern area, which is more of mixed land use.

Figure 4.1: **Uptown Cincinnati**



Street Network

Two interstate highways, I-71 and I-75, run north-south through the City. I-71 passes through Uptown area and a half interchange at W. H. Taft and McMillan St. brings in north bound traffic to the area. The Hopple St. exit of I-75 brings in traffic from both north and south of the City. The state highways and major arterial roads follow the ravines and mild slopes in the area (Reading Rd, Gilbert Ave, Vine St, MLK drive, Ludlow Ave). Martin Luther King Dr. is one of the main arterial roads connecting east and west parts of the City. The street network ties the entire area in a rectangular from in central Uptown area. This development pattern shows the strong impact of physical setting due to steep topography in the area.

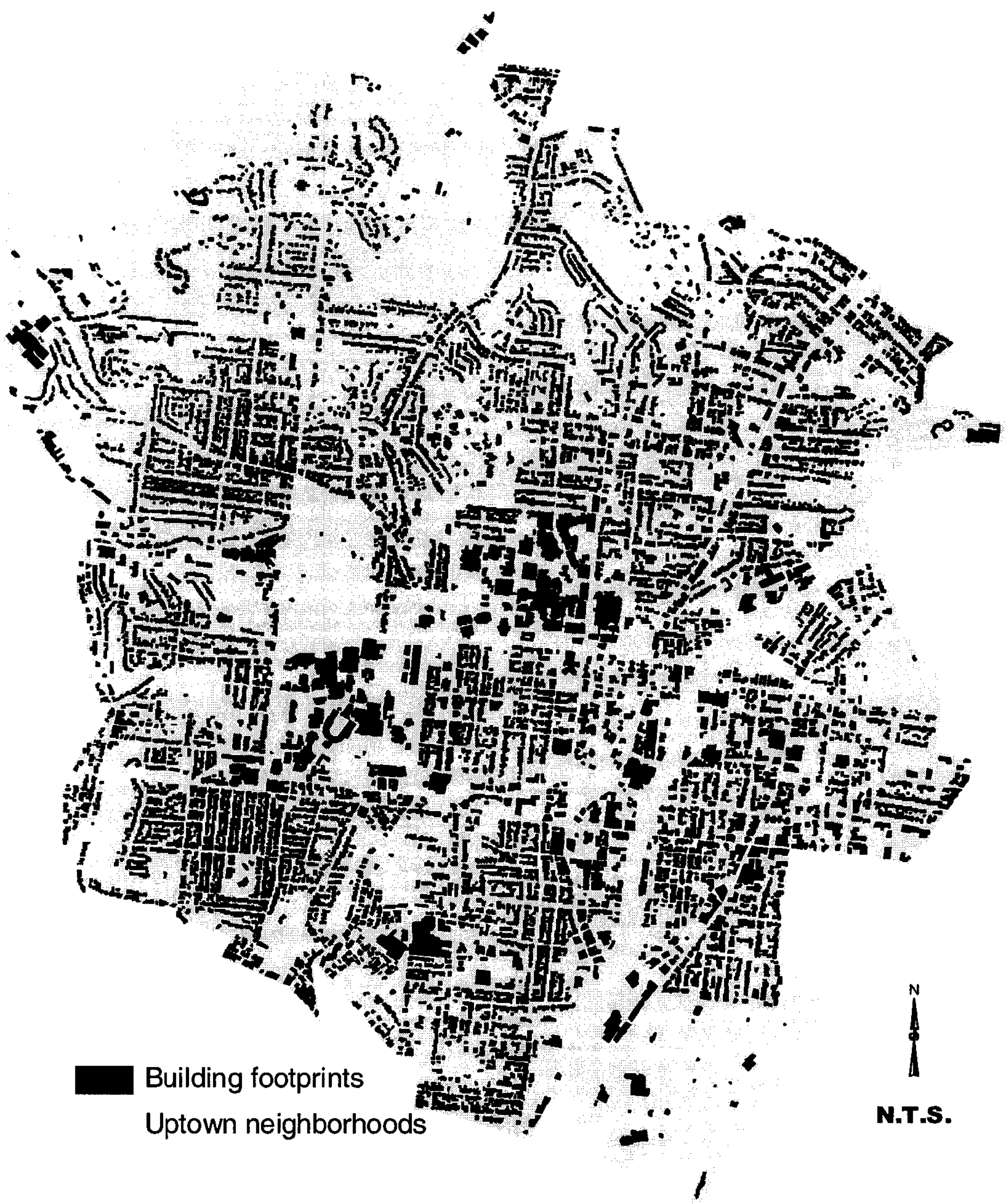
Built Form

Uptown Cincinnati is home for University of Cincinnati and 10 hospitals. The area is also known as 'Pill Hill' for its renowned medical services in the entire tri-state region. High concentration of hospitals, institutional buildings, professional offices, schools and other commercial developments are seen in central Uptown area and the edges are mainly residential areas. The figure ground map (*figure 4.2*) of the area shows a dense development where the building mass dominates more than the open spaces. Places like Burnet Woods, foot hills of Eden Park and steep slopes in Clifton are the only major undeveloped voids in the area. The building footprints also show the dominance of old roads laid on grade (Reading Rd, Gilbert Ave), which defy the general grid pattern. The presence of the University of Cincinnati is seen significantly as it occupies most of the central area of Uptown. Vine Street and Gilbert Ave, which have historic significance in the City, have lost their importance as neighborhood commercial areas and arterial roads. This is evident from the vacant land or parking lots along these roads that do not define an edge for these roads clearly due to voids or non continuous buildings. Reading Rd and Ludlow Ave are well defined with the adjoining buildings, with minimal vacant land and parking and have defined edges.

Parcel Subdivisions

The residential and institutional land uses occupy the most percentage of the land in Uptown Cincinnati. Commercial development is seen along Ludlow Ave, Reading Rd., Gilbert Ave, Short Vine, and Taft/Calhoun and Macmillan corridor. These are the neighborhood Business Districts (NBD) and are mostly concentrated in the central area of Uptown surrounded by residential areas. Residential areas are subdivided in small gridiron blocks irrespective of the topography. Housing stock is built along the grade of street. This adaptation has also contributed to the overall character of the area. Institutional and commercial uses occupy larger sizes of parcels and have large foot prints. Large size parcels allow large footprints of buildings and are placed on wider roads. Hence most of commercial and institutional uses are located along arterial roads and the collector and local street network serves the fine grain residential uses.

Figure 4.2: **Figure Ground map of Uptown Cincinnati**



Major Players in Uptown, Cincinnati

- City of Cincinnati
- Hamilton County Regional Planning Commission

Stakeholders

- University of Cincinnati
- Children's Hospital
- Cincinnati Zoo
- Tri Health
- Health Alliance

Community Development Corporations (Non Profit)

- Corryville Community Development Corp. (CCDC)
- Corryville Economic Development Corp. (CEDC)
- Bellevue Gardens Community Urban Redevelopment Corp.(BGCURC)
- Clifton Heights Community Urban Redevelopment Corporation (CHCURC)
- University Heights Community Urban Redevelopment Corporation (UHCURC)
- Uptown Crossings Community Urban Redevelopment Corporation (UCCURC)
- Avondale Redevelopment Corporation

Community & Business Associations

- Clifton Heights-University Heights-Fairview (CUF) Neighborhood Association
- Clifton Heights Business Association (CHBA)
- Corryville Community Council (CCC)
- University Village Association – *Corryville Business Association* (UVA)
- The Heights Community Council (HCC)
- Avondale Community Council
- Mt. Auburn Community Council

- Walnut Hills Area Council
- Walnut Hills Business District Associations
- Clifton Town Meeting
- Clifton Business Association

Table 4.1: **Overview of ongoing and proposed projects**

Project Name	Type	Scale of Project (minimum $30 million in cost)			
		$ (in Millions)	Area (acres)	Housing units	# of Jobs
UC campus improvements	institutional	751			
Children's Hospital 2004 expansion	institutional	TBD	11		2000
Children's hospital expansion	institutional	155			
Calhoun Street Marketplace	Retail/Comm.	110	6	1033 beds	
Cardiac Unit & Emergency expansion, Christ Hospital	institutional	77			
Advance Tech. & Learning Center, Cincinnati State	institutional	55			
Stratford Heights Housing	Housing	52	10	469 beds	150
Uptown Traditions, Corryville	Housing	50			
Future Vine/Calhoun Gateway	Retail/Comm.	40			
Future Jefferson Ave. Mixed-Use Dev.	Retail/Comm.	40			
Critical care pavilion, University Hospital	institutional	33			

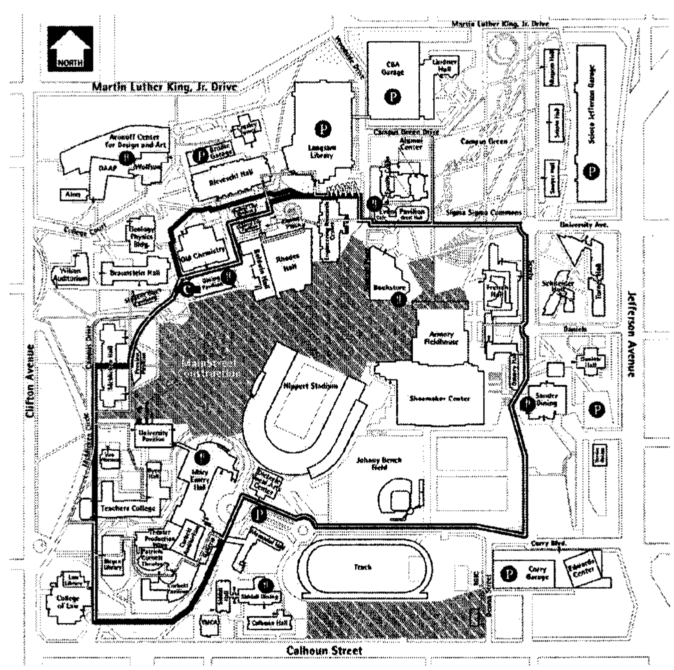
Source: Community Development, Office of University Architect, University of Cincinnati

Note: Transportation improvement projects such as MLK/I71 interchange, Hopple St/I75 interchange improvements, Metro Moves bus hub development in Uptown are not listed as these projects have more involvement of City, state and federal dollars.

University of Cincinnati – Master Plan

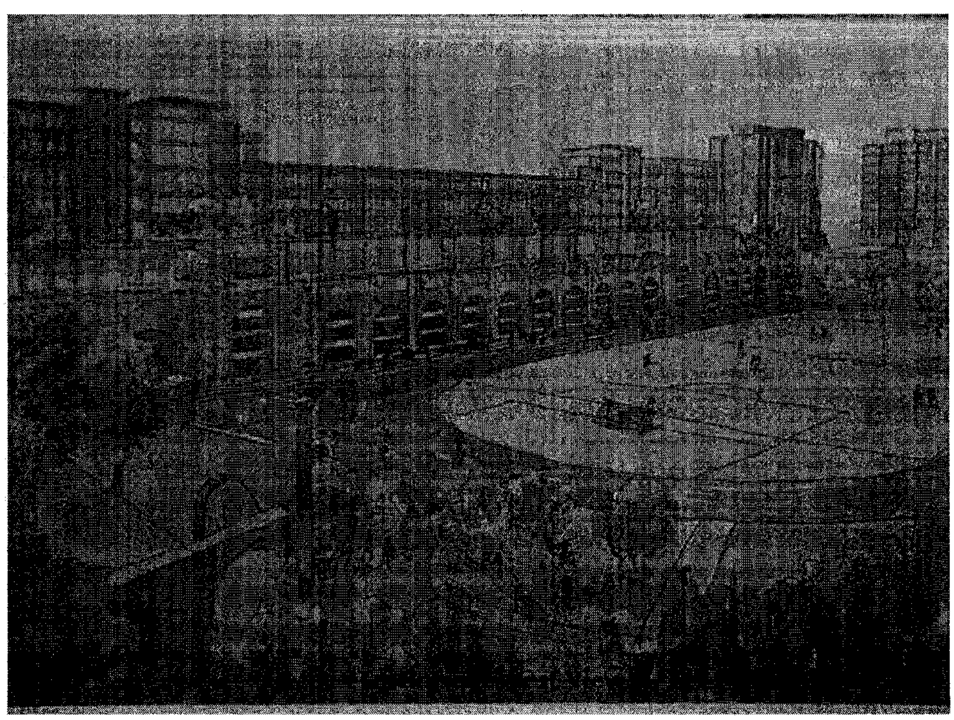
UC, one of the largest institutions in uptown area, is one of the major employers in the city. The university's adoption of a 10-year master plan has drawn both regional and national attention. The campus improvements are in process of improving student life, educational and research environment along with its relationship with the surrounding communities. The proposed $750 million projects are another step to attract more students and clients to increase the population and research carried out in the university (Master Plan 2000).

The increased student population cannot be served by on campus housing only. The surrounding neighborhoods have housing stocks which supplement on campus housing. This transient population also needs supporting facilities for extra-curricular activities which an educational institutional cannot provide. Knowing these facts, UC has also taken an initiative to involve in neighborhood development projects and represents some of the non-profit organizations operating in the area. UC foundation also gives financial and infrastructural support to these organizations. The campus plan strengthens the internal circulation of students, staff, and faculty and the community initiative plans built better relationship with surrounding communities.



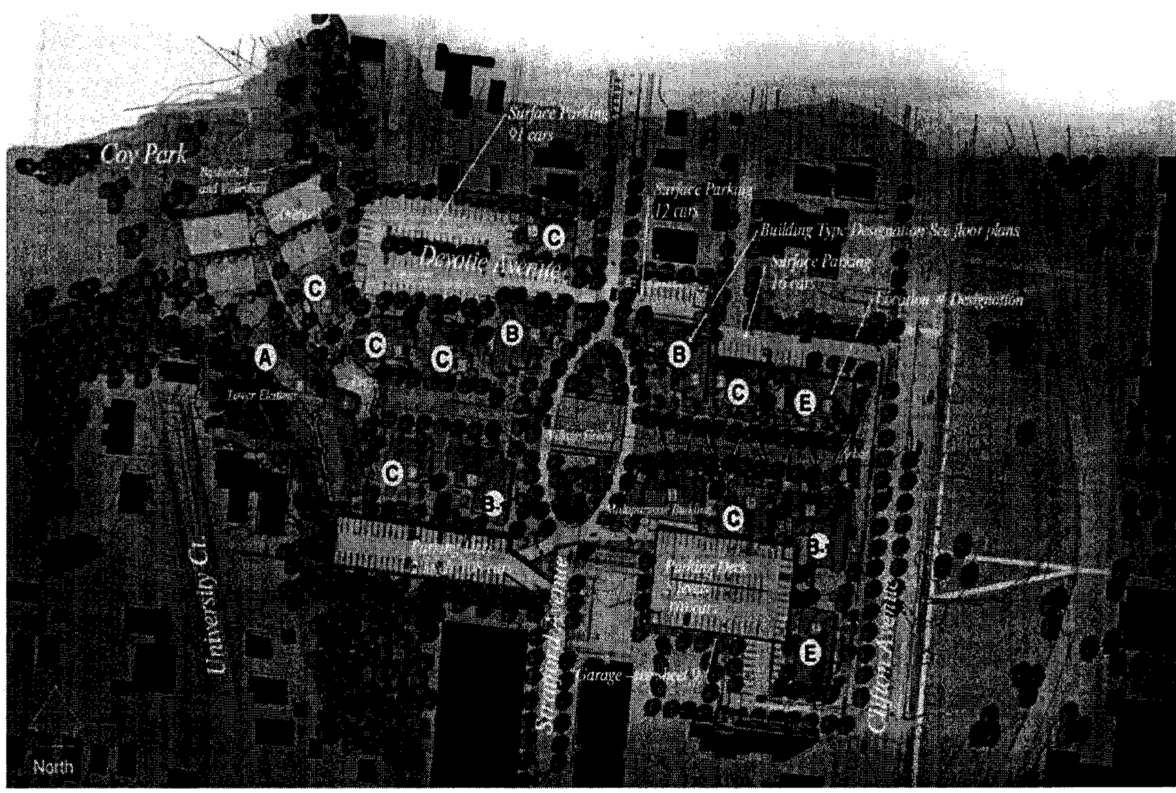
Calhoun Street Marketplace - Clifton Heights Community Urban Redevelopment Corporation / University of Cincinnati

CHCURC and UC, together have broken ground to start their first joint venture in a development project located Calhoun Street. This project includes student housing and ground floor retail space. An underground parking garage is provided for the University and business district. The project focuses on mixed use of buildings and creating open spaces and parks for public use. The project is also considered as a gateway to the university given the access from I – 71 to the uptown area. Future development considers the intersection of Vine and Calhoun/McMillan Streets to develop offices/entertainment districts to support the first phase of the project (www.chcurc.org).



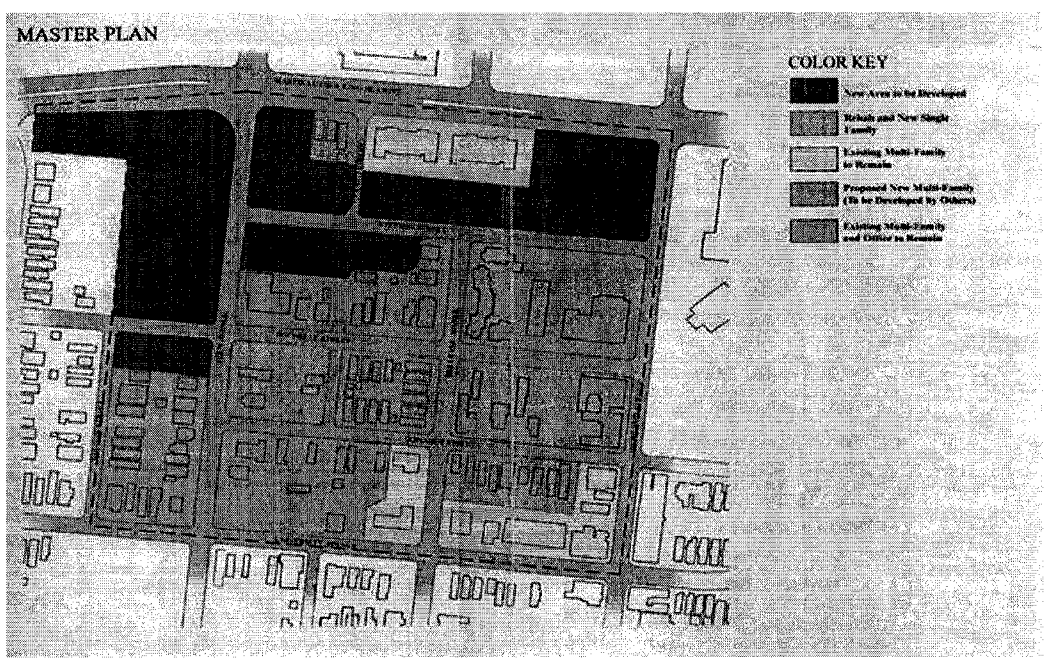
Stratford Heights Housing - University Heights Community Urban Redevelopment Corporation (UHCURC)

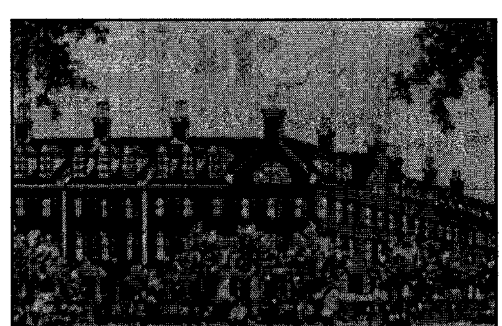
Stratford Heights is the first project for UHCURC. The housing project is targeting student academic, religious, and fraternal organizations. Located on Clifton Avenue adjacent to the University of Cincinnati, the project provides a central housing location for student organizations. The initial master plan is completed. Plans for the Stratford Heights neighborhood are based on three areas, namely, Student Housing, Community Goals/Shared facilities, and Structured and Outdoor Recreational facilities. The project is under approval process and has faced certain opposition. One of the main concerns is concentration of student population in one place, which may disturb the surrounding area (www.uhcurc.org).



Uptown Traditions, Corryville

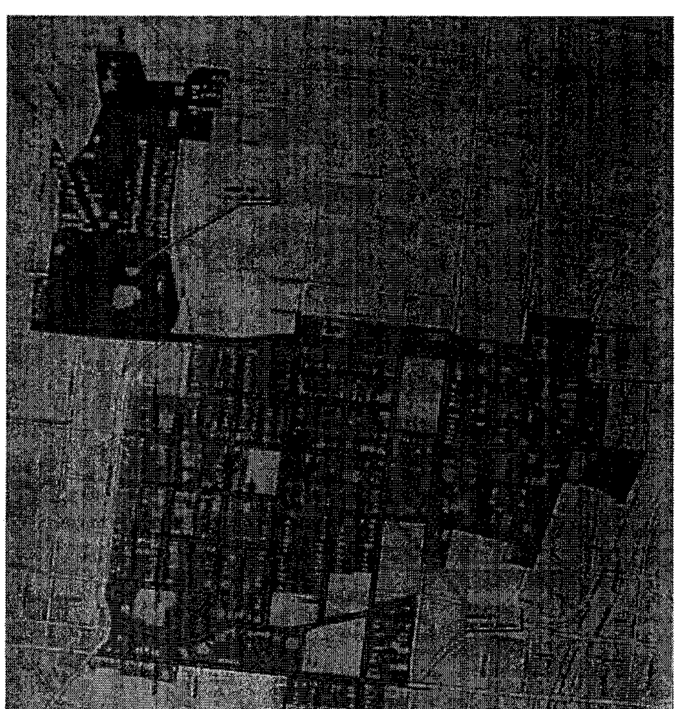
The aim of this program is to increase home ownership and overall population in neighborhood of Corryville. The first phase of the program is already complete in form of town houses on MLK Drive and open for rental market. The program plans to built 96 owner occupied units and 175 rental units, targeting singles and couples in age group of 25 - 30. 52,000 sq. ft of Retail / Professional offices along with structures parking is also part of the program.





Other Planning Projects

Uptown Crossings Community Urban Redevelopment Corporation is looking at the area between Burnet Woods, Zoo, East Campus, and Short Vine NBD. The area has redevelopment potential especially for the metro bus hub proposed in the bus expansion plan. The central location of the area is an asset for many stakeholders, who are members of the corporation. There are no particular plans set for the area, but the edges of the district are almost finalized.



One of the private initiatives is to establish Tax Increment Finance Districts to fund future projects. Areas from Corryville and Clifton Heights are included in the current boundaries to meet the requirement of 300 acres for formation of the district.

Development / Redevelopment Trends in Uptown Cincinnati

As seen from the analysis, current and future projects are focusing on redeveloping within the existing fabric of Uptown area. Vacant land is not available for new development. The existing infrastructure serves the current needs of the area. However, the increasing development densities for both residents and businesses and institutions, is exerting pressure on the support structure of the area. The physical form of Uptown is being transformed with new buildings and developments and the emerging economic development opportunities are also expected to propel with these changes.

A major concern regarding all mentioned projects is absence of a comprehensive plan. The most recent Uptown development plan was drafted in 1990 (Uptown comprehensive development plan, 1990). The City's comprehensive plan that addressed the development issues is also almost 25-year old. Most of the projects are focusing on housing, commercial and retail development. Student and working population is the base for most of the development speculations. The projects plan to expand the market with good housing even though student population (that is the core audience target in most cases) has not increased in the same ratio. These projects are competing with each other in a similar market which has felt the current economic recession. Transportation is another concern for the area. The defeated proposal to fund the Light Rail has created a sense of urgency among the major stakeholders of the area. Additionally the area is also under-served by the connections to the interstate highways. Proposals for transportation improvements need collective approach to gain the City, the State and the Federal support. Formation of Uptown Transportation Advisory Committee (UTAC) is a beginning of this process. The committee represented by major stakeholders in the area needs to communicate with other neighborhood organizations and local community councils to achieve their goals to improve transportation services in Uptown Cincinnati.

THE STUDY AREA

The proposed interchange is located on East Martin Luther King Drive and I-71. The proposal referred as scheme D is a full access and multi-directional interchange with all ramps, except one, located north of M. L. King Dr. There are three side entrance ramps for access to both north and south I-71 and one signalized intersection for exit ramps. The scheme also proposes to modify entrance ramp from Montgomery Road at Brewster Avenue (Edwards and Kelcey, 2002; 19).

Based on this location on interchange the area in immediate surrounding should experience dramatic change. The construction of I-71 access ramps will impact the street pattern and require selective demolishing of buildings in the right-of-way area. This will be the first immediate impact on the area. With improved access to the area, the value of surrounding land is expected to increase, generating the possibility of redevelopment projects at a variety of scales and densities. To carry out analytical studies how this development would occur, I have identified hypothetical boundaries for physical impact. These boundaries are based on the assumption that:

- The existing commercial and institutional development, which is in good physical condition and can sustain for next 20 - 25 year, will not be considered for redevelopment with this new interchange.

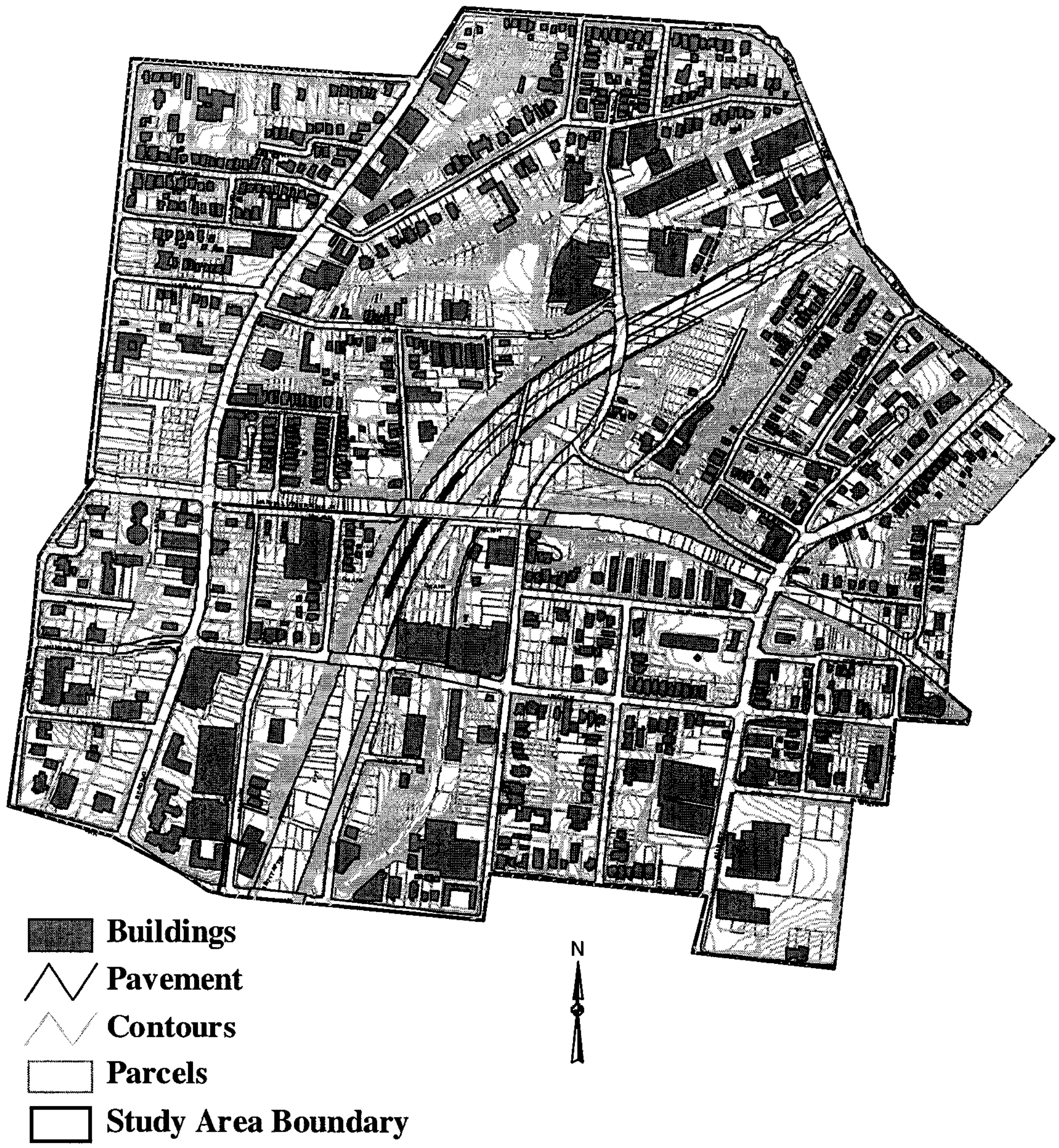
- The existing housing in the area which may not survive in next 20-25 year is prone to yield to emerging economic development forces and activities.
- Some housing areas may or may not change, irrespective of their physical condition, depending on the economic forces that would drive the development in the area.

Based on these assumptions the study area is bounded by Harvey Ave. and Vernon Ave on west of I-71, Cemetery and Park Ave. on east of I-71, Blair Ave and Hale Ave on north of M. L. King Dr. and Oak Ave. and Yale Ave. on south of M. L. King Dr (*figure 4.3*).

PRELIMINARY OBSERVATIONS OF STUDY AREA

The study area is situated in a strategic location with Downtown Cincinnati in the south, University of Cincinnati and Hospitals in west and upscale neighborhood of Hyde Park on east. I-71 and M. L. King Dr. divides the study area into four quadrants with proposed ramps mostly located in the north-west quadrant. Located on a mild topography, the area has mostly for residential, business and industrial uses. Two major highways, Reading Rd. and Gilbert Ave. run north-south parallel to I-71 and are connected by M. L. King Dr., Blair Ave., Lincoln Ave, Oak St., and Fredonia Ave in east-west direction. The commercial uses are located along Reading Rd. and Gilbert Ave.; the residential areas are connected by local streets. Currently the area has access from Taft Exit # 3 from I-71, which is a half interchange serving north bound traffic only.

Figure 4.3: **Base map of study area**



CHAPTER 5: METHODOLOGY

The literature review identifies five determinants of urban form; Natural Environment, Visibility, Street Pattern, Land Subdivision, and Built Form. These determinants can be analyzed to study the physical impact of proposed interchange in Uptown Cincinnati. Since there is a proposed transportation improvement, it is necessary to identify the potential of the area for development with and without the interchange. In other words, the 'physical impact' of transportation improvement can be measured, to a certain extent, by comparing the development potential of the area in both cases based on physical conditions. The resultant development that would follow the proposed action, which can be either positive, negative or neutral is termed as 'impact' and the term does not solely means negative impact.

PHYSICAL ANALYSIS OF STUDY AREA

The study area will be analyzed for physical impacts in four ways. These are as follows:

1. Environmental Analysis
2. Visibility Analysis
3. Street Network Analysis
4. Land Use Analysis
5. Building Assessment (for selected areas)

Procedure for Analysis

The street network divides study area into 52 blocks of various sizes (*figure 5.1*). In each type of analysis, the blocks are used as units to assess the existing conditions and impacts of proposed action. These blocks are categorized in one of the three levels – best for development, reasonable for development, and poor for development – based on its individual physical characters. The categorization is based on each block's potential for development, which can be best, reasonable, or poor and will differ for each analysis. For example, a block may have soil type that are not suitable for any development and will be considered as a poor category in environmental analysis; but the same block may have dilapidated buildings that cannot be rehabilitated (but can be removed in favor of new construction) which can be best category in built form analysis. Hence each analysis defines criteria for the three categories to define a block as best, reasonable, or poor.

Built form is not studied for the entire study area since it is difficult to assess structural stability and life of each building in the area. Hence the study focuses only on buildings that are located on the blocks that are identified as best for development after assessing the impacts of proposed action of transportation improvement.

The following steps are used for the analysis of each type:

Step – 1	Existing conditions
Step – 2	Criteria for block classification
Step – 3	Classifications of blocks based on existing conditions
Step – 4	Proposed actions
Step – 5	Impacts of proposed actions
Step – 6	Classification of blocks based on proposed actions

To quantify the change and visualize the potential development in urban form, the three categories are given a value. The best potential for development has value 3, reasonable has 2, and poor has 1. A table/chart is developed for step 3 and step 6 in most cases.

The value system is not used to weigh one analysis with another. Each type of analysis is independent of other factors and the results are derived by weighing the criteria of each analysis only. Hence the values used in all analyses are in the same range and do not imply importance of one type of analysis over the other.

Steps 3 and 6 of each analysis are put in a matrix that shows all values for each block for the analysis analyses. The average value of each block is derived for both existing conditions and proposed actions. Comparing these values will reflect the physical impact of the interchange on the area. Buildings on the blocks that are identified as best for development in the proposed action section will be analyzed for verification of the potential of those blocks.

The results of the analysis of both existing conditions and proposed actions cannot be directly mapped in the three levels due to decimal values in some parts of analyses. Hence a statistical range will be used for block classification for those parts. Following method is used for deriving the range:

X = (maximum – minimum)/3

Lowest range = minimum to (min. x X)

Middle range = (min x X) to (min. x 2**X**)

Highest range = (min. x 2**X**) to maximum

METHODOLOGY

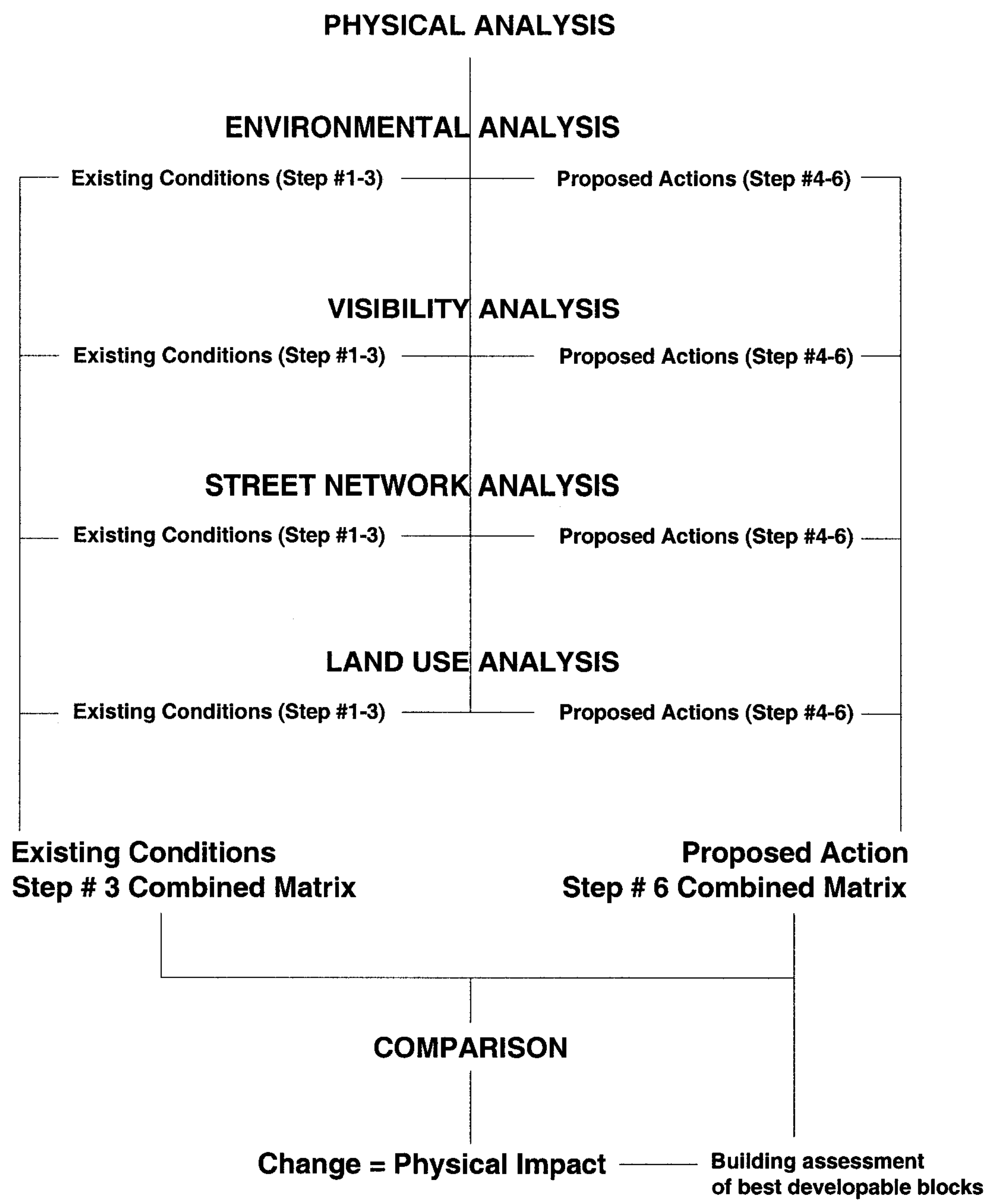
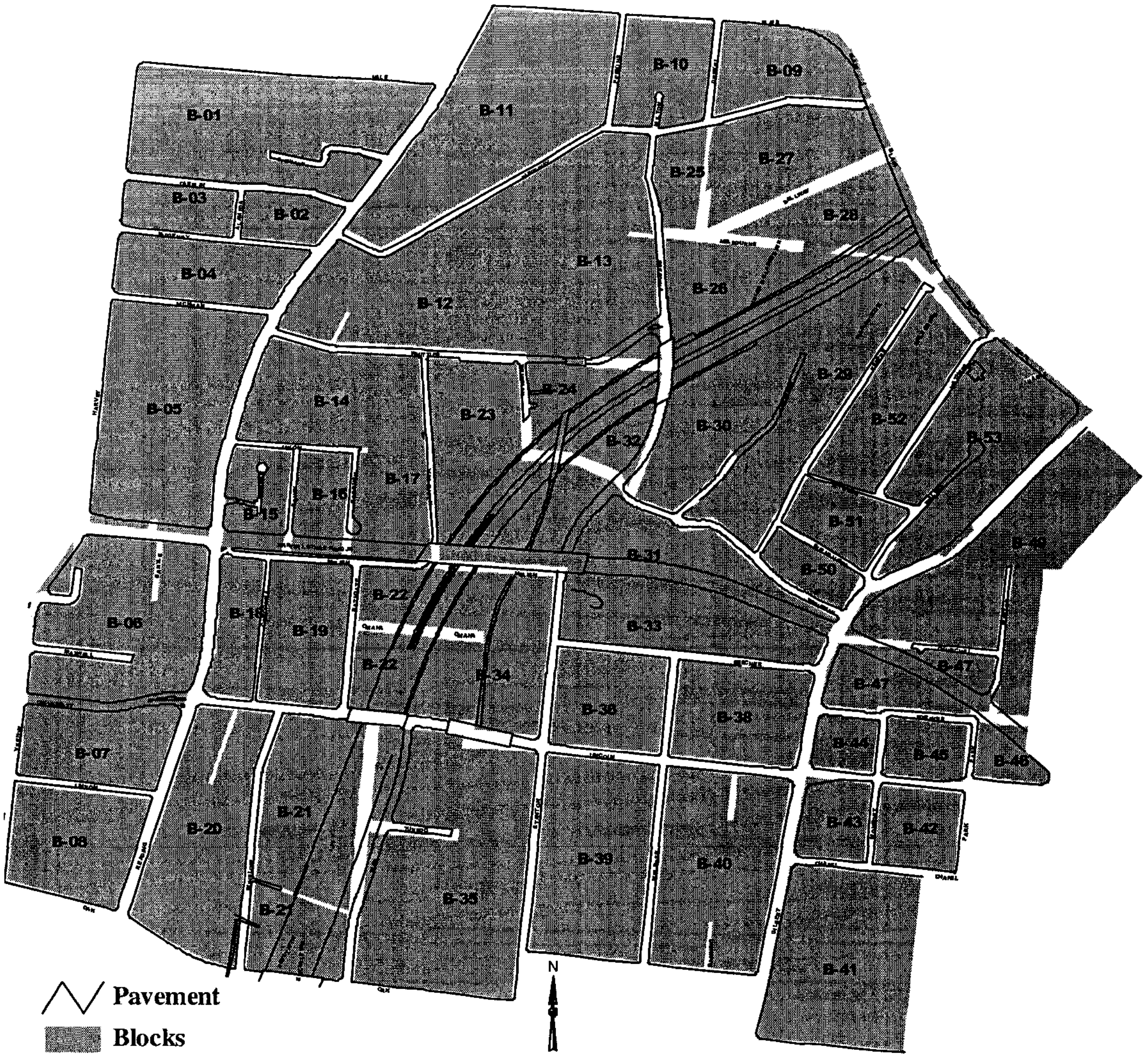


Figure 5.1: **Study area block identification**



ENVIRONMENTAL ANALYSIS

Physical construction for any development starts with site planning and analysis. It is important to understand the characteristics of the natural landscape for efficient development. In case of this study this factor in not very critical as the area has undergone development and has negotiated with existing conditions of natural landscape. But it is necessary to evaluate some basic aspects of the landscape, such as soil types and slope, since the proposed development is unique to the area and there is a significant increase of road construction and vehicular traffic which will affect the surrounding natural environment.

Step – 1 Existing Conditions

1. Soil Classification

The study area has three types of soil, namely, EeD, RtB and RtC (*figure 5.2*). Following are the general characteristics of these soil types:

EeD: Eden – Urban Land Complex

- 15 to 25% slope
- Well drained and moderately steep
- Located on hill sides or uplands
- Slow permeability
- Rapid runoff
- Recommended for parks, open spaces, lawns and gardens
- Unsuited for buildings and septic tanks

RtB: Ross Moyne – Urban Land Complex

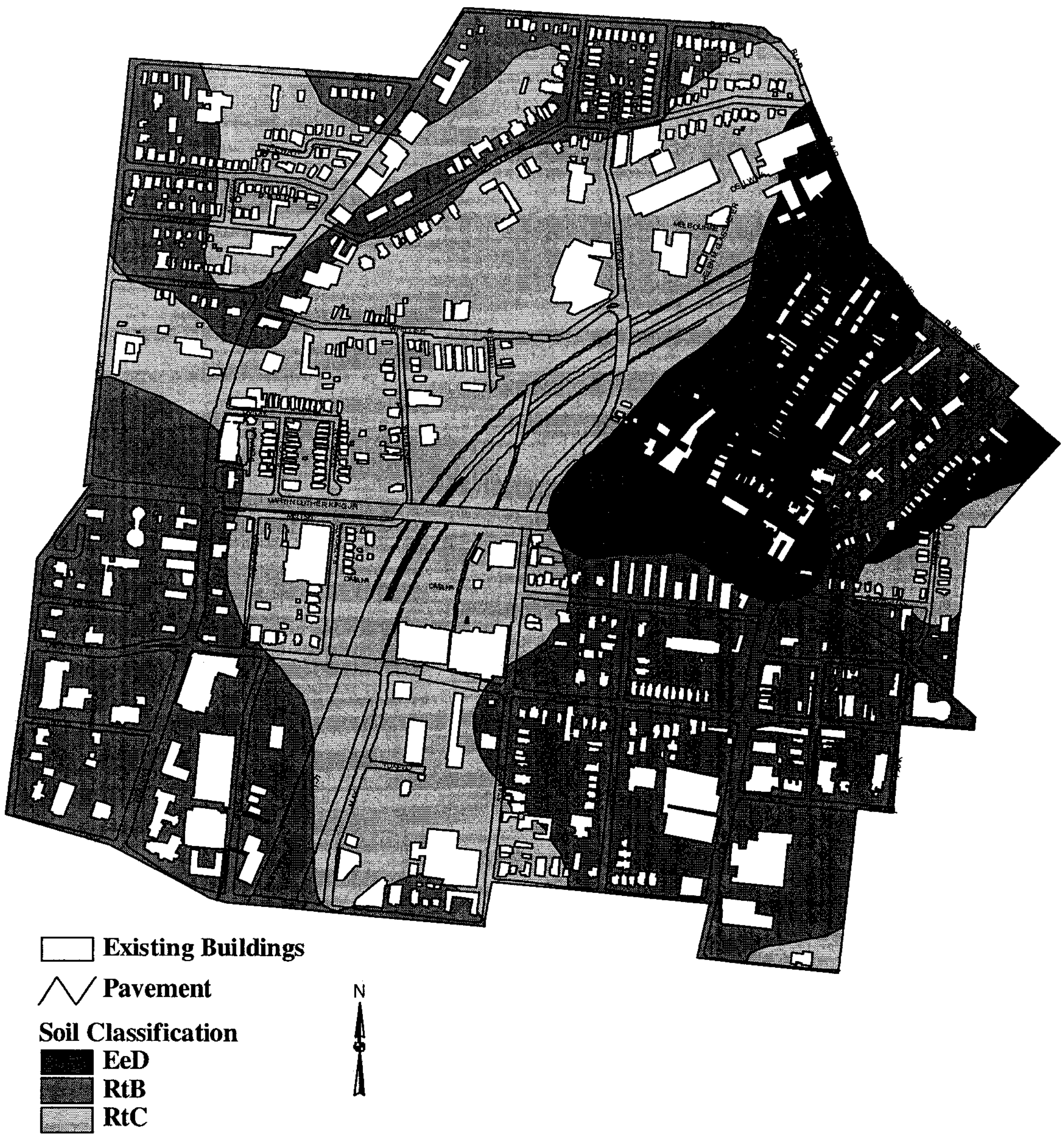
- 3 to 8% slopes
- Moderately well drained
- Moderate permeability
- Corrosive to uncoated steel and concrete
- Slow runoff
- Recommended for parks, open spaces, lawns and gardens
- Moderately well suited for building but poor for septic tanks
- Limited use for local streets and roads due to low strength of soil and by hazard of frost action in the soil (can be mitigated by addition cost in construction)

RtC: Ross Moyne – Urban Land Complex

- 8 to 15% slopes
- Moderately well drained
- Moderate permeability
- Corrosive to uncoated steel and concrete
- Rapid runoff
- Recommended for parks, open spaces, lawns and gardens
- Moderately well suited for building but poor for septic tanks
- Limited use for local streets and roads due to low strength of soil and by hazard of frost action in the soil (can be mitigated by addition cost in construction)

(Source: Soil Survey of Hamilton County, Ohio and CAGIS)

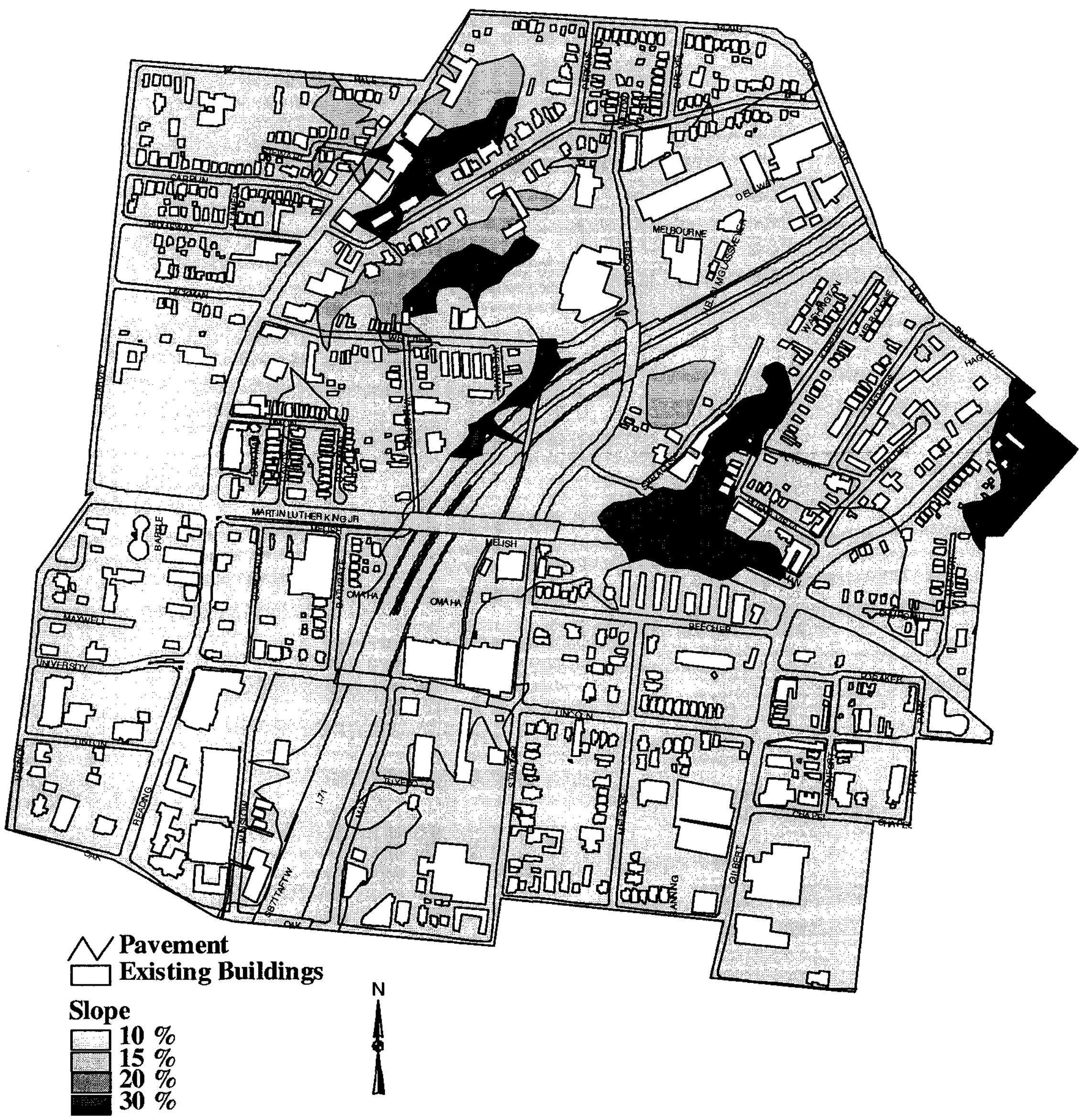
Figure 5.2: **Soil type classification and existing development**



2. Slope Classification

The study area has a varied topography starting from 690 feet to 850 feet above sea level. The slope varies mainly between 3 to 15 % for most of the area and is suitable for development. Some areas have slope above 15 % and are not suitable for development (*figure 5.3*).

Figure 5.3: **Slope classification and existing development**



The study area has soil type that is not ideal for physical development. But the existing development shows that improved construction technology can mitigate these limitations. As seen from figure 5.3, there is no major development in the areas with steep slopes except for streets and small housing structures.

Step – 2 Criteria for Block Classification

The three soil types present in the study area are not ideal for construction. Hence no block has best potential based soil type classification. The soil types RtB and RtC are reasonably good while soil type EeD is poor for development. Hence blocks with soil type RtB and RtC will have value 2 and blocks with EeD will have value 1. Blocks with slope less than 10% can be considered best for development. Blocks with slope between 10 to 15% can be considered reasonable while blocks with slope more than 15% can be considered poor for development.

Step – 3 Classifications of Blocks based on Existing Conditions

Based on the criteria and existing conditions, the blocks can be classified as shown in figures 5.4 and 5.5.

Figure5.4: **Block classification based on slope**

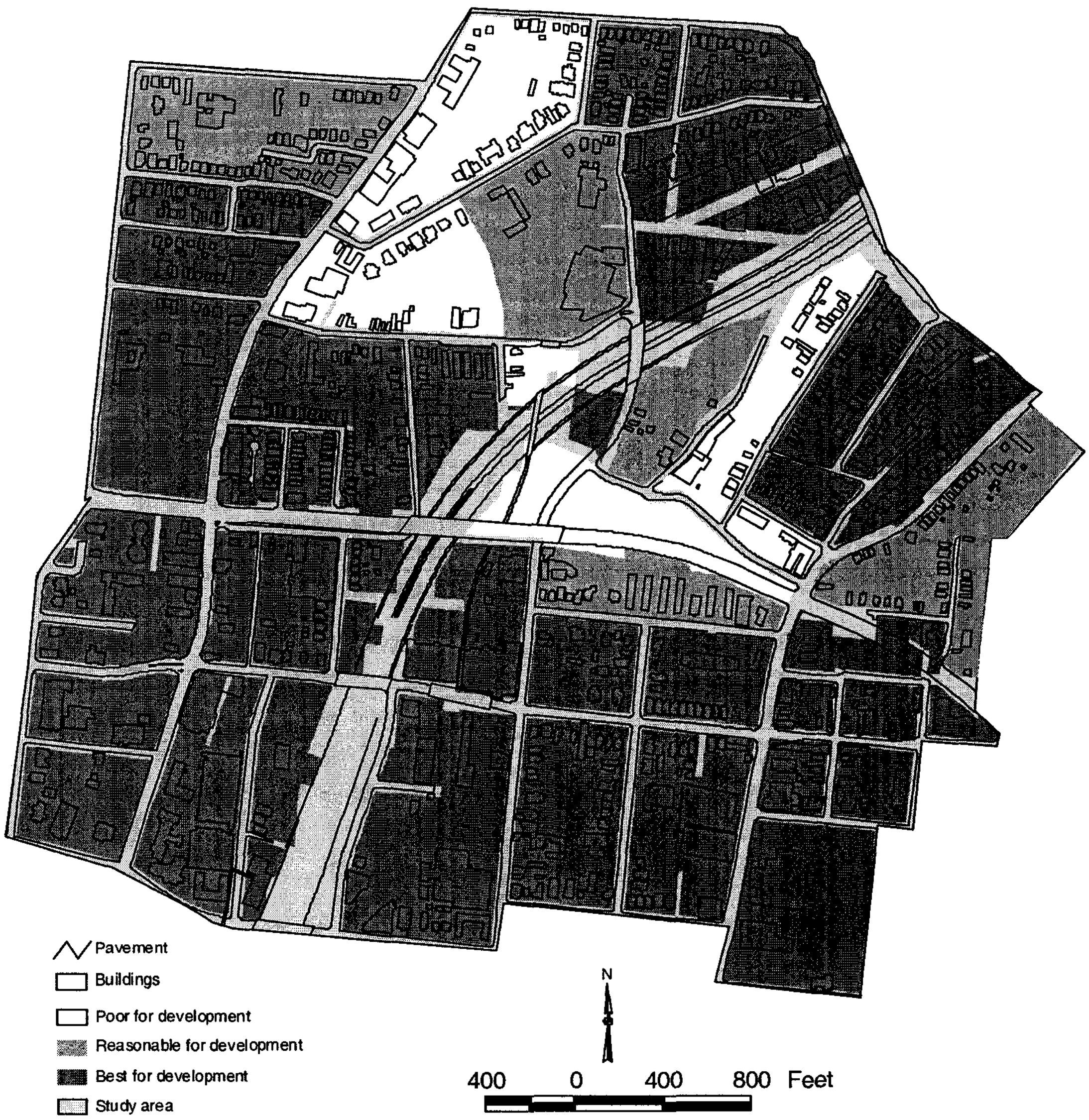


Figure5.5: **Block classification based on soil type**

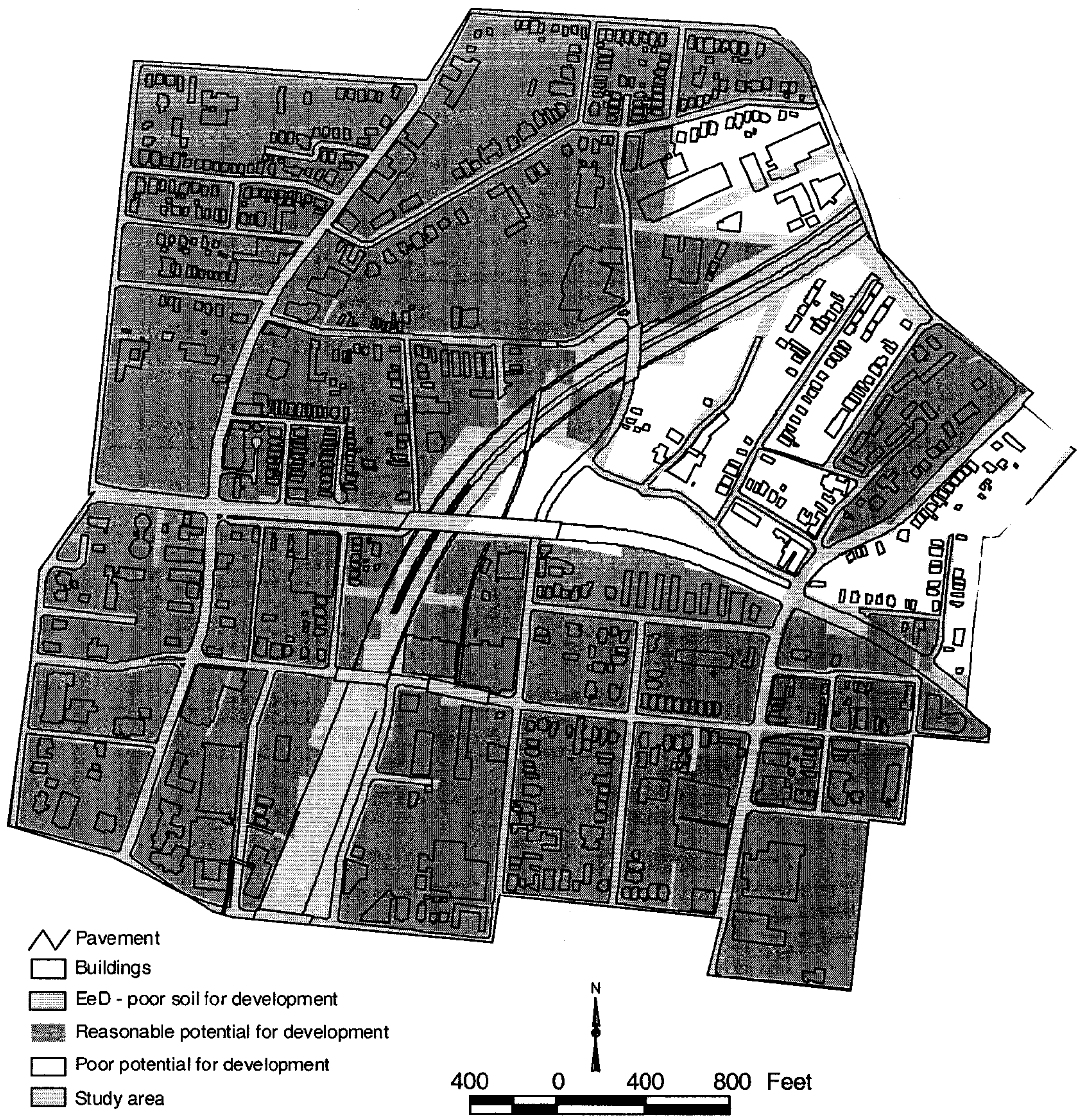
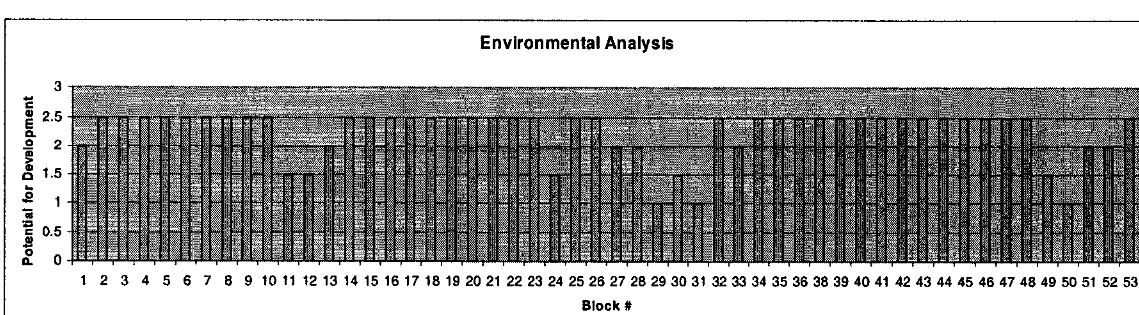


Chart 5.1: **Graph showing environmentally sensitive blocks (including slope and soil type)**

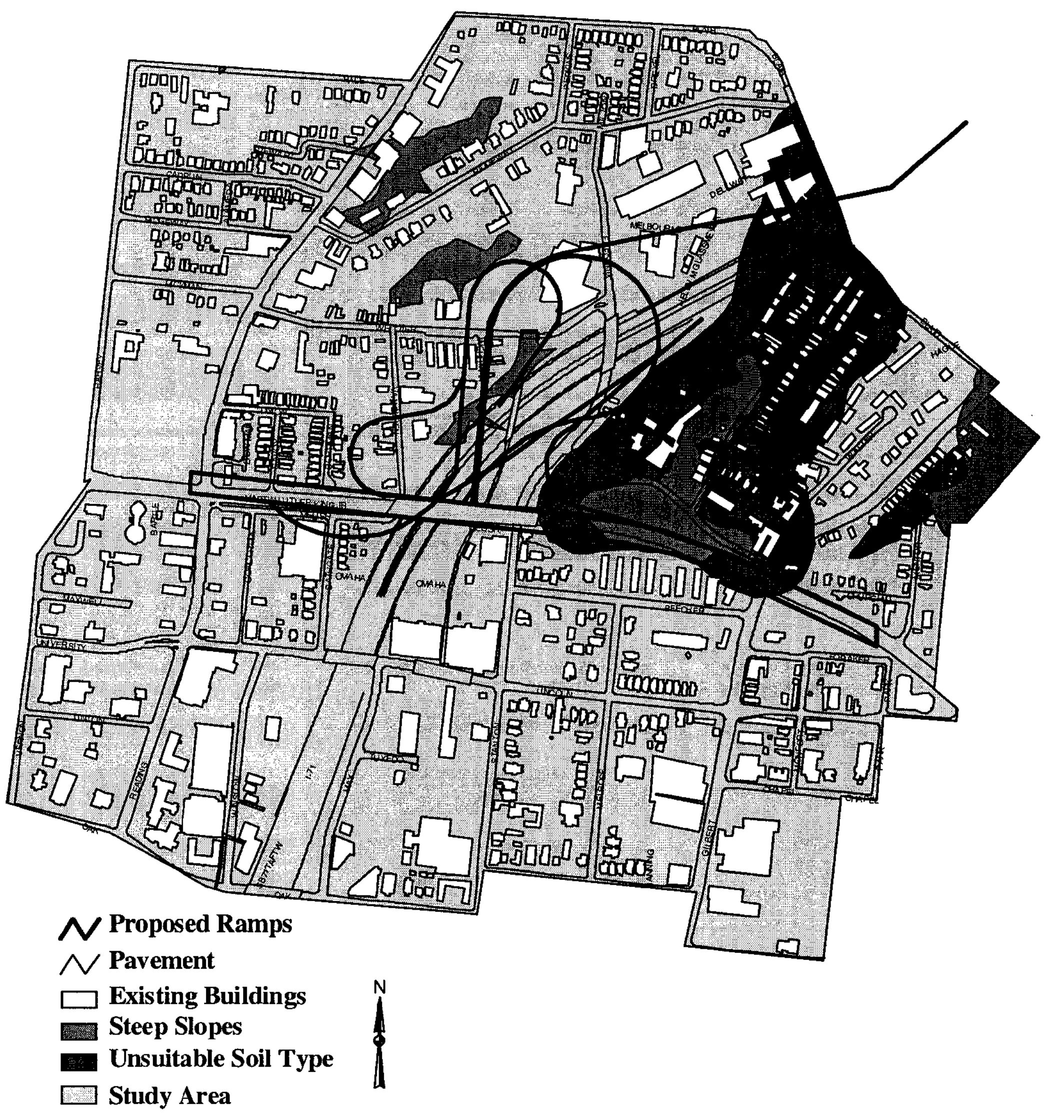


The study area has very few environmentally sensitive areas based on existing conditions. The areas with steep slopes and poor soil (blocks # 10, 11, 28 – 32, and 47 – 51) already have some development (Refer table 1 in Appendix).

Step – 4 Proposed Actions

Figure 5.6 shows the location of proposed interchange overlaid on the environmentally sensitive areas.

Figure 5.6: **Location of ramps and environmentally sensitive areas**



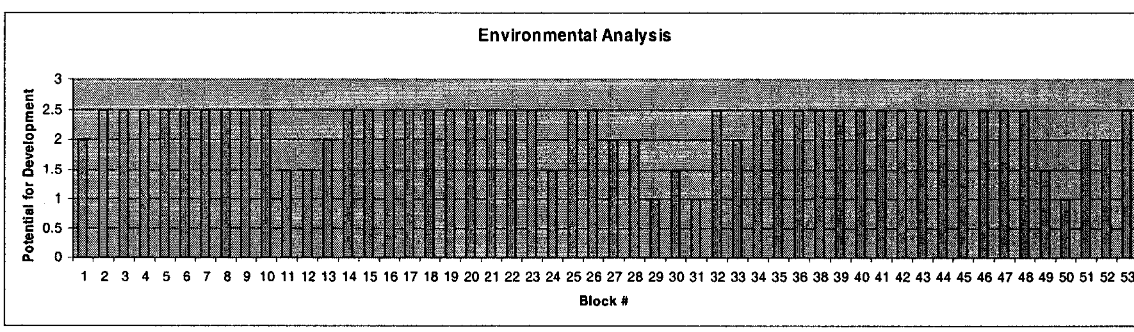
Step – 5 Impacts of Proposed Actions

The proposed ramps are located over some environmentally sensitive areas. The areas have either steep slopes or have unstable soil base. But the structural system of ramps can be designed to mitigate these problems. The foundation of ramps can be designed to avoid the unstable soil and steep slopes. Most of the ramps are placed in developable areas and will not be harmful to the area.

Step – 6 Classification of Blocks based on Proposed Conditions

Since the interchange construction does not affect the environmental conditions mentioned above, the categorization of blocks remains same as the existing conditions.

Chart 5.2: **Graph showing environmentally sensitive blocks (including slope and soil type)**



VISIBILITY ANALYSIS

Location of potential development depends on visibility, especially for commercial and retail land uses. Visibility becomes a main criterion from the perspective of advertisement and marketing which is an important component of economic development.

Step – 1 Existing Conditions

The study area is divided in 52 blocks based on the street network. The hierarchy of streets and visibility of blocks from important streets can determine their potential for development. The street network identifies I-71, Reading Rd, Gilbert Ave, and Martin Luther King Drive as four main roads that can be used to categorize the blocks in three levels based on their visibility. The blocks along I-71 have reasonable visibility mainly because of the curve in the road. The intersection of Reading Rd and MLK Dr. has best visibility due to its location, existing built form, and relatively low elevation change. The intersection of MLK Dr. and Gilbert Ave. has relatively high elevation change and has less visibility as compared to the intersection of MLK Dr. and Reading Rd.

Step – 2 Criteria for Block Classification

Visibility from two or more main roads	-	Best potential for development
Visibility from one main road	-	Reasonable for development
Visibility from no main road	-	Poor for development

Topography and existing buildings are also used to determine the potential as major level difference or big building footprints can block the view of adjacent areas.

Step – 3 Classifications of Blocks based on Existing Conditions

Figure 5.7 identifies the blocks that have different potential for development in existing condition based on their visibility from the four main roads mentioned in step 1.

Figure 5.7: **Existing visibility from main roads**

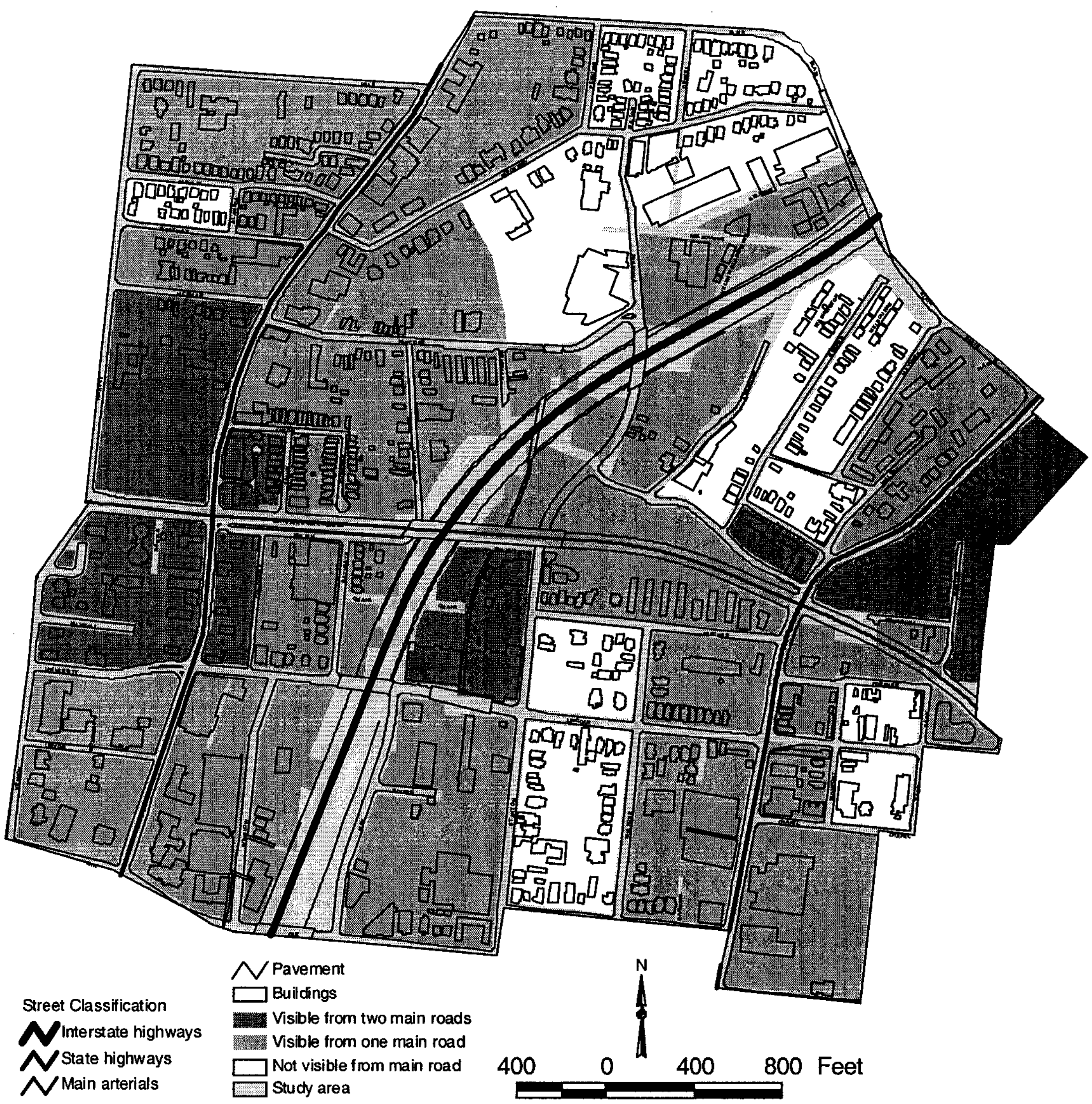
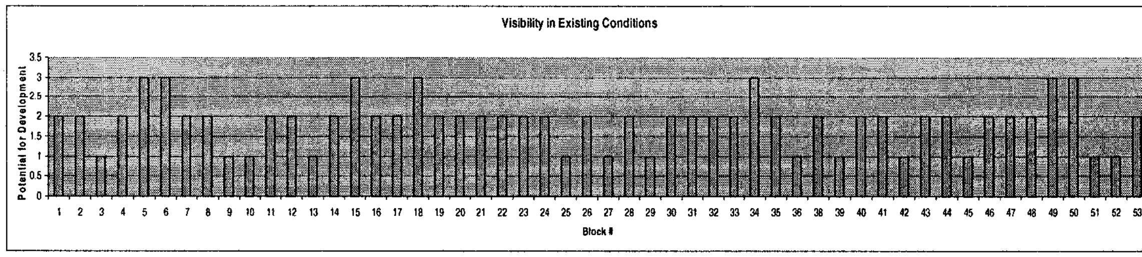


Chart 5.3: **Graph showing existing visibility of each block**



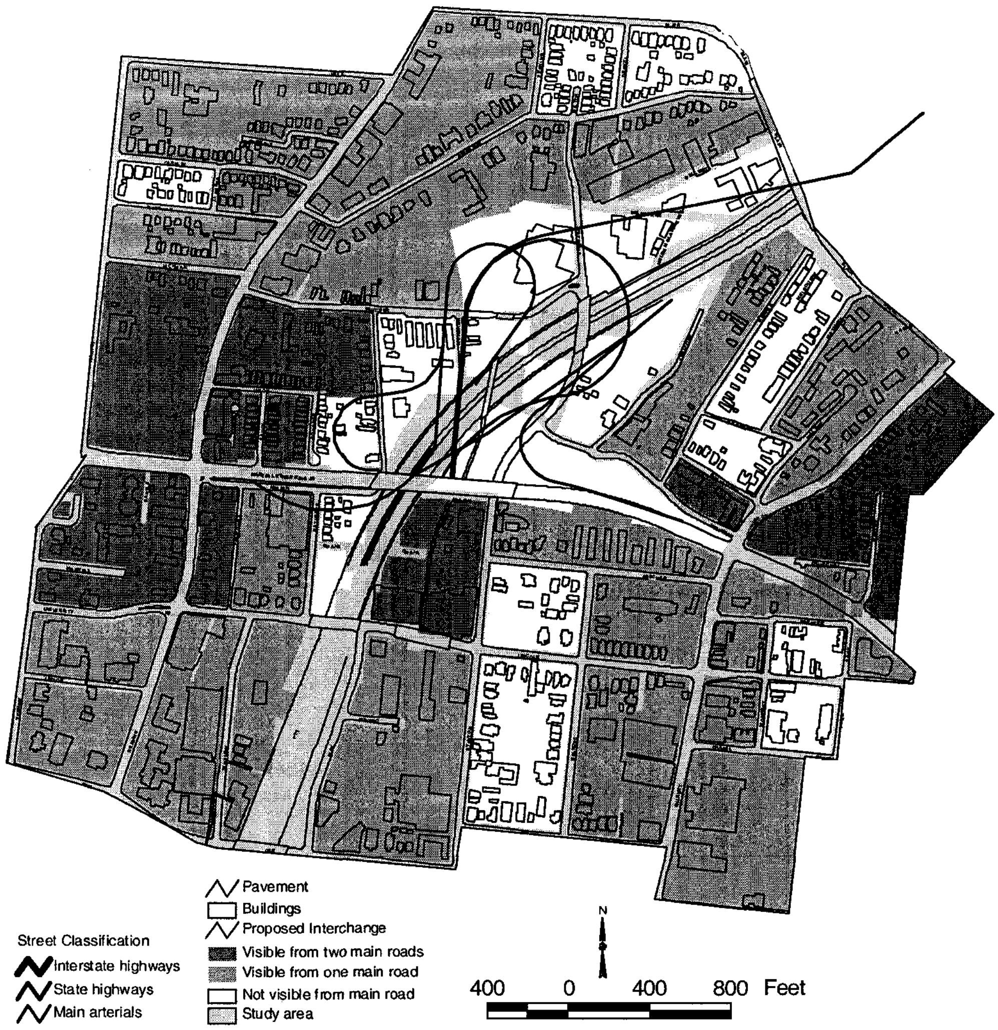
Step – 4 Proposed Actions

The proposed interchange overlaps on several blocks along the interstate highway. These blocks lose their potential for any type of development because of the construction and right-of-way. Some blocks are partially affected by construction while some remain completely unaffected (*figure 5.8*).

Step – 5 Impacts of Proposed Actions

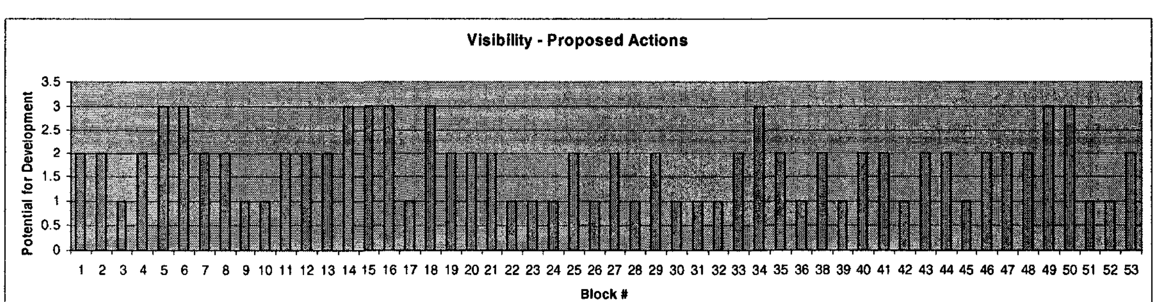
The north-western part of the study area is affected the most in terms of visibility due to the location of ramps in that area. The intersection of Reading Rd and MLK Dr. gains more visibility. Block # 13 is partially used for construction and right-of-way, but gains visibility for the remaining area from the off-ramps. Block # 25 and 27 are not visible in existing conditions, but the off ramps make them more visible. Block # 17, 22, 23, 24, 26, 28, 30, 31, and 32 are affected by the interchange construction.

Figure 5.8: **Visibility from main roads based on proposed conditions**



Step – 6 Classification of Blocks based on Proposed Conditions

Chart 5.4: **Graph showing proposed visibility of each block**



STREET NETWORK ANALYSIS

Accessibility can change the character of any area. The non accessible natural environment can change dramatically by providing access followed by human intervention. A mode of access is a prime criterion to evaluate any property or area. The economic value of land also depends on this criterion. Hence it is necessary to study the existing street network to analyze development pattern of any area.

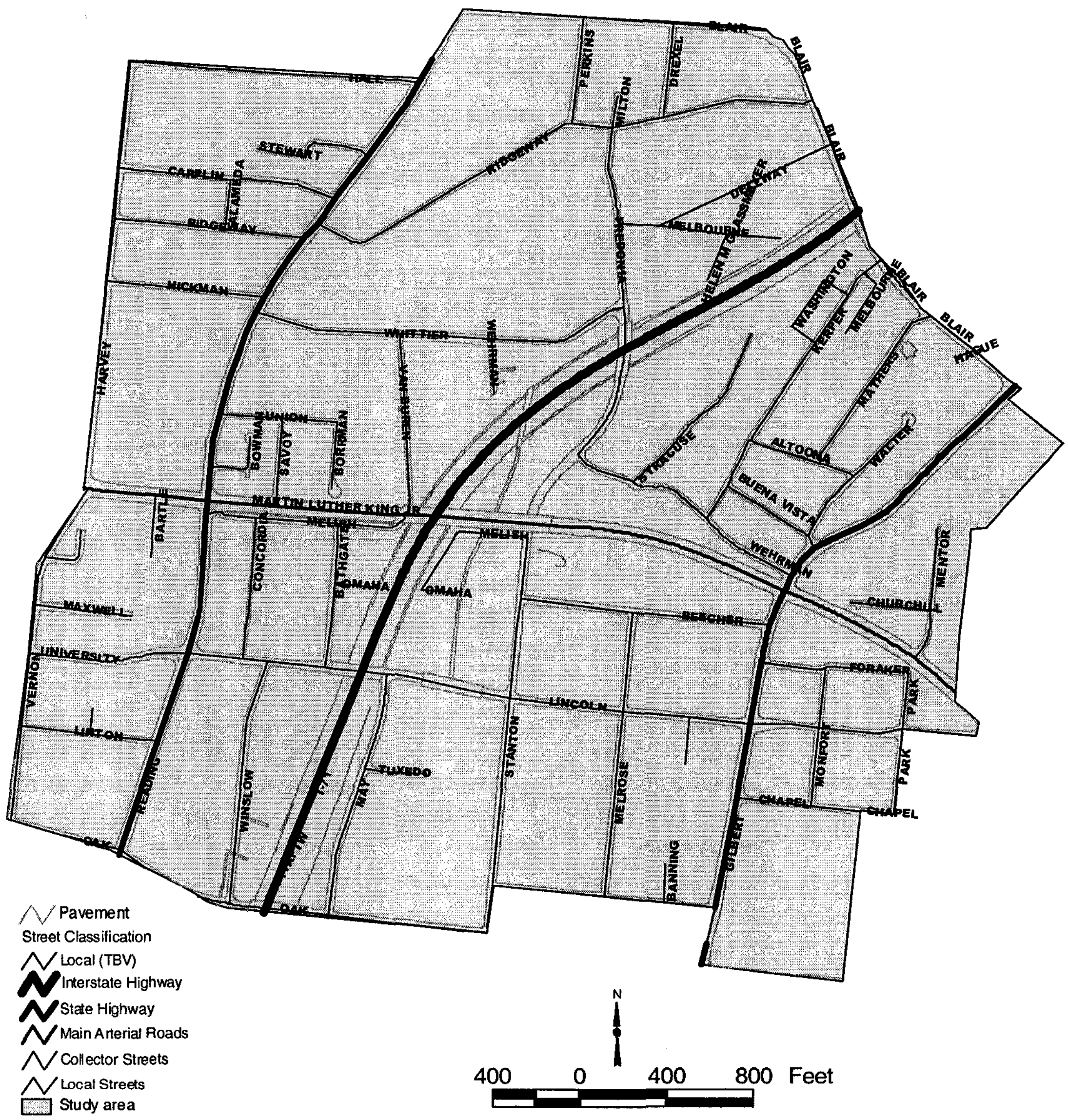
Step – 1 Existing Conditions

The study area is divided into four quadrants by I-71 running North-South and Martin Luther King Drive running East-West. The two quadrants on each side of I-71 are further split vertically by two highways, Reading Road and Gilbert Avenue. The road network is classified in seven levels; 0 – Local Streets (To Be Verified), 1 – Interstate Highway, 2 – US/State highway, 3 – Main Arterial, 4 – Collector Streets, 5 – Local Streets, 6 – Highway Ramps (*figure 5.9*) (CAGIS).

Step – 2 Criteria for Block Classification

Land subdivisions that have accessibility from interstate highways are most prone to development. The area connects to a regional network and hence has the highest potential for development. Connectivity through state highways and main arterial streets can be termed secondary to the interstate highway connection. Local street network provides accessibility and connectivity but has limited potential for development due to its location and physical characters. For the purpose of analysis the development potential of the adjoining land can be divided in three categories with respect to the street network. First are the blocks, in this study, that are connected by interstate highway or have access from at least two state highways or arterial roads or both; second are the blocks that have access at least through one state highway or arterial road, and; third are the blocks that have no access from either state highway or arterial road.

Figure 5.9: **Existing street network**



Step – 3   Classifications of Blocks based on Existing Conditions

Figure 5.10:   **Classification of blocks based on street network**

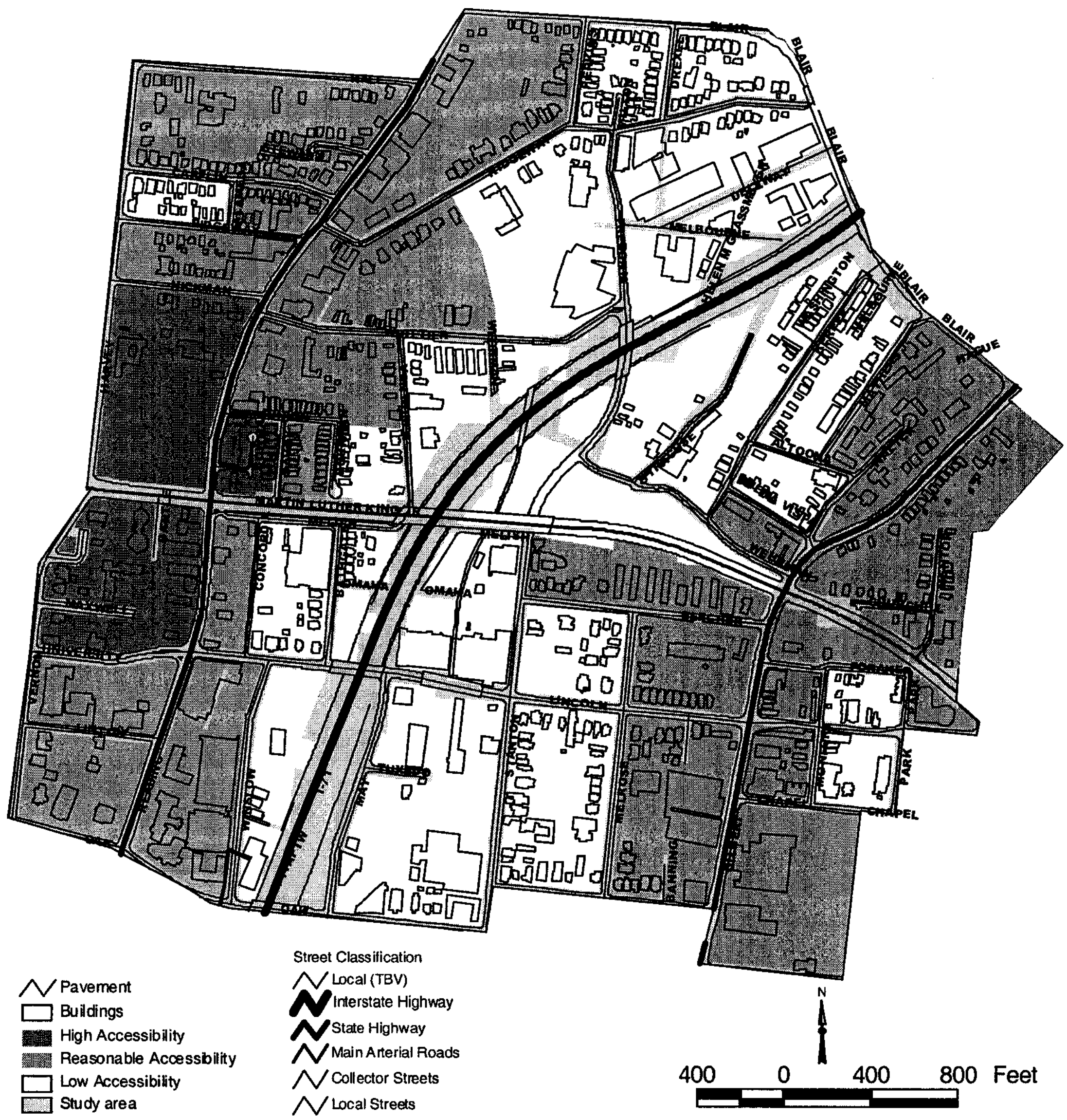
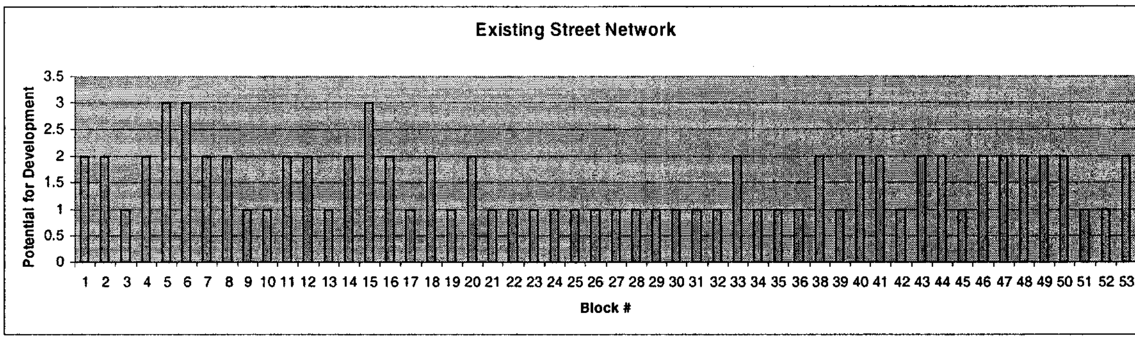
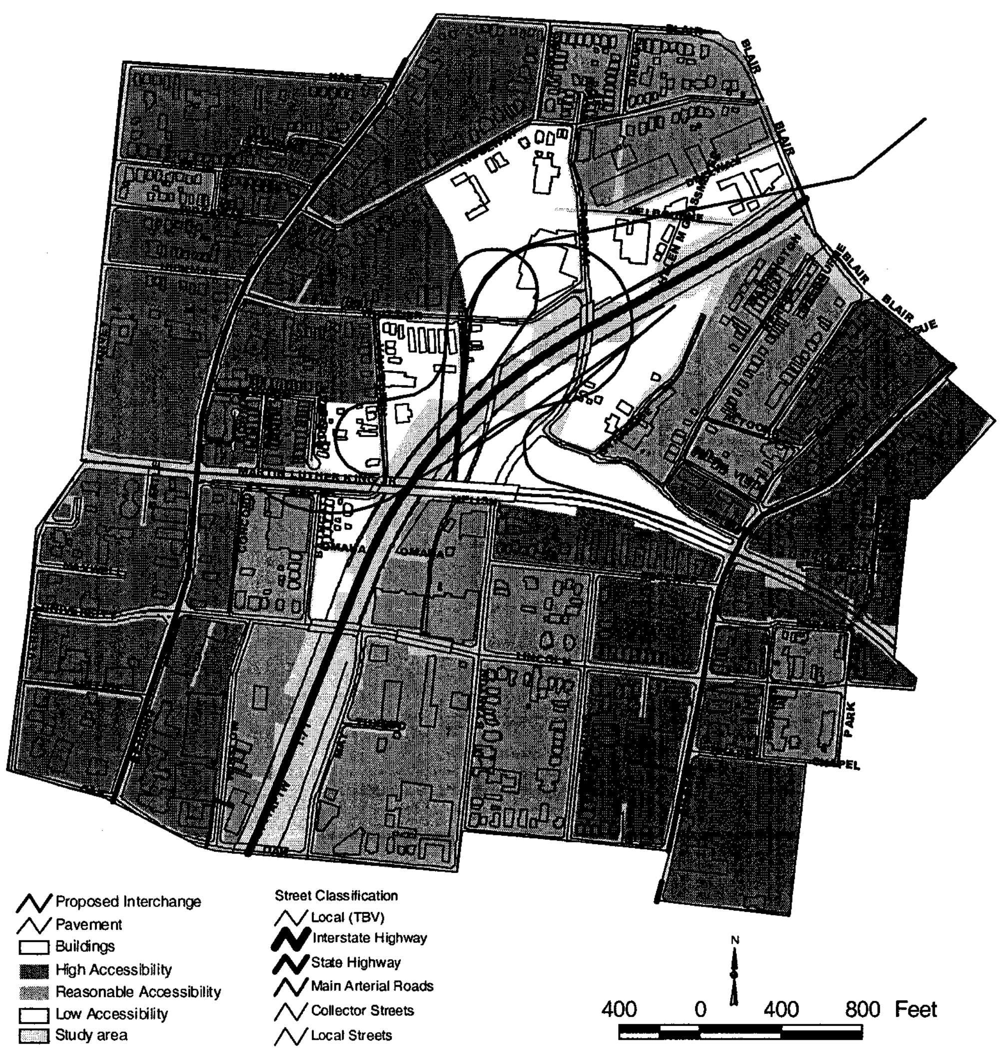


Chart 5.5: **Potential of each block based on existing street network**



Step – 4 Proposed Actions

Figure 5.11: **Proposed conditions for street network**

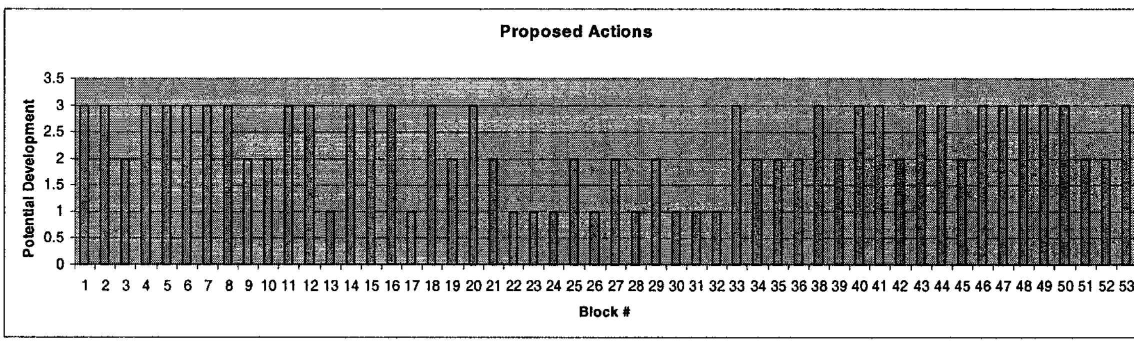


Step – 5 Impacts of Proposed Actions

Addition of the interchange improves accessibility for all the blocks along Reading Rd. and Gilbert Ave. The improved access connects the area to the regional network. However, the block along I-71 do not benefit from the addition as some blocks are used for the construction and right-of-way of the interchange, while other are located away from the main roads and are blocked by topography as well as the expressway.

Step – 6 Classification of Blocks based on Proposed Actions

Chart 5.6: **Graph showing potential of each block based on existing street network**



LAND USE ANALYSIS

This part of the analysis studies primarily the land use of the study area. Land use determines the functional character of the area. It also regulates the density and diversity of the built form in the area.

Step 1 – Existing Conditions

The study area has 15 types of land uses that include housing, commercial, industrial, institutional, public recreation and services and vacant land. Each land use has its own properties and dynamics with respect to its physical characteristics such as location, accessibility, and parcel acreage and dimensions. Considering the potential for development in the existing conditions, the land uses can be categorized in three groups;

Commercial (C), Offices (O), Mixed Use (MU), and Vacant Land (VA)

– Best for development (group 3)

Heavy Industry (HI), Light Industrial (LI), Multi Family (MF), Single Family (SF), and Two Family (TF)

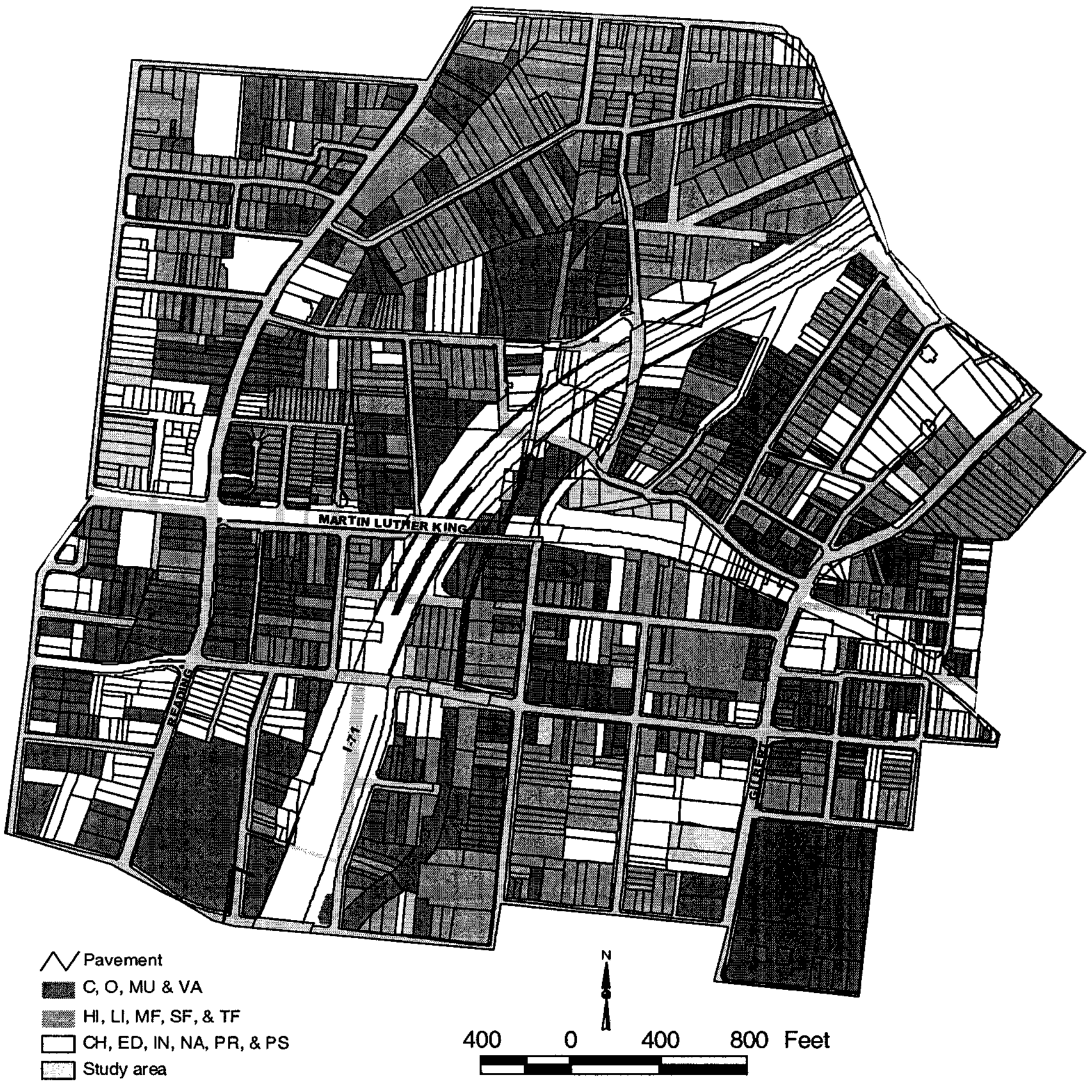
– Reasonable for development (group 2)

Churches (CH), Educational (ED), Institutional (IN), Not Applicable (NA), Public Recreation (PR), and Public Services (PS)

– Poor for development (group 1)

These categorizations become the primary criteria but cannot be used directly to classify the blocks, as each block has land uses that are part of any of the three categories. According to this classification, the land use map (*figure 5.12*) shows that approximately 36% of the area is best for development, 39% of the area is reasonable for development and the rest 25% is poor for development (refer table 6 in appendix).

Figure 5.12: **Existing land use**



Step 2 – Criteria for Block Classification

The primary criterion of block classification is based on the three groups mentioned above. Land use percentages are noted for the three groups in each block. Each group has the values 3, 2, and 1 based on the potential for development. To calculate the overall potential of each block based on its land uses, the percentages of the three groups are multiplied by their corresponding value. The results are added for group 1 to 3 and divided by 100 to get the potential development value of the block. For example, a block has 40% best developable land uses, 30% reasonable developable land uses and 30% of poorly developable land uses. The potential value of that block will be,

$[(40 \times 3) + (30 \times 2) + (30 \times 1)] / 100 = 2.1$ which is reasonable for development.

However, this value is regardless of its location in the study area. The actual value for potential development can be judged by adding this value to the results of other analyses and calculating the average.

Step 3 – Categorization of Blocks

Figure 5.13: **Block classification based on existing land use**

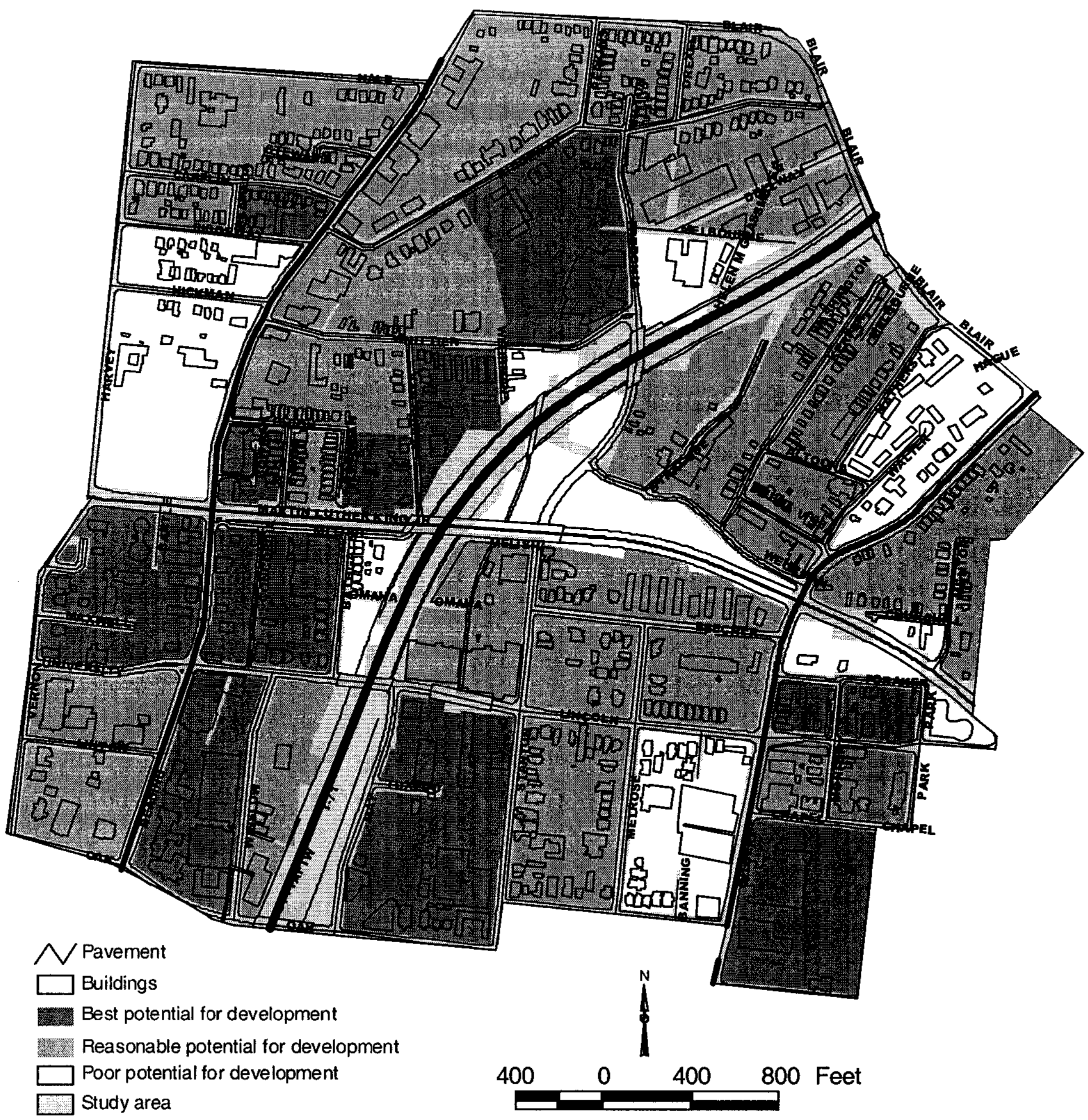
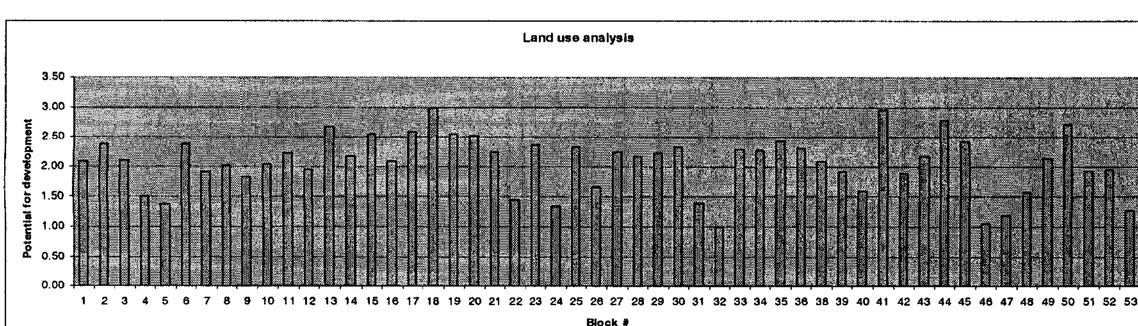
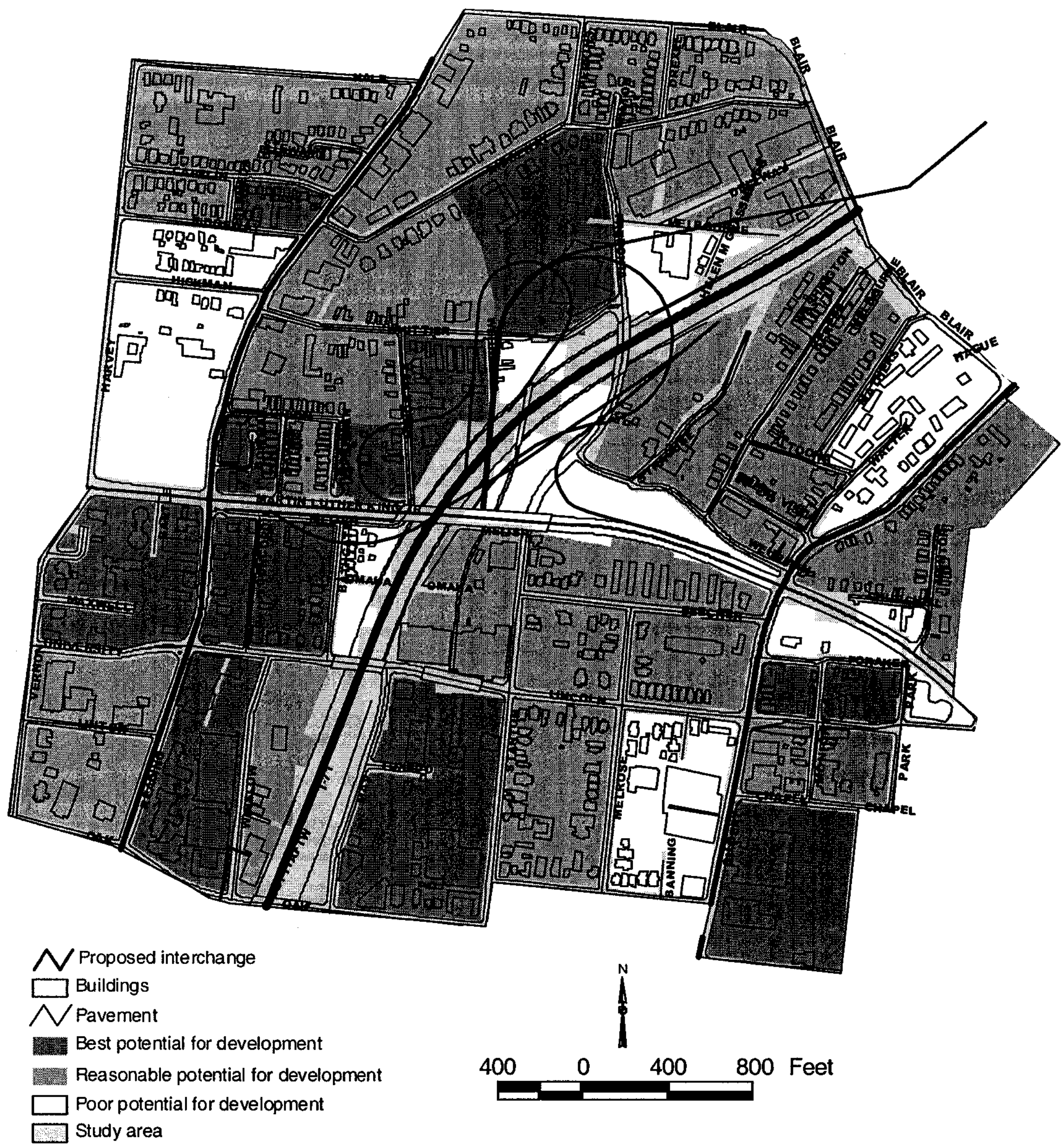


Chart 5.7: **Graph showing potential of each block based on existing land use**



Step 4 – Proposed Actions

Figure 5.14: **Block classification based on proposed actions**



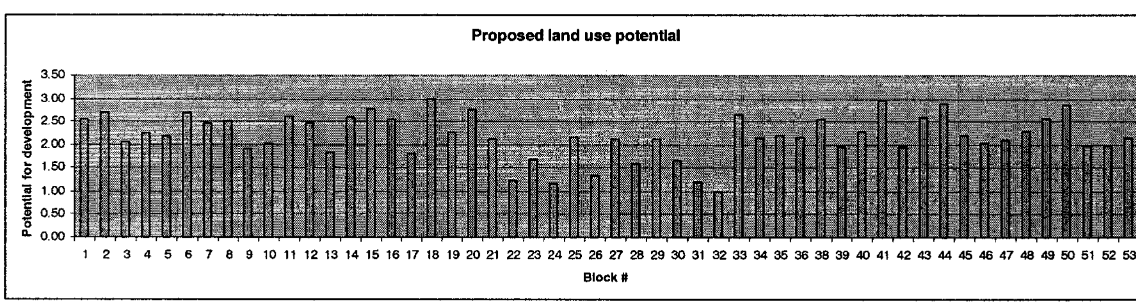
The proposed ramps diminish the value of blocks on which they are situated but the access from the interchange increases the overall value of the area. The possible change in land use that may occur from this physical change is very speculative and will require an economic study and analysis. As that is not part of this thesis, the change in potential development is considered only on the assumption that the existing physical conditions will improve/deteriorate for each block by the addition of the interchange.

Step 5 – Impacts of Proposed Development

Improved accessibility accounts for the overall increase in the value of the area. The blocks along Gilbert Ave. gain potential value for development as these blocks have land uses that are best for development but were not having good access. Blocks along Reading Rd. also gain from this improved accessibility. The proposed interchange will diminish the potential of the blocks along I-71 where the ramps would be constructed along with the necessary area for right-of-way.

Step 6 – Categorization of Blocks

Chart 5.8: **Graph showing potential of each block based on proposed actions**



CHAPTER 6: CONCLUSIONS

PRELIMINARY FINDINGS

The preliminary findings show that the proposed action of transportation improvement increased the overall potential of the area for development. The area that is best for development in existing conditions increases from almost 13% to 31%. The area that is poor for development with the proposed actions is reduced to almost 10% from initial 35% in the existing conditions. This area is mainly the location of the interchange and its right-of-way. Hence it is evident that the transportation improvement has an overall positive impact of the area.

Table 6.1: **Comparative percentage change in potential for development**

Existing Conditions	%	Proposed Actions	%
Best developable areas	12.97	Best developable areas	30.75
Reasonable developable areas	51.54	Reasonable developable areas	59.66
Poor developable areas	35.49	Poor developable areas	9.58

The following tables (6.2 & 6.3) summarize the findings of the analysis of existing conditions and proposed actions. The table evaluates each block based on all types of analyses and the entire area for each analysis as well as its combined impact. For example, Block # 14 has potential development values of 2.5, 2, 2, and 2.16 for the four mentioned analyses. The average of these values, which is 2.17, shows its overall potential for development in existing conditions. In proposed actions, the values of each analysis become 2.5, 3, 3, and 2.16 that has an average of 2.67. Thus the block has a positive physical impact as its potential for development increased from 2.17 to 2.67. The overall impact for each analysis is evident by comparing the change in value for each analysis in existing conditions and proposed actions.

Table 6.2: **Existing condition of the area based on physical analysis**

Block #	Environmental Analysis	Visibility	Street Network	Land Use	Potential for each block
1	2	2	2	2.08	2.02
2	2.5	2	2	2.38	2.22
3	2.5	1	1	2.11	1.65
4	2.5	2	2	1.50	2.00
5	2.5	3	3	1.38	2.47
6	2.5	3	3	2.37	2.72
7	2.5	2	2	1.91	2.10
8	2.5	2	2	2.01	2.13
9	2.5	1	1	1.83	1.58
10	2.5	1	1	2.03	1.63
11	1.5	2	2	2.22	1.93
12	1.5	2	2	1.94	1.86
13	2	1	1	2.67	1.67
14	2.5	2	2	2.16	2.17
15	2.5	3	3	2.54	2.76
16	2.5	2	2	2.09	2.15
17	2.5	2	1	2.59	2.02
18	2.5	3	2	2.98	2.62
19	2.5	2	1	2.54	2.01
20	2.5	2	2	2.51	2.25
21	2.5	2	1	2.24	1.94
22	2.5	2	1	1.45	1.74
23	2.5	2	1	2.36	1.96
24	1.5	2	1	1.35	1.46
25	2.5	1	1	2.32	1.71
26	2.5	2	1	1.65	1.79
27	2	1	1	2.23	1.56
28	2	2	1	2.17	1.79
29	1	1	1	2.23	1.31
30	1.5	2	1	2.31	1.70
31	1	2	1	1.40	1.35
32	2.5	2	1	1.00	1.63
33	2	2	2	2.29	2.07
34	2.5	3	1	2.27	2.19
35	2.5	2	1	2.42	1.98
36	2.5	1	1	2.31	1.70
38	2.5	2	2	2.08	2.15
39	2.5	1	1	1.92	1.60
40	2.5	2	2	1.59	2.02
41	2.5	2	2	2.95	2.36
42	2.5	1	1	1.88	1.60
43	2.5	2	2	2.17	2.17
44	2.5	2	2	2.78	2.32
45	2.5	1	1	2.41	1.73
46	2.5	2	2	1.05	1.89
47	2.5	2	2	1.19	1.92
48	2.5	2	2	1.57	2.02
49	1.5	3	2	2.14	2.16
50	1	3	2	2.71	2.18
51	2	1	1	1.93	1.48
52	2	1	1	1.94	1.48
53	2.5	2	2	1.28	1.94
Area	**2.25**	**1.88**	**1.56**	**2.07**	**1.94**

Table 6.3: **Analysis based on proposed actions**

Block #	Environmental Analysis	Visibility	Street Network	Land Use	Potential for each block
1	2	2	3	2.08	2.27
2	2.5	2	3	2.38	2.47
3	2.5	1	2	2.11	1.90
4	2.5	2	3	1.50	2.25
5	2.5	3	3	1.38	2.47
6	2.5	3	3	2.37	2.72
7	2.5	2	3	1.91	2.35
8	2.5	2	3	2.01	2.38
9	2.5	1	2	1.83	1.83
10	2.5	1	2	2.03	1.88
11	1.5	2	3	2.22	2.18
12	1.5	2	3	1.94	2.11
13	2	2	1	2.67	1.92
14	2.5	3	3	2.16	2.67
15	2.5	3	3	2.54	2.76
16	2.5	3	3	2.09	2.65
17	2.5	1	1	2.59	1.77
18	2.5	3	3	2.98	2.87
19	2.5	2	2	2.54	2.26
20	2.5	2	3	2.51	2.50
21	2.5	2	2	2.24	2.19
22	2.5	1	1	1.45	1.49
23	2.5	1	1	2.36	1.71
24	1.5	1	1	1.35	1.21
25	2.5	2	2	2.32	2.21
26	2.5	1	1	1.65	1.54
27	2	2	2	2.23	2.06
28	2	1	1	2.17	1.54
29	1	2	2	2.23	1.81
30	1.5	1	1	2.31	1.45
31	1	1	1	1.40	1.10
32	2.5	1	1	1.00	1.38
33	2	2	3	2.29	2.32
34	2.5	3	2	2.27	2.44
35	2.5	2	2	2.42	2.23
36	2.5	1	2	2.31	1.95
38	2.5	2	3	2.08	2.40
39	2.5	1	2	1.92	1.85
40	2.5	2	3	1.59	2.27
41	2.5	2	3	2.95	2.61
42	2.5	1	2	1.88	1.85
43	2.5	2	3	2.17	2.42
44	2.5	2	3	2.78	2.57
45	2.5	1	2	2.41	1.98
46	2.5	2	3	1.05	2.14
47	2.5	2	3	1.19	2.17
48	2.5	2	3	1.57	2.27
49	1.5	3	3	2.14	2.41
50	1	3	3	2.71	2.43
51	2	1	2	1.93	1.73
52	2	1	2	1.94	1.73
53	2.5	2	3	1.28	2.19
Area	2.25	1.83	2.31	2.07	2.11

The maps below (*figure 6.1 & 6.2)* show the areas that are categorized in the three levels of best, reasonable, and poor for development in existing conditions and proposed actions respectively. The area has only six blocks that area best for development in existing conditions, where as the tally increases to 17 blocks with the proposed actions.

Figure 6.1: **Block classification based on combined matrix of existing conditions**

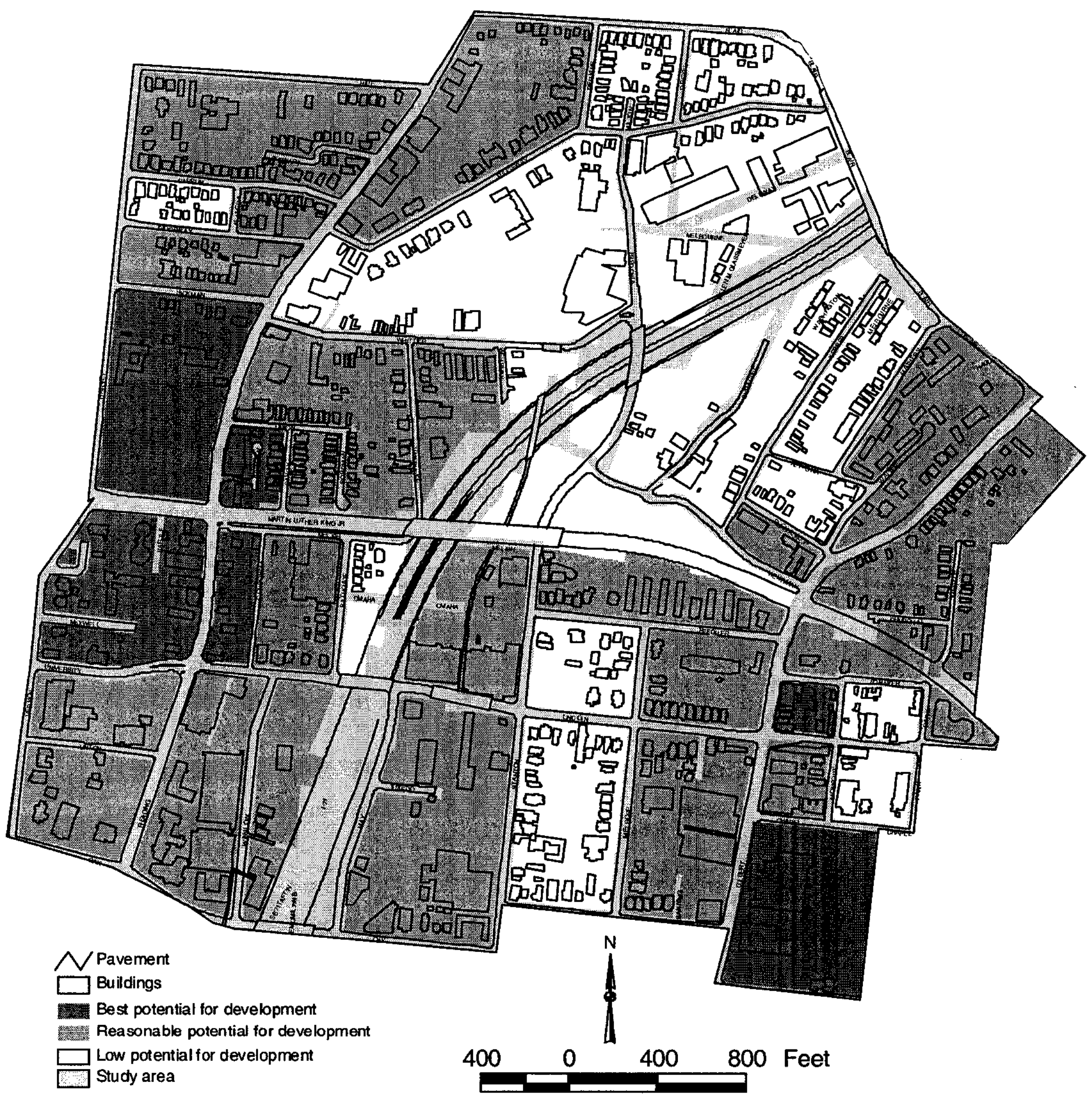
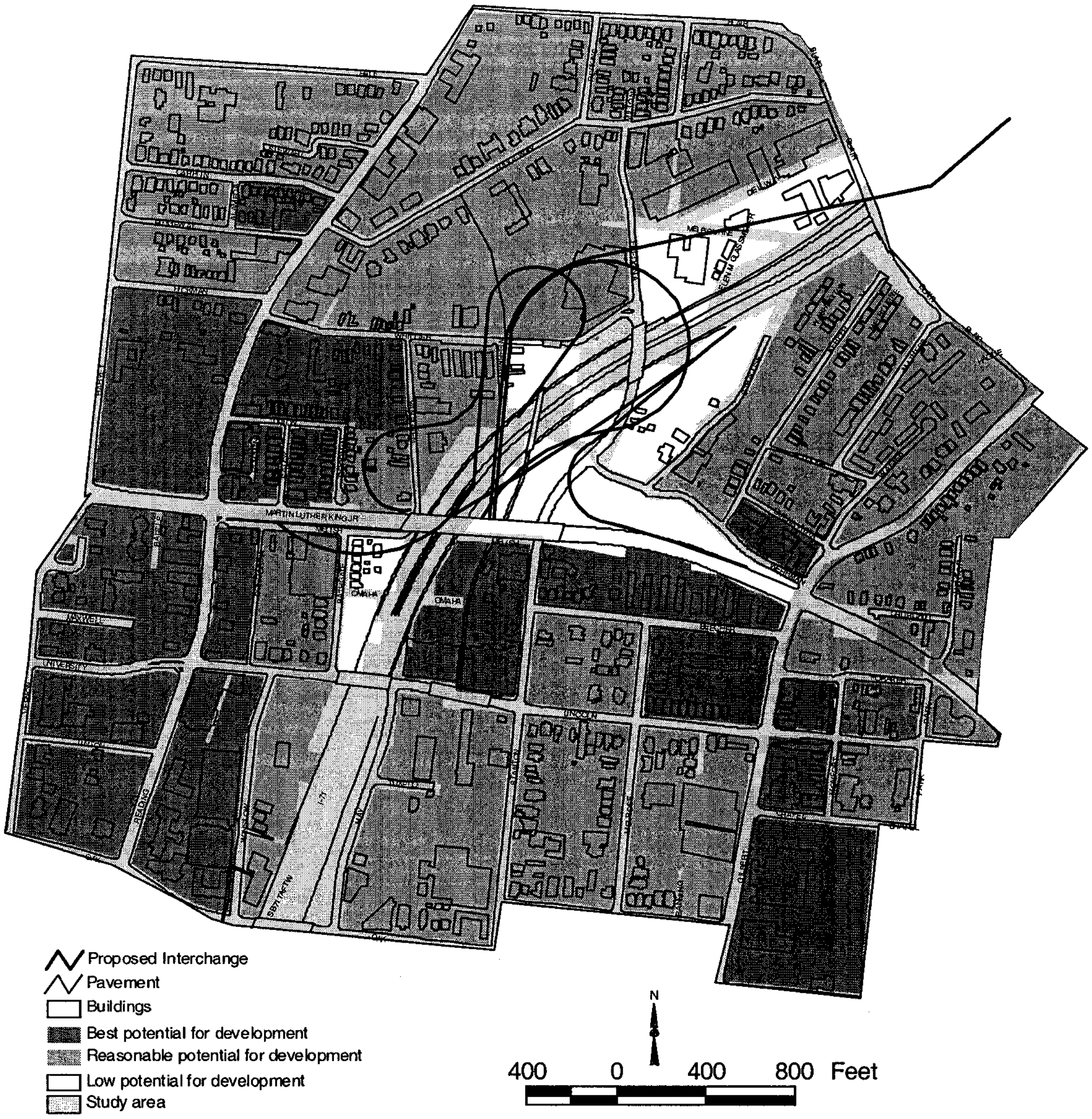


Figure 6.2: **Block classification based on combined matrix of proposed actions**



BUILDING ASSESSMENT

The preliminary findings of proposed actions show that 17 blocks in the study area are best for development after the interchange is operational. The buildings located on these blocks are assessed to further determine the potential of the blocks. The buildings are categorized based on three criteria; age, type of building and historic designation. Age is used as a tool to evaluate the life of the building; the type is used to understand the diversity of use that can be accommodated in the buildings and historic designation is used to understand the importance of the structure to the character of the surrounding area.

Buildings that are more than 40 years old (as mentioned in the Urban Renewal section of Cincinnati Municipal Code) are considered as best for development, as the age of the building would make it costlier to rehabilitate than to construct a new building. The buildings that are between 20 – 40 years in age are considered reasonable for development as it is possible that the implementation and full operation of the interchange will take 8 – 10 years from the time this study is done. New construction that is less than 20 years in age is considered poor for development.

Buildings types are primarily classified as commercial and residential by the building inspection department of the City. The commercial classification is divided into commercial, industrial and educational. Apartment buildings are also classified as commercial by the departments. For the purpose of this study, building types are categorized similar to the land use categorization in the previous section. Commercial buildings have the best potential for development, industrial and residential have reasonable for development and educational buildings are poor for development.

Historic designation is a criterion used to evaluate the development constraint on the buildings. A building that is neither historic nor located in a historic district is considered best for development. Building located in historic district is considered reasonable as it is developable with some constraints of the district. Historic buildings are considered poor for development as these buildings have limited potential to be reused.

Based on the criteria to categorize the buildings, it is evident that most of the buildings in the selected area have reasonable to best potential for development. More than 80% of the buildings are aging more than 40 years and only two are designated as historic structures. The area has 13 buildings in historic district which are currently unoccupied as noticed from field visit. Block # 20 has educational / institutional buildings and has least potential for development in all the selected blocks.

Table 6.4: **Building assessment**

Block #	Building type	Building age	Historic designation	Building assessment
2	2.21	2.93	3.00	2.71
5	2.19	2.88	3.00	2.69
6	2.75	2.42	3.00	2.72
7	2.57	2.71	2.71	2.67
8	2.63	2.75	3.00	2.79
14	2.13	2.87	3.00	2.67
15	2.33	2.75	3.00	2.69
16	1.95	3.00	3.00	2.65
18	3.00	2.17	3.00	2.72
20	1.00	3.00	3.00	2.33
33	2.45	2.60	3.00	2.68
34	2.00	3.00	2.60	2.53
38	2.13	2.87	2.13	2.38
41	3.00	3.00	3.00	3.00
43	2.44	3.00	3.00	2.81
44	2.70	2.90	3.00	2.87
50	3.00	3.00	3.00	3.00

Chart 6.1: **Graph showing potential of the selected blocks based on building assessment**

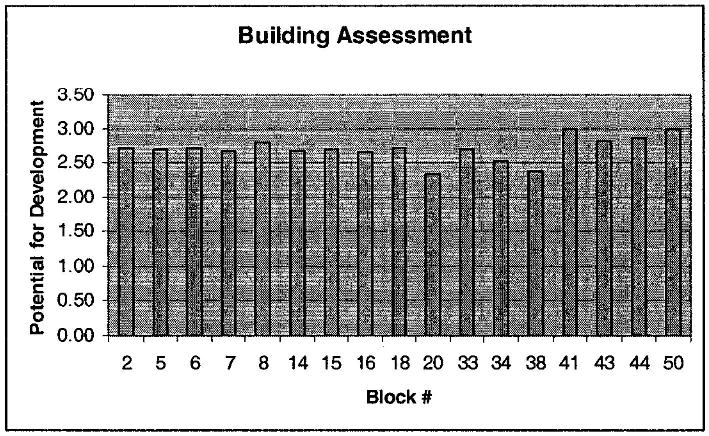
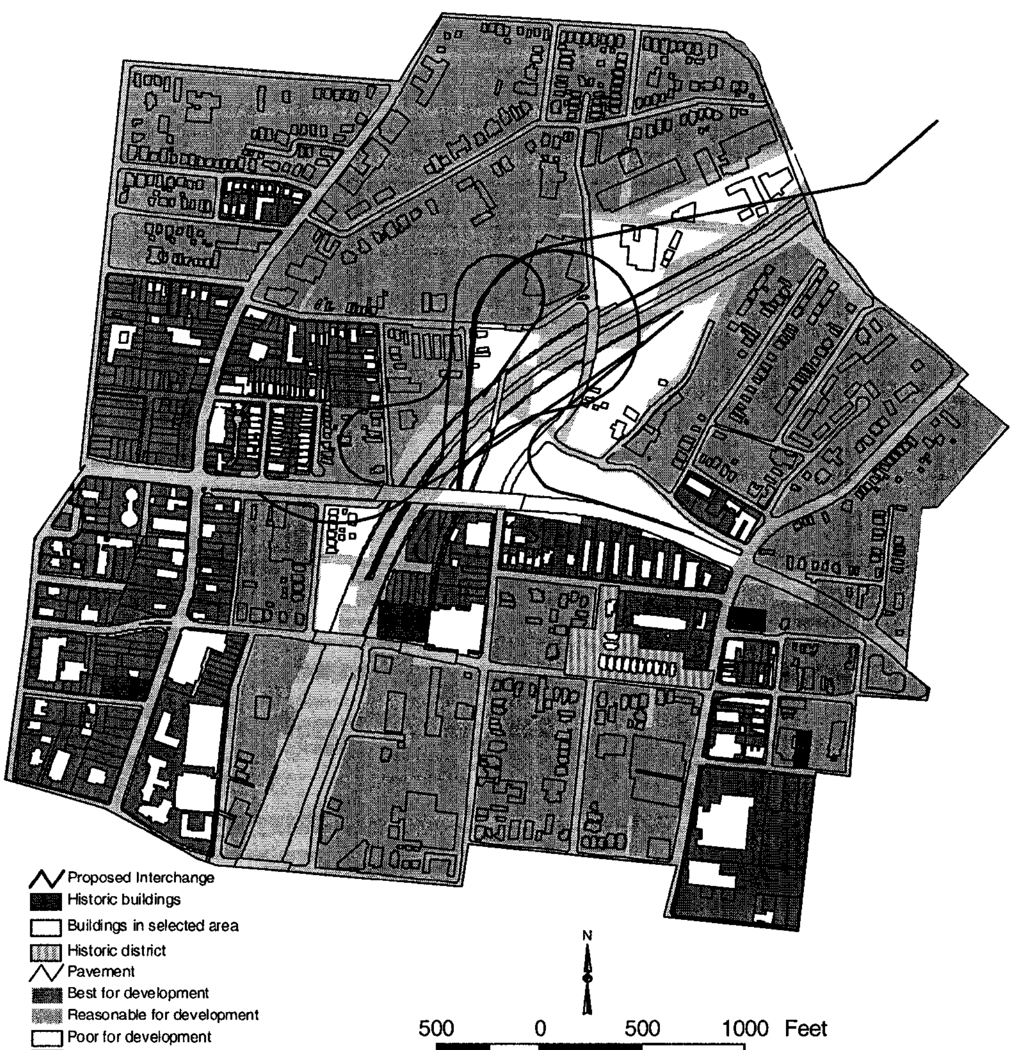


Figure 6.3: **Building classification in selected area**



The environmental analysis shows that the interchange will have minimal impact on the area. The physical conditions of topographic level change, in fact, facilitated the grade change that is necessary to accommodate the ramp inclination. The soil type is reasonable for construction and sound construction technology can mitigate the limitations of soil bearing capacity.

The visibility analysis reveals that the interchange has an overall negative impact on the area as a large area of land is occupied by the interchange that was otherwise visible from I-71. Some blocks gain visibility from the ramps, but most of the blocks that are parallel to the highway and will be used for the interchange construction lose the potential for any further development.

The street network analysis shows that improved accessibility has a positive impact on the area. The area currently has access to I-71 from Taft Rd Exit, which is a half interchange with access only to north of I-71. Hence the area is not benefited from its proximity to the expressway. With the proposed actions, the potential of the area increases from a range from poor to reasonable (1.56) to reasonable to best (2.31) for development.

Land use analysis shows that the area has reasonable potential for development. Even though the study does not speculate any new land uses in the area, it is possible that some areas which are used below potential due to limited accessibility may change to land uses that are more benefited by such accessibility.

The only negative impact on the area is in the blocks that are occupied by the ramps. These nine blocks are either partially or fully used for he ramps and the right-of-way. Other than this negative aspect, the area gains more potential for development and shows an overall positive impact, which is mainly due to the improved street network. This proposed action, in my opinion, is favorable for the area as it improves the overall connectivity of the area for development without much harm to the immediate surroundings.

CHAPTER 7: RECOMMENDATIONS

The study identifies almost 80 acres of land that is best for development that has necessary infrastructure and utilities. The existing development in this area is old enough to make redevelopment schemes viable. Hence the city should identify these areas as potential redevelopment sites and conduct further analysis to study the economic value of the area. The city can take some of the steps mentioned below to mitigate with uncontrolled development that may follow the construction of the interchange.

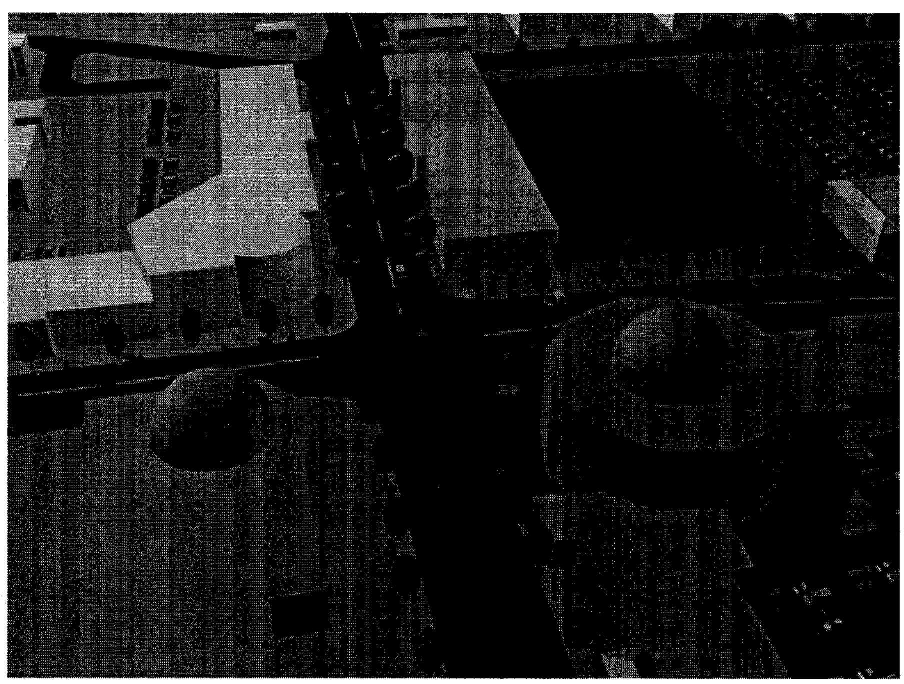
The city can:

- Identify the site as a redevelopment or urban renewal project
- Conduct studies to evaluate the socio-economic potential of the area
- Develop land use and zoning plan specific for these areas
- Acquire land through eminent domain or other equivalent process to control development in the area
- Use community participation to understand the needs of the neighborhoods and stabilize socio-economic conditions

The study identifies two main areas for potential redevelopment. These areas are located on east and west side of I-71 along Reading Rd. and Gilbert Ave. These areas link the highway traffic to the Uptown area on the west as well as neighborhood of Walnut Hills on the east. One option can be development of gateways to the communities they connect with. A dense development with mixed use activities can be the primary focus of such scheme.

A team of students (with author being part of the team) from the Niehoff Studio conducted at the University of Cincinnati proposed the Reading Rd. corridor as a potential entertainment district. The Uptown area was considered as the primary population base for the proposal, which has the diverse socio-economic background needed for such development. The plan proposed boulevard design for Reading Rd and proposed a mixed use development involving grocery stores, restaurants, shopping plaza, Movie Theater, condominium and apartment housing along with community convention center. The purpose of the plan was to create an entertainment district that will also become a gateway to the uptown community.

Figure 7.1 – **View of the proposed urban design plan for Reading Rd Corridor**



(Team: Milind Surve, Snehal Jagdale & Christopher Schadler; Neihoff Studio, fall 2002)

APPENDIX

Environmental Analysis – Existing Conditions / Proposed Actions

Block #	Value for slope	Value for soil type	Average block value
1	2	2	2
2	3	2	2.5
3	3	2	2.5
4	3	2	2.5
5	3	2	2.5
6	3	2	2.5
7	3	2	2.5
8	3	2	2.5
9	3	2	2.5
10	3	2	2.5
11	1	2	1.5
12	1	2	1.5
13	2	2	2
14	3	2	2.5
15	3	2	2.5
16	3	2	2.5
17	3	2	2.5
18	3	2	2.5
19	3	2	2.5
20	3	2	2.5
21	3	2	2.5
22	3	2	2.5
23	3	2	2.5
24	1	2	1.5
25	3	2	2.5
26	3	2	2.5
27	3	1	2
28	3	1	2
29	1	1	1
30	2	1	1.5
31	1	1	1
32	3	2	2.5
33	2	2	2
34	3	2	2.5
35	3	2	2.5
36	3	2	2.5
38	3	2	2.5
39	3	2	2.5
40	3	2	2.5
41	3	2	2.5
42	3	2	2.5
43	3	2	2.5
44	3	2	2.5
45	3	2	2.5
46	3	2	2.5
47	3	2	2.5
48	3	2	2.5
49	2	1	1.5
50	1	1	1
51	3	1	2
52	3	1	2
53	3	2	2.5

Visibility Analysis – Existing Conditions

Block #	Visibility - Existing Conditions
1	2
2	2
3	1
4	2
5	3
6	3
7	2
8	2
9	1
10	1
11	2
12	2
13	1
14	2
15	3
16	2
17	2
18	3
19	2
20	2
21	2
22	2
23	2
24	2
25	1
26	2
27	1
28	2
29	1
30	2
31	2
32	2
33	2
34	3
35	2
36	1
38	2
39	1
40	2
41	2
42	1
43	2
44	2
45	1
46	2
47	2
48	2
49	3
50	3
51	1
52	1
53	2

Visibility Analysis – Proposed Actions

Block #	Visibility - Proposed Actions
1	2
2	2
3	1
4	2
5	3
6	3
7	2
8	2
9	1
10	1
11	2
12	2
13	2
14	3
15	3
16	3
17	1
18	3
19	2
20	2
21	2
22	1
23	1
24	1
25	2
26	1
27	2
28	1
29	2
30	1
31	1
32	1
33	2
34	3
35	2
36	1
38	2
39	1
40	2
41	2
42	1
43	2
44	2
45	1
46	2
47	2
48	2
49	3
50	3
51	1
52	1
53	2

Street Network Analysis – Existing Conditions

Block #	Street Network - existing Conditions
1	2
2	2
3	1
4	2
5	3
6	3
7	2
8	2
9	1
10	1
11	2
12	2
13	1
14	2
15	3
16	2
17	1
18	2
19	1
20	2
21	1
22	1
23	1
24	1
25	1
26	1
27	1
28	1
29	1
30	1
31	1
32	1
33	2
34	1
35	1
36	1
38	2
39	1
40	2
41	2
42	1
43	2
44	2
45	1
46	2
47	2
48	2
49	2
50	2
51	1
52	1
53	2

Street Network Analysis – Proposed Actions

Block #	Street Network - Proposed Actions
1	3
2	3
3	2
4	3
5	3
6	3
7	3
8	3
9	2
10	2
11	3
12	3
13	1
14	3
15	3
16	3
17	1
18	3
19	2
20	3
21	2
22	1
23	1
24	1
25	2
26	1
27	2
28	1
29	2
30	1
31	1
32	1
33	3
34	2
35	2
36	2
38	3
39	2
40	3
41	3
42	2
43	3
44	3
45	2
46	3
47	3
48	3
49	3
50	3
51	2
52	2
53	3

Land Use Analysis

Block #	Land use for existing conditions
1	2.08
2	2.38
3	2.11
4	1.50
5	1.38
6	2.37
7	1.91
8	2.01
9	1.83
10	2.03
11	2.22
12	1.94
13	2.67
14	2.16
15	2.54
16	2.09
17	2.59
18	2.98
19	2.54
20	2.51
21	2.24
22	1.45
23	2.36
24	1.35
25	2.32
26	1.65
27	2.23
28	2.17
29	2.23
30	2.31
31	1.40
32	1.00
33	2.29
34	2.27
35	2.42
36	2.31
38	2.08
39	1.92
40	1.59
41	2.95
42	1.88
43	2.17
44	2.78
45	2.41
46	1.05
47	1.19
48	1.57
49	2.14
50	2.71
51	1.93
52	1.94
53	1.28

BIBLIOGRAPHY

Hartshorn, Truman A. Perception and Quality of Life Issues in Interpreting the City: An Urban Geography, 2nd Ed. New York: John Wiley & Sons, Inc, 1992.

Muller, Peter O. Transportation & Urban Form: Stages in the Spatial Evolution of the American Metropolis. Edited by Susan Hanson. The Geography of Urban Transportation. New York: The Guilford Press, 1986.

Hodge, David. *Social Impacts of Urban Transportation Decisions: Equity Issues*. Edited by Susan Hanson. The Geography of Urban Transportation. New York: The Guilford Press, 1986.

Canty, Eugene T. *Transportation and Urban Scale*. Warren, Michigan,1969.

I-71 and Martin Luther King Interchange Feasibility Study, Cincinnati, OH. By Edward & Kelcey. Cincinnati, OH, November 2002.

Batty, Michael and Paul Longley. *Fractal Cities*. New York: Academic Press, 1994.

Lynch, Kevin. *The Image of the City*. MIT Press, 1960.

Conzen, M.R.G. *Alnwick, Northumberland: A Study in Town-plan Analysis*. London: George Philip & Son, Ltd, 1960.

Cevero, R. "Built Environments and Mode Choice: Toward a Normative Framework". *Transportation Research Part D*. Oxford: Elsevier Science Ltd, 2002.

Corsi, Thomas M., Robert J. Windle and Michael A Knemeyer. "Evaluating the Potential Impact of Interstate Highway Right-of-Way Commercialization on Economic Activities at Interchanges". *Transportation Journal*, Vol. 39, Issue 2, pg. 16, 1999.

Giglierano, Geoffrey J., Deborah A. Overmyer and Frederic L. Propas. *The Bicentennial Guide to Greater Cincinnati: A Portrait of Two Hundred Years*. The Cincinnati Historical Society, Cincinnati, Ohio, 1988.

Giuliano, Genevieve. *Land Use Impacts of Transportation Investments: Highway and Transit.* Edited by Susan Hanson. The Geography of Urban Transportation. New York: The Guilford Press, 1986.

Stutz, Frederick P. *Environmental Impacts*. Edited by Susan Hanson. The Geography of Urban Transportation. New York: The Guilford Press, 1986.

Brune, Albin J. Jr. *A Study of the Impact of the Long Range Transportation Planning Process on the Cincinnati Urbanized Areas*. Cincinnati: University of Cincinnati, 1976.

University of Cincinnati. *Master Plan 2000*. Cincinnati: University of Cincinnati, 2000.

www.chcurc.org. visited on 02/22/02.

www.uchcurc.org. visited on 02/23/02.

Uptown Development Plan. Cincinnati: City of Cincinnati, 1990.

Claritas, Economic Research Associates. *Calhoun Street Marketplace*. Cincinnati, Ohio, 2002.

US Department of Transportation and Maine Department of Transportation. *Final Environmental Assessment and Findings of No Significant Impact: I-91 Interchange with Stillwater Avenue, City of Bangor.* March, 1999.

Soil survey of Hamilton County, Ohio / United States Department of Agriculture, Soil Conservation Service ; in cooperation with Ohio Department of Natural Resources, Division of Lands and Soil, and Ohio Agricultural Research and Development Center, 1982.

Turabian, Kate. *A Manual for Writers of Term Papers, Theses, and Dissertations.* University of Chicago Press. 1996.