Walk On:
Walkability Assessment in Boyle Heights, Los Angeles

Professional report submitted in partial satisfaction of the requirements for the degree of Master’s of urban and Regional Planning
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EXECUTIVE SUMMARY

Creating safe, attractive places for people to walk could have a profound impact on health. Promoting walking through community design and supporting policies and programs are all important strategies to enhance physical activity and at the same time reduce traffic congestion and improve air quality.

The purpose of this report is to identify existing conditions for pedestrians in Boyle Heights, highlight the changes that need to happen and provide some guidance on what these changes could look like. The report begins with an outline of the demographic and cultural characters and existing pedestrian elements of this area. It addresses the Boyle Heights’ existing street conditions, walking rates, and pedestrian/vehicle collision data. Bayle Heights’ diverse history and unique Latino culture give it the foundation for a walkable neighborhood. It has amongst the highest walking rates of Los Angeles. Meanwhile, Boyle Heights is currently the target for several projects and programs that will ultimately have a significant impact on the land use, residential pattern, and economic activity of the community. A great number of community members and organizations are active in enhancing healthy living and planning. However, on the other hand, major constraints on walking include pedestrian/motor vehicle conflicts on busy streets and freeways as physical barriers for pedestrians. Automobile-oriented networks and urban forms have led to important impacts in terms of transportation congestion, air pollution, sedentary lifestyle, pedestrian safety, poor pedestrian environment, and other built environment issues. Through the discussion of opportunities and constraints, my recommendations are centered on the following three goals: promoting pedestrian safety; encouraging pedestrian friendly streetscaping and compatible land uses; and outlining programs to ensure a pedestrian friendly environment can thrive in Boyle Heights.
CHAPTER 1 INTRODUCTION

A healthy community matters. Health is linked to the design of community. Walkable and safe streets, together with parks, full-service grocery stores, farmers’ markets, less traffic volume, and open spaces, are all indispensable factors that contribute to the health of a community and have a positive impact on the health of residents.

Home to one of the largest Latino communities in the United States, Boyle Heights in the Eastside of City of Los Angeles is an area with rich history, but also significant public health challenges. Land use and transportation facilities create barriers to physical activity and have a negative impact on environment. Automobile-oriented networks and urban forms have led to important impacts in terms of transportation congestion, air pollution, sedentary lifestyle, pedestrian safety, poor pedestrian environment, and other built environment issues. Therefore, assessment of walkability and implementation of infrastructure improvements that make neighborhoods more walkable, healthy, and livable are urgently necessary in Boyle Heights.

Although Boyle Heights has many challenges, it also possesses many assets which will help enhance a walkable neighborhood. It is characterized by a variety of cultural heritages and a traditional urban form that encompasses residential areas with neighborhood commercial, public nodes, and industrial zones. There are several on-going or future planning plans and infrastructure improvement projects. One of the important projects is Adelante Eastside
Redevelopment Project which is conducted by The Community Redevelopment Agency of the City of Los Angeles (CRA/LA). The main goal of the project is to encourage live/work mix-use development through the preservation of buildings, industrial and commercial uses within the community. A variety of community-based organizations are taking a progressive approach and coordinated strategies to ensure that residents live in communities with health-promoting land use, transportation and community development. The Evergreen Cemetery Jogging Path is a great example of how residents and grassroots organization transformed space (Prevention Institute, 2004, p.6). In this case, local residents and the Latino Urban Forum noticed that Evergreen Cemetery was a convenient location, but the sidewalks’ poor condition made the route created a barrier to health-promoting activity; thus, those barren sidewalks were transformed into a 1.5-mile jogging path to promote a safe, healthy, pedestrian-friendly environment¹.

Proyecto Pastoral, a non-profit organization concerned with creating a healthy community through the empowerment and public participation, is partnering with colleagues from University of California, Los Angeles. Funded by the California Endowment, this joint project “Academic and Community Collaborative to Improve Our Neighborhood (ACCION)” aims to improve current issues, to build community awareness and capacity in Boyle Heights, and to change policies to mitigate air pollution and pedestrian safety impacts². Walkability assessment and improvement is one of these efforts’ main goals. As one part of ACCION project, this report analyzes the existing conditions and community assets and produces planning and design recommendations that accurately target areas of need.

**Problem Statement**

Walking is the oldest, most friendly and green transportation mode. In fact, built before the advent of the automobile, Boyle Heights has the charm of historically significant buildings and architecture, and small and walkable scales. However, rapid growth has made travel by foot a challenge. Today, Boyle Heights is largely surrounded by freeways, heavily overwhelmed with truck traffic from the good movement, and constructed in such a way to discourage walking for local residents. Many streets have poor or no sidewalks and have difficult street crossings. Urban form has been developed for automobiles. Considering these issues, it is necessary to assess and improve its walkability in Boyle Heights. This report aims to analyze current conditions, to assess needed improvements, and to identify strategies.

**Objectives**

Three objectives of this professional report will be to:

1. Assess the current conditions of the streets in study area; identify and map the specific factors in Boyle Heights that impact walking at the neighborhood level from

¹ See Prevention Institute (2004) p.6-p.9, for a full introduction of Evergreen Cemetery

perspectives of urban form, collision data, traffic, street design, land use, intersection safety, and perceived safety

2. Provide insights to help prioritize future investments, as well as point out the opportunities for improvement in the study area

3. Recommend short- and long-term planning and policy for a pedestrian-friendly environment

Significance

- **For residents**

  Many research have proven that places, where people live, work and play, have a direct and profound on the health of local residents (Lo, R. H., 2009; Southworth, M., 2005). A healthy community is not only referred to health coverage or the number of clinics and hospitals. It is also referred to safe, convenient and attractive access to destinations, clean air, healthy food, etc. What surrounds us deeply shapes us.

  Pedestrian-friendly places should be encouraged in Boyle Heights because walking is the most efficient and the only fully sustainable mode of travel. A walkable environment can help deal with transportation congestion, air pollution, sedentary lifestyle, pedestrian safety, poor pedestrian environment, and other built environment issues in Boyle Heights. A body of practice has shown that walkable neighborhood is associated with reduced vehicular travel, increased levels of physical activity, and decreased vehicle pollution exposure (Frank, Lawrence D., and Peter O. Engelke., 2001; Susan, H., 2004; Lee, C., & Moudon, A., 2004; Southworth, M., 2005). Meanwhile, it is also associated with mental health of local residents, sense of community, and general well-being (Leyden, K. M., 2003; Toit., 2007; Paranagamage., 2010). The study area is a portion of Boyle Heights community, where the improvement in pedestrian environments is desired for creating a safe, walkable, healthy and livable neighborhood. Results of this research will provide context for efforts to address community concerns and provide residents with systematic analysis of the community they are living in terms of pedestrian environment.

- **For policymakers and client**

  This report is a great opportunity to advance the application of planning methods and data to inform local policy decisions from the perspectives of urban planning and public health. Government and non-government agencies are seeking innovative policies and programs that protect and promote health while accomplishing the primary transportation objectives. This research will help local policymakers identify needs and priorities of the residents for making their community safer and more walkable. In a larger context, the walkability assessment process will significantly influence the projects and plans within and beyond the study area. After have an overview of the current situation in study area, I propose a range of actions and policy recommendations for creating a healthy and walkable neighborhood, ranging from overarching policies and organizational practices to small-scale community programs.
1. Policy changes

For example, California state law requires local governments to develop a general plan that contains seven elements including land use, circulation, housing, conservation, noise, open-space, and safety. For the most part, general plans don’t address the public health issues specifically. Therefore, in ten to twenty years, it is necessary to incorporate public health priorities and make a walkable community an indispensible goal in Boyle Heights Community Plan Update. In addition to the expected changes in general plan and zoning codes, the update of street design standards will be discussed in details in order to promote safer, more accessible pedestrian environments. “Complete street” idea is introduced to refresh the existing policy goal. According to the definition from The National Complete Streets Coalition3, “Complete Streets are streets for everyone. They are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists, and public transportation users of all ages and abilities are able to safely move along and across a complete street”.

2. Civic engagement and partnerships with anchor organizations

Besides the emphasis on the function of government, this report also reviews some successful programs and projects initiated by diverse groups. These successes show that there are opportunities for residents to participate in decisions that impact their lives and promote healthy community development. Some institutions and organizations will be identified for further cooperation, such as, local media, community centers, non-profit organizations, schools and other entities. The project is intended to aid Proyecto Pastoral in its efforts to generate policy goals focused on activating walkable sidewalks and building safer and healthier communities for Boyle Heights residents. The data, site analysis, and recommendations presented in this report will help Boyle Heights community members and Proyecto Pastoral actualize improvements and realize their policy and planning goals in their neighborhoods.

• For researchers

This research will make a methodological contribution to the study of walkable neighborhood measurement and design. A growing number of planners advocate that urban areas should strive for more pedestrian-friendly environments. And, a large amount of literature has explored the relationship between pedestrian environment, socioeconomic environment, individual characteristics and walking (Southworth, M., 2005; Forsyth, A., Hearst, M., Oakes, J., & Schmitz, K., 2008; Ewing, R., & Handy, S., 2009). In order to evaluate and measure these attributes, planning professionals try to find practical tools to assess and mitigate the impact of transportation, land use and development decisions on the quality and safety of the pedestrian environment, and to prioritize improvements that will increase pedestrian activity.

This report aims to apply Pedestrian Environment Quality Index (PEQI) in the study area in Boyle Heights and offer a methodological contribution to such an evaluation. Developed by San Francisco Department of Public Health, the PEQI is an observational survey which

3 More information about complete street can be found on http://www.completestreets.org/who-we-are/
quantifies twenty-one street segments and nine intersection factors empirically known to affect people’s travel behaviors, and is organized into five categories: traffic, street design, land use, intersections, and safety. It helps evaluate existing barriers to walking and assess the quality of the physical pedestrian environment in Boyle Heights study area. Recommendation on the inclusion of new indicators in this professional report will allow the Index to be further refined.

In the following chapters, this report identifies the existing conditions of pedestrian environment in a selected research area in Boyle Heights and formulates planning strategies and policies for the community.

Chapter 2 provides an overview of Boyle heights and the study area from the perspective of planning history, demographics, and relevant plans.

Chapter 3 reviews the definition of “pedestrian” and “walkability” and discusses the benefits of promoting a walkable community.

Chapter 4 presents data resources and methods.

Chapter 5 provides a comprehensive picture of study area, including pedestrian safety and street conditions in study area. It discusses the urban form factors which might influence walking experiences, such as land uses, block size, connection to transit and residential density. It also addresses the existing street conditions and pedestrian/vehicle collisions.

Chapter 6 presents the vision for a walkable neighborhood in research area of Boyle Heights. It identifies strategies, actions and design guidelines.
CHAPTER 2 BACKGROUND

Scope of This Report

The project “Academic-Community Collaborative in Our Neighborhood (ACCIÓN)” works to build community awareness and capacity to collect data about and change policies to mitigate air pollution and pedestrian safety impacts in Boyle Heights. Figure 1 illustrates Boyle Heights Community Planning Area Boundary/ACCIÓN Area Boundary, Study Area Boundary, and Walkability Assessment Area Boundary (Community PEQI Data Collection Area).

- **ACCIÓN Area/Boyle Heights Community Planning Area**

  The 35 Community Plans comprise the Land Use Element of the General Plan of the City of Los Angeles. They reflect the communities’ desires for their neighborhoods and designate land for the range of uses needed in a community, including housing, jobs, transportation and amenities. Boyle Heights Community Plan is one of them, which has provided a detailed introduction of the community and summarized census data for Boyle Heights.

  ACCION boundary covers the traditional Boyle Heights neighborhood, which is the same with the boundary of Boyle Heights Community Planning Area. In Figure 1, area within black line represents Boyle Heights. For convenience, this report organizes data and materials of Boyle Heights Community Planning Area which has already been summarized by Los Angeles City Planning Department. These data and report provide a background of Boyle Heights.

  According to Boyle Heights Community Plan⁴, **Boyle Heights Community Planning Area is situated at the eastern boundary of the City of Los Angeles and is surrounded by the City of Vernon on the south, the unincorporated community of East Los Angeles on the east, the communities of Lincoln Heights and El Sereno on the north and the Los Angeles River and downtown on the west. The neighborhood has a total area of 6.49 square miles of land, with an additional 0.04 square miles of area encompassing water of Los Angeles River and lake.**

- **Study Area**

  It is the main focus of this report. This project focuses on the corridors of 1st Street, 4th Street and East Cesar E Chavez Ave. More specifically, the project will look at: the neighborhood bounded by Los Angeles River, East Cesar E Chavez Ave, Evergreen Ave, and E 4th Street, which is shown as a area within light green boundary in Figure 1.

  The corner of Cesar E. Chavez Avenue and Soto Street is considered by locals and some historians as the Eastside's premier intersection. They see it as a vibrant place that was at the center of the country's biggest Jewish community west of Chicago before World War II and the nation's largest concentration of people of Mexican descent after it⁵. Despite the change of the street name and the language heard on it, the intersection evokes an intimate sense of neighborhood that is often missing in Los Angeles.

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Walkability Assessment Area - PEQI Data Collection Area

Developed by San Francisco Department of Public Health in 2008, the Pedestrian Environmental Quality Index (PEQI) is used in this report to assess walkability of the physical pedestrian environment and inform pedestrian planning needs in Boyle Heights. The index draws on published research, walkability efforts from numerous cities, and national expertise. It is an observational survey which quantifies street and intersection factors empirically known to affect people’s travel behaviors, and is organized into five categories: traffic, street design, land use, intersections, and safety. My client, Proyecto Pastoral, is concerned about pedestrian safety and experience in Boyle Heights, as well as health aspect in the general planning process. Pedestrian Environmental Quality Index (PEQI) is used to evaluate 14 intersections and 20 street segments/sidewalks within the study area for pedestrian comfort and amenities as part of the ACCION. PEQI data collection area is located within the study area. It is an area bounded by Los Angeles River, E 1st Street, Highway 101, and E 4th Street. In Figure 1, green area, located in northwest of the community, refers to PEQI area.

Additional information regarding the PEQI, including a methods report, manual, and data collection forms, can be accessed online at: http://www.sfphes.org/HIA_Tools_PEQI.htm.
Figure 1 Boyle Heights Community Map, Study area, Walkability Assessment Area
Source: Los Angeles City Planning Department, Academic and Community Collaborative to Improve Our Neighborhood; prepared by: Professor Doug Houston, Anqi Zhao, UC Irvine
Background of Boyle Heights Neighborhood

The study area exists within the larger economic, social and physical context in Boyle Heights. This section will discuss Boyle Heights’ history, demographic trends, rates of pedestrian, the role of the study area in Boyle Heights, and how this research fits within the framework of Boyle Heights Community Plan.

1. Planning History

A neighborhood is made up of people and places. It is defined by the experiences of those who consider it home. It holds their hopes for their future and their memories of the past. As an important intersection of Los Angeles, Boyle Heights is a place of infinite possibilities where people from different places and different cultures, meet and connect.

Boyle Heights’ unique history has shaped its current day neighborhood. According to Boyle Heights Community Plan (1995), the neighborhood was named after Andrew A. Boyle, an Irish immigrant who built his first home in this area in 1858. In the 1880s, the arrival of the railroads brought industrial development to the area just west of the Los Angeles River in downtown. Immigrants and residents employed in this industrial sector begun to settle on the eastside of the Los Angeles River in what today is the community of Boyle Heights. Since it was built in the late 19th Century, originally, Boyle Heights had a grid pattern of streets and short blocks like a traditional walkable residential community. In this period, most residents were European immigrants.

Boyle Heights Community Plan shows that explosive population and development in early 20th Century changed the demographic structure of neighborhood. Many people move to the east of Los Angeles River due to downtown development, rising real estate values and racially discriminatory housing policies in the rest of the city. Besides, with the industrial development of East Los Angeles, labors from various ethnic and racial groups came here and eventually succeeded the European immigrants of Boyle Height. From the 1920s through the 1950s, it was considered as the city’s most ethnically heterogeneous neighborhood with residents coming from such far-flung places as Mexico, Japan, England, Germany, Russia, and Armenia, as well as from the eastern, southern, and southwestern United States. During this same period, besides the industry land uses located on the west side of the Los Angeles River, more lands are designated for industry uses in the northern, western and southern parts of the Boyle Heights Community. Along with industrial development, public buildings and institutions, schools, religious facilities were built. Consequently, some housings, infrastructures and facilities were very old.

Figure 2 Andrew A. Boyle
Source: http://www.amoeba.com/blog/2010/01/eric-s-blog/boyle-heights.html

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In the first half of the 20th Century, three motivated events significantly influenced Boyle Heights. Many residents of Mexico decent were unwilling repatriated to Mexico during the Great Depression. And during the World War II, all residents of Japanese descent were removed from Boyle Heights due to Pearl Harbor War. After World War II, most of the non-Latino population left for other parts of the city for various reasons, including Jewish Americans, Russian and Yugoslav immigrants, and Japanese American. Since then, Boyle Heights has been populated mostly by Latinos. Although these groups moved to other places, they left many landmarks and traces of their presence in Boyle Heights that can still be seen today.

Before 1960s, Boyle Heights was a productive industrial zone which provided much of employment opportunities for local residents. However, as the whites flee downtown and urban centers, industry activity diminished and only some light manufacturing remained. During the 1950s, four public housing projects were constructed in Boyle Heights, two of which were subsequently enlarged.

Bounded by the Los Angeles River and divided by freeways, Boyle Heights is physically segregated from downtown Los Angeles and the rest of the City. It had been significantly affected by the construction of a concrete tangle of freeways. Over 10 percent of Boyle heights’ land was transformed to build four freeways (The 5, 10, 101, and the 60), uprooting approximately 10,000 residents and fracturing the landscape. Looking at the history, residents had often organized to protect and promote the well-being of them.

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Today, the majority of land use is multi-family residential uses. As Boyle Heights land use map shows (See Figure 4), The Community’s industry surrounds its residential neighborhoods, creating a continuous belt along its northern, western and southern edges. Commercial and open spaces are dispersed in residential areas. Several planning initiatives and plans intend to have a significant impact on land use, affordable housing, economic revitalization, historical protection, and community development.

As Latino population flush into Boyle Heights, these immigrants carry to North America the spatial experience of living in the Latin American. For the last 50 years, they have an indelible mark on Boyle Heights. The Latino Mural movement of the 1960s and 1970s resulted in world-famous murals of Latino life adorning the walls of shoe stores and public housing projects. Residents can hire Mariachi musicians off the street to perform at their parties and to mark anniversaries. In addition to vibrant business corridors, street vendors play a cat-and-mouse game with police officers and health department personnel, working to make a living through what in many cases may be the only employment option for the area’s undocumented immigrants.10

Boyle Heights’ residents also attempt to transform the spaces where they live. James Rojas, who initiated the sidewalk outside Evergreen Cemetery in Boyle Heights and dedicates to improve the built environment of East L.A, comments “In the Latino culture, public life is the key. Sidewalks, front lawns, and open areas become important spaces for interaction between community members. Because of lack of resources many Latinos walk, bike and use public transportation. The car-oriented urban form of US cities is being transformed by Latino mobility patterns. Latino Urbanism encompasses an active social life – spending time in groups outside the walls of the home. Active living is a way to get people out of their house and into their environment”11. This description implies that Latino people have the roots in nature and open space. They love social interaction and vivid street life. This unique perspective of urbanism lays a solid foundation for this report to provide information which assists the transformation of auto-centric streets to walkable Streets. It has been seen that new leadership is emerging from the community-based organizations serving the area.

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10 East LA Community Corporation. (2009), Boyle Heights: Our Place to Thrive
11 One Alumnus To Improve the Human Environment: Will you be the one person to help SA+P initiate change?, http://sap.mit.edu/about/giving/one_alumnus/
Figure 4 Land Use Map for Boyle Heights
Source: SCAG, 2005
2. Regional Transportation Context

As Figure shows on the right, the circulation system—railroads, streets, highways and freeways—greatly impacts the Boyle Heights community. In the map, black lines are referred to freeways and red lines are referred to major highway-class roads. According to Boyle Heights Community Plan (1995), “The topography of Boyle Heights is generally flat and the street grid system is oriented for east/west travel. The San Bernardino Freeway was first opened in 1943, followed by the Santa Ana, Golden State, Pomona and Santa Monica Freeways. In total, they represent 9.6 miles of continuous freeway and occupy 10% of the Community's land area”.

Figure 5 Regional Transportation Contexts in Boyle Heights
Source: CRA/LA

In the study area, the major east/west arterials are First Street, Fourth Street, and E Cesar Chavez Ave. These streets provide through regional access from downtown to the outlying communities beyond East Los Angeles such as Monterey Park, Whittier, Montebello and Santa Fe Springs. The major north/south arterials are Soto Street, Evergreen. Evergreen Avenue also provides north/south access but is narrow at the southern portion of Boyle Heights and ends at the northern border of Boyle Heights.
3. Demographics

Today, Boyle Heights is home to a growing concentration of Latinos, families, immigrants, renters, and many of whom live in poverty. According to 2005-2009 American Community Survey 5-Year Estimates\(^\text{12}\), Boyle Heights had approximately 89,394 residents at the time. With a total of over 24,432 housing units, this community has average household size of 3.97 people, high for the city of Los Angeles (2.95). Data shows that, Boyle Heights Community was less diverse and 93% of residents were Latino/Hispanic. Approximately 55% of resident had less than high school education in Boyle Heights, compared to 27% in Los Angeles City. 49% of the population was foreign born. Median household income was $32,377, low for the city of Los Angeles ($48,570). 30% of people in Boyle Heights lived in poverty while 19% of people in LA City lived below poverty line.

**Figure 6 Demographic Data for Boyle Heights, 2005 to 2009**

<table>
<thead>
<tr>
<th>Population statistics</th>
<th>Los Angeles City</th>
<th>Boyle Heights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population estimate</td>
<td>3,796,840</td>
<td>89,394</td>
</tr>
<tr>
<td>Total housing units estimate</td>
<td>1,385,394</td>
<td>24,432</td>
</tr>
<tr>
<td>Average household size</td>
<td>2.95</td>
<td>3.97</td>
</tr>
<tr>
<td>Median household income(in 2009 inflation-adjusted dollars)</td>
<td>$48,570</td>
<td>$32,377</td>
</tr>
<tr>
<td>% of Latino/Hispanic</td>
<td>49%</td>
<td>93%</td>
</tr>
<tr>
<td>% of foreign born</td>
<td>40%</td>
<td>49%</td>
</tr>
<tr>
<td>% of High school graduate or higher (population 25 and over)</td>
<td>73%</td>
<td>45%</td>
</tr>
<tr>
<td>% of individual below poverty level</td>
<td>19%</td>
<td>30%</td>
</tr>
<tr>
<td>Median age</td>
<td>33.3</td>
<td>29.2</td>
</tr>
<tr>
<td>% Persons under 5 years old</td>
<td>8%</td>
<td>10%</td>
</tr>
<tr>
<td>% Persons under 19 years old</td>
<td>28%</td>
<td>35%</td>
</tr>
<tr>
<td>% Persons 65 years old and over</td>
<td>10%</td>
<td>9%</td>
</tr>
</tbody>
</table>

*Source: U.S. Census Bureau, American Community Survey 2005-2009*

\(^{12}\) List of Census Tracts for Boyle Heights: 203200, 204420, 203500, 204600, 203600, 204700, 203710, 204810, 203720, 204820, 203800, 204910, 203900, 204920, 204110, 205110, 204120, 205120, 204200, 206030, 204300, 206040, 204410, and 206050.
There are no current and accurate figures on walking rates in Boyle Heights. Some figures related to pedestrian behaviors are available from U.S. Census data, including “means of transportation to work for workers 16 years and over” and “the number of households in an area with no vehicle available”.

Information on the number of pedestrian commuters in Boyle Heights is obtained from the U.S. Census American Community Survey 2005-2009 “Journey to Work data”. A central focus of presenting commute information is to identify the current “mode split” of people that live and work in Boyle Heights. Transportation mode split refers to the choice of transportation a person selects to work, which includes walking, bicycling, public transit driving alone, or carpooling. Nearly 19 percent of workers choose public transit on their journey to work, as compared to 11 percent for Los Angeles City as a whole. And, rates of walking to work in Boyle Heights (7%) are also far higher than the City average (4%). These numbers indicate that walking rates for Boyle Heights are likely higher than rates for the City as a whole and it possesses many potential assets to be developed into walkable neighborhood. Around 7 percent of residents above 16 years old in Boyle Heights go to workplace on foot, compared to the city average of 4%. However, we should pay attention to this point that since walk for
work is generally a small percentage of total walking trips, this figure is only marginally useful. It does not include walking trips to other destinations.

**Figure 8 Means of Transportation to Work: Workers 16 Years and Above in Boyle Heights**
Source: U.S. Census Bureau, American Community Survey, 2005~2009 Estimates

In addition to mode of travel to work, the number of car-free households from the U.S. Census American Community Survey 2005~2009 is another important indicator of the number of people who prefer walking and mass transit out of necessity. Lower car ownership rate suggests higher rates of walking and transit ridership. In Boyle Heights, 23 percent of occupied households are car-free, compared to 13 percent at the city level. Lower car ownership rates also suggest higher rates of walking and transit ridership. Taken as a whole, these data shows Boyle Heights has one of the highest rates in the City of Los Angeles.

**Figure 9: Car Ownership in Boyle Heights**
Source: U.S. Census Bureau, American Community Survey, 2005~2009 Estimates
5. Population of Pedestrian Emphasis

In 2009, 4,092 pedestrians were killed and an estimated 59,000 were injured in traffic crashes in the United States; on average, a pedestrian was killed every two hours and injured every nine minutes in traffic crashes. Certain populations are more likely to depend on pedestrian infrastructure and more vulnerable to injury and death.

Children and teenagers getting to and from school have been observed to have a very high walking rate, although this has been declining in recent years as more parents drive their children to school. Another important group is people who are disabled. They may lack motorized transportation options and as a result are also more dependent on public transit and pedestrian networks. Senior citizens may also lack access to vehicles or the ability to drive and rely heavily on transit and pedestrian mobility options.

In Boyle Heights, the median age is 29.2, younger compared to the city of Los Angeles (33.3). Children and youth under 19 years make up 35% of the local residents and the people above 65 years make up 9%. The percent of Boyle Height’s population in the 19 and under age group is almost 8 percent more than the citywide percentage. Conversely, the percent of Boyle Heights’ population above 65 is 1 percent less than LA City percentage. The percentage of disabled population in Boyle Heights is at average level (22%). Safe and equal access should be emphasized when walkable streets will be designed.

Background of Study Area

1. Neighborhood Setting

The study area in this report contains the areas south of E 4th Street to E Cesar Chavez Avenue from the Los Angeles River to S Evergreen Ave. It is considered as an important and diverse area in Boyle Heights with both low-density residential and medium-density residential, established major commercial corridors, and a series of light industrials adjacent to Los Angeles River. This research of this area will not only help improve the pedestrian environment in this area, but also provide a good example for the rest of Boyle Heights.

There are three major commercial streets, such as E Cesar Chavez Avenue, and E First Street, E Fourth Street. According to Boyle Heights Community Plan (2009), “commercial zoning in Boyle Heights was established in the early 1920’s. The general zoning pattern is one of continuous strips along major east-west streets”. In these vibrant business corridors, types of commercials range from scattered "mom-pop" stores to small clusters of retail stores to neighborhood and community-oriented commercial centers. Besides, street vendors are indispensible parts of the vivid street life, though they are playing a cat-and-mouse game with police officers and health department personnel.

14 Centers for Disease Control and Prevention, Why don’t more children walk to school? http://www.cdc.gov/motorvehiclesafety/Pedestrian_Safety/factsheet.html
This region possesses many community assets, such as rich social capital, historic pride and community spirit. There are many community-based organizations which play an active role in enhancing Boyle Heights’ development. For example, east LA Community Corporation (ELACC) focuses on community development through three components: housing, economic development, community organizing\textsuperscript{15}. Proyecto Pastoral at Dolores Mission is another non-profit organization working in the economically and politically disenfranchised community of Boyle Heights to empower the community personally and socially by developing grassroots projects in education, leadership, and service\textsuperscript{16}. A.R.T.E.S., a grassroots community coalition, promotes creative dialogue between policy makers, residents, business owners, educators, developers, and artists while helping direct revitalization projects in Boyle Heights (Boyle Heights Arts District/East First Street Corridor) and East Los Angeles neighborhoods. Based on the rich history and Latino culture, they initiate many activities and advocate community arts-based economic redevelopment and preservation of historic architecture and neighborhood multicultural integrity\textsuperscript{17}.

In addition to these intangible and unique assets, several landmarks and historic resources reflect a history of Boyle Heights. As the report “Boyle Heights: Our Place to Thrive” (2009) reviewed, Mariachi Plaza is named for the mariachi musicians who have gathered here in their

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\textsuperscript{15} East LA Community Corporation: http://www.elacc.org/index.php

\textsuperscript{16} Proyecto Pastoral at Dolores Mission: http://www.proyectopastoral.org/index.php

\textsuperscript{17} Artists revitalizing the Eastside: http://artes-eastside.org/
elegant charro suits since the 1930s, ready to be hired to perform at their parties and to mark anniversaries. These professional musicians were the heart of the vibrant community. The vast majority of the mariachis live in the historic Boyle Hotel, better known as "Mariachi Hotel," on the west side of the Plaza. The historic Boyle Hotel, a four-story structure built in 1889, sits at the corner of Boyle Avenue and First Street. The East Los Angeles Community Corporation (ELACC) acquired the building in 2006, and soon thereafter began to work on restoring the dilapidated building, which was closed for the construction phase of the project in April 2010. It is a cultural landmark known for its Mariachi musician tenants. In addition to these historic architectures, some of new physical assets include the newly constructed Metro Gold line, local and regional parks, white memorial hospital, schools and many senior centers and health care clinics.

However, on the other hand, figures and studies have shown that Boyle Heights is confronted with some health challenges. Currently, Boyle Heights is suffering from high rates of obesity and overweight, with over 33% of local residents deemed overweight and 23% obese\textsuperscript{19}. These findings are significant because rates of obesity can be directly linked to other chronic diseases such as diabetes, heart disease, cancer, hypertension and an overall poor quality of life. In addition, based on official land use summary, Boyle Heights also suffers from a deficiency in park space with only 161 acres of open space, much of which is Evergreen cemeteries. Compared to most places in City of Los Angeles, open Space in acres per 1,000 people in Boyle Heights is only 3 acres\textsuperscript{20}.

Residents’ subjective perception of neighborhood environment is equally as important as planners’ objective measurement. The former use their eyes, ears, and hearts to sense the places where they live; while the latter applies their professional knowledge to objectively investigate the place. From November 2006 through February 2007, City of Los Angeles Planning Department held a series of community meetings with diverse stakeholder groups. The topics included traffic, urban design, commercial, housing, open space, public facilities, etc. Topics related to pedestrian environments will be discussed in this report. In this survey, residents show their great concerns about traffic congestion, pedestrian safety, sidewalk conditions, and sense of place. They identified the existing assets and challenges across the community and discussed possible solutions\textsuperscript{21}.

From their point of view, traffic congestion was all bad over Boyle Heights. In the study area, congestion was especially felt on Soto St, 1st St, and Cesar Chavez Blvd. Residents also complained that freeways adjacent to residential areas, parks and schools result in unwanted noise, congestion and pollution. People thought bus services were unreliable due to congestion.

Pedestrian safety was another major concern. Streets were suggested to be improved to create greater sense safety along major corridors and residential streets, especially for pedestrian and after sunset. Paths between schools and parks needed to be improved in terms of safety (e.g. lighting, trees, sidewalks, crosswalks and traffic calming). For example, sidewalk conditions were poor - seniors who used them trip and fall. Most major corridors suffer from a lack of street trees.

In addition, residents expected a livable neighborhood where they could feel sense of place, pride, history and community values. They emphasized the importance of street vending, though sometimes street vending posed environmental and health concerns. As a cultural feature of Boyle Heights, street vending was considered a vital economic activity and should be preserved and enhanced.

\textsuperscript{21} Community Plan Workshop for Boyle Heights, City of Los Angeles Planning Department, http://sites.google.com/site/bheightsncp/home
2. The Emerging Trend of Study Area: Related Plans

This section discusses the various local planning projects and policies that relate to “walkability” in Boyle Heights. Boyle Heights is currently the target for several projects and programs that will ultimately have a significant impact on the land use, residential pattern, and economic activity of the community. The following is a list of some that should be reviewed:

- **Boyle Heights Community Plan Update**

  According to Los Angeles City Planning Department\(^{22}\), the basic role of Community Plan is to review existing policies and programs and revise them as necessary. The intent is to ensure that the plans reflect the existing reality of how the community has developed since the plan was last revised and to determine desirable future growth patterns in each individual Community Plan area. Similar to general plan, community Plan will focus on land use and related mobility issues, urban design and the phasing of public infrastructure and services with growth. Currently, Boyle Heights is going through the Comprehensive Plan Update process and thus there may be some significant changes to the existing document. However, the plan adopted in 1998 is the current plan that guides overall development in this area. Over the course of 2007, the Planning Department conducted many small group meetings with a wide range of stakeholders in which issues and concerns were identified. Based on this input along with department research and analysis, preliminary draft recommendations and visions for policies, land uses, and zoning are being developed for the Boyle Heights Community Plan update. The following visions are developed to promote healthy lifestyle, preserve community identity, and improve streetscapes and characters. They can be considered as an important foundation for enhancing unique, healthy and walkable neighborhood.

  1. Promoting development near new rail transit system stations in order to help protect stable neighborhoods, transit use and reduced dependence on the car, and promoting safer, more active streets
  2. Enhancing the positive characteristics of existing uses that provide the foundation for community identity, which includes the design, look and feel of buildings, streets and open spaces
  3. Enhancing the character of First Street and Cesar Chavez Ave and other key community streets by reinforcing their cultural character as highly pedestrian-oriented areas that have gathering places

- **The Adelante Eastside Redevelopment Project**

  The Adelante Eastside Redevelopment Project, adopted on March 30, 1999 by CRA/LA, is located in approximately two miles east of the downtown Central Business District. The goal of the project is “to preserve industrial and commercial uses within the community to promote a stable industrial base to provide jobs for the community, to build housing for all income levels, and to enhance the existing shopping areas to provide alternative commercial

\(^{22}\) City of Los Angeles Planning Department, What is Community Plan, http://planning.lacity.org/cpu/WhatsComPlan.pdf
choices for residents.” Figure 11 presents the Adelante Eastside Redevelopment Project Area which includes most important corridors in Boyle Heights. The area within yellow dotted line is the study area. West commercial streets such as Cesar Chavez Avenue, 1st Street, and 4th Street in the study area are planned for development.

Figure 12 Adelante Eastside Redevelopment Project
Source: CRA/LA

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23 CRA/LA Adelante Eastside Project Website http://www.crala.org/Projects/adelante/index.cfm
Cesar E. Chavez Avenue Streetscape Project, one of comprehensive streetscape projects, aims to support businesses along the historic Cesar Chavez Avenue commercial corridor by “repairing broken and deteriorating sidewalks and enhancing access to and use of alternative modes of pedestrian travel.” This project will also improve use of transit facilities along this key commercial shopping sector, and facilitate connections south of Chavez Avenue to the new Metro Gold line station along First Street. Enhancements will include new sidewalks, curb extensions, pedestrian lighting, new trees, landscaping, Historic District ID Signage, pedestrian crossings, and undergrounding of utilities. An arts district has long been part of the city’s community plan for Boyle Heights. These projects will enhance streetscape improvements to increase pedestrian/bicycle access in communities surrounding the Metro Gold Line Eastside Extension.

It is notable that the Gold Line expansion is being built along a major transit corridor (1st Street) in Boyle Heights. Following this expansion, Transit-Oriented Development (TOD) in Adelante Eastside Redevelopment Project is being planned. TOD has gained popularity as a means of redressing a number of urban problems, including traffic congestion, affordable housing shortages, air pollution, and incessant sprawl (Hess & Lombardi, 2004). In the study area, there are four potential TOD sites which cluster in E 1st Street and E Cesar Chavez Avenue. They are 1st & Mission TOD, 1st & Boyle TOD, 1st & Soto TOD, and Cesar Chavez & Soto TOD. By living within a half mile of public transportation, people can not only reduce vehicle related GHG emissions, but also live in a downtown-type of environment near jobs, housing, transportation, shopping, and services.

Three residential projects are anticipated or in process around TOD sites. Considering the average household size and income level, CRA/LA aims to build a great amount of large family dwelling units and houses for low-income family. For example, the Boyle Hotel Apartments, as

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the historic landmark of Los Angeles, will be transformed into a mixed-use residential and commercial project consisting of 51 units of affordable housing and approximately 4150 square feet of ground floor commercial retail space.\(^5\)

- **Los Angeles Neighborhood Initiative Project (LANI)**

  Boyle Heights is also one of the communities being targeted by the Los Angeles Neighborhood Initiative Project (LANI). The LANI program will utilize federal funds for streetscape improvements for several commercial corridors throughout the city. A 1.6 mile stretch of East First Street between Boyle Avenue and Lorena Avenue will be targeted for revitalization. The project includes the improvement of bus shelters, bus stop security lights and trees.

\(^5\) Boyle Hotel Apartments One-for-One Replacement Plan
http://lahd.lacity.org/laehinternet/Portals/0/MajorProjects/1%20fo%20Replacement%20Plan%20BHA.pdf
CHAPTER 3 PLANNING CONTEXT: DESIGN FOR PEDESTRIAN

In the traditional planning realm, automobile oriented values have been codified in the transportation policies and street design standards. Walkability was damaged by high-speed transport and the quest for efficiency. Today, walking matters. Recent decades witnessed a significant increase in pedestrian research in United States. Pedestrian has become the core of planning, instead of cars (Frank, Lawrence D., and Peter O. Engelke., 2001; Susan, H., 2004; Lee, C., & Moudon, A., 2004; Southworth, M., 2005). Walkability has been a hot topic in the field of transportation, planning, urban affairs, and public health.

What Is Pedestrian?

To define “pedestrian” is the first step. As Ria Hutabarat Lo emphasized, “The definition of what is a pedestrian is vital since it strongly influences the design of infrastructure and the urban environment as a whole”\textsuperscript{26}. In other words, the understanding of pedestrian influences our criteria of walkability.

From the perspective of law, California Vehicle Code Section 467 states that, “(a) A “pedestrian” is any person who is afoot or who is using a means of conveyance propelled by human power other than a bicycle. (b) “Pedestrian” includes any person who is operating a self-propelled wheelchair, invalid tricycle, or motorized quadricycle and, by reason of physical disability, is otherwise unable to move about as a pedestrian, as specified in subdivision (a)”\textsuperscript{27}.

Lo summarized definitions of pedestrian from different perspectives. She started with the citation of the Compact Oxford English Dictionary (2006), a pedestrian is “a person walking rather than traveling in a vehicle”. Pedestrian behavior is mainly defined as the transportation mode compared to vehicles, public transit or bicycles. Then, she discussed The American Heritage Dictionary which define pedestrian as “a person traveling on foot or a walker”. The definition is used to describe more social aspects. In addition to transportation purpose, walking for non-transportation purposes include exercise, recreation, leisure, shopping, social interaction, or even protest. From the perspective of social equity, Lo maintained that the definition of pedestrians could be further expanded to include those using wheelchairs or other aids. They may lack motorized transportation options and as a result are also more dependent on public transit and street networks. In addition, other certain populations are proved to be more vulnerable and more likely to depend on pedestrian facilities. For example, children and teenagers getting to and from school have been observed to have a very high walking rate, although this has been declining in recent years as more parents drive their children to school. Senior citizens may also lack access to vehicles or the ability to drive and rely heavily on transit and pedestrian mobility options.

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\textsuperscript{26} Lo, Ria Hutabarat 'Walkability: what is it?', Journal of Urbanism: International Research on Placemaking and Urban Sustainability, 2:2, 145 - 166
\textsuperscript{27} California Vehicle Code Section 467, \url{http://www.dmv.ca.gov/pubs/vctop/d01/vc467.htm}
To Summarize, pedestrian in this report is defined as “any person traveling by foot and any mobility-impaired person using a wheelchair”, not only for transportation purpose, but also for social interaction, shopping, leisure, recreation, exercise, protest, etc.

**What Is Walkability?**

Walkability has become a measure of how friendly an area is for pedestrians. What is walkability? The word is widely referred to, but poorly defined. In order to develop a more walkable neighborhood in Boyle Heights, it is necessary to define the term first and perform analysis towards this objective.

1. **Factors Influencing Walking**

Before presenting the criteria of walkable neighborhood, I first review the factors affecting walking. A body of literature has explored that the aspects of pedestrian environment, socioeconomic environment, and individual characteristics that encourage or discourage walking (Forsyth, A., Hearst, M., Oakes, J., & Schmitz, K., 2008; Lee, C., Moudon, A. V., 2006; Wendel-Vos, G. C. W., 2004; Pikora, T., Giles-Corti, B., Bull, F., Jamrozik, K., & Donovan, R., 2003).

![Figure 14 Factors Influencing Walking Paradigm](image)

Source: Summarized by the author

Motivation to walk depends on personal characteristics, which is the most difficult factor to change. One considers its ability, comfort, confidence, habits, and perceptions when he/she choose transportation mode. Although those can evolve over one’s lifespan but may also be modified by targeted intervention and education programs. Pedestrian built environment factors contain land use patterns, street connectivity, adequate pedestrian facilities and sidewalk design, all of which are shaped and affected by development policies and public investments over time. Socioeconomic factors are also playing an important role in influences
the willingness and desire of an individual to walk, such as poverty level, median income, car ownership, the community attitude towards walking, etc.

2. The Definition of Walkability and its Attributes

Individual and socioeconomic characteristics are invisible factors for promoting walking behavior. Walkability is more closely related to the attributes of the physical environment. Michael Southworth offer the following definition of walkability, “Walkability is the extent to which the built environment supports and encourages walking by providing for pedestrian comfort and safety, connecting people with varied destinations within a reasonable amount of time and effort, and offering visual interest in journeys throughout the network”\textsuperscript{28}.

\begin{center}
\begin{quote}
According to Michael Southworth (2005), a walkable network has several of the following important attributes:

1. **Connectivity**: connectivity of path network, both locally and in the larger urban setting;

2. **Linkage with other modes**: bus, streetcar, subway, train;

3. **Land use pattern**: Fine grained and varied land use patterns, especially for local serving uses;

4. **Safety**: safety both from traffic and social crime;

5. **Quality of path**: including width, paving, landscaping, signing, and lighting; and

6. **Path context**: including street design, visual interest of the built environment, transparency, spatial definition, landscape, and overall explorability.
\end{quote}
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To summarize, the five attributes of walkability helps promote Boyle Heights as a walkable community towards safety, sustainability, vitality, public health, and equity.

**Safety**: safety is a major concern for pedestrians. The car-oriented streets are large and wide, which lead to high speed and high volume of traffic. Motor vehicle traffic can be at odds with crossing safety. The elderly, children and the disabled are considered as the most vulnerable population. The continuous sidewalk and safe crossing is the fundamental factors of walkable streets. Ample sidewalks can ensure pedestrian safe walking and convenient crossing. The street and intersection design which encourage pedestrian activities can improve safety and balance the uses of vehicles, pedestrians, and cyclists. In practice, measures that design the street for pedestrians in mind – sidewalks, raised medians, better bus stop placement, traffic-calming measures, and treatments for disabled travelers – all improve pedestrian safety\textsuperscript{29}.


In 2009, the fatality rate for older pedestrians (age 65+) was 1.96 per 100,000 population—higher than the rate for all the other ages. In 2009, one-fifth (19%) of all children between the ages of 5 and 9 who were killed in traffic crashes were pedestrians. Children age 15 and younger accounted for 7 percent of the pedestrian fatalities in 2009 and 25 percent of all pedestrians injured in traffic crashes. - NHTSA, “Traffic Safety Facts 2009 Data: Pedestrians”

**Sustainability:** like bicycle, walking can help reduce traffic congestion and save energy. It is a sustainable green transportation mode that reduces noise and air pollution. Good walking routes connected to public transit provide environmentally sustainable alternatives to the private automobile. Compact, mixed-use land use pattern might be linked to lower Greenhouse Gases.

**Vitality:** varied land use pattern, path quality and path context can contribute to vivid and attractive street life. A safe and continuous can ensure the safety and connectivity, but cannot invite pedestrians. As Michael Southworth states, “many aspects of the path context and quality can contribute to a positive walking experience: landmarks of the built environment, design of the street as a whole, transparency of fronting structures, visible activity, street trees and other landscape elements, lighting, and views.”

**Public health:** health doesn’t only begin in a doctor’s office. Where we live, work, learn and play has a profound impact on our health. What surrounds us shapes us and if we are living in unhealthy surroundings, our health will reflect that. From the perspective of public health, walkable environment encourage people to get exercise on foot. As I review previously, physical activity enables people away from numerous health problems, such as obesity, asthma, osteoporosis, cardiovascular disease and even mental health issues. In addition to that, a pedestrian-friendly environment has social capital effects. Numerous interactions and transaction people have on the streets can help enhance social cohesion and improve mental health.

**Equity:** walkable streets are crucial spaces of strengthening the social fabric of a community. From equity standpoint, walking requires no license, no fare, and no fuel. It is popularly accessible and inexpensive mode of transportation. A pedestrian-friendly environment provides a majority of population fair access to livelihood, education, and resources. The poor, children, and elderly suffer disproportionately from living in auto-oriented environments, since they are most dependent upon other forms of transport and vulnerable to traffic collisions.

Based on background introduction above, the following analysis part begins with field observation in the study area, observing activities of pedestrians, land use, vehicle speed and road conditions. Urban form analysis, Pedestrian Environment Quality Index analysis and collision analysis are conducted. I synthesize the observation and data and identify a list of opportunities and issues in the study area.

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CHAPTER 4 DATA AND METHODS

The analysis begins with an overview of the existing condition in study area by using the secondary data. Then, pedestrian collision analysis helps locate improvement areas and understand collision types by identifying pedestrian collision rates, reasons, locations, and times as well as at-risk groups. Pedestrian Environment Quality Index Area analysis focuses on micro-scale and provides an overview of the existing street in sub study area. These measures can be considered as indispensible parts of walkability. They provide a comprehensive picture of Boyle Heights’ pedestrian opportunities and constraints. By looking at them simultaneously, we can have a full picture of Boyle Heights’ walkability.

Each community has unique characters and urban forms affecting pedestrian environment. In the overview analysis, I use secondary data from Southern California Association of Government (SCAG) and The Housing + Transportation (H+T) Affordability Index. The distribution of land use is the skeleton of urban space. It offers the origins and destinations for the users. Balanced, mixed-use environments with retail services significantly induce walking.

Land use data is obtained from SCAG, 2005.

The Chicago-based Center for Neighborhood Technology (CNT), in partnership with Center for Transit-Oriented Development (CTOD), developed a tool that provides a more accurate analysis of housing affordability by factoring in both housing costs and associated transportation costs for the neighborhood. The Housing + Transportation (H+T) Affordability Index, as an interactive online tool, provides access to data for 337 metropolitan areas across the United States. By integrating census data and other data from the census block group level, the model predicts a household’s total transportation expenditures for a given household size and income at a neighborhood level. In this report, the tool is used to help understand the overall existing condition of the study area. The indicators I chooses from the tool are closely related to walkable neighborhood, such as residential density, transportation accessibility, average block size, and Vehicle Miles Traveled. The distribution of land use is the skeleton of urban space. It offers the origins and destinations for the users. Average block size is defined by dividing the total land area in a block group by the number of blocks within a census block group. Residential Density is the number of household per acre of land area within the Census block group. The Transit Connectivity Index (TCI) was developed as a measure of transit service levels. The TCI is based on the number of bus routes and train stations within walking distance for households in a given Block Group scaled by the frequency of service. This measure is not available to all metro areas because of data acquisition issue. Vehicle Miles Traveled represents the average annual auto travel by households. This includes commute travel, but also all other daily auto trips.

31 More information regarding The Housing + Transportation Affordability, can be accessed online at: http://htaindex.cnt.org/
Pedestrian Environmental Quality Index

My client, Proyecto Pastoral, is concerned about pedestrian safety and experience in Boyle Heights, as well as health aspects in the general planning process. Pedestrian Environmental Quality Index (PEQI) was used to evaluate 14 intersections and 20 street segments/sidewalks within the study area for pedestrian comfort and amenities as part of the ACCION. The PEQI is aimed at increasing pedestrian activity and safety in land use and urban planning processes. In this study, PEQI examined the area bounded by Los Angeles River, E 1st Street, Highway 101, and E 4st Street. The data for PEQI was collected by trained observers in the summer of 2010 and analyzed by the author in the winter of 2010. The portions of the study area that received low PEQI scores represent an environment that is an obstacle to walking. General recommendations that improve the pedestrian environment are included in the recommendation chapter.

1. Introduction to the PEQI Instrument

In 2008, San Francisco Department of Public Health (SFDPH) developed the PEQI in order to assess the quality and safety of the physical pedestrian environment and inform pedestrian planning needs. The PEQI draws on published researches and works from numerous cities to assess how the physical environment impacts walking behavior in a neighborhood.

It is an observational survey that quantifies street and intersection factors empirically known to affect people’s travel behaviors and is organized into five categories: traffic, street design, land use, intersections, and safety. Within these categories are 30 indicators in the following table that reflect the quality of the built environment for pedestrians and comprise the variables of the survey used for data collection. SFDPH aggregates these indicators to create a weighted summary index, which can then be reported as an overall index or deconstructed by pedestrian environmental category or even by individual indicators.

In ACCION project, the PEQI has been modified for use in Los Angeles by Malia Jones, MPH. Key changes have been made to the original instrument in order to make it applicable to the Los Angeles Environment.

The PEQI is an accessible tool that public health departments, transportation departments, and community organizations can use to raise awareness about pedestrian environmental quality. It engages community members in local land use planning processes, and can help to increase understanding of the connections between street design and physical activity.

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32 Additional information regarding the PEQI, including a methods report, manual, and data collection forms, can be accessed online at: http://www.sfphes.org/HIA_Tools_PEQI.htm.
33 Pedestrian Environmental Quality Index: Toolkit for implementation in Los Angeles, CA
2. Steps of Pedestrian Environmental Quality Index

“The Pedestrian Environmental Quality Index (PEQI): An assessment of the physical condition of streets and intersections DRAFT Methods Report (2008)” has illustrated the steps of PEQI application. In this section, I summarize them in order to have an overview of PEQI methodology and rationale.

a. Planning and training

First, ACCION people choose the sub-area in Boyle Heights for PEQI data collection and identify intersections and segments. Then, volunteers are trained by the professionals using the PowerPoint presentation. In the training presentation, the first section is about walkability and why it is important for health. The second section, which is much longer, goes through each item on the PEQI form one at a time, providing instructions about how to answer the questions.

b. Collecting data

After volunteers have been trained, they are assigned to teams, given materials and go to observe—forms, pencils, clipboards, tape measures, stop watches, name tags, and area assignments.

c. Data entry and cleaning

After the data is collected for all desired streets and intersections, the PEQI data is entered into a database so that indicator responses can be converted into numeric
values in Microsoft Excel. There is two sheets, one for street segments and the other for intersection. Within each sheet, there is one row for each intersection or side of each street segment.

d. Mapping, data analysis and score interpretation

To calculate overall PEQI scores for each segment and intersection in Boyle Heights PEQI area, I first create weighted items according to the weights listed on the formula sheet included in the PEQI toolkit. Then, I add the items according to the formulas. The PEQI scores street segments and intersections separately, on a scale from 0 - 100.

- 100 - 81 = highest quality, many important pedestrian conditions present
- 80 - 61 = high quality, some important pedestrian conditions present
- 60 - 41 = average quality, pedestrian conditions present but room for improvement
- 40 - 21 = low quality, minimal pedestrian conditions
- 20 and below = poor quality, pedestrian conditions absent

I sort the data from lowest to highest to see what streets perform the worst on specific elements or overall. ArcGIS software can help present results on a map by attaching the individual data elements or the index scores to the map.

3. Application

PEQI Index has been applied in many projects as a part of Health Impact Assessment and walkability assessment. It offers a new approach to data analysis and visualization that can help in investigations of street- and intersection-based conditions. Through mapping and therefore the visualization of the composite PEQI scores, one can observe different patterns in walkability conditions within and across geographic areas. Take Treasure Island project for example. The California Department of Transportation awarded a Community-based Transportation Planning Grant to SFDPH and the San Francisco Bicycle Coalition (SFBC) to create a Community Transportation Plan to ensure a walkable/bikeable Treasure Island. This participatory based effort is aimed at developing sound transportation polices and street and bicycle design guidelines for a healthy neighborhood. As part of the project the SFDPH created an Existing Conditions Report and Health Impact Assessment of Treasure Island. The PEQI was used to assess the existing conditions of the pedestrian environment (see Figure 15) and profile opportunities for walkability planning. Data was collected for 52 street segments and intersections by a SFDPH employee in July of 2007 and will be collected again in the winter of 2008. The goal of using the PEQI for this transportation plan is to show the overall need for pedestrian improvements.

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34 Pedestrian Environmental Quality Index: Toolkit for implementation in Los Angeles, CA
4. **Objectives for using PEQI in Boyle Heights are:**

1) To gather data to advocate for pedestrian quality improvements in the forthcoming redevelopment plan

2) To build the capacity of local organizations to prioritize pedestrian safety and quality in land-use planning

3) To increase the awareness of the local residents to use the PEQI, and weigh in on current and future issues that impact pedestrian quality

**Pedestrian/Vehicle Collision Data Analysis**

1. **Methodology**

   Pedestrian safety is regarded as a primary concern in Boyle Heights by local residents in community plan workshop. The objective of pedestrian/vehicle collision data analysis is to provide an in-depth analysis of the factors associated with pedestrian collisions in Boyle heights in order to recommend future preventive strategies through outreach, education, engineering and planning, and enforcement.

   Collision data are obtained from Los Angeles Department of Transportation and the Safe Transportation Research and Education Center (SafeTREC) at the University of California, Berkeley. Data gathered on the collisions contain information about the location, time,
reasons, environmental factors and actions relating to the actual collision. Pedestrian data contain demographic data and specific conditions related to the pedestrian, such as injury, sobriety, pedestrian action and describe the condition of traffic control devices present at the time of the collision location.

The analysis focus is to identify either individual-level factors or attributes of environments in order to support future transportation safety policies and standards. In addition, I investigate the spatial distribution of pedestrian collisions across Boyle Heights. Collision maps tend to highlight those areas where there is high frequency of pedestrian collisions. In analysis and finding section, I will present the following results:

- Boyle Heights Compared to the rest of Los Angeles City
- Rates of pedestrian/vehicle collisions in Boyle Heights
- Reasons for pedestrian/vehicle collisions: Pedestrian action and driver action
- Time of pedestrian/vehicle collisions
- Location of pedestrian/vehicle collisions

2. Data Source

1. Pedestrian/vehicle collision data from 1994 through 2001

Data on pedestrian-automobile collision from 1994 through 2001 were obtained from the Los Angeles Department of Transportation. In this report, collisions involving pedestrians were geo-coded, mapped, and aggregated to the census tract level for spatial analysis. Traffic collisions involving pedestrians were geocoded by researchers from University of California, Los Angeles, Lewis Center. All data were in geographic information systems (GIS).

2. Pedestrian/vehicle collision serious and fatal data from 2002 through 2008

In order to acquire updated information, I use the California Statewide Integrated Traffic Records System (SWITRS) data from 2002 through 2008 provided by the Safe Transportation Research and Education Center (SafeTREC) at the University of California, Berkeley. The Statewide Integrated Traffic Records System (SWITRS) is collected and maintained by the California Highway Patrol (CHP). Through the Transportation Injury Mapping System (TIMS) website, users have free access to data and mapping analysis tools and information for traffic safety related research, policy and planning. TIMS currently only provides fatal and severe injury collisions. Thus, in this report, I view and download the history of serious and fatal crashes from 2000 to 2008 in Boyle Heights.

3. Data Limitation

Being useful for locating problem areas, collision analysis can highlight those areas where pedestrian collisions cluster. However, the lack of data on local pedestrian volumes creates a challenge to study pedestrian collision rates. For example, areas like E Cesar Chavez might have high pedestrian volumes and high numbers of pedestrian collisions. In contrast, collision

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Additional information regarding the Transportation Injury Mapping System (TIMS) and Safe Transportation Research and Education Center (SafeTREC), can be accessed online at: http://tims.berkeley.edu/index.php
maps cannot identify those areas where people avoid walking because they are perceived as too dangerous for pedestrians. Thus, in the future, for a comprehensive analysis, feedback from the community residents should balance this shortcoming of collision data.
CHAPTER 5 ANALYSIS AND FINDINGS

The Existing Condition - Overview

Land use

A body of studies have explored that the high-walkability neighborhood has a concentration of nonresidential land uses along the main corridor of the neighborhood (Cervero and Kockelman, 1997; Southworth, 2005). Residents can have access to most local-serving uses on foot within 10–20 min or up to half one mile. The types of activities that fall within this “neighborhood access” category include such uses as shops, cafes, banks, laundries, grocery stores, day care centers, fitness centers, elementary schools, libraries, and parks (M. Southworth, 2005).

Land use is controlled by zoning ordinances that reflect political decisions most often made at the local level. From my observation, the physical character of Boyle Heights is low-scale in nature both along the commercial corridors and in the residential community as well. The land use map (See Figure 17) shows that the majority of the study area is comprised of low and medium density residential uses (yellow and orange), with strips of retail and commercial activity along major corridors (pink). Like the other area in Boyle Heights, industry here surrounds the residential neighborhoods, creating a continuous belt along Los Angeles River (light blue). Areas where industrial zoning will be maintained and residential uses in these

Figure 17 Land use and half-mile radius of Transit-oriented Development In study area, Boyle Heights

Source: SCAG, 2005; edited by the author
Districts are not appropriate (Boyle Heights Community Plan, 1995). The current mixed land use distribution provides potential opportunity for developing walkable community.

Although freeways make residents accessible to many locations, it poses some challenges. The land use map illustrates that the residential core of Boyle Heights has been repeatedly bisected by the construction of freeways. In the workshop for new community plan, residents complained about the negative effects of freeways, such as noise, air pollution, and pedestrian safety. It is imperative that any modifications include mitigation measures adequate to minimize additional negative impacts and mitigate existing impacts on public facilities, environmental quality and social stability. In addition, East First Street, East Fourth Street and Cesar E Chavez Ave are focal points for shopping, social and entertainment activities. They serve the everyday and weekly shopping needs of residents, providing supermarkets, drugstores, retail shops and other neighborhood-oriented services. As physical barriers, U.S. 101, Freeway 5, and Freeway 10 divide neighborhood and isolate residential neighborhoods and retail areas.

Transit-oriented districts might be the solutions. The planned TODs are mainly located within a quarter to a half mile of a high-capacity transit station. This radius is related to pedestrian walking distances, since public transit most influences those land uses that can be reached on foot in five to ten minutes. The half mile radius of Gold Line stations is also shown in Figure 17. In the near future, residents in most of the study area can have access to daily shopping and service needs on foot, in addition to regional transit options.

**Average Block Size**

Positively correlating with the degree of connectivity, small block sizes usually produce compact urban form. Smaller and shorter blocks fit scale of walking, create a variety of route choices and enhance pedestrian uses (Forsyth, A., Hearst, M., Oakes, J., & Schmitz, K., 2008; Lee, C., Moudon, A. V., 2006; Pikora, T., Giles-Corti, B., Bull, F., Jamrozik, K., & Donovan, R., 2003). They make it easy to reach destinations directly and provide numerous route choices that make walking interesting and enjoyable. The measurement of average block sizes provides the foundation for quantifying the factors which affect connectivity. Average block size is defined by dividing the total land area in a block group by the number of blocks within a census block group. Boyle Heights is found to have small block sizes regardless of their land use functions (See Figure 18). Short blocks are a standard feature of streets platted before the development of motorized. Most of block size shown in the map are less than 10 acres, which might contribute a desirable walkable environment.
Figure 18 Average block size in study area, Boyle Heights

Figure 19 Residential densities in study area, Boyle Heights
Residential Density

It has been recognized that walking is higher in areas with elevated residential density (Cervero and Kockelman, 1997; Handy et al., 2002; Handy, 2003; Saelens et al., 2003). Residential Density is the number of household per acre of land area within the Census block group. Higher densities have many benefits, including efficient use of infrastructure, housing affordability, energy efficiency and possibly vibrant street life (Forsyth, A., Oakes, J. M., Schmitz, K. H., & Hearst, M., 2007). Figure 19 illustrates the analysis of residential density in the study area. This area has a mixture of single-family and multiple-family residences, which is consistent with higher residential density (4.6 HHs per Acre and greater). Higher density residential population areas will result in a higher demand for nearby pedestrian facilities.

Transit Connectivity Index and Vehicle Miles Traveled (VMT)

Estimates for household vehicle miles traveled at the neighborhood level are an essential component for analyzing household travel behavior. Vehicle Miles Traveled represents the average annual auto travel by households. This includes commute travel, but also all other daily auto trips. The lower value of VMT per household refers to less car use. As Figure 20 shows, VMT in the study area is mostly lower than 12,000 to 14,000 annual mile. Residents are more likely to use public transit, bicycle or foot.

The Transit Connectivity Index (TCI) was developed as a measure of transit service levels. The TCI is based on the number of bus routes and train stations within walking distance for households in a given Block Group scaled by the frequency of service. Figure 4 shows the results of the TCI application within the study area. Not surprisingly, the higher level of TCI run through this area, where auto ownership and the percent of people driving to work are proved relatively low across the City.
Figure 20 Vehicle Miles Traveled per Household in study area, Boyle Heights
Source: the national Household Travel Survey [NHTS], The Housing + Transportation Affordability, http://htaindex.cnt.org/index.php

Figure 21 Transit Connectivity Access in study area, Boyle Heights
Vehicle/Pedestrian Collision Data Analysis

1. Boyle Heights Compared to the Rest of Los Angeles City

Pedestrians are the most vulnerable population in traffic collisions. My analysis of Los Angeles Department of Transportation collision data shows that, for the eight-year scope of this study from 1994 through 2001, in terms of Los Angeles City, pedestrian collisions account for 6 to 7 percent of all traffic accidents each year for a total of 25,683 collisions. On average, nine pedestrian/vehicle collisions occurred each day in Los Angeles. Because of multiple injuries per collision, the actual total number of pedestrians involved was slightly higher at 27,835. On average, there were 3215 collisions each year and 173 people lost life each year.

Pedestrian collisions were not equally distributed across City of Los Angeles. Using the same dataset with this analysis, a study of pedestrian-automobile collisions in Los Angeles from 1994 to 2001 created a map which shows pedestrian collision incidents per square mile by census tract for the City of Los Angeles\(^\text{36}\). As Figure 22 demonstrates, there was a wide

variation in collision density at the tract level. Boyle Heights and some areas in East Los Angeles were identified one of collision hotspots. This study also explored the relationship between the frequency of pedestrian collisions and socio-demographic and land use characteristics at the census tract level. The analysis provides a good way to look at collision data and socioeconomic factors. For example, the analysis shows that high-density urban neighborhoods had more pedestrian collisions. Most of hot spots are located in the neighborhoods with a majority of low-income Latino population. They find a higher probability for pedestrian collisions in neighborhoods with high traffic volumes. More pedestrian collisions are encountered in neighborhoods with higher percentages of street space. Certain land uses, in particular commercial/retail and high density residential establishments, seem to generate more risk for pedestrian collisions, while areas with large portions of industrially zoned or vacant land have few collisions.

2. Rates of Pedestrian Collisions in Boyle Heights

A total of 562 pedestrian-vehicle collisions were recorded within Boyle Heights over the 8 year period. Compared to 7% in LA, pedestrian collision represents 10% of all reported collisions in Boyle Heights. Because of multiple injuries per collision, the actual number of pedestrians involved was slightly higher at 634. Among a total of 562 pedestrian crashes, 38% occurred at intersections and 62% occurred at mid-blocks.

<table>
<thead>
<tr>
<th>Collision Statistics</th>
<th>LA City</th>
<th>Boyle Heights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total collisions</td>
<td>364,029</td>
<td>5600</td>
</tr>
<tr>
<td>Pedestrian/vehicle collisions</td>
<td>25,565</td>
<td>562</td>
</tr>
<tr>
<td>% of pedestrian collisions</td>
<td>7%</td>
<td>10%</td>
</tr>
<tr>
<td>Number of pedestrian in collisions</td>
<td>28,724</td>
<td>634</td>
</tr>
<tr>
<td>Number of pedestrian per collision</td>
<td>1.12</td>
<td>1.13</td>
</tr>
<tr>
<td>Pedestrian fatalities</td>
<td>664</td>
<td>12</td>
</tr>
</tbody>
</table>

Source: Los Angeles Department of Transportation, 1994~2001

3. Reasons for Collisions

In 86% of the 562 reported pedestrian collisions examined in this study, at least one party was cited for violating a California Vehicle Code (CVC) Section. And in about 14% of the cases the primary factor is “other” or “unknown”. As Figure 24 demonstrates, vehicle drivers are responsible for approximately 49% of pedestrian/vehicle collisions. Pedestrians are responsible for approximately 37% of such collisions.

Pedestrian outside crosswalk (32%) and violation of the pedestrian right-of-way by a motor vehicle driver (31%) are the leading common cause of pedestrian/vehicle collisions. Other common driver movements include improper passing and turning at red light or signal, unsafe starting or backing and unsafe speed. Furthermore, 30% of pedestrian/vehicle collisions are hit-and-run collisions. Some well-known pedestrian violations include failing to obey traffic signals and failing to obey auto right of way violation.
4. Pedestrian Actions

In my pedestrian collision analysis, there is no information on gender for 3 pedestrians. Of the remaining, more males than females were involved in pedestrian collisions (almost 58 percent male). Of the 634 pedestrians included in the analysis, there were 311 pedestrians under age 19 (49%), 56 pedestrians above 65 (9%), and 267 pedestrians between the ages of 20 and 64 (42%).

The “Pedestrian Action” describes actions of the pedestrian in relation to the roadway, intersection, or crosswalk and is included in the statistical data portion of the police report. Figure 25 shows that 39% of pedestrian/vehicle collisions occur when the pedestrian is in a crosswalk (marked or unmarked). Accounting for 35% of the total, the next most frequent pedestrian action in collisions is crossing not in a crosswalk. Youths under 19 years of age represent 66.2% of these pedestrians. These types of collisions might be reduced with increased safety education, pedestrian safety training targeting youth, and more driver education. Pedestrians in the road accounted for 10% of the collisions. This type of crash often involves pedestrians walking along the shoulder or curb area, pedestrians getting into vehicles, or pedestrians standing in the road. Collisions at mid-block crosswalks, pedestrian action “crossing in crosswalk not at intersection”, represented 3% of the collisions. Pedestrian
collisions outside of the road represent 19% of the collisions. These collisions usually occur on private property, driveways and sidewalks.

Figure 25 Pedestrian Action Collisions, Boyle Heights, 1994~2001

<table>
<thead>
<tr>
<th>Pedestrian Action</th>
<th>Age group</th>
</tr>
</thead>
<tbody>
<tr>
<td>crossing in crosswalk at intersection</td>
<td>0-19  19 to 64  65 and above  Total</td>
</tr>
<tr>
<td>crossing – not in crosswalk</td>
<td>66%  30%  4%  35%</td>
</tr>
<tr>
<td>in road (including shoulder)</td>
<td>38%  59%  3%  10%</td>
</tr>
<tr>
<td>not in road</td>
<td>36%  59%  5%  14%</td>
</tr>
<tr>
<td>crossing in crosswalk not at intersection</td>
<td>77%  18%  6%  3%</td>
</tr>
</tbody>
</table>

Source: Los Angeles Department of Transportation, 1994~2001
5. **Time of Collision**

As expected, pedestrian collisions often occur in time with high traffic volume and pedestrian volume. The analysis of collision data revealed that collisions were more frequent on weekdays. The frequency of event varied little in terms of seasons and years. As expected, the peak collision period coincided with the afternoon and morning rush hours (with a major peak between 2 p.m. and 7 p.m. and a shorter morning peak between 7 a.m. and 8 a.m. As the figure shows, collisions occur year round at consistent levels with a slight rise during the winter months from October to January.

![Pedestrian Collisions by Time of Day, Boyle Heights](source)[Figure 26 Pedestrian Collisions by Time of Day, Boyle Heights]

![Pedestrian Collisions by Time of Month, Boyle Heights](source)[Figure 27 Pedestrian Collisions by Time of Month, Boyle Heights]

![Pedestrian Collisions by Time of Week, Boyle Heights](source)[Figure 28 Pedestrian Collisions by Time of Week, Boyle Heights]

6. **Environmental Conditions**

Multiple data fields are included in the environmental conditions including weather, roadway lighting, roadway surface, roadway condition. Lighting conditions, roadway surface conditions, and weather conditions do not present any surprising results.

![Pedestrian Collisions by Time of Month, Boyle Heights](source)

![Pedestrian Collisions by Time of Week, Boyle Heights](source)
Figure 29 Light Conditions of Pedestrian Collisions, Boyle Heights
Figure 30 Weather Conditions of Pedestrian Collisions, Boyle Heights
Figure 31 Roadway Conditions of Pedestrian Collisions, Boyle Heights
Figure 32 Roadway Surface Conditions of Pedestrian Collisions, Boyle Heights
7. Location of Collisions

The map (See Figure 34 and Figure 35) shows the spatial distribution of intersections and streets with pedestrian collisions. The larger point represents that more collisions occur in one point. The following tables (See Figure 33) summarize the top ten most dangerous intersections and streets in Boyle Heights based on the total counts of pedestrian collisions from 1994 through 2001. Among them, five streets and four intersections are mainly located within the study area.

As expected, pedestrian collision concentrate along the arterial streets of Boyle Heights, such as Cesar E. Chavez Av, 1st St, Whittier Bl, Olympic Bl, and Soto St. As previous analysis demonstrates, these streets have high levels of pedestrian activity and high levels of motor vehicle traffic on multi-lane, one-way streets. Some intersection located in the study area should be paid attention to, such as, Cesar E. Chavez Ave & Soto St, Gless St & 4th St, Cesar E. Chavez Ave & Fickett St, Cesar E. Chavez Ave & State and Breed St & Cesar E. Chavez Ave.

Annual average daily traffic, abbreviated AADT, is a measure used primarily in transportation planning and transportation engineering. It is the total volume of vehicle traffic of a highway or road for a year divided by 365 days. AADT is a useful and simple measurement of how busy the road is. It is also sometimes reported as "average annual daily traffic". Figure 34 also present AADT in 2000. We can find that the intersections with a large number of pedestrian collisions are mostly located in the streets or roads with high AADT (Above 25,000).

---

**Figure 33 Top 10 Ranked Vehicle/Pedestrian Collisions Intersections and Streets**  
**By Total Number of Collisions, Boyle Heights, 1994~2001**

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Street</th>
<th>Number of Pedestrian/vehicle collisions</th>
<th>Intersection</th>
<th>Number of Pedestrian/vehicle collisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Whittier Blvd</td>
<td>31</td>
<td>Cesar E. Chavez Av &amp; Soto St</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Cesar E Chavez Ave</td>
<td>29</td>
<td>Soto St &amp; Whittier BL</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>1st St</td>
<td><strong>29</strong></td>
<td>Gless St &amp; 4th St</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Soto St</td>
<td>26</td>
<td>Cesar E. Chavez Av &amp; Fickett St</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Lorena St</td>
<td>21</td>
<td>Breed St &amp; Cesar E. Chavez Ave</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>4th St</td>
<td><strong>17</strong></td>
<td>Olympic Bl &amp; Orme Av</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Olympic Blvd</td>
<td>16</td>
<td>Orme Av &amp; Whittier Bl</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>6th St</td>
<td>16</td>
<td>Lanfranco St &amp; Lorena St</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>State St</td>
<td>15</td>
<td>Boyle Av &amp; 8th St</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>Euclid Ave</td>
<td>15</td>
<td>Marengo St &amp; State St</td>
<td>5</td>
</tr>
</tbody>
</table>
Figure 34 Locations of Pedestrian Collisions, Boyle Heights, from 1994 to 2001
Source: LADOT, mapped made by the author
Figure 35 Intersection locations with the number of pedestrian collisions above 5, Boyle Heights, from 1994 to 2001
Source: LADOT, mapped made by the author
Figure 36 Top ten dangerous streets, Boyle Heights by the total number per street, 1994~2001
Source: LADOT, mapped made by the author
In order to acquire updated information, I use the California Statewide Integrated Traffic Records System (SWITRS) data from 2000 through 2008 provided by the Safe Transportation Research and Education Center (SafeTREC) at the University of California, Berkeley. TIMS currently only provides fatal and severe injury collisions. Thus, I summary serious and fatal crash data from 2000 to 2008 in Boyle Heights and I look at its spatial distribution with the help of GIS. Figure 36 illustrates that more than one heavy injury or death collision happened in four intersections within Boyle Heights from 2000 through 2008. The intersections are Cesar E. Chavez & Fickett, Soto St & Olympic Ave, Whittier & Fresno, and Whittier & Lorena. Through comparison between the previous data from 1994 to 2001 and the latest one from 2000 to 2008, it can be find that Cesar E. Chavez Av & Fickett St is a dangerous intersection for pedestrians within the study area.
Figure 37 Intersection with over 1 pedestrian/vehicle collision, Boyle Heights 2000~2008
Source: SWITRS, mapped made by the author
Pedestrian Environmental Quality Index Analysis

As a quantitative, observational survey instrument, Pedestrian Environmental Quality Index helps us answer this question: What are the existing environmental factors that support or prevent safe and interesting walking experience? In this research, PEQI is used to evaluate 14 intersections and 20 street segments/sidewalks within the study area for pedestrian comfort and amenities.

1. Summary of Findings: overall PEQI Score

Individual intersection and street segment scores within the Study Area range from zero, which corresponds to an unsuitable environment for pedestrians, to 100, which corresponds to nearly ideal urban pedestrian conditions. Relatively, 57% of these intersections and 40% of street segment sides in study area have unsuitable or poor pedestrian conditions. 14% of intersections and 20% of street segment sides are rated as basic. 21% of intersections and 25% of street segment sides score reasonable. 1 intersection and 3 street segments sides earn an ideal score. The median walkability score is 39 for intersection and 52 for segment.

Figure 38 Pedestrian Environment Quality Index, the study area in Boyle Heights
Source: Survey data collected by Proyecto Pastoral; map created by the author
2. Mapping PEQI Score

Maps above (Figure 38) display the street intersection and segment scores. Street/intersection with “ideal” scores (80-100) are shown in dark green; “good” scores (60-80) are shown in light green; “fair” scores (40-60) are displayed in yellow; and “poor” scores (20-40) are shown in orange. “Worst” scores (0-20) are shown in red. The maps are discussed in more detail in the following pages.

As revealed by PEQI analysis and portrays in the Figure 38 and Figure 39, the current pedestrian environment within the Study Area widely varies in quality depending on location. On average, the 1st Street corridor is the best performing arterial in the neighborhood. All segments rated “above fair” with two “good” segments and one “ideal” segment. This corridor is mostly pedestrian-oriented in terms of connectivity and building orientations, which helped contribute to its better ratings. It is characterized by a better pedestrian environment, likely due to large quantities of retail stores and restaurants in First Street, as well as established pedestrian amenities such as crosswalks and signals. The Gold Line stations, the existing 1st Street Beatification Project and public transit services is enhancing the improvement of pedestrian environment in 1st Street. Intersections within the Study Area that received good scores have well marked crosswalks, pedestrian signals, and traffic calming.
features. Several of the intersections in the Study Area received low scores because they do not include crosswalks in all four directions, pedestrian signals, and/or traffic calming features. A good example is the intersection 1st St & Utah St.

Compared to the good environment for walkers in main corridors, the area in the vicinity of light industry land use receives low PEQI scores because it is primarily industrial, with no pedestrian needs and facilities. The following pictures show the comparison (See Figure 40). In Moto Street clusters four intersections which are considered not suitable for pedestrians and four street segments which are not suitable or good for walking. PEQI survey shows that, in Mono Street and S Utah Street, in terms of streets, there is no sidewalk in both sides. Some abandoned buildings and litter can be seen. Abandoned buildings may increase feelings of pedestrian discomfort, including fears of increased crime or delinquency. Furthermore, abandoned buildings detract from visual interest for the pedestrian. Thus, PEQI data shows that perceived safety score and visually attractiveness score are very low.

**Figure 40 Comparisons between Intersection 1st Street & S Utah St (Dark green) and Intersection S Utah St & E 3rd St (red)**

Source: Google maps

### 3. Top/Bottom Three Street Segments/Intersections

The top three and bottom three street segments and intersections are extracted to compare results and briefly discuss their characteristics. The full list of scores for each street segment and intersection can be found in Appendix.
Three of the street segments shown in Figure 42—segment 8, 5, and 3, are located adjacent to the industry uses and are located next to each other. Three bottom intersections are connected with the bad segments. This area is one of the worst places to walk through because of car-oriented street design, a lowered sense of security, and dull factory buildings and streetscapes. All of these street segments have missing sidewalks and lack other pedestrian facilities, either in poor condition or with path obstructions; have poor overall cleanliness and maintenance; and are connected to less than three sidewalks. Figure 43 show the existing condition of Mono segment between S Utah and S Anderson. These three segments have less amenities, including public seating, planting, and public arts. Perceived street cleanliness, pedestrian lighting and the actual presence of litter is another way to evaluate the walking environment. In Mono and S Utah segment, further improvement should also be focused on cleaning litter, removing graffiti and adding more pedestrian-scale light.
All of top three street segments are located around Pico Aliso Senior Housing which provides 114 units for mixed-used senior citizens. These streets are located on low volume roads; have four way intersections that connect to five or more sidewalks; have detached sidewalks with wide, tree and grass-lined buffers; have curb ramps; are located on streets with two lanes, on-street parking, and 25 mph speed limits; have traffic control devices, crosswalks, and crossing aids; and have “good” overall cleanliness and maintenance.

Figure 43 Myers/Mono segment between S Anderson and S Mission
Mono segment between S Utah and S Anderson
Source: Google maps and the author

To summarize, although the PEQI analysis was not comprehensive, the portions of the Study Area that received low PEQI scores represent an environment that provides a disincentive to walking and other non-motorized transportation. While site-specific recommendations were not made, general recommendations that improve the pedestrian environment included engineering and planning measures that provide designated space on roadways for pedestrians, encourage pedestrian visibility, and reduce vehicle volume and speed; as well as land use changes such as the addition of public green space, retail and dining destinations, and other public gathering spaces.

“Top Five” Priority Locations

Based on audits, community mapping and collision data, five specific locations emerged as the highest priority for improving safety and making Boyle Heights a more walkable community. The locations were selected because of their pedestrian injury history (especially involving seniors and children), conduciveness to engineering countermeasures, and/or potential to generate significantly more walking among seniors and other residents.
CHAPTER 6 DISCUSSION AND RECOMMENDATIONS

The research has shown that Boyle Heights possesses many assets and opportunities for developing walkable neighborhood. These assets should be built on to make the environment more attractive and to encourage pedestrian-friendly environment development. This section summarizes key points identified in the background and analysis chapter and reiterates the goals of walkability. Finally, I will link the recommendations to the existing conditions.

Opportunities and Constraints

Walking rates in Boyle Heights are higher than the City average. Around 7 percent of residents above 16 years old in Boyle Heights go to workplace on foot, compared to the city average of 4%. Lower car ownership rate suggests higher rates of walking and transit ridership. In Boyle Heights, 23 percent of occupied households are car-free, compared to 13 percent at the city level. Boyle Heights neighborhood possesses walkable characteristics because they contain a mixture of homes, businesses, retailers, and public resources within easy walking distance of each other. Higher residential density is the resources of pedestrians. Short blocks in older sections are good for developing a pedestrian-friendly environment because they increase the number of possible walking routes and destinations. Old industrial areas of the study area are being redeveloped as residential and live/work neighborhoods with improved pedestrian infrastructure. This area has a mixture of single-family and multiple-family residences, which is consistent with higher residential density. Higher density residential population areas will result in a higher demand for nearby pedestrian facilities. The study area is well-served by public transit, making walking an important mode of transportation for trips across the neighborhood as well as within city.

Boyle Heights is currently the target for several projects and programs that will ultimately have a significant impact on the land use, residential pattern, and economic activity of the community. This region possesses many community assets, such as rich social capital, historic pride and community spirit. There are many community-based organizations which play an active role in enhancing Boyle Heights’ development.

Although freeways make residents accessible to many locations, it poses some challenges; the residential core of Boyle Heights has been repeatedly bisected by the construction of freeways. As physical barriers, U.S. 101, Freeway 5, and Freeway 10 divide neighborhood and isolate residential neighborhoods and retail areas. More efforts should be focused on mitigation measures adequate to minimize additional negative impacts and mitigate existing impacts on public facilities, environmental quality and social stability.

In addition to the challenges from land use pattern and transportation network, pedestrian safety is another big issue. Pedestrian collision represents 10% of all reported collisions in Boyle Heights. Most pedestrian/vehicle collisions occur along arterial streets for retail and business uses, such as Cesar E. Chavez Ave, 1st Street, Soto Street, etc. 39% of pedestrian/vehicle collisions occur when the pedestrian is in a crosswalk.

As PEQI analysis presents, some streets in residential area and industry area do not always have sidewalks, crosswalks, and numerous destinations within easy walking distance, such as
grocery stores. Many streets lack benches, bus shelters, trees, plantings and other street furniture that are important and attractive ingredient of a walkable neighborhood.

**Recommendation for Improving Walkability**

1 **Pedestrian Safety**: Create a street environment that strives to ensure pedestrian safety

   Based on Pedestrian Environmental Quality Index Survey, sidewalks, pathways and crossings should be designed and built in study area to be free of hazards and to minimize conflicts with external factors such as noise, vehicular traffic and protruding architectural elements. For example, in the study area, four street segments without sidewalk are: Mono St (between S Utah and S Anderson), S Utah (between Moto St and 3rd St), Callegjon (between S Gless and S Clarence), and Mono St (between S Anderson and S Mission St). Lighting - implement pedestrian scale lighting on the street and buildings so the focus is not only on lighting the road for the automobile. Curb Ramps - should be built or repaired at each crossing location. Buffering/Screening - provide ample buffering throughout the area to protect the pedestrian physically and psychologically from vehicles. This can be in the form of landscaping, trees, planting strips and bollards. Implementation of landscaping can provide shade and other benefits to the pedestrian. Speed Limit - the recommendation is that the speed limit be reduced to 25 miles per hour both for pedestrian and motorist safety in study area. In general this road is built for a much faster speed which encourages drivers to speed up. All of the recommendations are designed to create an environment that is attractive and in which drivers are aware of pedestrians. It is hoped that this will help to reduce speeding.

2 **improving streetscaping and land use**: provide pedestrian amenities and promote land uses that enhance walkability

   In long term, walkability can be improved through land use planning. Land use planning tool can include general plan, redevelopment plan, zoning, development review, subdivision plans, and pedestrian/bike plan. Community plan outline what a city/county envisions in terms of its overall pattern of growth and the type of place it wants to become (e.g., sprawl vs. Smart Growth, densities, housing mix and type, mixed vs. separate uses, transportation infrastructure, and land conservation. Public Health should be advocated and integrated as a stated goal in the Community Plan. Public health goal is defined narrowly. It is usually implied but not explicitly stated. It is a great opportunity to shift overarching land use vision of a community towards walkable and sustainable communities. Community plan can integrate “health” as a goal and as a rationale for key policies.

   In short term, zoning code is a tool to put community plan into action. General plan is general, while zoning code is specific. A health-oriented form-based code should be encouraged and promoted. Form-based codes focus on the relationship between building facades and the public realm, the form and mass of buildings in relation to one another, and the scale and types of streets and blocks.

3: **Education, program and Health Promotion**: Educate citizens, community groups, business associations, and developers on the safety, health, and civic benefits of walkable communities.
It is recommended that Boyle Heights places an emphasis on walking through bi-lingual printed materials or workshop, public meeting, signage, public art, and educational campaigns to promote the benefits of these forms of transportation and inform the population of the available resources. Conducting walkability audit survey, such as Pedestrian Environmental Quality Index, cannot only inform the planning process, but also get residents involved and seek recommendations from residents. Being active in walking audit data collection is a process of public participation where residents work together and act towards for built-environment efforts and policies. Through a comprehensive promotion program, an increasing number of people will have an increased awareness of available transportation options. This attention might help lessen congestion and associated air and noise pollutants in the environment, as well as increase levels of physical activity among residents and visitors.

Recommendation for Pedestrian Environmental Quality Index

The PEQI is an accessible tool that public health departments, transportation departments, and community organizations can use to raise awareness about pedestrian environmental quality. It engages community members in local land use planning processes, and can help to increase understanding of the connections between street design and physical activity. PEQI is a useful tool to increase participants’ awareness of the impact of the environment on walkability, and foster their interest in using the PEQI for future projects.

One strength of the PEQI is that it allows the user to analyze street or intersection factors holistically – as opposed to focusing on the presence of a solitary factor, when its importance may be context dependent and vary based on the presence of other factors. Also, it is crucial to remember that an index is only a partial measure of what is actually happening in the real world, and that a map of PEQI data is only a proxy of walkability.

However, there are several limitations to this study that should be acknowledged. First, there is a limitation in the method used to construct the PEQI, as there are a number of other environmental factors related to walking that were not included. It was designed to collect primary field data on a street segment or intersection level and does include variables which are not directly measured by a trained field observer (with the exception of traffic volume). The PEQI is a dynamic index, and indicators and values will be refined and expanded as new research is released on physical attributes of streets, intersections, and potentially neighborhoods.

Second, the PEQI was designed for use in an urban walking environment. There are likely environmental factors important for walkability in rural environments that are not included. Furthermore, the indicators chose support general walkability. Additional factors more relevant for specific subgroups, such as children, seniors and people with disabilities may not be represented. Design standards, such as ADA standards are not explicitly addressed in the PEQI.
"I want my kids to grow up in this community, see that change and live through a time where they don't have to be fearful of walking down the street -- and have the opportunity for art and theater


Pikora, T., Giles-Corti, B., Bull, F., Jamrozik, K., & Donovan, R. (January 01, 2003). Developing a framework for assessment of the environmental determinants of walking and cycling. Social Science and Medicine, 56, 8, 1693-1703.


