A Healthy Community in Burlington Neighborhood

A Thesis Presented for

The Master of Landscape Architecture

Degree

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Abstract

Studies have shown that the rising rate of adverse physical, social and mental conditions are tightly related to a lack of physical activity, poor eating habits, and the lack of social interaction. Unlike health problems centuries ago which were often caused by lethal diseases, the contemporary health problems in the United States relate to peoples' lifestyles and built environments. Vehicle-oriented community design has caused limited physical activity and unhealthful eating habits that increase obesity and other related health problems. Modern built environments often unintentionally discourage social interactions and present unintended obstacles to physical activities which causes social and mental health problems.

This thesis is an attempt to address some of the issues related to improving community design for better community health outcomes via a better design on the built environment. Specifically, this thesis is a case study in the Burlington neighborhood, a low income urban area in Knoxville, Tennessee. I test how design may help alleviate the issues mentioned above. Following the WHO's definition of health, which is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." This thesis therefore addresses the issue of human health by focusing upon two things. The first thing is to improve the physical health. This includes providing access for pedestrians and bicyclists, access to healthy food and places to exercise. The second focus is to improve social and mental health by providing recreation areas for socialization and refreshing mental health.

Unlike the traditional public health approach that relies upon medical interventions, this thesis posits the preventive efforts by utilizing spaces close to people's dwelling places.

Chapter 1

Introduction

The built environment that we live and spend our free time in can either foster or undermine our health. For instance, the quality of air that people breathe, the food and water people eat and drink, and the access people have to have physical and social activities affect their health [1]. Unfortunately, in the past forty years, changes in the built environment in the United States led to a more sedentary lifestyle and less healthy eating habits [2]. These two factors correlate with obesity. According to Schneiderman et al., obesity is seen as an epidemic in the U.S. due to its significant growth rate [3]. National Center for Health Statistics reported that in the year 2000, 62 percent of adults in the United States were overweight. Twenty-seven percent of those above were classified as obese, having a body mass index (BMI) of 30 and greater. In the United States, only Colorado had a percentage of obesity below 20 in 2009. In 1980, no state had an obesity rate above 20 percent. Consequently, obesity is cited as a major health problem in the United States [4].

Physical inactivity and obesity are serious health issues that have tremendous consequences on peoples' lives. First, they increase the risk of cardiovascular diseases, liver and gallbladder diseases, chronic disease, osteoporosis, coronary heart disease, respiratory problems, gynecological problems, hypertension, dyslipidemia, mental disorders, and type-2 diabetes [5]. Second, those issues create significant economic burden: obese Americans spend about $1429 more annually on health care than the average $3400 spent by people of average

weight [6]. Third, there are hidden costs related to those issues including income lost caused by lower productivity, limited activity, bed days, and absenteeism.

According to Centers for Disease Control and Prevention, the percentage of obese adults in the southern states including Tennessee in 2009 has reached more than 30%, one of the highest among the States [7]; one out of three adults in Tennessee are obese. The percentage of adults diagnosed with diabetes and the percentage of adults who are physically inactive in Tennessee are among the highest among in the nation [8]. These facts are related to communities' built environment in Tennessee, which often have unhealthy options when it comes to physical activities and dietary choices.

To try to counter these trends in obesity, federal and state governments started obesity-prevention programs and policies. Recently, president Barack Obama launched a White House Task Force on Childhood Obesity. One of the goals of the task force is to provide a national strategy to decrease child obesity rates from 17 percent to 5 percent by 2030 [9]. Other similar programs include "Let's Move" [10] created by the first lady Michele Obama and "Every Child Outdoors" [11] in Tennessee. Those programs focus upon increasing physical activity and promoting healthful diets which include providing fruits, vegetables, and low-fat food at school cafeterias. This programs also include implementing physical education in school, taxing soda and other high-sugar beverages, and labeling menus to provide nutritional information.

Despite this progress, obesity persists as one of the most challenging health problem this country has encountered. Most Americans believe that weight is a personal issue, which is an obstacle in fighting obesity [9]. While it is clear that people need to make healthy choices to fight obesity, it is also obvious that making healthy choices are often difficult because of many obstacles. Finding safe places to walk and bike is challenging in many neighborhoods. Parks are often too far from housing clusters and lack safe pedestrian connection, and healthy food is often more expensive and harder to find than processed or fast food. While many Americans can face these obstacles in making healthy choices, individuals of low income communities suffer the effect of these barriers even more than high income communities [2]. People of those communities are less likely to afford fees to a gym, less likely to have

leisure time because most of them may have multiple jobs, less likely to afford organic food from grocery store, and more likely to consume food from fast food restaurants. Those communities also are more likely to get impacted by increasing fuel costs more than the ones with higher incomes, yet the lack of public transportation and difficult access to mass transit stops make them rely on private automobiles [12].

Although obesity is a prevalent health problem in Tennessee, addressing physical health problems only is not enough to improve holistic health as a whole. The World Health Organization (WHO) defines health not only by the absence of illness and disease but also considers the human quality of life and social well-being [13]. The Oxford dictionary defines "well-being" as: "the state of being or doing well in life; happy healthy, or prosperous condition; welfare" [14]. Researchers show that health and well-being are related to urbanization. In general, the higher the level of population density, the higher the stress level on individuals in the community [1]. Social factors such as limited access to social activities, poverty, and lack of safety contribute significantly to "more depression, less well-being, and higher levels of disability from chronic diseases" [13].

Health problems strongly correlate to lifestyle and food consumption [9]. Modernization in a a developed country often affects how people behave and what people consume. For instance, as technology advances, processed food, frozen food, and ready-made food becomes less expensive than fresh produce. Therefore, people shift their preferences to those products for price and practicality. Since those factory-made products may be shipped long distances, connection between people and their local environment is missing. This trend has gradually changed how people see their health, community, and environment.

Landscape architects can help promote physical, mental, and social health of a community by improving community design in lower income areas. Since a state consists of communities, improving health in one community will contribute to alleviating the complexity of global health problem. Following WHO's definition of health, this thesis includes two foci upon addressing human health. The first focus is to improve physical health in the community. This includes "becoming advocates for better pedestrian, bicycle, and mass transit infrastructures" [15], providing places for exercise that have clean water and air; and

providing access to healthy food. The second focus is to increase the social and mental health of the community which include providing recreation area for socialization and the refreshing of mental health. This may create a town identity for community's pride and help people's spirits by fostering a connection to their place.

This thesis is an exploration of how design can improve health. By improving community design, one can change community lifestyle and improve its health. Unlike the traditional public health approach that relies upon medical interventions, this thesis posits the preventive efforts by utilizing spaces close to people's dwelling place.

Chapter 2

Discussion of Issues

Globalization and modernization have advanced the world's societies and created significant impacts on human health. In the United States, the modernization and industrialization of the country was marked by the construction of roads that connected the country's industries and factories. This allowed a convenient modern life that fostered peoples' dependence upon "tools" such as cars, computers, and other machines. Besides tremendous benefits for human society, technology has decreased inter-personal activities [16]. Time spent with video games, cable TV and personal computers replace communal activities. Consequently, modern living may cause less physical and social activities than our grandparents or parents had.

Industrial employment opportunities mostly exist in cities, so more people move to cities, which increases their population density. According to the U.S. Census Bureau, more than 73 percent of the U.S. population lived in urban areas in 2000 [17]. Rapidly growing urban areas have a complex set of issues that affect health [18]. Burlington neighborhood is an example of this issue.

2.1 Community and Neighborhood

The term of *community* has several meanings. In biology, a community is defined as an ecologically integrated group of species that interact and inhabit a given area. Community can also be defined as a group of people who share common characteristics, histories, believes,

or political interests. Examples of the latter definition include communities of hobbies, academic communities, church communities, and veteran communities. In a modern world, community can also refer to a group of people interacting virtually over the internet regardless of where they live. It is a social network. In this case, the area has no geographical limitation.

Public health's definition of a community is the one adopted for this thesis. It refers to a group of people sharing common values, social identity, norms, goals, and institutions and living together in a particular area [19]. However, it is not necessary for all people in the community to all have the same beliefs, values, goals, and social identities to interact successfully. In fact, having diversity is desirable because homogeneity can lead groups of people to have a low adaptability to new problems. Fundamentally, a diverse community is supported by the belief that "culture is a writhing knot of convoluted, tangled, and constantly mutating values, beliefs, and perceptions that must exist to provide variability of lived experience" [20]. Thus, experiencing heterogeneity presents various perspectives that will create a dynamic and open-minded community. Such experiences may help communities to be tolerant, sympathetic, and resilient.

Neighborhood is defined as a geographically defined area where a community lives. A neighborhood has special characteristics and commonly lays inside a city or suburb. In a city structure, the boundary of a neighborhood is usually drawn by the city government which sometimes consists of several ZIP codes. However, the interaction inside one neighborhood can be blocked by features such as wide roads, railroads, rivers, or forest. Those barriers can create sub-neighborhoods within a neighborhood.

2.2 Urban Built Environment and Health Issues

There is variety of terms necessary to know when referring to the built environment. *Urban design* usually refers to the configuration of towns and cities based upon function, appearance, and the uses of urban public space. Public spaces are spaces used by the general public on daily basis. Those spaces include parks, streets, plazas, and may extend to building facades. *Land use* usually refers to management of land portion for various activities or

functions. The functions include residential, industrial, commercial, and mixed-residential-commercial uses. *Transportation network* typically refers to a network of roads, bike paths, sidewalks, railroads, and greenways. *The built environment* includes urban design, land use, and transportation network [21]. The built environment is human-modified spaces such as homes, schools, grocery stores, workplaces, parks, business areas, and roads [22].

The built environment is a significant factor to the health of a community. The built environment can facilitate or inhibit physical and social activity and healthy diets [23]. As an example, a neighborhood with segmented sidewalks, few recreational facilities, insufficient lighting, inadequate shade trees, and a dilapidated appearance can discourage physical activity. In many areas of the United States, the growth of automobile industries and Interstate Highway System adversely influenced the built environment. Many areas are designed primarily for automobile with much less consideration for pedestrians [24].

2.2.1 Physical Activity

2.2.1.1 Sedentary Lifestyle and Obesity

In the United States, despite the increasing health in its population due to the advancements in medical fields, the country still faces a trend of a rising rates of chronic diseases. In contrast to the problems experienced by some developing countries that struggle with malnutrition, the United States population faces overeating and sedentary lifestyles, which results in obesity. In addition, health care costs are skyrocketing, and health experts are afraid that the current youth may not outlive their parents [12]. Accordingly, health experts are investigating ways to address this new epidemic, from changing lifestyles and diets to technological innovations. Evidence shows that lifestyle and environment in peoples' immediate environments are major contributors to health [24].

There is a strong relationship between the amount of green space in peoples' living environment and healthy lifestyles. Public health researchers concluded that children and teenagers who have easy access to recreational facilities and programs near their dwelling places are more active than those without [25]. Preschoolers having access to places that

accommodate vigorous play tend to spend more time in those places and become more active. Some studies report that children's physical activity is related to their being outdoors [25].

Recreational facilities and parks are not the only places that can accommodate physical activities. Public Open Spaces (POS) such as plazas, squares, urban farms, and natural areas can be used to accommodate physical and social activities. In fact, public places that do not seem to provide programmed physical activities are actually places that can increase walking. The attractiveness of those places usually makes people walk without the feeling of having exercised. In addition, POS are more efficient for physical exercise when they are well-designed. A study shows that after public open spaces were adjusted for attractiveness, they were likely to get visited 150 percent more than the previous conditions [26].

Having public open places that can accommodate physical activities is not sufficient. Distance and access from homes to those places can influence the frequency of use. There is an inverse relationship between distance to POS and frequency of people visiting that POS. Giles-Corti, et al [26] show that those with good access to POS are more likely to use POS compare to the ones with poor access, and those who use POS regularly typically achieve three times more than the recommended levels of activity compared to those who do not. Difficult access to those facilities will limit physical activity opportunities. People intuitively know when physical activity is welcomed in certain areas and is discouraged or inhibited in other areas [21]. As an example, in a neighborhood that has greenways or connecting sidewalks; people spend time running and walking. In comparison, neighborhoods that have no pedestrian access along the road only have few people brave enough to walk on road shoulders.

Unfortunately, many communities lack the design enabling a way of life that incorporates physical activities into daily routines. Many communities depend upon automobile for transportation. Vital services such as healthy food suppliers, workplaces, and other destinations are often not located within walking or bicycling distance from peoples' residences. These unfortunate conditions are strengthened by discontinuous and narrow sidewalks, unsafe bike routes, absence of street crossings, limited public transportation routes, lack of green spaces for exercising, and fears of crime. All of those factors inhibit

people from being physically more active. These conditions can be linked to the fact that more than half of the U.S. population did not meet the criteria for adequate physical activity in 2009 [27]. CDC defines "recommended physical activity" as moderate-intensity activities in a usual week that lightly increase heart rate, which include walking, biking, and gardening for at least 30 minutes a day at least 5 days a week. Accomplishing the recommended physical activity can be done through lifestyle activities such as household chores and leisure-time activities. Statistic shows that in 2005, 51 percent of adults in the U.S did not meet the minimum requirement for sufficient moderate activity per week; in Knox county the number was 56 percent.

Obesity is not only a problem for adults, but also for children in the United States. The Center for Disease Control and Prevention (CDC) reports that the rate of obesity in kids aged 7-11 increased from 6.5 percent to 19.6 percent between 1980 and 2008 [28]. The rate for adolescents age 12-19 years alone increased from 5 percent to 18.1 percent during the same period [28]. The cause of childhood obesity is similar to those of for adults: lack of physical activity and calorie over-consumption. The former is caused by the lack of safe and interesting places to be active close to their home, unsafe neighborhoods, and high television viewing times. The CDC [29] reports that Children aged 12-13 years spend an average of more than 6 hours a day using entertainment media, which includes television, computers, and video games. Screen time is considered a passive activity, which contributes to obesity. Advertisements on television and media often promote fast food restaurants and influence kids to make unhealthy food choices. Over-consumption in children is often caused by sugar drinks and less healthy foods on school campuses.

Obesity and diabetes, common effects of physical inactivity, have been found to impact people's mental well-being. Study by Loyola University of Chicago shows that people and health care professionals who work with obese patients have a negative attitude towards overweight and obese people. Carr and Friedman reported that obese people have lower self-esteem than people with normal weight. They explained that this association may be related to mistreatment toward obese people due to their appearance that is far from the "ideal body type" [30]. Furthermore, effects of for physical inactivity upon mental health

can be found in children also. The International Diabetes Federation notes that diabetes impacts every aspect of a child's experiences, which can lead to frustration [31].

2.2.1.2 Transportation

The built environment in the United States has been strongly, if not exclusively, influenced by the growth of our road systems. This issue can be traced back to the late 1930s, when President Franklin D. Roosevelt constructed networks of superhighways to provide post-war employment. The interstate highway has been an integral part of American life. Easy access to spacious roads has made the automobile the favored mode of transportation for most people the United States [32]. Roads caused the elimination of streetcars and electric trains —the most important and effective public transportation systems in American cities. Buses replaced rail lines because they were thought to be faster. Buses ran on paved streets, so the maintenance cost could be shared with automobiles rather than being separated as rails and roads were [33]. Only some cities kept and relied upon the rail-based transportation system; San Francisco, New York City, Washington D.C, and Chicago. Buses cannot fully replace the steadiness of streetcars and commuter rail. Private vehicles have become the default choice for transportation for most American households. By early 1970s, the United States was nearing automobile saturation, which means the demand for new vehicles was mostly to replace old ones [34].

Automobile-oriented transportation systems create adverse effects. First, it is land-consuming. Space needed for an average-size car is 200 square feet of land [34]. An acre can only accommodate 200 vehicles. These spaces were not needed when public transportation was used to travel. More streets are necessary to support the amount of vehicles and to connect one road to the others. Areas not originally designed to handle heavy traffic loads had sidewalks removed for roadway widening to increase automobile flow. This left limited space for pedestrians and bikers. The lack of sidewalks, the absence of crosswalks, and fast traffic, all discouraged people from walking and biking. As a result, only around 10 percent of children walked or biked to school in 2003, a 40 percent drop since 20 years before [22]. Secondly, the increase of automobile use increases air pollution. Air pollutants

from cars include SO_2 which contributes to acid rain, NO_x which contributes to smog, CO, and particulate matter which can damage lung tissue, the heart, and nervous system [35]. More vehicles on the road creates traffic jams that increase the risk of accidents [36]. Most automobiles run on fossil fuels, an unsustainable source of energy that has become a major cause for concern and discussion on topics like climate change.

Government has tried to "properly balance the use of private vehicles and mass transportation to help shape as well as serve urban growth" through funding and acts [32]. Unfortunately, the public transportation system is often inadequate in many urban areas, leaving driving as the only choice. With the rise of automobile ownership, mass transit ridership has been declining since the 1950s. The U.S Department of transportation reported that 89.3 percent of people use personal vehicles while only 2.1 percent use buses for long-distance travel [36]. The same report also shows the increase of automobile use for transportation to workplaces since 1989, with more than 70 percent of the automobiles transporting only the driver.

2.2.1.3 Nutrition

Urban living can make healthy eating habits difficult. Studies show that Americans consume 31 percent more packaged food than fresh food, and more packaged food per person than people worldwide [37]. This implies that the joy of preparing food from scratch has gradually disappeared from many families. Processed food such as frozen food, canned food, boxed food, ready-made food, and fast food are appealing, great tasting, accessible, and affordable. The economic value and convenient of those products provide excuses for not having to deal with the hassle of preparing food, despite the fact that processed fast foods often contain high fat, sodium, and sugar and often have low nutritional value.

At the beginning of the 21st century, average Americans consumed more food and hundreds more calories than in the late 1950s [38]. In the year 2000, USDA estimates the average calorie intake per person as about 2700 calorie per day. That number is about 500 calories higher than the number in 1970. This increase may be related to the increase of

eating out. When people eat away-from-home, food often has a higher calorie amount due to high fat and high sugar content.

In urban settings people live in apartments without private greenspace or live in a house with small backyard. This lack of space may prevent people from growing their own vegetables and fruits. Urban has a limited amount of greenspaces, such as the traditional backyard [39]. Community garden have gained momentum nationally, increasingthe access to greenspace and the availability of fruits and vegetables for urban residents.

Community gardening improves physical, mental, and social health since it involves regular physical exertion. The yield of the garden encourages the increase of fruits and vegetables intake for urban residents [40]. Community gardens facilitate social interactions between participants which may provide relief from daily stress. Furthermore, gardens contribute beauty to the neighborhood and can refresh the emotional health of the immediate community. Community gardens give a sense of community and strengthen connections to nature in the area people live with, thus raising community pride.

Cost has been documented to be one reason that people do not consume fresh fruits and vegetables more frequently [40]. This is especially true for people with low income. Millions of Americans, in particular low income people have difficulty to get access to fresh, nutritious and affordable food [41]. The price of fresh vegetables and fruits is higher than the price of meats and processed food. The high cost of fruits and vegetables compared to meat is mainly due to the differential caused by federal subsidies, of which 73 percent is for meat and dairy production, and 0.73 percent is for vegetables and fruits [42]. This explains why most people typically have diets that are high in meat and saturated fat and low in fruits and vegetables. This dietary pattern increases the risk of chronic diseases such as cardiovascular disease, diabetes mellitus, and some cancers [43].

Another cause of the high cost of vegetables and fruits is transportation. The issue of *food miles* —the distance that food travels from its production to consumer— has gained much attention. In the United States, the average food miles per meal is about fifteen hundred [44]. Transportation depends heavily on fossil fuel. Rising fuel prices also impact fresh

produce prices. Long-distance food shipping contributes to the increase of carbon emissions and decreases air quality.

Cities rely upon having food brought in from distant areas. In the United States, corn is imported from Iowa, lettuce and tomatoes from farms in California, oranges from Florida, bananas from Mexico, apples and peaches from Argentina, and garlic from China [45]. The environmental impacts of food miles include the required energy for food production, processing, packaging, and motorized transportation [46]. The energy used in food production creates air and water pollution, which affect human health. Also, distant food supplies can limit urban residents' awareness of the potential of the place they live.

Cities have enormous potential for food growing despite their high density [47]. Urban metropolitan areas produced 30 percent of the U.S. agricultural production in 1980. That figure has increased to 40 percent by 1990. Urban agriculture can also be found outside the United States. For instance, 65 percent families in Moscow in 1970, eighty thousands community gardeners in city of Berlin, and 67 percent families in Dar-es-Salaam in 1967 were involved in food production. In Philadelphia, there were 212 food-producing gardens under one-half acre that grew nearly a million dollars worth of vegetables and herbs [41].

2.2.2 Mental and Social Health

People that live in urban areas usually have below average mental health compared those living in rural areas [1]. Competition exists in most parts of urban lifestyles. Excessive focus on careers, decreased opportunities for long-term community relationships, and a high rate of technology use puts social interaction, especially with neighbors, as a secondary need. This may contribute to isolation that may cause depression and other mental health problems. In the book *Health and Therapeutic Environment*, Moughtin describes that emotional behavior, which affects feeling and many parts of bodily function, are shaped by social interaction. When one's feelings are troubled, one would consequently have less ability to process information in decision making [1]. Accordingly, physical illness could be the outcome of depression.

The built environment can be an important determinant of mental health because it can shape stressors on individual mental health [48]. A study has shown that an individual living in a neighborhood with by poor features is more likely to have psychosocial stress than one living in a neighborhood that has a better built environment [49]. Psychosocial stress, that relates to an individual psychological development and social environment, is associated with mental health; especially depression. Densely populated urban areas and poor quality built environments may significantly expose daily stressors and nuisances that can amplify social stress in the community [50].

The relationship between the quality of built environment in a neighborhood and depression may be an expression of concentration of detrimental elements of the neighborhood. Those elements may include the lack of green space that has been associated with poor overall health. Noise exposure, pungent smell, social threat in the neighborhood may also contribute to psychological stress and poor mental health [51].

Urban environments introduce intricate set of issues that impact health. Daily convenience technology can be easily enjoyed in urban areas, yet has often caused sedentary lifestyle for urban residents. Lack of community design often prevents lifestyles that incorporates physical activities into daily activities, inhibits social interaction, and discourages mental restoration.

Chapter 3

Method

The fieldwork for this project started with data gathering, analysis of the data, identification of the problems that existed on the current site, and an ensuing new site plan as solution to address the identified problems. The data gathering includes archival research, literature reviews, interviews, and a survey. The analysis part consists of suitability analysis and site analysis.

The literature review involved books, journals, and online literature. It played the largest role in this study for several reasons. First, the literature review provided the background of problems and aspects in the subject of what makes a healthy community. The keyword-searching for this information includes *built environment*, *healthy community*, *active living*, *urban health*, *obesity*, and *physical activity*. Second, the study of literature brought the author up-to-date with the current trends of health issues related to health and well-being. The current trends change constantly, therefore recent journal articles and online reports are good resources to get information and relevant data.

Archival research is important for this project since Burlington has historical value. Resources for this research came from the East Tennessee Historial Society and the Calvin M. McClung Historical Collection-Knox County Public Library collections. The data sources include photographic collections, Sanborn Maps, and old newspaper clippings.

Interviewing a former Burlington resident was necessary to comprehend the history of the place. For this project, the author interviewed Phillip Flanagan, a research associate from the Plant Science department at the University of Tennessee. Flanagan spent his childhood in Burlington. During the interview, Flanagan indicated that this area was an ideal place, where people lived, worked, and played. As a living space, this neighborhood was once a tight-knit community. The close relationship among people was probably encouraged by the fact that walking was the main transportation mode in this area. In contrast to driving, walking gave people opportunities to pay attention to their immediate environment, including the people around them. As a working space, the local business district and public sector provided employment opportunities as well as energizing this neighborhood as a lively place. As place to play, Chilhowee park and Cal Johnson racetrack offered various types or entertainment and recreation for families.

The author also interviewed a current East Knoxville resident, Stanley Johnson. Johnson is a member of the community development group called SEEED [52]. His group helps to identify the problems and the potentials of Burlington and its surrounding neighborhoods. Giving a tour to Park City neighborhood, he showed projects that have been built to improve the community. He explained the reasons for the successes or failures of those projects. Among those failed projects are a community garden that lacks management, and parks in the area that are targeted for only specific audience. These parks are located in Park City, which is adjacent to Burlington; it has similar demographic conditions. These failed projects provide lessons to apply to areas to be developed in the Burlington neighborhood.

Gathering data from current residents was done by a questionnaire survey given to the current Burlington dwellers (survey questionnaire and results are included in Appendix). The survey was distributed at Burlington Public Library. Eleven surveys were collected, and almost all questions were answered. This particular public library also serviced areas other than the Burlington neighborhood. This may have been the primary cause of the limited number of respondents.

The survey questions are divided into three sections. The first one is the demographic of the residents. The purpose of the next section is to understand the current condition

of Burlington neighborhood. The last one is to find out residents' expectations for their neighborhood. A map of the neighborhood is attached to the questionnaire, in which respondents were asked to locate a possible future park, community gardens, bike routes, walking routes, and unpleasant areas. In addition, a conversation with Burlington residents occurred during survey distribution. They indicated positive responses to the idea of improving the built environment to get better health outcomes.

Chapter 4

Site Selection

The following criteria are used to select the site for this project. To test the thesis, the project needs a low income community as its site. The project needs for a site that has poor quality of pedestrian and bicyclist accesses, and lacks green space and physical activity facilities. The third criteria for the site is that it has to be accessible by the current public transportation system in Knoxville.

To improve healthy food selection through a community garden, the area also needs to have good size of flat area, plenty of sunlight, and easy access to water. Fountain City and Burlington were nominated to be the site for this project. Figure 4.1 and 4.2 show that both sites have a low quality of pedestrian and bicyclist access, have limited green spaces and limited affordable exercise facilities. Both are accessible by public transportation and have flat full-sun areas. The site in Fountain city, near Broadway street, is a low income neighborhood. The area includes rundown buildings and concrete surfaces, a small under-designed skate park, and some part of First creek. Some fast-food restaurants and a grocery store are located on Broadway street close to the site. Fountain City Park is close to the area, but there is no connection between both places. Figure 4.4 shows that the area is subject to be developed as a greenway extension as a part of Knoxville Greenway system. Therefore designing a part of the area would contribute to the city's plan.

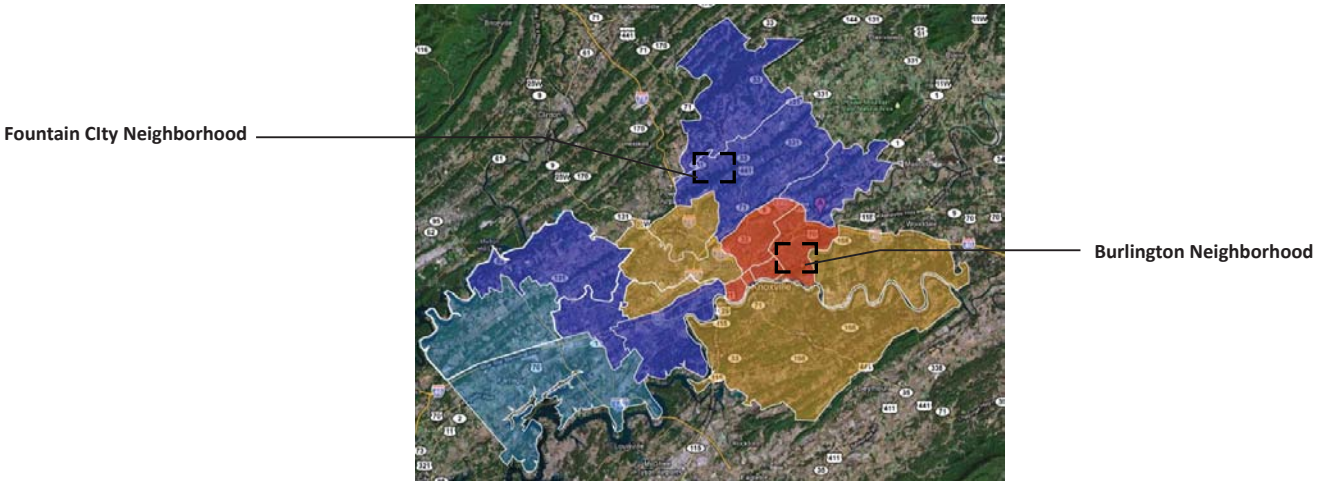


Figure 4.1: Suitability analysis of Fountain City and Burlington neighborhood

Burlington has a limited amount of open public green space, almost no exercise facilities, and greenway connection to this area is non-existent. Designing this neighborhood to improve the community's health may be the first of its kind in this area. It is the author's hope that this project will generate more interest of development. Both sites were potential sites for this project. However, the Burlington neighborhood was chosen to be project site because of its lower income compared to Fountain City's (as a reference, see figure 4.3).

Some studies show that health problems are greater among vulnerable populations including those who are isolated by their level of income [53, 1]. Those communities usually live in neighborhoods that have limited access to facilities that support physical activities. The accessibility to the facilities depends on the distances and adequate connections from their home. Researchers find fewer parks, fitness centers, sport fields, and trails in lower-socioeconomic status communities [2, 54]. Another determinant for accessibility is the cost to use the facilities. Many low-income communities relatively have less free facilities [2]. Consequently, low-income communities may face greater rates of obesity and other illnesses.

Low-income and minority communities are less likely to have options for healthy foods than the more affluent ones [55]. Full-service supermarkets and farmers' markets are rare in low-income, minority, and immigrant neighborhoods. Even if some exist, food markets located in low-income neighborhoods are often smaller, with limited selection, and low quality produce [41]. Low-income neighborhoods have few sit-down restaurants; instead are dominated by fast-food chain restaurants that become the likely sources of prepared food.

4.1 Site Chosen

The choosen site for this thesis is Burlington neighborhood, a neighborhood on East Knoxville about 6 miles from downtown Knoxville. As shown on figure 4.5, the neighborhood is bounded by I-40 on the northwest side, Cherry street on the southwest, and Wilson avenue on the south east. The main roads that go through this neighborhood are Magnolia avenue, Asheville highway, and Martin Luther King Jr. avenue. The area is dominated by small

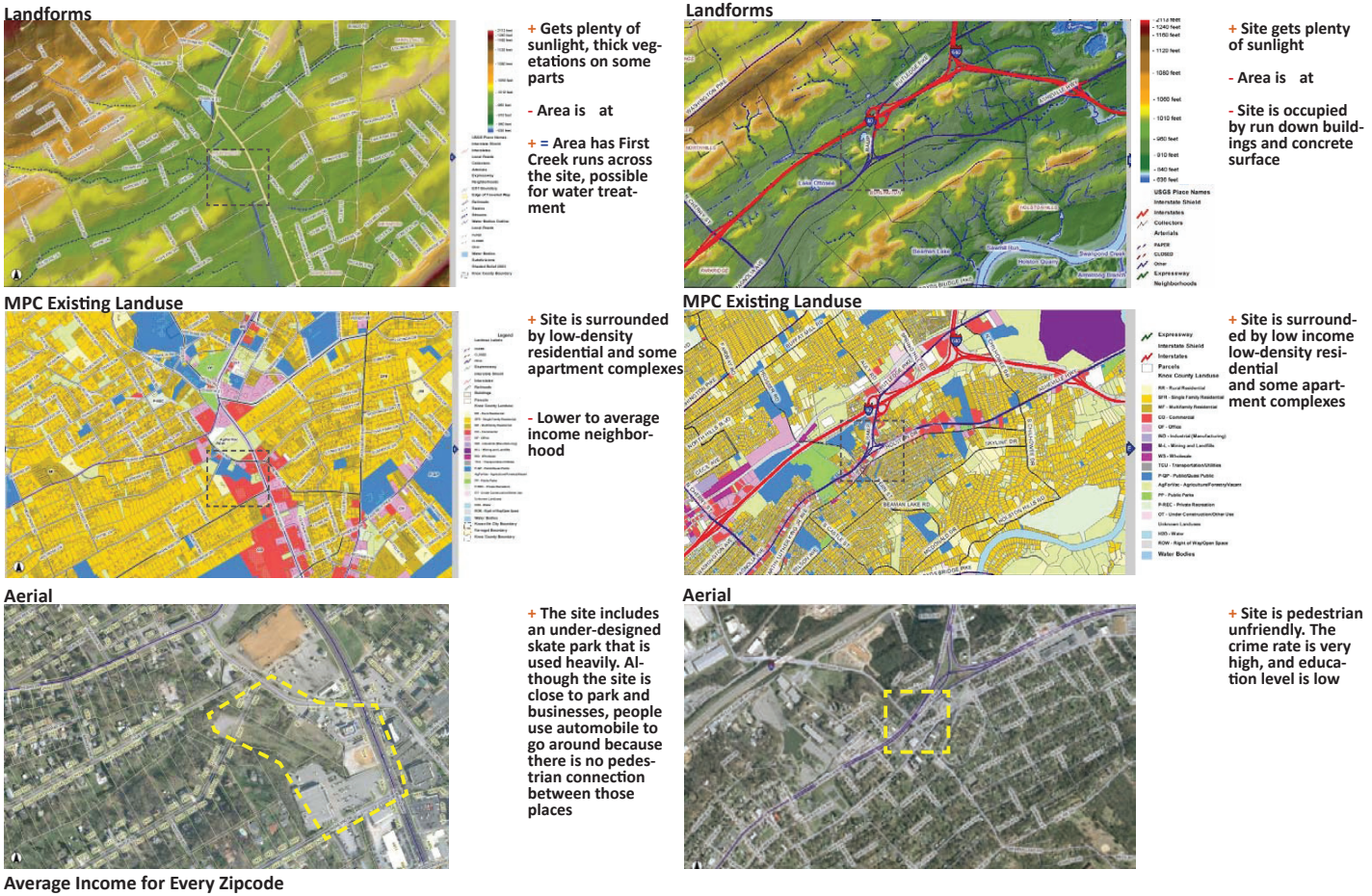


Figure 4.2: Suitability analysis of Fountain City and Burlington neighborhood

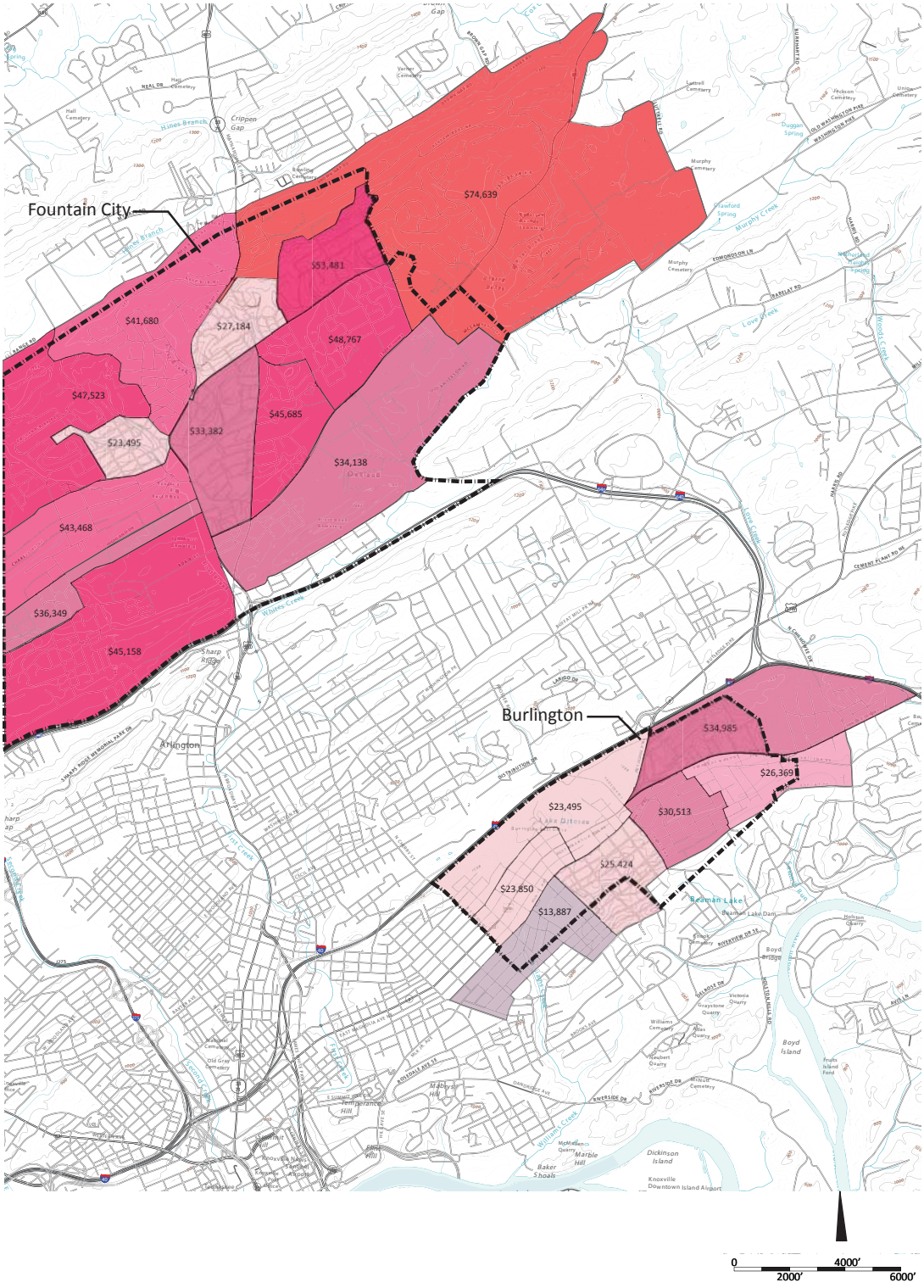


Figure 4.3: Average household income in Burlington versus Fountain City neighborhood

to medium houses. Some businesses such as car shop, restaurants, and chain stores can be found along Magnolia avenue and Holston drive. Some old Victorian homes can be found on Magnolia avenue and the clustered buildings indicate the old commercial center are remnants of Burlington's glorious days in the past.

Public open space is limited in this area, although there exists some big parks residing close to some residents' houses. Those places include Chilhowee park and Knoxville zoological garden. Regrettably, Chilhowee park is fenced up to keep the community from entering the park, and is open only for fairs and exhibitions. The zoo requires $16.95 entrance fee, which may be prohibitive for some members of the neighborhood considering their level of income. The Knoxville greenway system has not reached this area yet, as shown by figure 4.4. What sidewalks do exist are often fragmented and skinny. The most noticeable sign of deterioration of this neighborhood is the amount of concrete surfaces, vacant lots, and run down buildings. Therefore, it is not surprising that during some site visits, some residents were seen playing basketball on an abandoned parking lot and only few people were seen walking.

This thesis focuses on part of the Burlington area; the northeast side of Chilhowee park. The northeast side of Burlington has the most potential for improvement compared to the rest of the neighborhood. The study area contains the old commercial area. This area can be developed to be the core of the community. From this center starting point, the improvement of the neighborhood is expected to radiate.

4.2 Demographic

The Burlington neighborhood is a low-income community with an average household income between $13,887 to $34,985. As a comparison, the average household income in Knoxville which is $43,614 dollars [56]. The poverty level in this area ranges from 11 to 47 percent [57], and there is a low level of educational attainment. The smallest bracket of average number of vehicles in dwelling units is 1.3 to 1.5. Hence, more than 80 percent of workers commute by cars. Only less than 6 percent walk, and almost no one bikes to work (figure 4.6).

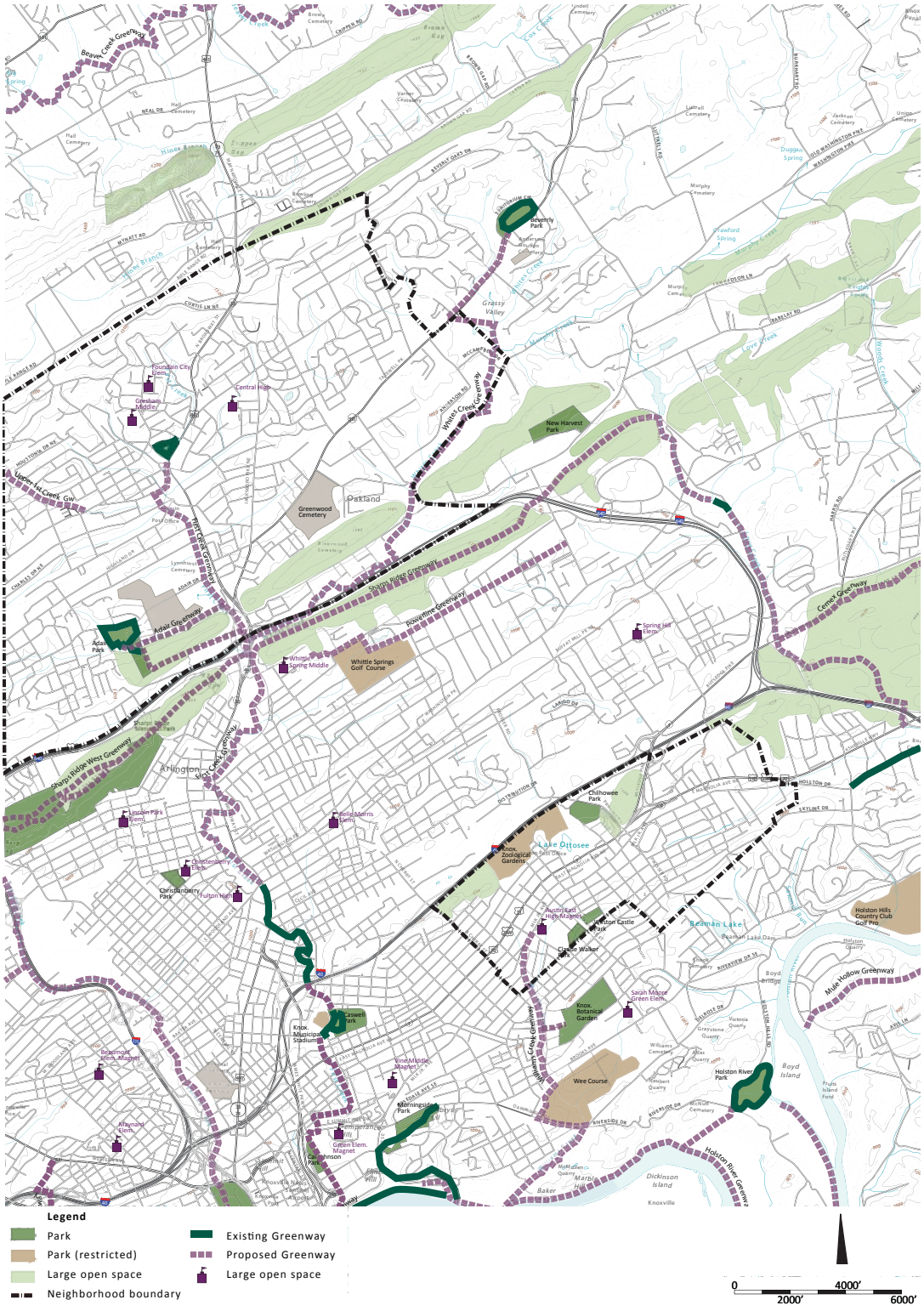


Figure 4.4: Burlington neighborhood in relation to Knoxville greenway and park system

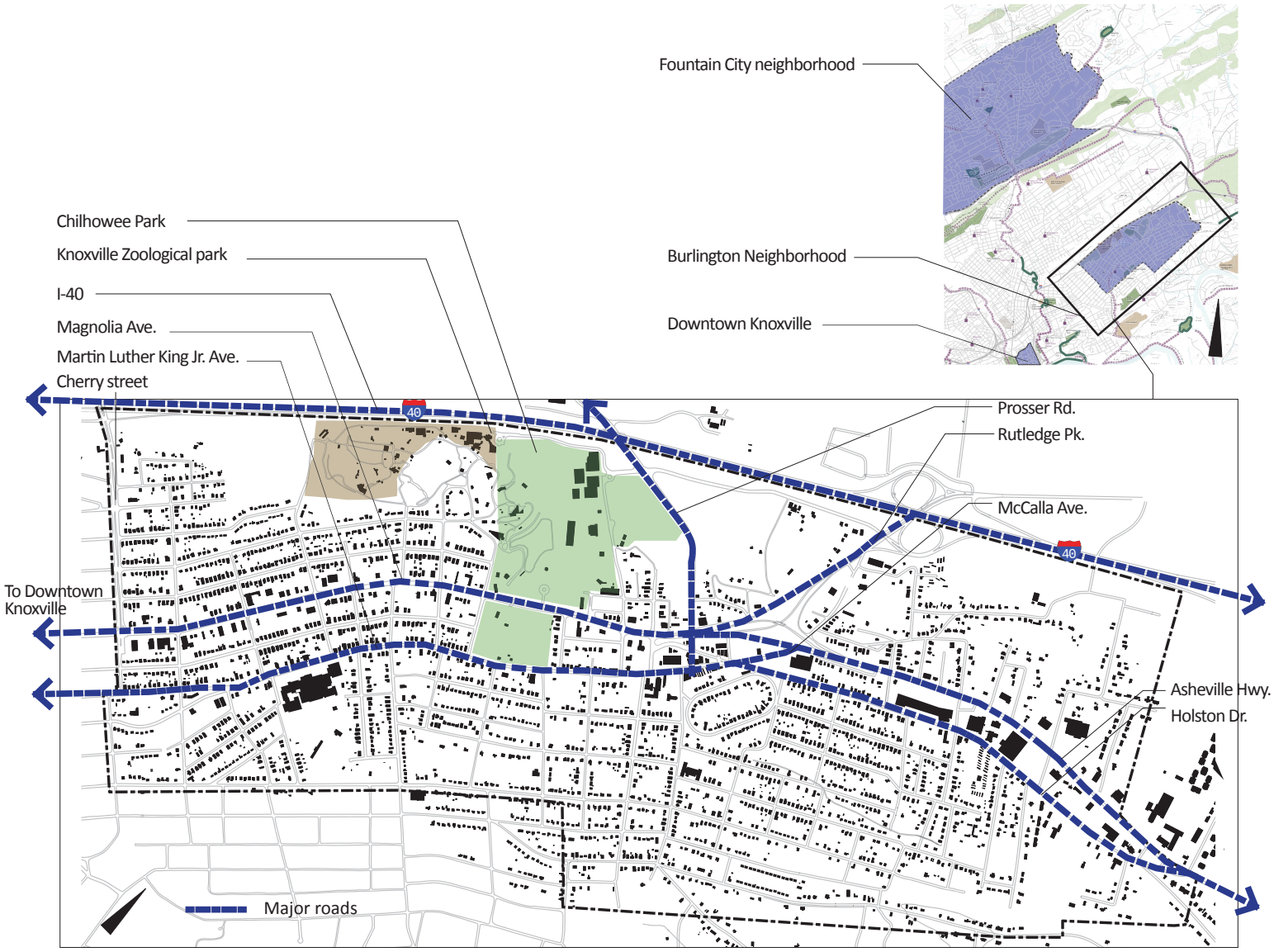


Figure 4.5: Main roads through Burlington Neighborhood

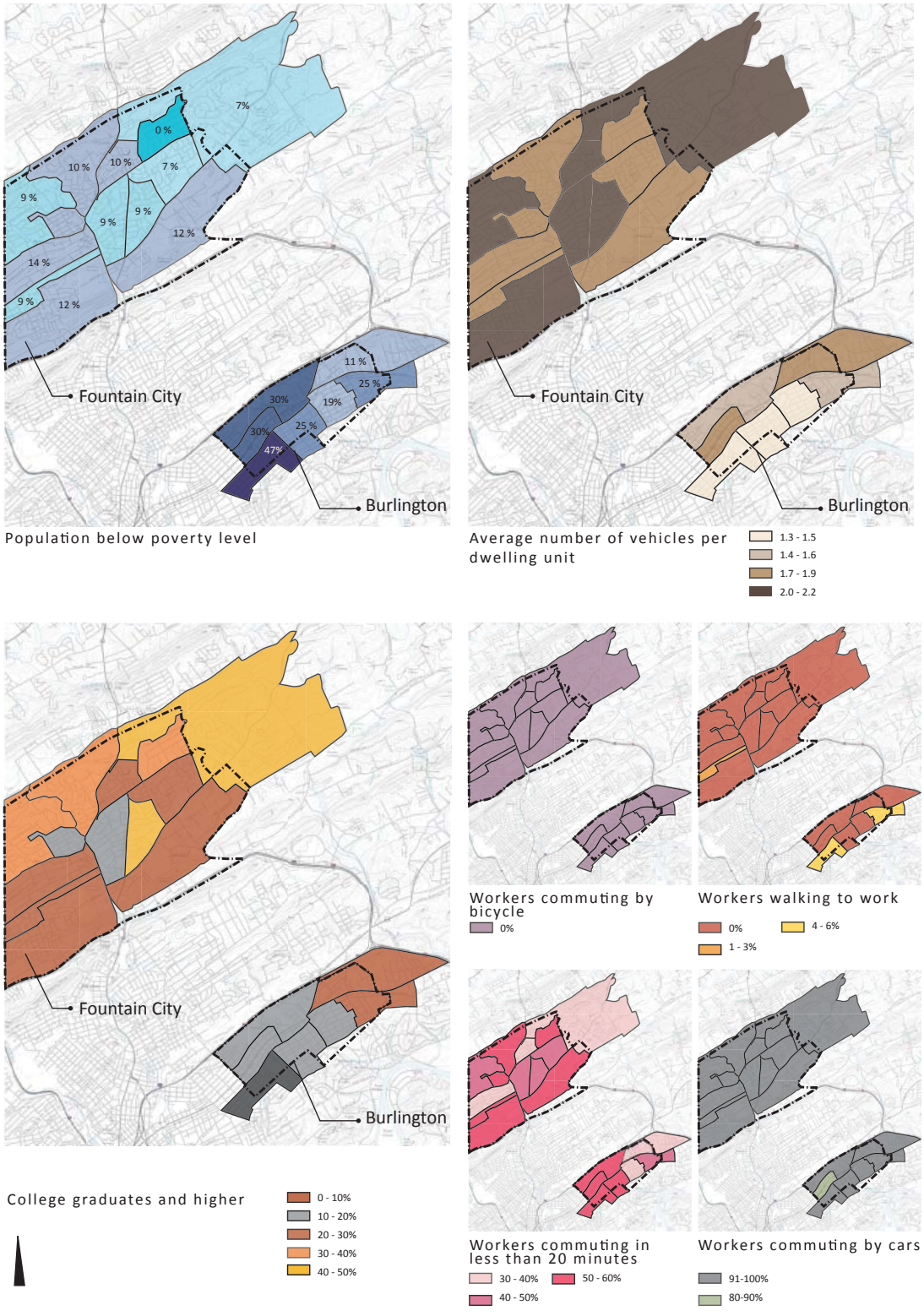


Figure 4.6: Demographic of Burlington and Fountain City neighborhoods

4.3 Health Problems

Knox County Health Department declares the Burlington area is a medically under-served area. Figure 4.7 shows existing health centers in the area. Knoxville Health Center, a clinic on Cherry street is a planned parenthood clinic to be open three days a week. Teen Challenge, a health service on Martin Luther King Jr. Avenue provides intensive care for teens with life-threatening problems. Those two health clinics may serve the need for niche groups in the Burlington community, but Burlington still needs a health clinic that has basic medical and dental services.

There are five primary health problems in this neighborhood: obesity, cancer, diabetes, mental health problems, and child abuse and neglect. Among those, obesity and diabetes relate to the absence of facilities that support physical activities. The lack of public space and car dependency is a cause of poor mental health [48].

Lack of physical activity may also contribute the most to causes of death in this area. The next leading causes of death here are cerebrovascular diseases and malignant neoplasms. These are cancers caused by common environmental factors such as tobacco, diet and obesity, radiation, a lack of physical activity, and environmental pollutants.

4.4 Historical Context

The Burlington neighborhood was once a stable, affluent and well-maintained residential area. Chilhowee Park and the streetcars helped grow Burlington. Until 1947, a streetcar from downtown looped around Prosser road moving people to and from Burlington (see figure 4.10). The heart of Burlington was a commercial center [58] that now looks like a dying downtown had once been the most visited place in the community. It once had drug stores, beauty shops, a bank, a grocery store, a cafeteria, coffee shops, a clothing store, and a movie theater. This place attracted people outside the neighborhood to visit and start new businesses [59].

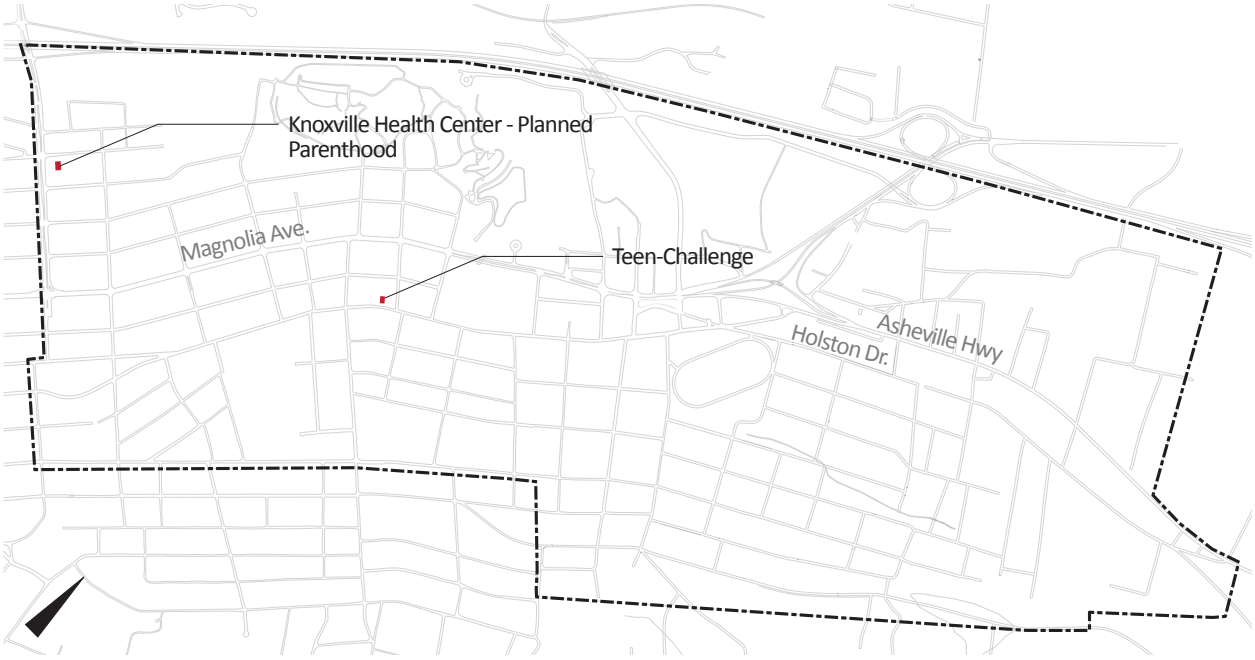


Figure 4.7: Existing Health Center

"The business area was a great place to walk even at night" -Phil Flanagan, former Burlington resident

There were many outdoor places that provided recreational activities such as Chilhowee Park and Cal Johnson speedway. Various destinations throughout the neighborhood and a limited amount of cars also made Burlington a walkable community.

"After school, I would watch the horse races... thats where my parents could find me. I used to look at the hole in the fence and watch the races" -The Knoxville Journal 1984

"For 6 cents you could transfer to another line and to go another park" -The Knoxville Journal 1984

There was a civic club that focused on the community improvement. This group added institutions service to the community, which include a bank, a post office, and an enlargement of the existing library [58]. The group erected a tall Christmas tree on the east parking lot of



Chilhowee Park, canoes on lake



Burlington M.E. Sunday School, "Willing Workers"



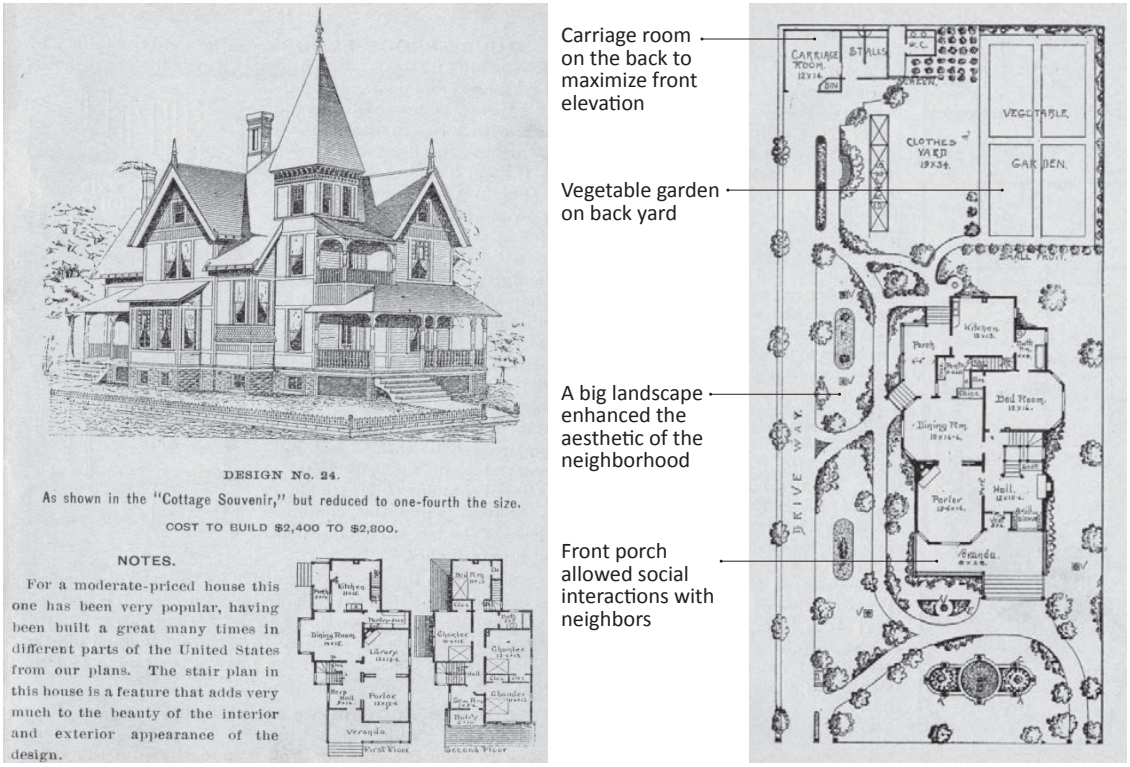
Burlington Streecar



First Aeroplane in Knoxville - Cal Johnson Racetrack

Source: Calvin M. McClung Historical Collection

Figure 4.8: Burlington in its heyday in the early 1900s



Source: East Tennessee Historical Society

Figure 4.9: Examples of Victorian houses designed by an architect George Barber. The designs of the houses and their landscapes beautified Burlington neighborhood



Figure 4.10: Sanborn map 1928 shows streetcar route going through Burlington neighborhood

the Cox & Wright Grocery. The lighting of the tree and the singing festival were big events in the community.

When the development of Knoxville went west, many residents wanted bigger lots, so wealthy people moved out from this area. Burlington started to become the area we see today. The flight of residents left vacant lots and rundown buildings.

4.5 Burlington Urban Analysis

Figure 4.11 show the main roads through the Burlington neighborhood. The east-west thoroughfares, Magnolia avenue and the Asheville highway, linked to downtown Knoxville, Asheville, and Virginia. The construction of I-40 made Magnolia avenue the second choice as a travel route, reducing traffic, but leaving a high-capacity urban road with fast traffic. Along Magnolia avenue are rows of one and two-story buildings spaced far apart from each other. The proportion of width of the road and the height of the buildings makes this area look bare (figure 4.11). The barren atmosphere created by the built environment, fast automobile traffic, absence of pedestrian crossings and trees discourage people from walking along this avenue. Three to four story commercial buildings facing Magnolia avenue and rows of trees may help define space on this corridor.

The main roads in the neighborhood are Martin Luther King Jr. Avenue and Holston drive. Those roads connect businesses and public buildings, and are not friendly to pedestrians and bikers. Based upon the survey results, Burlington residents perceive danger in walking on this area primarily because of the lack of sidewalks, no pedestrian crossings, a and lack of park.

There are many vacant lots and buildings in this neighborhood. Many of the vacant buildings are the old business center that still has the potential to be improved. Some buildings need to be demolished, such as massive concrete surfaces and the trailer park. Figure 4.13 shows the location of the vacant lots and buildings that scatter over the area. Vacant lots and buildings are often targets for crime-related activities. They are visually unpleasant for the neighborhood and reduce the quality of the walking and biking experience.



Magnolia avenue is too wide for its traffic volume



Holston Dr., the most important road in the neighborhood

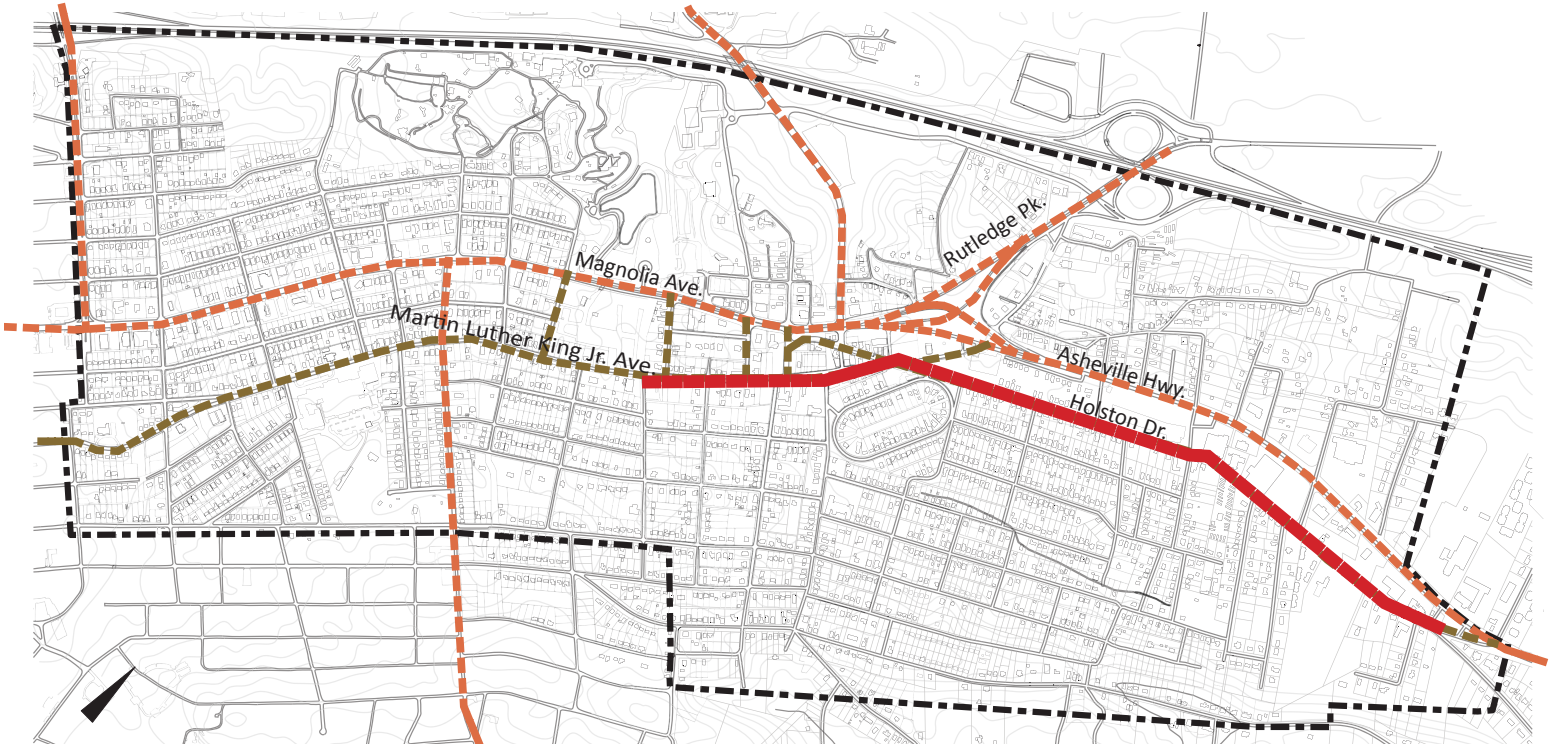


Figure 4.11: Main vehicle access through Burlington neighborhood


Abandoned trailer park


Vacant lots along Magnolia Avenue

Figure 4.12: Examples of vacant lots in Burlington

Vacant lots can be combined and used as public open space. Vacant historic buildings should be preserved and used as a commercial center.

There is no core of the community nor adequate destinations in Burlington. The disconnection of grocery stores, shopping centers, restaurants, churches, and public services buildings can be seen from figure 4.14. Most activities occur in the commercial and public buildings. Figure 4.15 shows the center of activities and a quarter-mile radius which is considered to be a comfortable walking distance. Spontaneous business activities such as flea markets sometimes take place in a vacant lot (figure 4.15). The overlap of the radii on the center of the neighborhood shows the most possible place to locate an open public space and village center.

Burlington has some food suppliers. The main streets are dominated by fast food restaurants. There are three grocery stores along Martin Luther King Jr. Avenue that sell fresh fruits and vegetables as well as the processed ones. Among those grocery stores, Kroger sells most fresh produce.

The quarter-mile walking distance from the center of activities can be used to determine a new park location. Figure 4.17 shows a quarter-mile circle from existing neighborhood parks. The possible location is the same as the place for the village center.

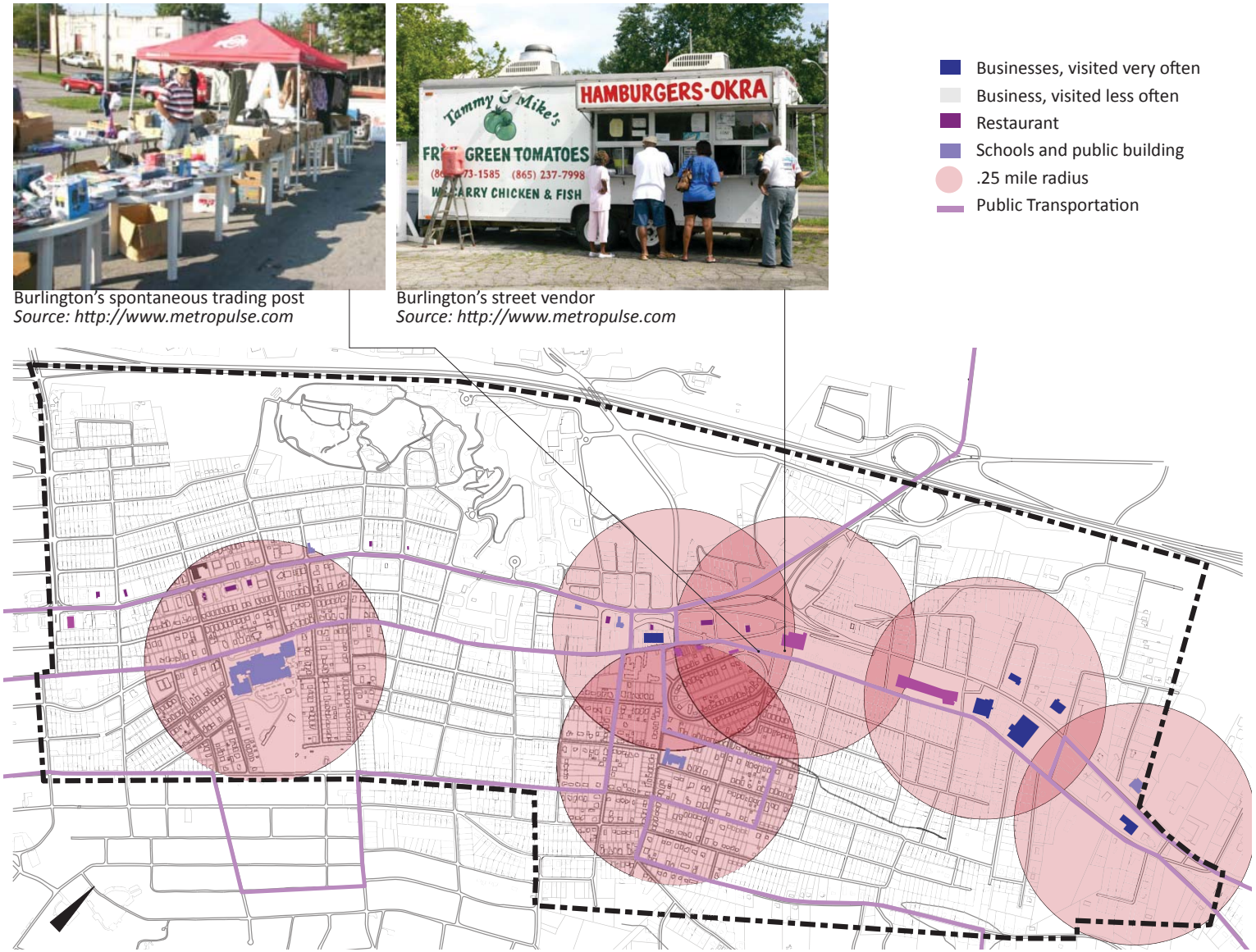
Burlington has gentle slopes and full sun in most areas. These conditions support the potential for a community garden in this area. Figure 4.18 shows the possible location of the



Figure 4.13: Vacant buildings and lands in Burlington neighborhood



Figure 4.14: Public and commercial places in Burlington are far from each other



Burlington's spontaneous trading post
Source: http://www.metropulse.com

Burlington's street vendor
Source: http://www.metropulse.com

Figure 4.15: Activities in Burlington neighborhood



Figure 4.16: Diagram of food destinations in Burlington neighborhood



Figure 4.17: Possible location for Burlington park

community garden. The green color shows low elevation area that has easy access to water. Accessibility to public transportation and proximity to churches that might act as a possible garden manager are a also consideration for the community garden location.

The old Burlington business district can be seen from its remaining structures. This area, located at the center of the neighborhood, consists of some rows of neglected brick buildings. Some still have their store names on them. Among those are a furniture store, a gas station, a barber shop, and a soda shop. There are some buildings that still function as they did historically, such as the Greater Warner Tabernacle Church, the Macedonia United Methodist Church, and Fire Station number 6. These old buildings are jewels of this neighborhood and need to be preserved. This area has been studied by Knox County Metropolitan Planning Commission [60]

KAT bus reaches most public and commercial areas (figure 4.20). However, most survey participants do not ride the bus as a transportation mode. Bus stops and peoples' houses are often connected by poor quality sidewalks. Bus stops are usually small structures inadequate as shelters from wind and cold that makes waiting miserable. Some bus stops are beside large concrete surfaces. These areas with little landscaping are unbearably hot in the summer. Other reasons for not riding bus transportation include having private cars, having little kids, and the infrequency of the bus schedule. Some buses come every thirty minutes, and some come every hour.

Figure 4.20 shows bike routes designated by the city on Magnolia and Martin Luther King Jr. Avenue. Most survey respondents perceive danger in biking in this area. The main reasons are no bike lanes, no driving enforcement to respect bikers, a wide road, and high traffic. Bike routes designated by the city are actually a lane beside a car lane without clear sign. In some places, these spaces are used for car parking (figure 4.20).



Figure 4.18: Possible community garden locations

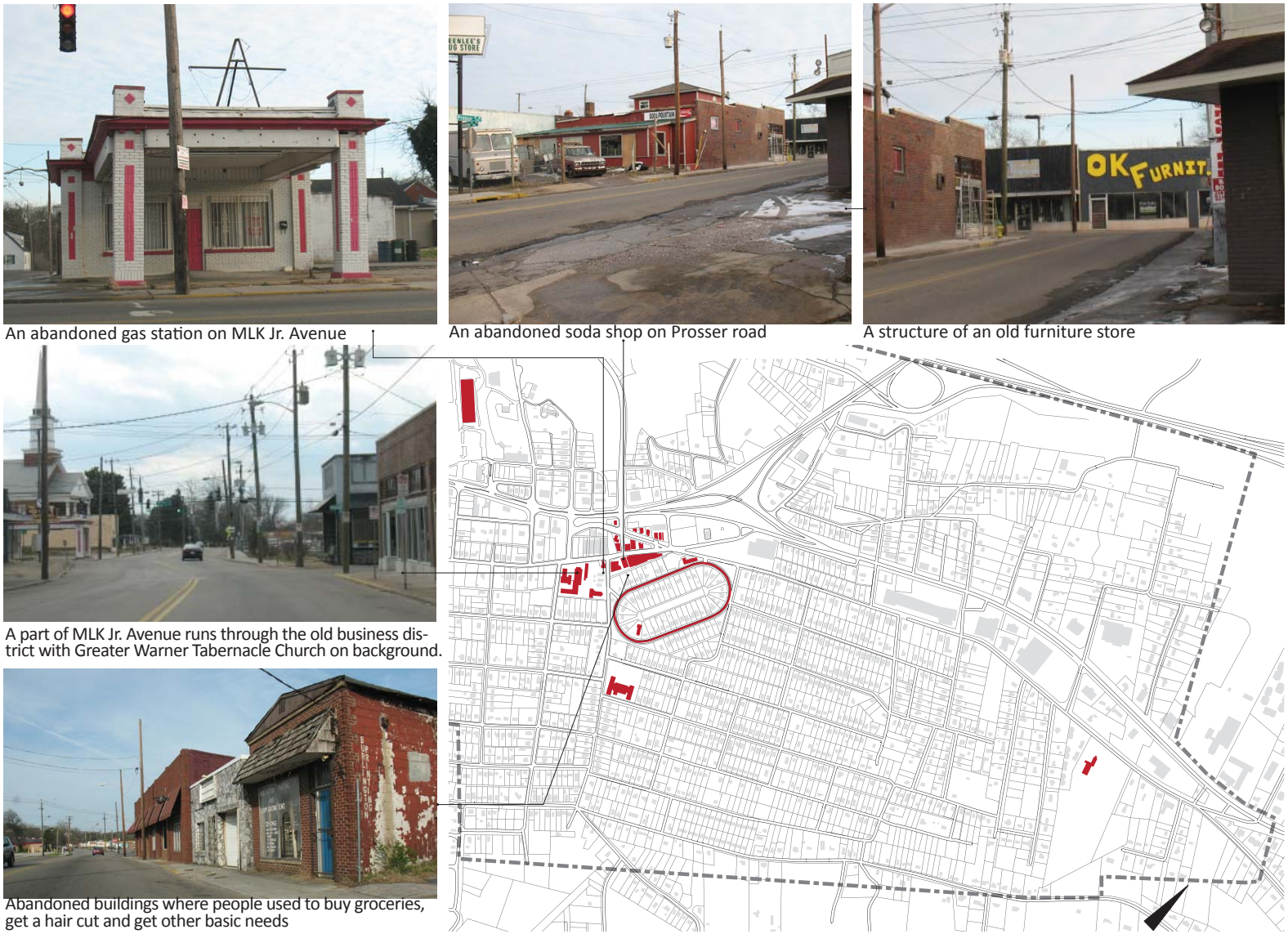


Figure 4.19: Burlington historical places



Figure 4.20: Public transportation and bike route

Chapter 5

Strategies for Change

It has been discussed on previous chapters that the rising rate of adverse physical, social and mental conditions correlate to a lack of physical activity, poor eating habits, and a lack of social interaction [39]. Lack of physical activity leads to obesity, which increases the risk of diabetes, heart attack, and many types of cancer. Medical interventions are usually limited in capacity to handle those issues [61]. Health problems centuries ago were often caused by lethal diseases; now health issues come from peoples' lifestyles and their immediate environment. Therefore, community-based intervention can improve health [62].

In the last two decades, public health professionals realized that to improve health, changes must occur at the level of individual behavior, and in the social and physical environment. Community-rooted health solutions may be more effective than convention, which is the reliance on centralized health care system in curing illnesses. While convention focuses upon medical intervention, this environmental approach centers upon illness prevention. Coreil et al., describe three principles of community-based interventions [20]. First, they are directed by an ecological framework. Second, they are designed to provide an answer to the needs and wants of the community. Third, they are characterized by community participation. A community-based approach may rely heavily on public health experts, and landscape architects can design physical spaces that support public health.

Therefore, this thesis attempts to fulfill this task specifically for the Burlington community in Knoxville, Tennessee.

To increase physical, mental, and social health of the Burlington community, it is important to have a system that can support the needs of the people in the community. There are important ingredients for physical, mental, and social health. The basic needs for physical health include the availability of choices for healthy food, clean water, the availability of sufficient spaces for exercising, and access to a good quality health center. The basic needs for social and mental health include places that can accommodate social interaction, places for contemplation, and the minimization of perceived social threats. The elements of the system must include pedestrian-and-biker-friendly connections that link to the destinations noted above. The purpose of having a self-supporting neighborhood is to create active living in the neighborhood, where people exercise and have social support and mental refreshment. Creating a fully self-sustained community is beyond the scope of this thesis. However, being able to fulfill the basic needs for health from the community will reduce driving and increase connection among people in the community and the environment they live in.

The improvement of the neighborhood is divided to three phases (figure 5.1). Phase one focuses upon upgrading the existing conditions. Since Burlington is an old neighborhood, improvement will be started from the area that has the greatest potential. I identified this as the old commercial district located at the center of the neighborhood (See figure 5.2). This area, which is called *the village center* in this project, serves as a nexus where most activities occur, the health center is located, and all bus routes go through. In order to activate this commercial areas, the main access to that area from existing amenities and bus stops is also the focus of phase one. The roads crossing the area —including Martin Luther King Jr. avenue, Asheville highway, Holston drive, and Kirkwood street— are redesigned as complete streets so that people may access the commercial area easily by walking and biking.

The second phase of the development focuses upon providing maximum public open space. This is achieved by changing the configuration of Asheville highway and Rudledge pike (figure 5.4 5.5). Another focus for this phase is to provide an accessible community

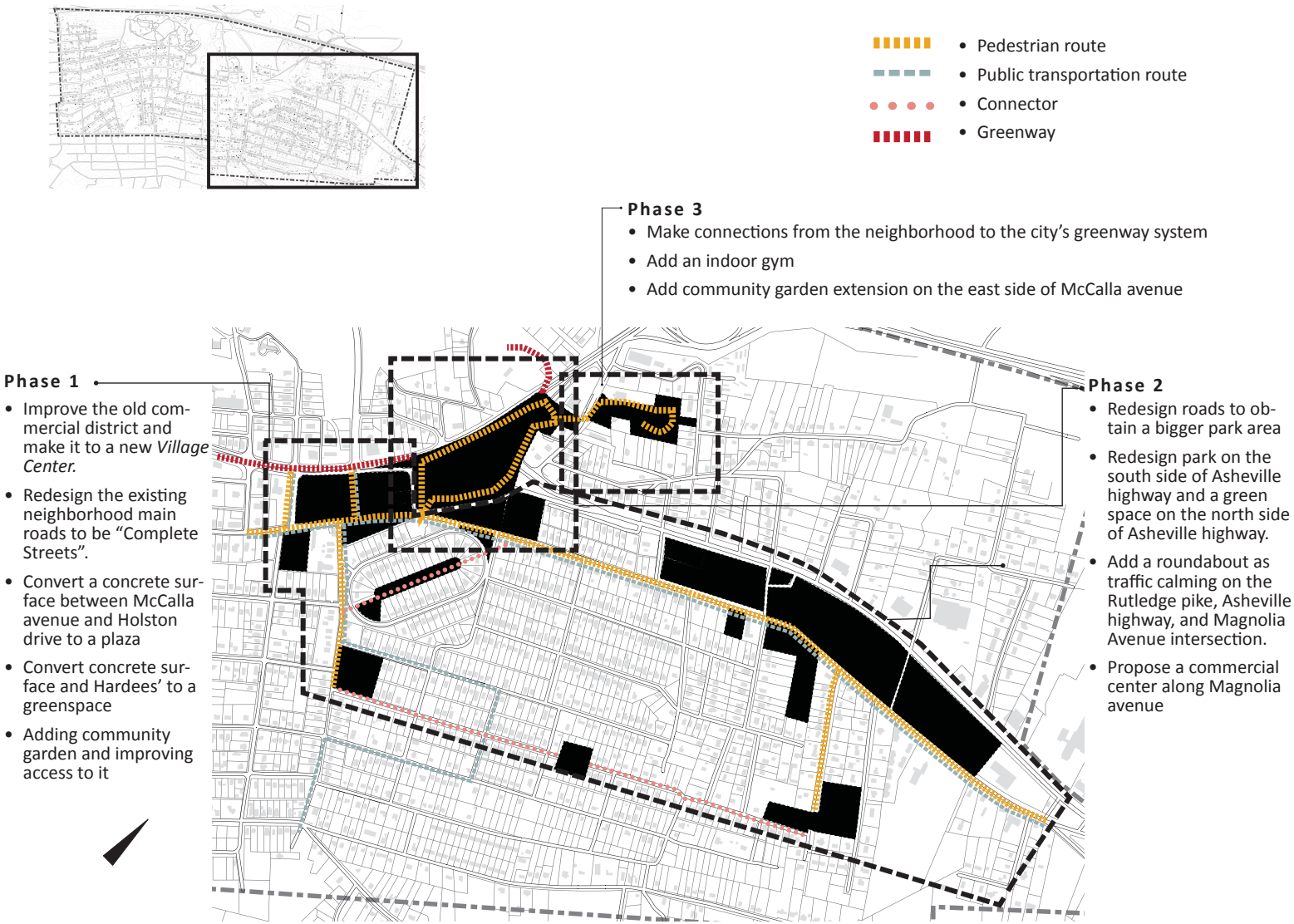


Figure 5.1: The improvement of the neighborhood is divided to three phases

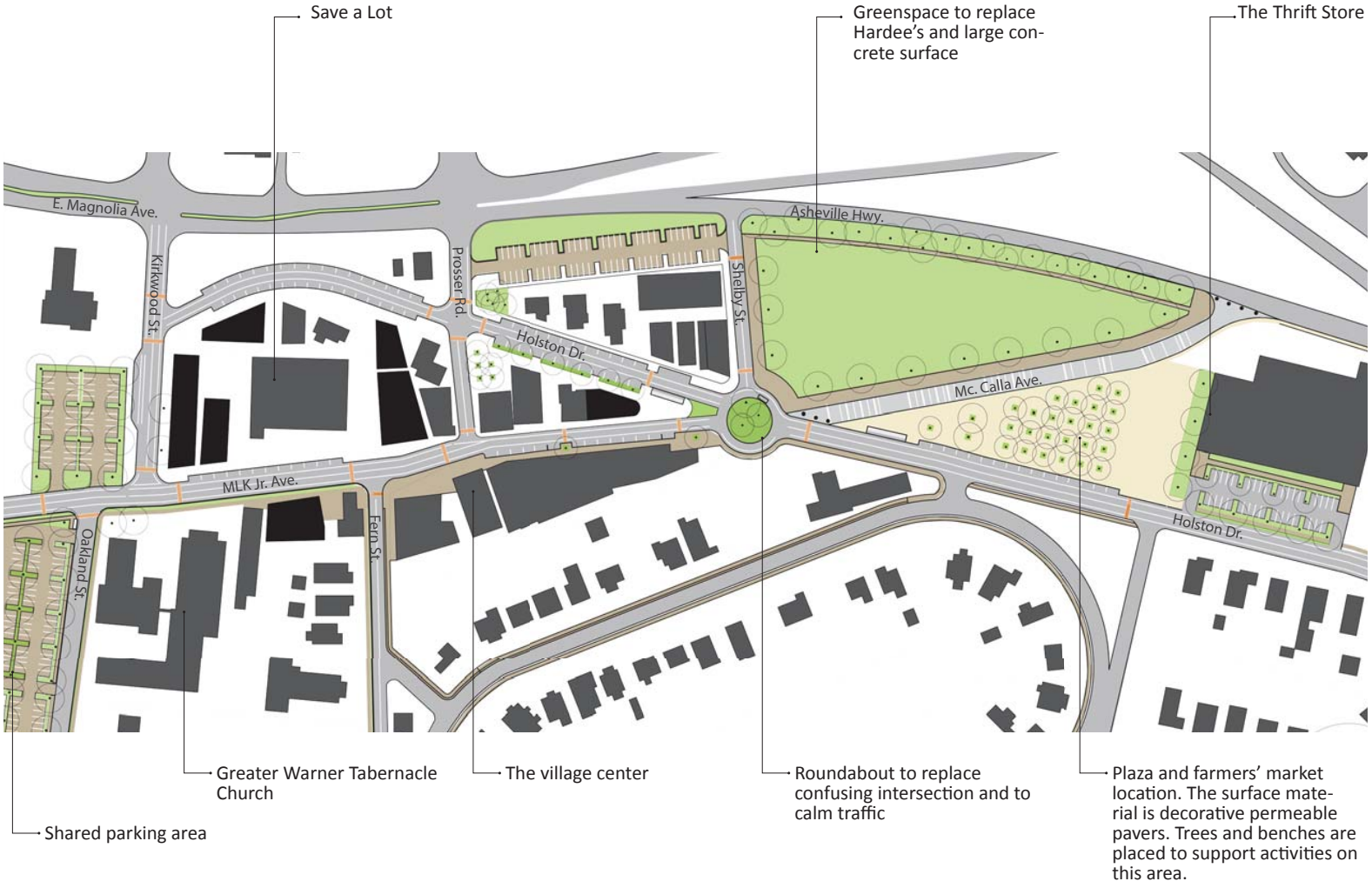


Figure 5.2: Plan of the phase one development

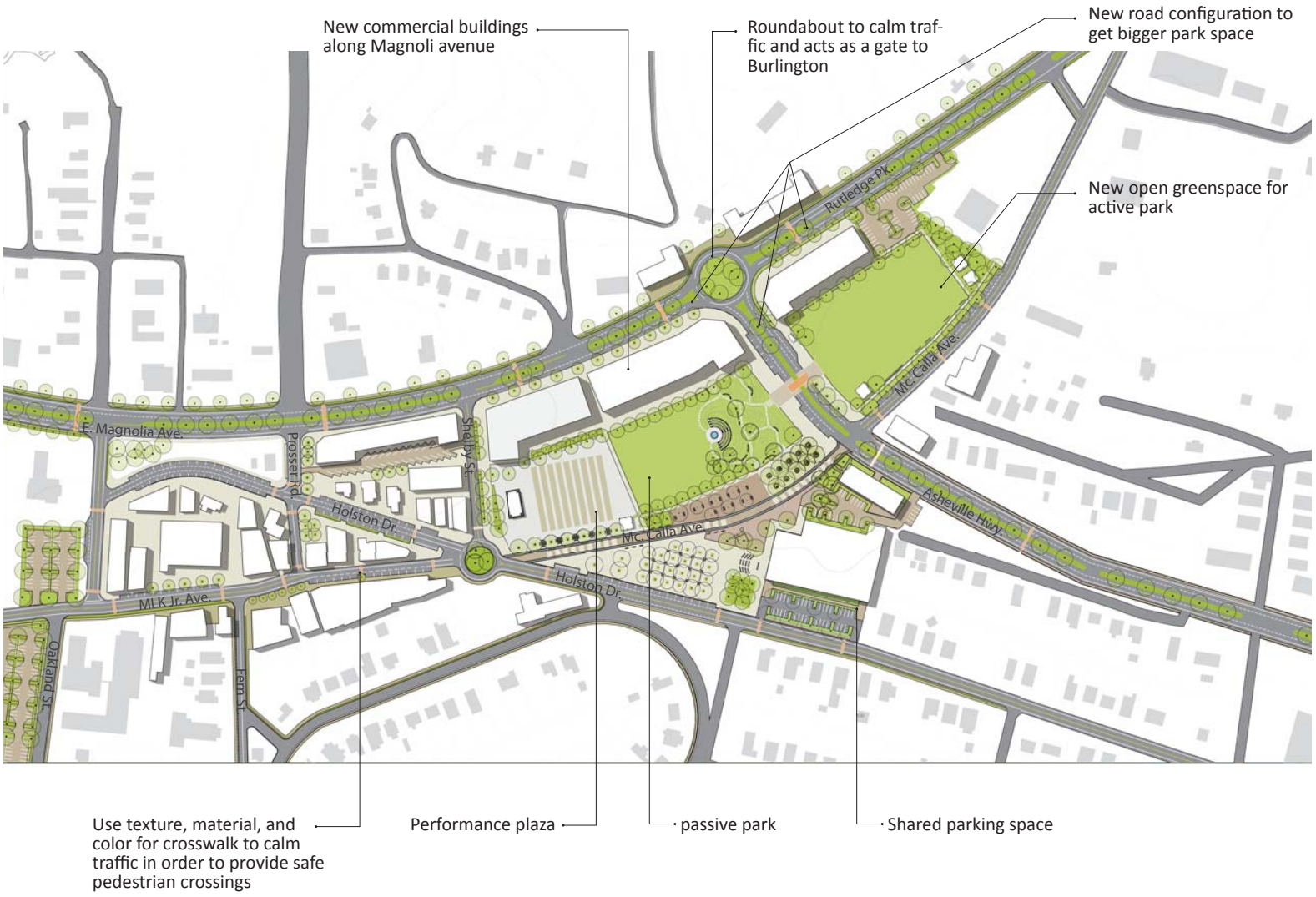


Figure 5.3: Plan of the phase two development

garden (See figure 5.3). The last phase focuses upon building indoor facilities and connection the city greenway system.

5.1 Physical Health

5.1.1 Food, Nutrition, and Community Garden

A community garden can offer health benefits to the community. Fortunately, Burlington has a spacious empty green flat space adjacent to a stream. This flood plain is located a quarter mile from a bus stop on Holston drive, and is within half mile radius from several churches who are potential partners for managing the garden (figure 4.18 and 5.6). This garden provides fifty 10 by 15 foot plots; enough plots for 10 percent of the total household in this community. As part of the phase three development, an expansion of the community garden is to be located on McCalla Avenue, where an indoor gym will be located. Across the main community garden, a shed, composting and recycling center is located. Therefore, neighborhood residents can participate in the garden and be leaders in sustainability. A space for socialization is also incorporated in the garden to encourage garden users to have interaction.

The role of community garden is not limited to producing fresh produce and plants. The community garden also plays a role in community health improvement by accommodating physical activity, socialization, and contemplation (figure 5.7). Furthermore, a community garden also gives a sense of community, beautifies the area, and strengthens the connection to nature in the area people live in, thus raising community pride. Gardening is categorized as moderate to heavy intensity physical activity, which is shown to reduce total cholesterol, HDL cholesterol, and systolic blood pressure [63]. This active lifestyle can be measured and quantified by the amount of calories expended. For male of 175 lbs, this is 408 calories per hour [64]. That amount of burnt calories is comparable to playing baseball or kayaking in the same duration. Gardeners rarely call their labor exercise because some of them perceive



Figure 5.4: Existing road and possible open space



Figure 5.5: Maximum size of open space after altering the roads



Figure 5.6: Community garden and famers' market location

it as leisure time. Gardening involves fine motor skills when cutting the plants and aerobic exercise when doing things such as digging holes [65].

Gardening involves activities that range from little to intensive energy expenditures. Calorie burning activities have been connected to reducing the risk of physical health problems for both adults and children; and even can help pregnant women, cancer survivors, and elderly people. A study also shows the role of gardening in lowering risk of obesity, coronary heart disease, glycemic control and diabetes, and occupational injuries [66]. Additionally, the benefit of having sufficient amount of sunlight exposure decreases a number of chronic diseases. Conversely, sunlight deficiency can lead to high blood cholesterol, depression, osteoporosis, prostate cancer, and breast cancer.

Community gardens can economically benefit communities since it can lessen the processing costs of commercial produce. Community gardens allow participants to bring their food directly from the garden to the kitchen.

There is correlation between peoples experience of growing food and their consumption. Practical experiences with fresh food such as growing, nurturing, harvesting, understanding seasonality, all positively influence dietary habit. Evidently, the sensory experience of consuming fresh-picked produce increases vegetable and fruit consumption among some groups [65]. In their book, Hynes and Lopez demonstrate that the more experience people have in growing food, the more likely they are to eat it [67] . Other studies show that fruits and vegetables intake per day for garden participants is higher than that of non-gardeners [68]. The study also shows that higher consumption of fruits and vegetables correlates to the lower consumption of high fat and sugar content.

5.1.2 Farmer's Market

The Burlington farmers' market will be located on the triangle of Holston drive, McCalla avenue, and the Thrift Store to replace the existing underused concrete surface. This area is often used for street vendors and spontaneous trading posts. As a location of the farmers' market, the surface of the area will be changed to decorative permeable pavers to brighten



Figure 5.7: Enlarged plan and section of community garden

up the area and to allow rain water infiltration (figure 5.3). Rows of trees are planted in the area to provide shade and define space. Benches under the trees are provided for people to sit. The market is held on weekend, so this area is used as a plaza on weekdays (Figure 5.9).

The farmers' market is a fresh food outlet that helps a community. It gives an opportunity for Burlington community gardeners to sell their produce. This business opportunity can possibly become an incentive for the gardeners to improve their gardening practice. Moreover, Burlington gardeners can also learn from other local farmers, such as the ones that live outside the neighborhood but are still in the Knoxville region. Participation in the farmers' market can also improve vendors' various skills, such as marketing, self-confidence in business, costumer relations, understanding consumers preferences, and farm-stand presentation [69].

Farmers' markets help keep local, small, family-labor farms in business while keeping *food dollars* in a particular area [70]. This practice helps maintain competition between local produce and cheap low-quality vegetables grown by food industries [71]. Local farmers typically favor selling their produce at a farmers' market because of the direct access to customers and removal of the middlemen in the sales circle. The farmers reap higher profit while maintaining the competitive retail price of their produce [69]. Farmers' markets also make direct feedback from the costumers possible [70], which gives the farmers an opportunity to focus on costumers' demands.

The farmers' market benefits consumers in Burlington community. It is common sense to buy local produce when possible. Fruits and vegetables that grow on the next block are fresher because they are often picked the day before or the morning of the market. Local produce also usually costs less than produce that has to travel from hundreds of even thousands of miles away. Moreover, local produce has more nutritional value than its long-distance counterparts. Five to ten days of travel and storing time between harvesting and consumption can degrade some nutrient content to 30-50 percent lower than the original value [65]. Unlike big national food producers that rely upon machinery and chemicals to increase quantity, shelf-life, and appearances of the produce, local farmers usually stress the quality of the produce with minimal or no chemical application[69].

Besides providing nutritious produce, farmers' markets may also bring economic, social, and economic benefits to Burlington community. The interactions take place at the market can strengthen the binds in the community and increase community awareness, which can ease community problems solving [70]. Since the farmers' market is part of the Burlington park, the social interaction is strengthened by activities happening in other parts of the park (figure 5.6 and 5.8). Furthermore, the activities occurring because of the farmers' market can open up possibility for the community to open small businesses, such as crafts, bakery, or clothes stands. These new opportunities are an expansion of the community's existing spontaneous used-good trading activities that is usually located at the same location.

5.1.3 Exercising by Walking and Biking

How the urban environment is constructed has a significant influence in choice of walking and biking as a transportation mode. Neighborhood aesthetics, easy access to destinations, adequate sidewalk and street amenities, and the presence of street crossings are believed to increase the walkability of a neighborhood [72]. Burlington has poor conditions. Sidewalks are either non-existent, or often narrow and disconnected. Some survey respondents wrote that dogs sometimes can be seen roaming loose or are behind poorly maintained fences. Consequently, walkability in this area is low, and driving becomes the main choice of transportation. Therefore, traffic to major services such as schools, workplaces, a library, grocery stores, and commercial centers are dominated by cars. This parallels statistics in a report from National Household Transportation Survey 2008 [73], which found that 28 percent of the all trips in the United States are one mile or less, and 72 percent of those shortest trips are made by automobiles.

Similar to walkability, the bikeability in this area is neglected. This contradicts Knoxville's bronze medal for Bicycle Friendly Communities given by the league of American Bicyclists in 2010 [74]. The absence of bike lanes in this area restrains people from choosing biking as a mode of transportation. When people ride bikes instead of driving cars, gas emissions that can cause serious health problems decrease. For physical health, cycling can



Figure 5.8: Diagram of the place used for a farmers' market on weekends and for a plaza on weekdays





Existing McCalla Ave. and large concrete surface close to the Thrift Store



Proposed farmers' market and plaza location. McCalla is proposed to be a vehicular free road. Only certain vehicles are allowed to access this road.

Figure 5.9: A view of the farmers' market

combat a sedentary lifestyle, increase exposure to sunlight (which helps prevent prostate and breast cancer), improve cardiovascular fitness, promote weight loss, strengthen the immune system, and reduce back pain. In addition, cycling can reduce stress, which leads to lower cholesterol and blood pressure.

Safety is a serious issue that can hinder peoples' ability to walk and bike. While Burlington needs places for pedestrians and bicyclists (especially between main public destinations); eliminating vehicles is not feasible. In fact, having vehicles in this area will activate the area at all times and and increase eyes on the street. With that consideration, Burlington should have urban thoroughfares that are pedestrian and bicycle oriented while integrating vehicular traffic (figure 5.10). The existing main roads in the neighborhood should be upgraded to complete streets —a road designed to be safe for drivers, bicyclists, transit vehicles and users, and pedestrians of all ages and abilities [73]— with some roundabouts located at some main junctions (figure 5.11).

Road designs affect users' behaviors. People tend to drive slowly on narrow roads, and when islands and tree plantings are present. Conversely, people drive fast on wide roads with long sight distances and wide shoulders [75]. In the book *Traffic*, Vanderbilt [76] explains that "a seemingly trivial variance in a car's speed can be the difference between life and death" for pedestrians. Roundabouts can be effective means of traffic calming at junctions, which means more safety for drivers, pedestrians, and bikers [77]. A study by Leeds University [75] reported that roundabouts can reduce speed by up to 50 percent; this can reduce occurrence of accidents. Roundabouts have a single direction of the traffic, islands and splitters for crossing pedestrians[77] to make crossing safe. The complexity and closeness of the roundabout forces users to make eye contact and pay attention to the road [76]. For those previously mentioned reasons, a roundabout is added to Asheville highway and Rutledge pike intersection. This roundabout serves as a traffic calmer for automobiles existing from I-40 and can be a gateway to East Knoxville. The addition of this roundabout to the neighborhood replaces areas used for cars; hence releasing free space to maximize park area. Another roundabout is placed to replace the confusing T-junction where Holston drive, Shelby road, and Martin Luther King Jr. ave meet (figure 5.12 and 5.13).





Existing Holston drive



Proposed Holston drive is pedestrian and bike friendly. This is the main road to the Burlington Public Library. The picture shows the swale on the side of the road.

Figure 5.10: A view of "Complete Street''street on Holston Drive

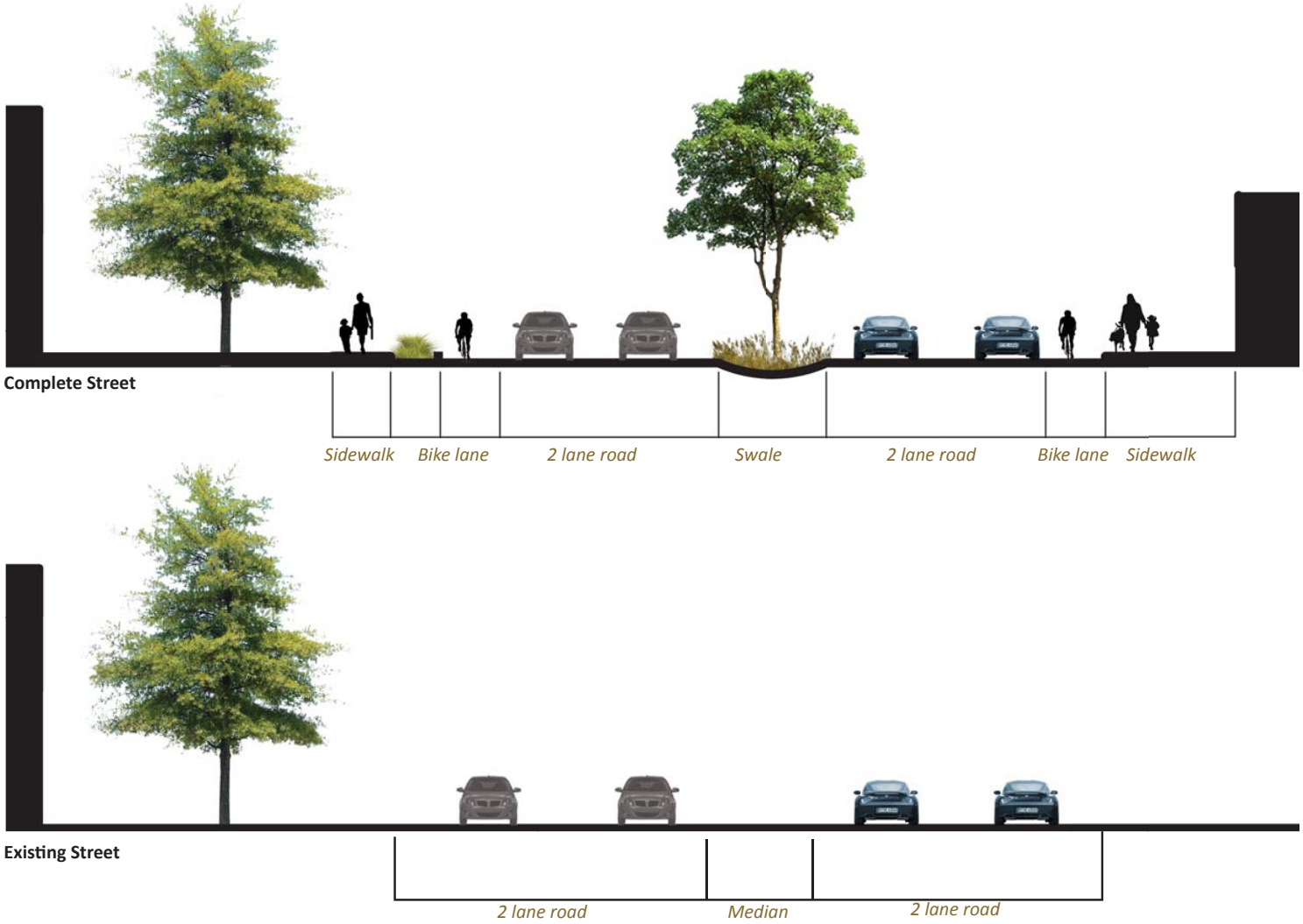


Figure 5.11: The typical existing streets in Burlington are designed for vehicles only. With the same width as the existing street, a complete street can accommodate pedestrians, bicylists, vehicles, swales, and landscape buffers



Figure 5.12: Bird's eye view of the phase one development



Figure 5.13: Bird's eye view of the phase two development showing the road alters and the roundabouts

Complete streets can provide a number of health, social, economic, and environmental benefits while improving traffic performance [73]. Fundamentally, complete streets give options for transportation mode chosen. In order to accommodate vehicles, bikes and pedestrians, the existing vehicle lanes are narrowed to be 11-12 feet, leaving spaces for bike lanes and wide sidewalks. On Magnolia avenue, the arterial road in the neighborhood, median strips are added for pedestrian safety [78]. Along most of the roads, barriers between roads and sidewalks are located to create a distance between pedestrians and moving vehicles. The barriers designed for this neighborhood are on-road parking spaces, trees, planters, bollards, and swales. Despite the clear division between sidewalks, bike lanes, and vehicle lanes, crossings points are unavoidable. Different road materials, textures, speed bumps, and colors alert automobile drivers at pedestrian crossings (See figure 5.14 and 5.15).

5.1.3.1 Health Center to prevent and cure illnesses

A health center is a need in a medically-underserved area like Burlington. The main purpose of the neighborhood health center is to provide family-centered preventive care and curative services for the community. By having easy access to a health center (figure 5.16), it is possible for the community to have regular health check-ups, so that health problems may be detected before becoming a more serious issue. The health center in this area is also expected to educate the community about healthy living. For this purpose, an outdoor classroom in the east part of the park is provided as place for community outreach for health awareness.

5.1.3.2 Exercising in a Park

A park that supports health is important to improve the wellness of this community. Burlington has been developed, leaving no new space for a community park. There are vacant lots and abandoned buildings in this area, but they are small in size and scattered throughout the neighborhood. Therefore, redesigning roads is one strategy to obtain a good-size park. The proposed park is adjacent to the village center will span from Martin Luther

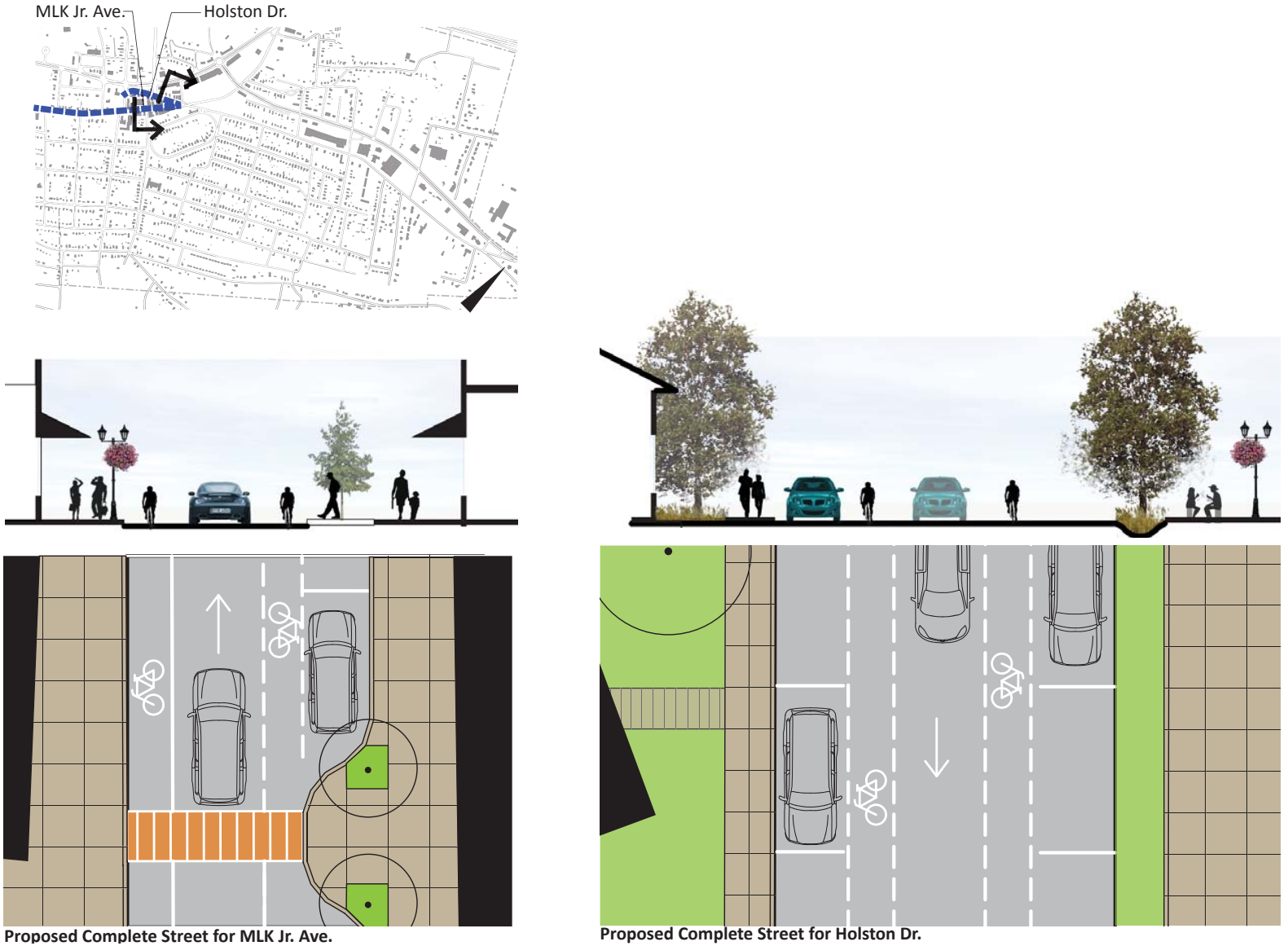


Figure 5.14: Character of streets crossing the village center

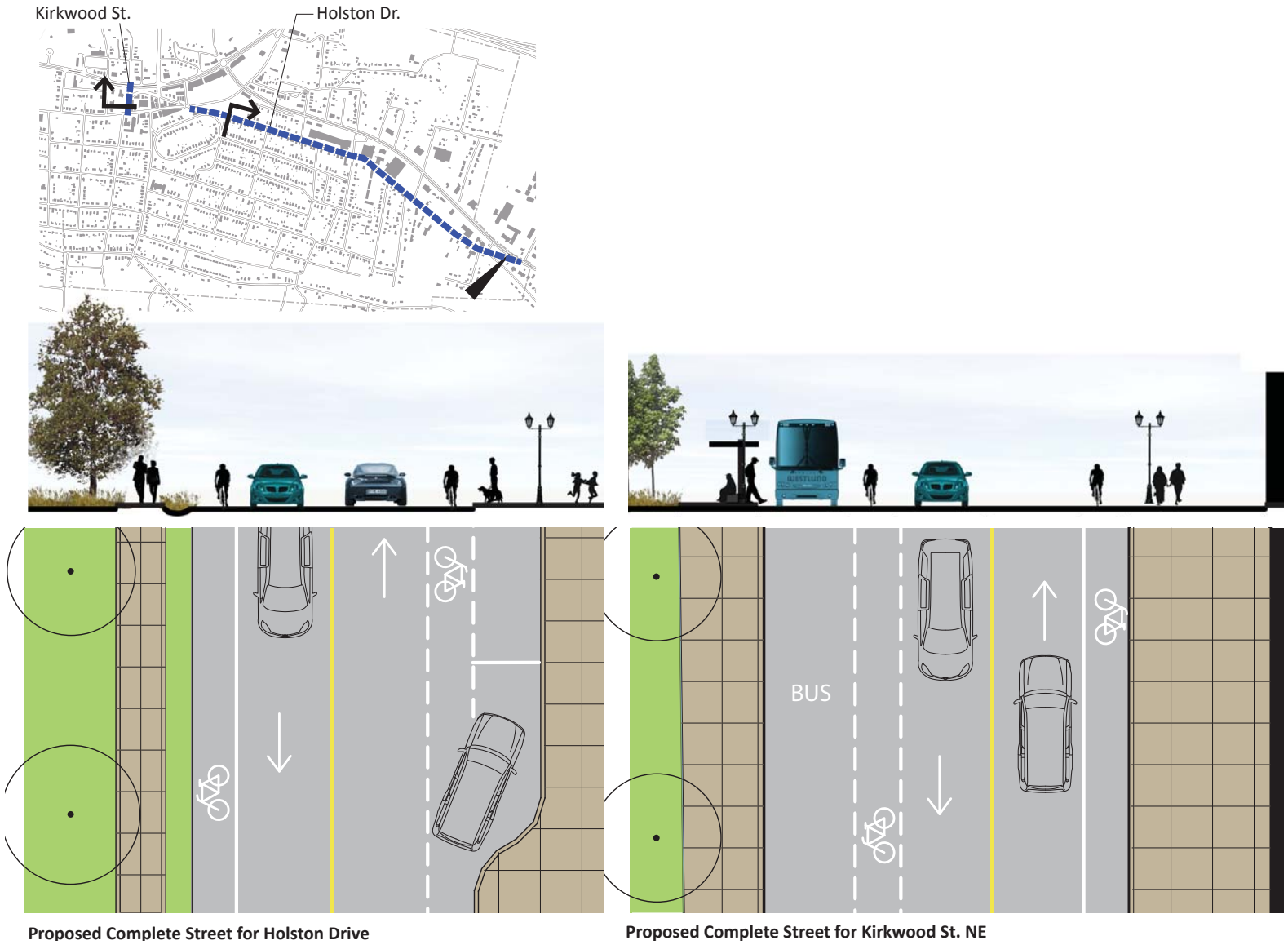


Figure 5.15: Wide sidewalk on Holston drive and Kirkwood is comfortable for walking while still giving space for a bus stop



Figure 5.16: Health center location

King Jr. Avenue to the north side of Rutledge Pike (Figure 5.4 and 5.5). This park is designed for multiple uses, with green space for passive and active recreation, a plaza and performance stage for community festivals, and an outdoor gym and playground for exercise.

Research shows that the percentage of green space inside a one to three kilometer (0.62-1.8 mile) radius has a strong relationship to general health [79]. People experience nature as a place to recover from their daily stress such as work pressures and daily commutes. Proximity to parks is especially important for the elderly and people with lower socio-economic status because these groups spend more time in the vicinity of their homes. Research also shows that ailing people exposed to green space recover faster than people who do not have access to green space [1]. Exposure to green space can also improve children's ability to focus and concentrate. Green space can be therapeutic for children with attention deficit disorder.

Figure 5.17 shows two new big green spaces in this park area which are connected by Asheville highway. The south part is used for passive recreation, where womens' organization can have outdoor meeting, shoppers can have a rest, and parents with children can have a picnic in a gazebo. The berms, amphitheater, and water fountain near the road are designed for foster a sense of solitude, which is important to refresh mental health (Figure 5.20). The north part of the green space is mainly used for active recreation. The size of the space is sufficient to accommodate sports and activities such as soccer, football, or softball, and it is enough space for performances. For public access, a bus stop is located near Asheville highway close to the park (Figure 5.19). A parking lot and on-street parking are available on the north and east side of the green space.

The new Burlington park offers spaces for a variety of activities for people of all ages (Figure 5.21 and 5.22). The performance stage and plaza on the south side enable this space to have outdoor performances such as musical concerts, theatrical shows, or movie nights (Figure 5.24). Some picnic tables and chairs are located on this plaza for people to sit. Located on the east side of the south green space is an outdoor gym. Trees around the gym protect gym users from direct sunlight as well as providing natural visual barriers. McCalla Avenue, on the east side of the outdoor gym, is closed to vehicles, except for service vehicles and farmers' trucks on particular days. The purpose of this traffic-free road is to

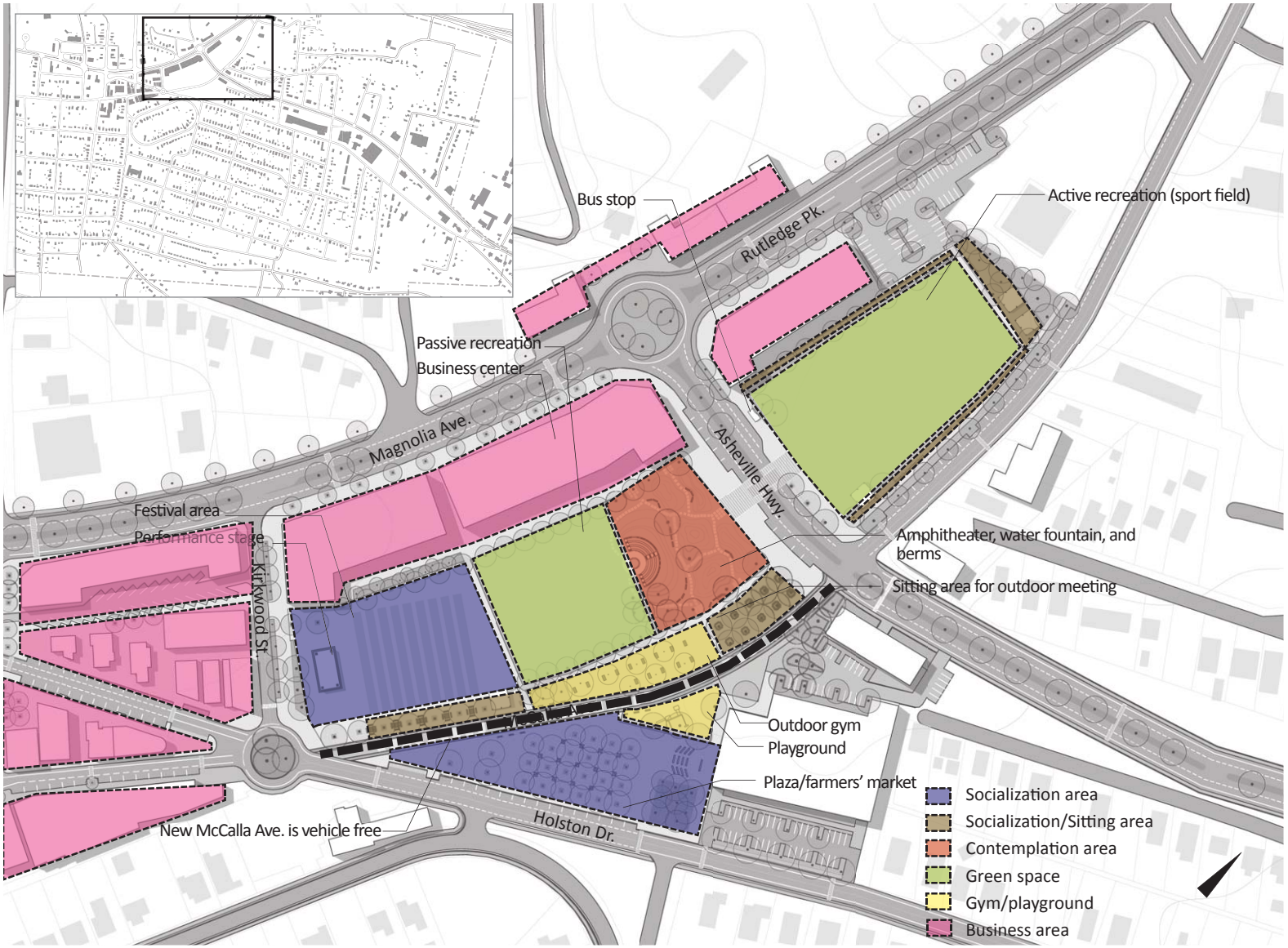
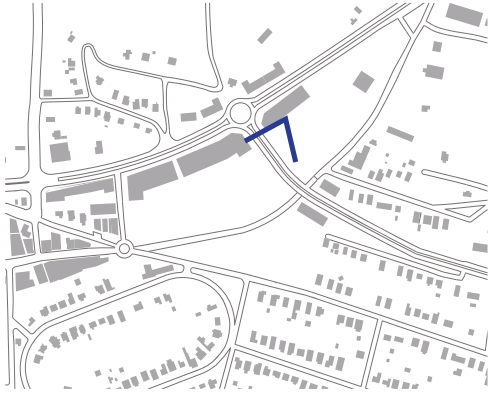


Figure 5.17: Diagram of activities on Burlington park



Figure 5.18: Open space provides place for active and passive recreation





Taking public transportation reduces carbon emissions and improves air quality, which improves physical health. Changing road texture is used as traffic calming so people can cross Magnolia Avenue safely.

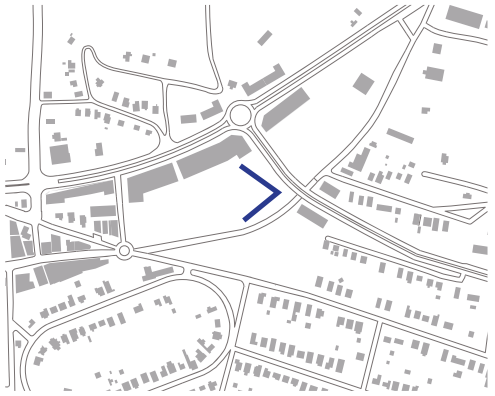




This part of the park provides space for active recreation to improve physical health. The space may be used for various sports activities. There are two picnic gazebos and a restroom building at the end of the park.

Figure 5.19: Views of KAT bus stop on Magnolia Avenue and active park on the north side of Magnolia Avenue





Having a place of solitude in the park can refresh mental health.





This outdoor space accomodates social interaction which could improve social health.. This place can also be used for informal outdoor meetings.

Figure 5.20: Views of the park on the south edge of Magnolia Avenue

provide a safe and attractive environment for pedestrians and bikers. On this road, youth can skateboard and kids can learn how to bike (Figure 5.23). The area close to the existing thrift store is dedicated to young children. This area is a playground because of its distance from the roads and its small size. This qualities make it a safe place for children.

5.1.4 Good Water Drainage

Urban conditions complicate drainage problems. Increasing stormwater runoff comes with the growing square footage of impermeable surfaces. This can leave inadequate drainage systems [80]. The problems caused by improperly managed stormwater runoff can adversely affect the economy and health of the community and its environment. Physically, flooding can destroy buildings and infrastructures, which harms the economy of the community. There are indirect effects of flood damage such as a loss of working days required to fix the damage, trauma, depression, and vulnerability because of disruption. For the environment, stormwater runoff increases the risk of erosion, lowers water quality, harms aquatic animals, and kills wildlife [81].

In areas with poor drainage, urban runoff can cause various waterborne and airborne diseases because water may mix with the sanitary system. Stormwater runoff carries pathogens and other pollutants such as copper, zinc, lead, phosphorous, and nitrogen from roads, parking lots, and other impermeable surfaces [81]. Exposure to contaminated water can lead to diseases such as gastrointestinal illnesses, skin rashes, and ear and eye infections [82]. More runoff means less groundwater recharge, which can become a problem since nearly half of the U.S. population drinks groundwater from wells [83].

In an asphalt-dominated surface area like the Burlington neighborhood, relying heavily on the city's central drainage system for discharging stormwater runoff may not be enough. Instead, management of stormwater runoff needs to be an integral part of community design. Therefore, several steps should be taken to address stormwater management; from sites to the city drainage network. Management techniques include maximization of permeable surfaces, achieved by installation of porous interlocking paving system for sidewalks and plazas, ang



Figure 5.21: Sections showing various activities on the park



Figure 5.22: Sections showing various activities on the park





Existing McCalla Avenue



McCalla is closed for vehicular traffic. The view shows activities on the road, an outdoor gym and a playground on the sides.

Figure 5.23: View of McCalla Avenue





Outdoor movie night is a great way to spend quality time with family and friends. This event can increase the social and mental health of the community.

Figure 5.24: View of a community event on the performance plaza

the use of green spaces in all possible areas. Figure 5.25 shows swales on part of Holston drive, Rutledge pike, Martin Luther King Jr Avenue, Magnolia Avenue and the Asheville highway. Swales will help create a green drainage network. Trees and shrubs spread throughout the neighborhood increase infiltration and beautify the neighborhood. Finally, shared parking spaces located close to the Greater Warner Tabernacle Church on Holston drive and on Rutledge pike may minimize hard surfaces which in turn minimizes stormwater runoff.

5.2 Mental and Social Health

5.2.1 Social Interaction

Green areas and natural elements, have effects on social health. Lofland [84] describes the importance of public spaces as facilitators for high-level interactions between individuals of different social and ethnic backgrounds. Green spaces have been proven to be successful tools to increase social mixing, which can strengthen social cohesion in urban neighborhoods [85]. Public outdoor spaces can also impact the social behavior of individuals. Streets with low-speed traffic and natural elements such as trees and shrubs present enormous potentiality for satisfaction, personal development and social integration [86].

Social interaction can occur at many places in Burlington. As previously mentioned, the Burlington park offers possibilities for social interaction for various people, including elderly people, men, women, people with disabilities, teenagers, and children. Even the sidewalk on Holston drive that goes through the village center, where people can stroll around slowly while browsing storefronts of the 'new' old commercial center can facilitate social interaction. The social interactions that could occur on this walkway is enhanced with pocket plaza and places that may host outdoor cafes (Figure 5.26).

Social interactions facilitated by the public open spaces increase the sense of community, an important social factor for the livelihood of a community. Ahlbrandt and Cunningham [87] describe sense of community as a prerequisite to an individual's commitment to a neighborhood. The study found that those who are committed and satisfied to their

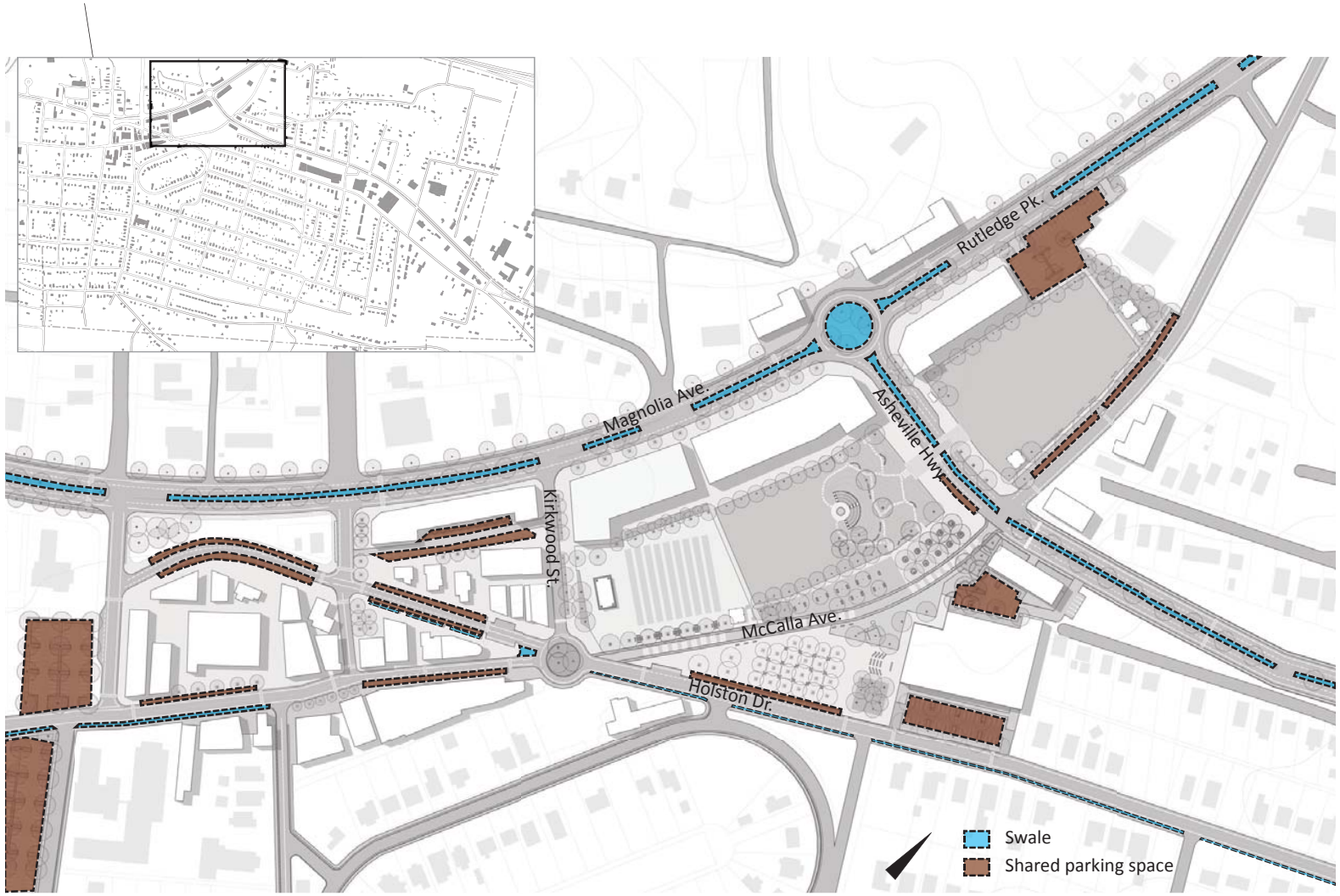
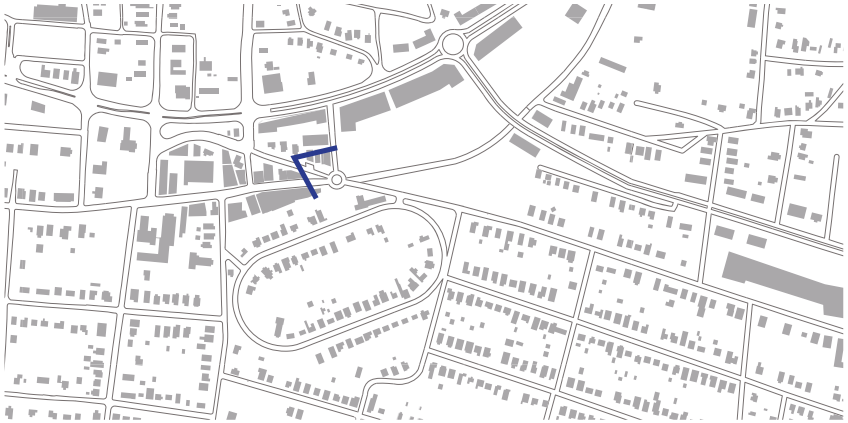


Figure 5.25: Diagram shows stormwater management strategies





Existing Holton drive and MLK Jr. Avenue intersection



Proposed roundabout on Holton drive and MLK Jr. Avenue intersection. Bike station and outdoor cafe are located at the corner of the intersection

Figure 5.26: Small roundabout and new activities around the village center

community were more loyal to their neighborhood than those who are not. Consequently, a stronger sense of belonging led to more community involvement [88], better problem solvers in the community, and more desire in individuals to make a better community.

5.2.2 Mental Refreshment

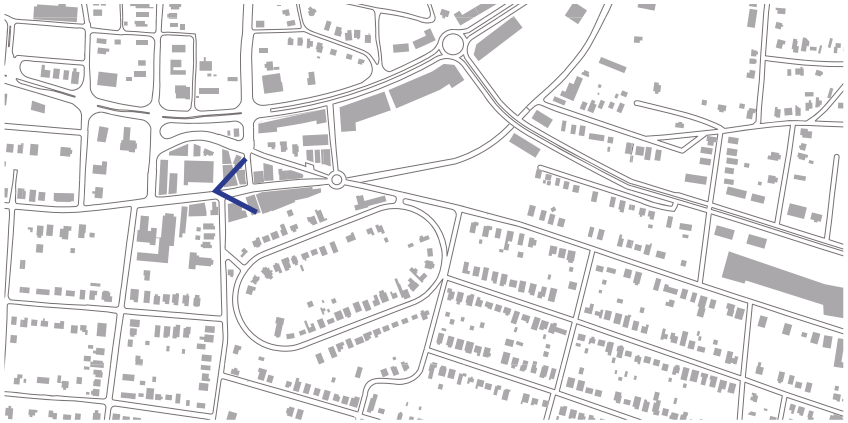
Connection with nature is important for mental health. Nature has a restorative value in urban environments. Imagine seeing Burlington's existing abandoned concrete surfaces with cumulated trash. Compare that experience with seeing the same place with green vegetation, trees, and colorful flowers. Honeyman [89] theorizes that urban built environments with vegetation introduce more psychological impact than ones without. The study added that vegetated urban areas have restorative impacts on people. The presence and visibility of nature in an urban setting have been shown to raise people's general satisfaction of living in an urban area, increase their calmness, and decrease their mental fatigue and irritability [67]. Natural areas enhance spiritual health, allowing connection with the Creator through nature, contemplation, and nurture. Nature demonstrates regularity such as life cycle and seasonal changes. Besides its steadiness, nature also gives a sense of wonder, creates excitement and hope for people. Kaplan [90] theorizes that a fascination of nature gives people a feeling of escape from routine life; which makes them feel whole and content.

5.2.2.1 Rejuvenate the Old Downtown

A neighborhood commercial center increases the quality of neighborhood life by offering social and economic values for the area [91]. Obviously, neighborhood commerce contributes directly to local economic stability by providing employment opportunities. Besides providing jobs, a small neighborhood commercial center may also provide a variety of local goods and services, hence reducing automobile dependency [92]. With the continuous rise of gas prices, local stores can be a financially wise choice for shopping destinations. Socially, patronizing local commercial facilities contributes to the foundations of community, by

promoting interactions among members of a community. This patronage can also contribute to the safety and vitality of the area [91].

Burlington's old commercial center has the potentials to thrive again. The structures that remain will be improved and preserve the character of the area. Those buildings will be places for business opportunities such as coffee shops, restaurants, barber shops, clothing stores, small grocery stores, banks, drug stores, and a movie theater. Along with improving the old buildings, increasing the aesthetic value in this area is crucial for improving community's health (Figure 5.27). In order to increase aesthetics and activities in this area, several strategies are adopted. First, by improving the facade of the old buildings. Second, by changing the road to one lane with on-street parking on the sides. By reducing the lane width, bike lanes and wide sidewalks can be attained. Third, by adding street amenities, such as street lights, trees, and colorful flowers to add beauties to the neighborhood. Giles-Corti [26] reported that the attractiveness of a public open space can encourage higher levels of walking.





Existing business district



Proposed village center

Figure 5.27: Character of proposed village center



Figure 5.28: Village center provide basic needs for the community

Chapter 6

Conclusion

The focus of this thesis is not to judge whether the lifestyle of some groups of people are better than the others. This project offers a vision of what could be done in a community to improve its health. Since healthy lifestyle behaviors and choices begin with the community environment; improvements are proposed to reveal the potentials of the neighborhood.

This study found that the health problems in Burlington are associated with its built environment. Figure 6.1 shows two groups of parameters for improving the health of this community: physical health, and mental and social health. The physical health aspect includes the availability of choices of healthy food, adequate spaces for exercising, good water and air quality, and a community health center. Improving social and mental health includes providing places for social interaction, contemplation, and minimization of social threats.

This thesis has several limitations. Confidentiality in health data makes the establishment of causal links between health problems and built environments difficult. It was difficult to gather community data and time limited my ability to study the Burlington community's expectations. To produce a plan that would better suit the Burlington community's needs, more collaboration with public health experts is necessary.

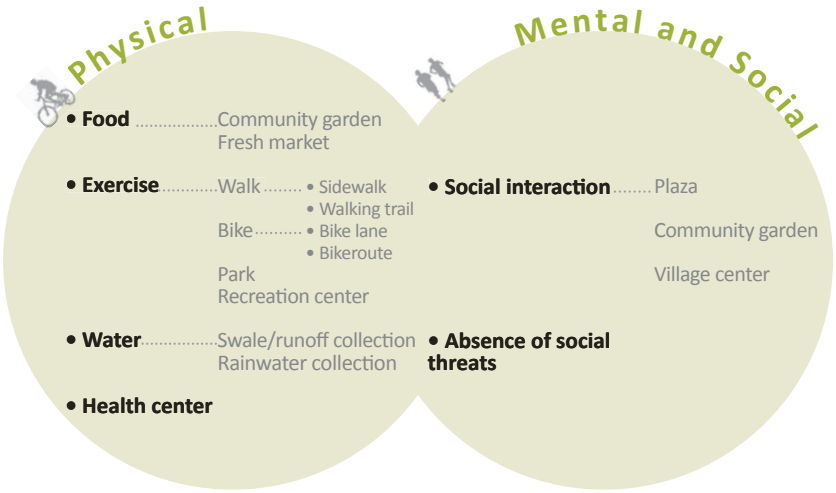
The elements of a healthy community are the creation of aggregations of destinations linked by adequate sidewalks, public transportation, and bike lanes. This thesis accomplished

more possible physical activities in the neighborhood. Figure 6.2 shows the lifestyle of Burlington residents in 1928 compared to their counterparts in 2011. The average resident expended from 2,300 to 3,000 calories per day. In the 1920s, physical activities were incorporated into daily life, which resulted in higher calorie expenditures than people expend in 2011. The activities of yore include people walking to school, their work place, and to other destinations. They got most of their daily needs from walking to the commercial center. When they needed to go to areas outside of Burlington, they rode street cars. Limited electronic appliances were used for household chores. In their leisure time, many people gardened or went to neighborhood recreation areas such as Chilhowee park, Beaman lake, or Cal Johnson Speedway with their family or friends. Fresh produce consumed came from people's own garden (figure 4.9). Since fast food and factory food were uncommon, the food was fresh with a high nutrient value.

In contrast, current daily activities depend heavily on cars and modern equipment (figure 6.2). The average person expends from 1,300 to 2,600 calories per day. People drive mostly everywhere. This results in limited physical activities and disconnection from the immediate environment. Leisure time is usually spent watching a television, playing video games, or browsing the internet. To finish household chores, people use various electronic appliances including vacuum cleaners, washing machines, and dishwashers. The community has to leave the neighborhood for many of their daily needs because they are unavailable in their neighborhood. To get recreation, people drive to parks outside Burlington such as Fountain City Park and Ijams Nature Center. Fast-food and processed food are cheap and readily accessible and thus become the main choice for meals for many families. These foods have less nutritional value than what many people consumed in 1928.

Figure 6.3 shows the envisioned daily activities for the Burlington community. Walking and biking become transportation choices for people living in the neighborhood. The average person expends from 1,900 to 3,600 calories per day. The village center and commercial center provide basic needs and employment opportunities. This self-sufficiency in the community allows residents to reduce the need to drive to outside their neighborhood to fulfill their needs. To get physical activities, people can go to the park or bike and walk around the

neighborhood. A community garden provides opportunities to grow fruits and vegetables. Other nutritious and healthful foods are available at the farmers' market. The active system proposed by this project brings back what was missing from this neighborhood. The improvements of the neighborhood allow the community to integrate physical activity into their lifestyles. The objective is not to duplicate the past culture, rather, to learn from it and transform it for a better future.



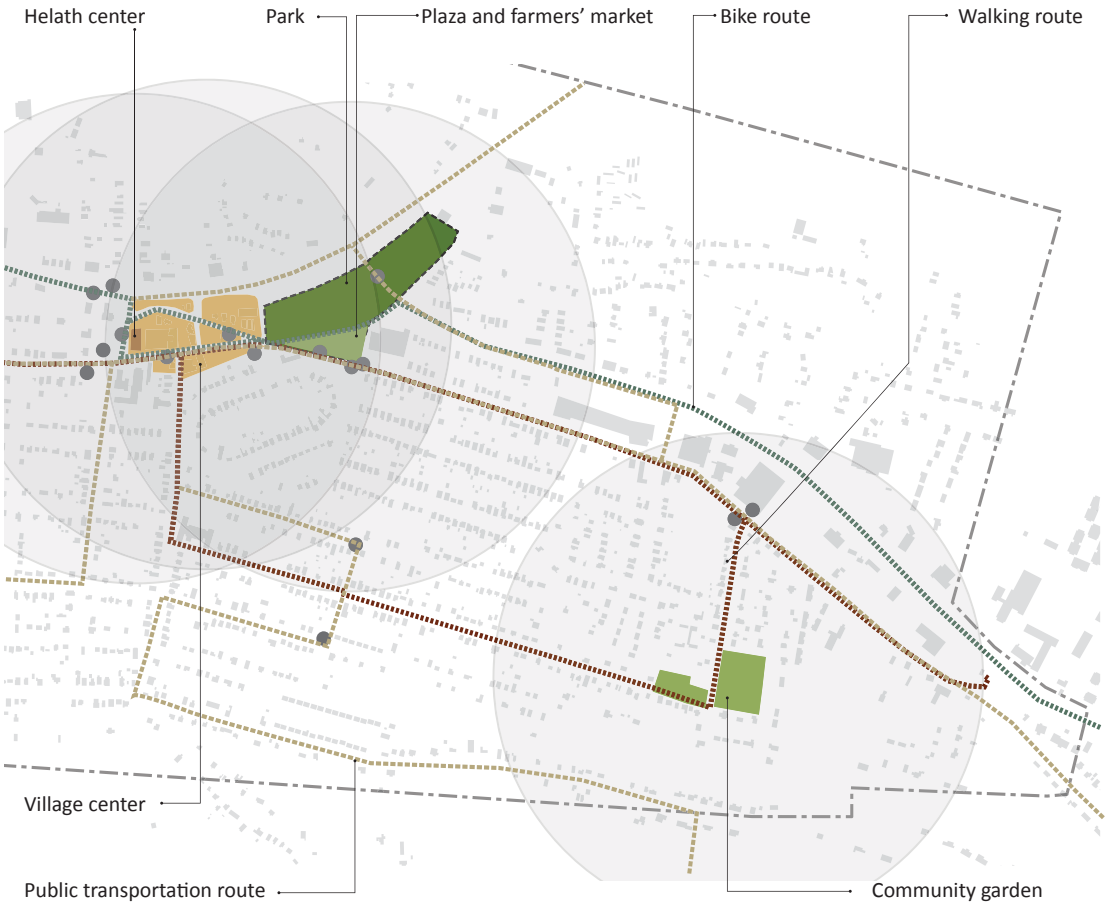


Figure 6.1: New destinations are connected with pedestrian and bicycle friendly roads creating an active system

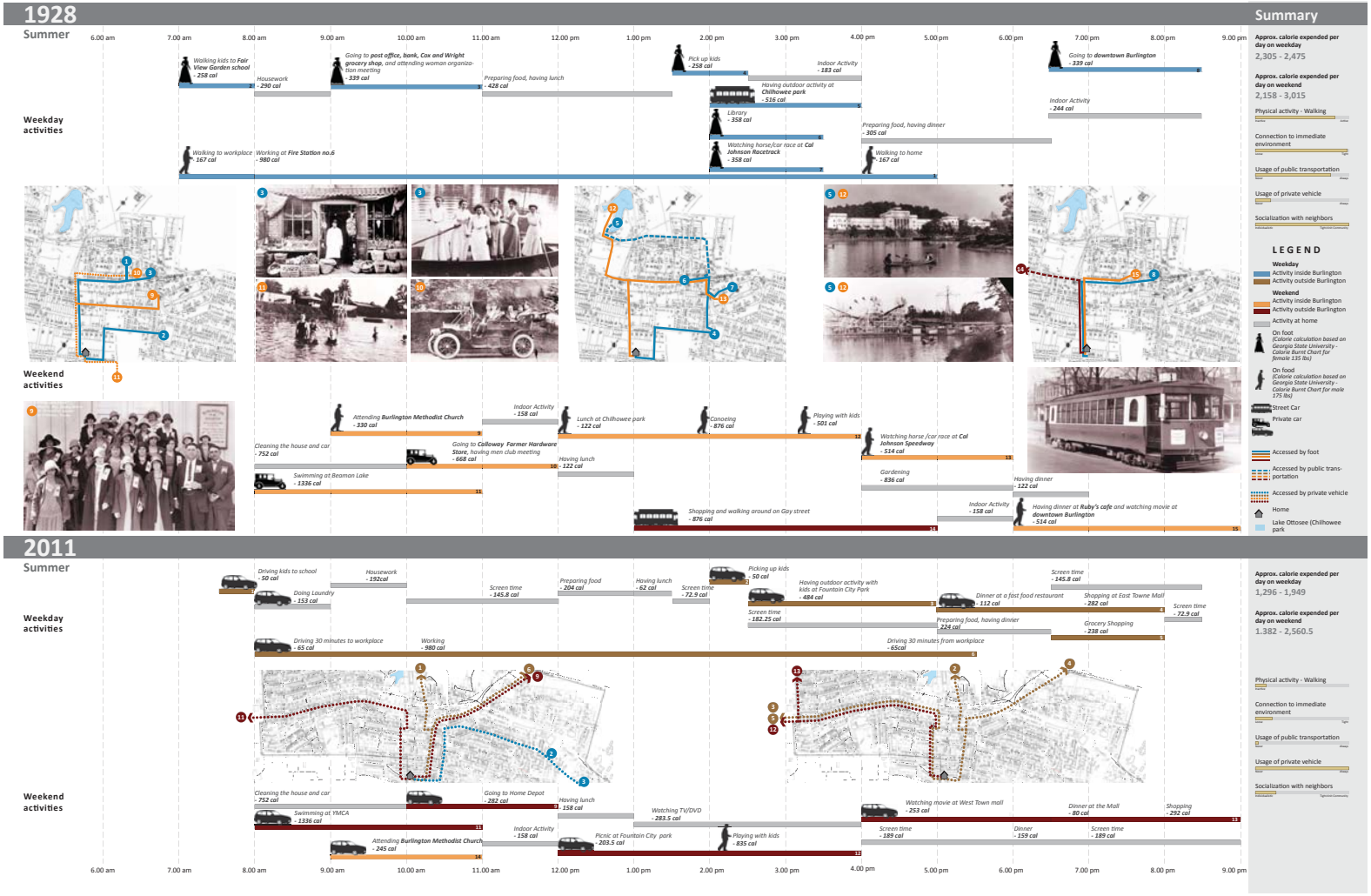


Figure 6.2: Past and current daily activities

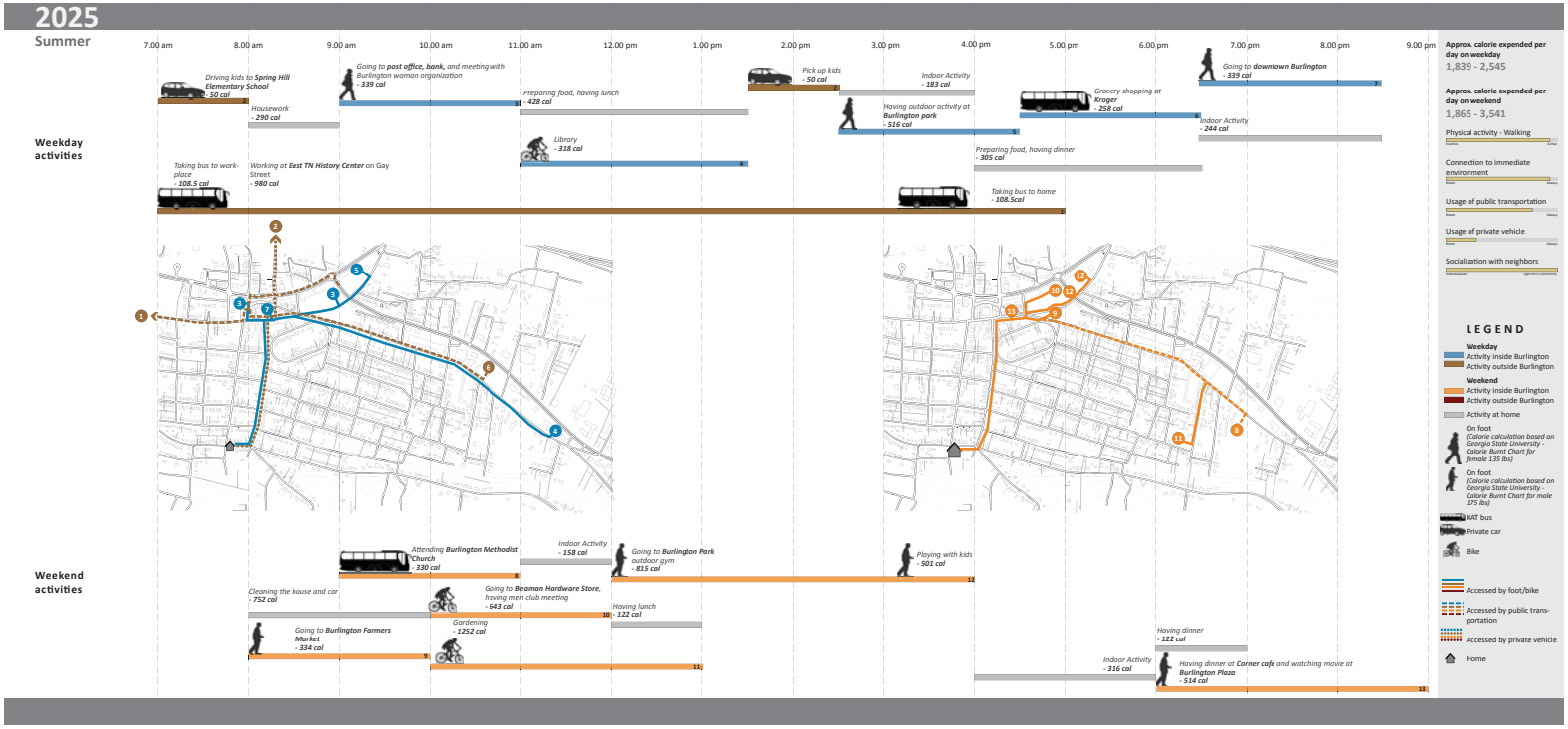


Figure 6.3: Future daily activities

Bibliography

Bibliography

[1] J Moughtin, Paola Signoretta, and Kate McMahon Moughtin. *Urban Design: Health and the Therapeutic Environment*. Architectural Press, 2009. 4, 6, 16, 23, 71

[2] James F. Sallis and Karen Glanz. The Role of Built Environments in Physical Activity, Eating, and Obesity in Childhood. *The Future of Children*, 16(1):89–108, 2006. 4, 5, 23

[3] Neil Schneiderman, Marjorie A. Speers, Julia M. Silva, Henry Tomes, and Jacquelyn H. Gentry. *Integrating behavioral and social sciences with public health.* American Psychological Association, Washington, DC, US, 2001. 4

[4] Centers for Disease Control and Prevention. Overweight and obesity. a growing problem. http://www.cdc.gov/obesity/childhood/problem.html. Accessed on April 30, 2011. 4

[5] James F Sallis, Brian E Saelens, Lawrence D Frank, Terry L Conway, Donald J Slymen, Kelli L Cain, James E Chapman, and Jacqueline Kerr. Neighborhood built environment and income: examining multiple health outcomes. *Social science & medicine (1982)*, 68(7):1285–93, April 2009. 4

[6] Eric A Finkelstein, Justin G Trogdon, Joel W Cohen, and William Dietz. Annual medical spending attributable to obesity: payer-and service-specific estimates. *Health affairs (Project Hope)*, 28(5):w822–31, 2009. 5

[7] Centers for Disease Control and Prevention. U.s. obesity trends. http://www.cdc.gov/obesity/data/trends.html. Accessed on April 28, 2011. 5

[8] Centers for Disease Control and Prevention: National Diabetes Surveillance System. County level estimates of diagnosed diabetes. http://apps.nccd.cdc.gov/DDT_STRS2/NationalDiabetesPrevalenceEstimates.aspx?mode=DBT. Accessed on December 31, 1969. 5

[9] Jeffrey Levi, Serena Vinter, Rebecca St. Laurent, and Laura Segal. F as in Fat: How Obesity Threatens Americas Future. Technical report, Robert Wood Johnson Foundation, 2010. 5, 6

[10] letsmove.gov. Let's move! http://www.letsmove.gov/. Accessed on August 7, 2011. 5

[11] Every Child Outdoor TN. Every child outdoors — tennessee. http://www.everychildoutdoorstn.org. Accessed on August 7, 2011. 5

[12] Dan Emerine, Eric Feldman, and Lena Delchad. Active Living and Social Equity: Creating Healthy Communities for All Residences. Technical report, International City/County Management Association, Washington D.C., 2005. 6, 10

[13] Hugh Barton and Catherine Tsourou. *Healthy Urban Planning*. Spoon Press, London and New York, 2000. 6

[14] Oxford University Press. *Oxford Dictionary of English*. Oxford University Press, 2010. 6

[15] Nicholas Freudenberg, Susan Klitzman, and Susan Saegert, editors. *Urban Health and Society: Interdisciplinary Approaches to Research and Practice (Public Health/Vulnerable Populations)*. Jossey-Bass, 1 edition, 2009. 6

[16] Paul Attewell, Belkis Suazo-Garcia, and Juan (Juan Jose) Battle. Computers and Young Children: Social Benefit or Social Problem? *Social Forces*, 82(1):277–296, 2003. 8

[17] U.S. Census Bureau. Urban and Rural Population by State: 1990 and 2000. Technical report, 2000. 8

[18] Nicholas Freudenberg, Sandro Galea, and David Vlahov, editors. *Cities and the Health of the Public*. Vanderbilt University Press, 2006. 8

[19] a J Schulz, E a Parker, B a Israel, a B Becker, B J Maciak, and R Hollis. Conducting a participatory community-based survey for a community health intervention on Detroit's east side., March 1998. 9

[20] Jeannine Coreil. *Social and Behavioral Foundations of Public Health*. Sage Publications, Inc, 2 edition, 2009. 9, 47

[21] Susan L Handy, Marlon G Boarnet, Reid Ewing, and Richard E Killingsworth. How the built environment affects physical activity: views from urban planning. *American journal of preventive medicine*, 23(2 Suppl):64–73, August 2002. 10, 11

[22] Shobha Srinivasan, Liam R O'Fallon, and Allen Dearry. Creating healthy communities, healthy homes, healthy people: initiating a research agenda on the built environment and public health. *American journal of public health*, 93(9):1446–50, September 2003. 10, 13

[23] Nicolas M Oreskovic, Jonathan P Winickoff, Karen A Kuhlthau, Diane Romm, and James M Perrin. Obesity and the built environment among Massachusetts children. *Clinical pediatrics*, 48(9):904–12, November 2009. 10

[24] R.J. Jackson and Chris Kochtitzky. Creating a healthy environment: the impact of the built environment on public health. In *The 131st Annual Meeting*, 2003. 10

[25] James F Sallis, Judith J Prochaska, and Wendell C. Taylor. A review of correlates of physical activity of children and adolescents. *Med. Sci. Sports Exerc.*, 32(5):963–975, 2000. 10, 11

[26] Billie Giles-Corti, Melissa H Broomhall, Matthew Knuiman, Catherine Collins, Kate Douglas, Kevin Ng, Andrea Lange, and Robert J Donovan. Increasing walking: how important is distance to, attractiveness, and size of public open space? *American journal of preventive medicine*, 28(2 Suppl 2):169–76, February 2005. 11, 85

[27] Centers for Disease Control and Prevention. U.s. physical activity statistics. http://apps.nccd.cdc.gov/PASurveillance/StateSumResultV.asp?CI=&Year=2007&State=0. Accessed on July 1, 2011. 12

[28] Centers for Disease Control and Prevention. Childhood Obesity. Technical report, 2010. 12

[29] J Hershey and Amy Jordan. Reducing Children s TV Time to Reduce the Risk of Childhood Overweight : The Children s Media Use Study Reducing Children s TV Time to Reduce the Risk of Childhood Overweight : The Children s Media Use Study Highlights Report. Technical Report 8680, 2007. 12

[30] D. Carr and M. a. Friedman. Is Obesity Stigmatizing? Body Weight, Perceived Discrimination, and Psychological Well-Being in the United States. *Journal of Health and Social Behavior*, 46(3):244–259, September 2005. 12

[31] Ann Fenton. Growing Trends : School-Based Community Gardens As a Grassroots Response To Childhood Obesity. Technical report, 2009. 13

[32] Randal O Toole. Local Transit Systems. *New York*, (559), 2006. 13, 14

[33] Martha Olson and Jim Klein. Taken for A Ride, 1996. 13

[34] L.R. Brown. Automobiles: a hazy future. *Bulletin of the Atomic Scientists*, 40(4), 1984. 13

[35] Jay Chen. Air Pollution. Technical report, University of Tennessee, Knoxville, 2011. 14

[36] U.S Department of Transportation. National Transportation Statistics. Technical report, 2011. 14

[37] H Fairfield. Factory Food, 2010. 14

[38] United States Department of Agriculture. Urban development, land use, and agriculture. http://www.ers.usda.gov/features/sprawl/. Accessed on June 16, 2011. 14

[39] Susan Thompson, Linda Corkery, and Bruce Judd. The Role of Community Gardens in Sustaining Healthy Communities. pages 161–171, 2007. 15, 47

[40] Katherine Alaimo, Elizabeth Packnett, Richard a Miles, and Daniel J Kruger. Fruit and vegetable intake among urban community gardeners. *Journal of nutrition education and behavior*, 40(2):94–101, 2008. 15

[41] Mark Vallianatos, A. Shaffer, and R. Gottlieb. Transportation and Food: The Importance of Access. Technical report, Center for Food and Justice, Urban and Environmental Policy Institute, 2002. 15, 16, 23

[42] Neal D (ed) Barnard. Health vs. Pork: Congress Debates the Farm Bill. *Good Medicine*, XVI(4):11, 2007. 15

[43] Polly Walker, Pamela Rhubart-Berg, Shawn McKenzie, Kristin Kelling, and Robert S Lawrence. Public health implications of meat production and consumption. *Public Health Nutrition*, 8(04):348–356, January 2007. 15

[44] Johns Hopkins Center for a Livable Future. Better Food: For the Health of People and the Plane. Technical report, School of Public Health at John Hopkins University, 2010. 15

[45] Sophia Huang and Kuo Huang. Increased U.S. Imports of Fresh Fruit and Vegetables. Technical report, United States Department of Agriculture, 2007. 16

[46] Tjeerd Deelstra, Herbert, and Girardet. *Urban Agriculture and Sustainable Cities*, pages 99–117. DSE, 2001. 16

[47] J. Smit and J. Nasr. Urban agriculture for sustainable cities: using wastes and idle land and water bodies as resources. *Environment and Urbanization*, 4(2):141–152, October 1992. 16

[48] M Elliott. The stress process in neighborhood context. *Health & Place*, 6(4):287–299, December 2000. 17, 30

[49] Gary W Evans. The built environment and mental health. *Journal of urban health : bulletin of the New York Academy of Medicine*, 80(4):536–55, December 2003. 17

[50] Sandro Galea, Jennifer Ahern, Sasha Rudenstine, Zachary Wallace, and David Vlahov. Urban built environment and depression: a multilevel analysis. *Journal of epidemiology and community health*, 59(10):822–7, October 2005. 17

[51] William W Eaton. *The sociology of mental disorders*. Praeger, New York, 2nd edition, 1996. 17

[52] SEED. Socially equal energy efficient development. http://seeedknox.org/. Accessed on August 2, 2011. 19

[53] Samiya a Bashir. Home is where the harm is: inadequate housing as a public health crisis. *American journal of public health*, 92(5):733–8, May 2002. 23

[54] Paul A. Estabrooks, Rebecca E. Lee, and Nancy C. Gyurcsik. Resources for physical activity participation: Does availability and accessibility differ by neighborhood socioeconomic status? *Annals of Behavioral Medicine*, 25(2):100–104, April 2003. 23

[55] David C. Sloane, Allison L. Diamant, LaVonna B. Lewis, Antronette K. Yancey, Gwendolyn Flynn, Lori Miller Nascimento, William J. Mc Carthy, Joyce Jones Guinyard, and Michael R. Cousineau. Improving the Nutritional Resource Environment for Healthy Living Through Community-based Participatory Research. *Journal of General Internal Medicine*, 18(7):568–575, July 2003. 23

[56] Zipatlas. Median household income in knoxville, tn by zip code. http://zipatlas.com/us/tn/knoxville/zip-code-comparison/median-household-income.htm. Accessed on December 31, 1969. 26

[57] City-data. 37914 zip code detailed profile. http://www.city-data.com/zips/37914.html. Accessed on July 11, 2011. 26

[58] Robert Cardwell. A Brief History of East Knoxville: Bicentennial, 1776-1976. Technical report, Knoxville, Tennessee, 1976. 30, 31

[59] Jim Balloch. On the Verge of a Rebirth. *The Knoxville News Sentinel*, 1998. 30

[60] Knoxville-Knox County Metropolitan Planning Commission. Magnolia Avenue Corridor Plan. Technical report, Knoxville-Knox County Metropolitan Planning Commission, Knoxville, TN, 2009. 43

[61] Jane Dixon. *The Seven Deadly Sins of Obesity: How the Modern World is Making Us Fat*. University of New South Wales Press, 2007. 47

[62] Laurie M Anderson, Susan C Scrimshaw, Mindy T Fullilove, and Jonathan E Fielding. The Community Guides model for linking the social environment to health. *American Journal of Preventive Medicine*, 24(3):12–20, April 2003. 47

[63] D. L. Armstrong. A Community Diabetes Education and Gardening Project to Improve Diabetes Care in a Northwest American Indian Tribe. *The Diabetes Educator*, 26(1):113–120, January 2000. 52

[64] J. Andrew Doyle. The exercise and physical fitness web page. http://www2.gsu.edu/~wwwfit/physicalactivity.html. Accessed on December 31, 1969. 52

[65] A.C. Bellows, K. Brown, J. Smit, and Others. Health benefits of urban agriculture. *Community Food Security Coaltion*, 2005. 56, 58

[66] Nearkasen Chau, Jean-Marie Mur, Christian Touron, Lahoucine Benamghar, and Dominique Dehaene. Correlates of Occupational Injuries for Various Jobs in Railway Workers: A Case-Control Study. *Journal of Occupational Health*, 46(4):272–280, July 2004. 56

[67] H. Patricia Hynes and Russell Lopez. *Urban Health: Readings in the Social, Built, and Physical Environments of U.S. Cities*. Jones & Bartlett Publishers, 2008. 56, 84

[68] Susan Giordano and Chick F Tam. Growing in the city. *WE International*, Spring/Sum:40–41, 1998. 56

[69] D. Hilchey, T Lyson, and G.W. Gillespie. *Farmers' markets and rural economic development: entrepreneurship, business incubation, and job creation in the Northeast. Community agriculture development series*. Farming Alternatives Program, Department of Rural Sociology, Cornell University, Ithaca, N. Y, 1995. 58

[70] Abel Jennifer. Extension's Role with Farmers' Markets: Working with Farmers, Consumers, and Communities. *Journal of Extension*, 37(5), 1999. 58, 59

[71] Thomas A. Lyson. *Community Agriculture and Local Food System*, chapter 1, page 160. Tufts, 2004. 58

[72] Ethan M Berke, Thomas D Koepsell, Anne Vernez Moudon, Richard E Hoskins, and Eric B Larson. Association of the built environment with physical activity and obesity in older persons. *American journal of public health*, 97(3):486–92, March 2007. 59

[73] By Dan Burden and Todd Litman. America needs Complete Streets. *The Institute of Transportation Engineers*, (aprIl), 2011. 59, 62, 67

[74] Meghan Cahill. Bicycle friendly communities announced. http://www.bikeleague.org/blog/2010/09/bicycle-friendly-communities-announced/. Accessed on July 9, 2011. 59

[75] T Harvey. A Review Of Current Traffic Calming Techniques. Technical report, Institute of Transport Studies, University of Leeds, Leed, UK, 1992. 62

[76] Tom Vanderbilt. *When Dangerous Roads are Safers*, chapter 7. Knopf, 1 edition, 2008. 62

[77] D. Antov, K. Abel, P. Sürje, H. Rõuk, and T. Rõivas. Speed reduction effects of urban roundabouts. *The Baltic Journal of Road and Bridge Engineering*, 4(1):22–26, March 2009. 62

[78] Michael Ronkin. Road Diets: Designing Streets for Pedestrians and Bicyclist. Technical report, New Partners for Smart Growth, Los Angeles, 2007. 67

[79] Jolanda Maas, Robert A Verheij, Peter P Groenewegen, Sjerp de Vries, and Peter Spreeuwenberg. Green space, urbanity, and health: how strong is the relation? *Journal of epidemiology and community health*, 60(7):587–92, July 2006. 71

[80] J. Parkinson. Drainage and stormwater management strategies for low-income urban communities. *Environment and Urbanization*, 15(2):115–126, October 2003. 76

[81] Andy D. Ward and Stanley W. Trimble. *Environmental Hydrology, Second Edition*. CRC Press, 2 edition, 2003. 76

[82] Stephen J Gaffield, Robert L Goo, Lynn a Richards, and Richard J Jackson. Public health effects of inadequately managed stormwater runoff. *American journal of public health*, 93(9):1527–33, September 2003. 76

[83] Greg Lindsey, Les Roberts, and William Page. Inspection and maintenance of infiltration facilities. *Journal of Soil and Water Conservation*, 47(6):481–486, 1992. 76

[84] Lyn H. Lofland. *The Public Realm: Exploring the City's Quintessential Social Territory (Communication and Social Order)*. Aldine de Gruyter, 1998. 81

[85] Karin Peters, Birgit Elands, and Arjen Buijs. Social interactions in urban parks: Stimulating social cohesion? *Urban Forestry & Urban Greening*, 9(2):93–100, 2010. 81

[86] Aysel Uslu and Afak Gökçe. Social interaction in urban transformation areas and the characteristics of urban outdoor spaces : A case study from Turkey. *Journal of Agricultural Research*, 5(20):2801–2810, 2010. 81

[87] Roger S. Ahlbrandt and J.V. Cunningham. *New Public Policy for Neighbourhood Preservation*. Praeger Publishers Inc, 1979. 81

[88] David W. McMillan and David M. Chavis. Sense of community: A definition and theory. *Journal of Community Psychology*, 14(1):6–23, January 1986. 84

[89] M Honeyman. *Vegetation and stress: A comparison study of varying amounts of vegetation in countryside and urban scenes*, pages 143–145. Timber Press, Incorporated, Portland, 1992. 84

[90] R. Kaplan. Some Psychological Benefits of Gardening. *Environment and Behavior*, 5(2):145–162, June 1973. 84

[91] Marlys McPherson and Glenn Silloway. *The Role of the Small Commercial Center in the Urban Neighborhood* , chapter 5, page 397. Praeger Publishers, 1986. 84, 85

[92] Susan L Handy and Kelly J Clifton. Local shopping as a strategy for reducing automobile travel. *Time*, (1989):317–346, 2001. 84

Appendix

Green Community – Burlington Neighborhood

"Green community embraces our personal environments, including the internal environment of our bodies, our home, work and social environments as well as the whole planet's environment."(www.improving-health-and-energy.com)

Questionnaire for a Master Thesis by: **Maudy Budipradigdo**| University of Tennessee Knoxville – Graduate Landscape Architecture Program.|Spring 2011|

1. How long have you lived in Burlington neighborhood?_____
2. How long is your commute to work everyday?
   a. >20 minutes
   b. 20-10 minutes
   c. 10-5 minutes
   d. <5 minutes
3. Do you ride public transportation? If not, why?_____
   _____
   _____
   _____
   _____
4. How long do you walk on average per week?
   a. >20 hours
   b. 20-10 hours
   c. 10-3 hours
   d. <3 hours
5. Where do you walk to (from home)?
   a. School
   b. Grocery store
   c. Friend's house
   d. Others_____
6. What do you think about the walking and biking accessibility in this area?
   Walking_____
   Biking_____
7. In your opinion, what prevents people from walking in this area? (there can be more than one answer)
   a. Lack of sidewalk
   b. No pedestrian crossing
   c. Other _____
8. In your opinion, what prevents people from biking in this area? (there can be more than one answer)
   a. Roads are too wide
   b. High traffic
   c. Other_____

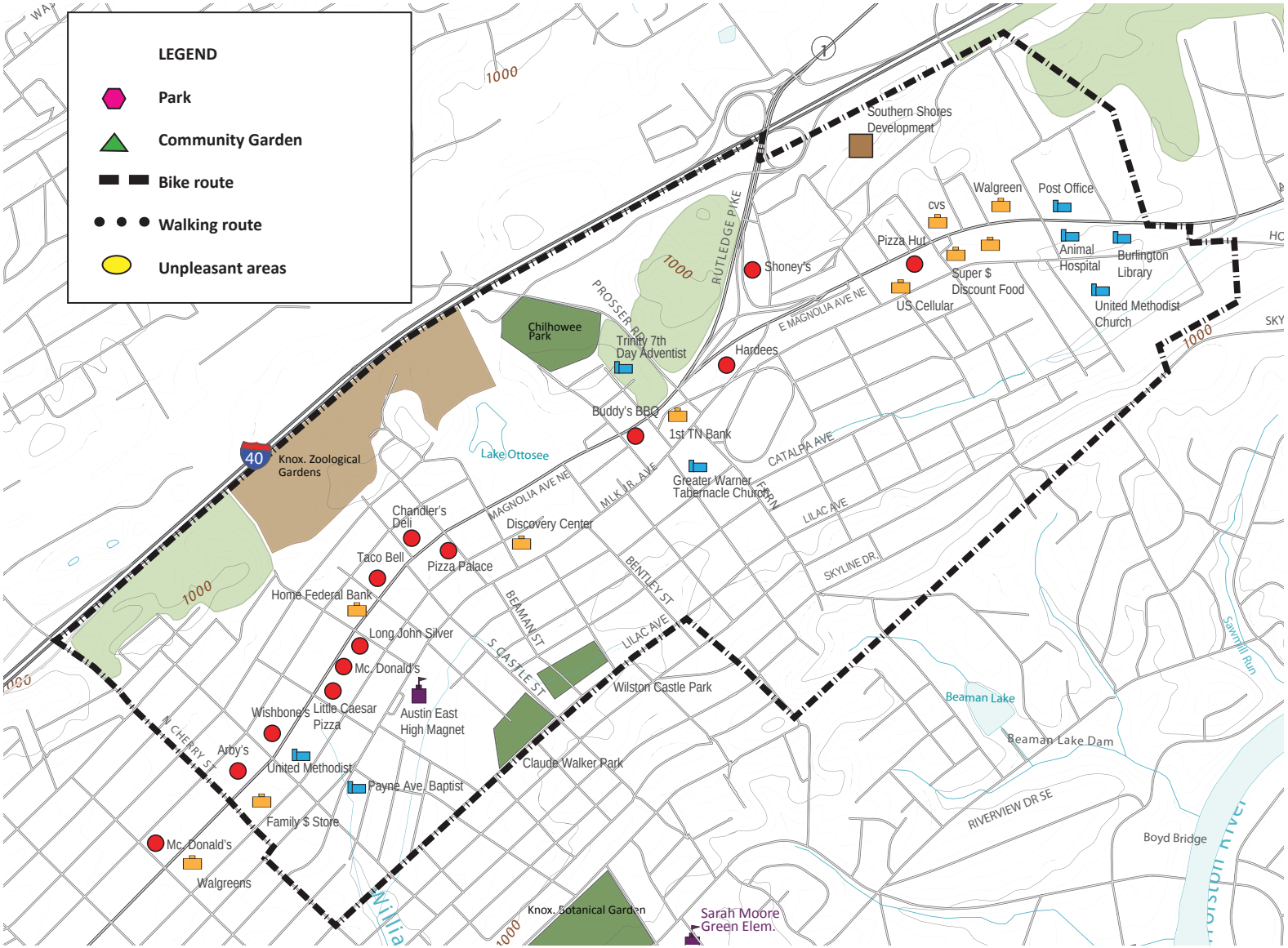
9. How often do you participate in outdoor activity in a given month?
    a. >5 times
    b. 5-3 times
    c. 3-1 time
    d. Never
10. What do you think about recreation facilities in this area?
    a. Enough
    b. Not-enough
    c. There is none available
11. Where do you usually go to do outdoor activities/to excercise?

    _____
    _____

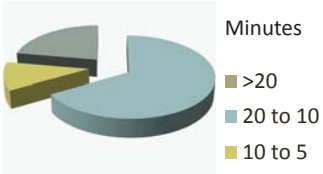
12. If there was a park in your area, would you be willing to use it for outdoor activities?_____
13. What would you want to have in the park?
    a. Sport field
    b. Hiking trail
    c. Outdoor classroom
    d. Water feature
    e. Other_____
14. Do you think a community garden is a need in your neighborhood? Why?_____

    _____
    _____
    _____

15. Would you be willing to participate in a community garden if there was one close to your neighborhood?
16. Which grocery store do you usually go?
    a. Kroger
    b. Save a Lot
    c. Super Dollar Discount Food
    d. Other _____
17. How often do you eat at a restaurant in a month?
    a. >20 times
    b. 20-10 times
    c. 10-5 times
    d. <5 times
    e. Never, always eat at home.
18. What restaurant do you usually go to?_____
19. Now go to next page, and using the supplied legend, place symbols on your map where would be the best place for parks, community gardens, etc; and which part of this area that you think is the best route for walking and biking. Please place as many features as possible.


LEGEND
Park
Community Garden
Bike route
Walking route
Unpleasant areas
Southern Shores Development
Walgreen
Post Office
cvs
Pizza Hut
Animal Hospital
Burlington Library
Super $ Discount Food
US Cellular
United Methodist Church
Shoney's
RUTLEDGE PIKE
PROSSER RD
E MAGNOLIA AVE NE
Chilhowee Park
Trinity 7th Day Adventist
Hardees
Buddy's BBQ
1st TN Bank
Knox. Zoological Gardens
Lake Ottosee
CATALPA AVE
Greater Warner Tabernacle Church
MLK JR. AVE
MAGNOLIA AVE NE
Chandler's Deli
Discovery Center
LILAC AVE
Taco Bell
Pizza Palace
SKYLINE DR.
BENTLEY ST
Home Federal Bank
BEAMAN ST
Long John Silver
S CASTLE ST
Mc. Donald's
Wilston Castle Park
Sawmill Run
Beaman Lake
Austin East High Magnet
Wishbone's
Little Caesar Pizza
Beaman Lake Dam
N CHERRY ST
Arby's
United Methodist
Claude Walker Park
Payne Ave. Baptist
RIVERVIEW DR SE
Family $ Store
Boyd Bridge
Mc. Donald's
Walgreens
Knox. Botanical Garden
Sarah Moore Green Elem.
1000
40

How long is your commute to work everyday?



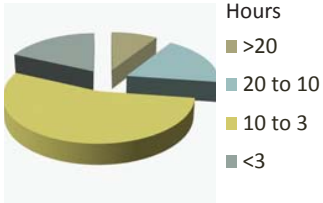
Do you ride public transportation?



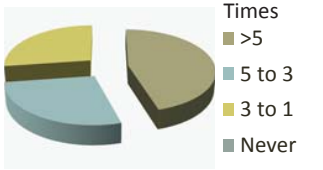
If not, why?

- "I have my own car"
- Schedule does not match my work schedule
- Have little kids

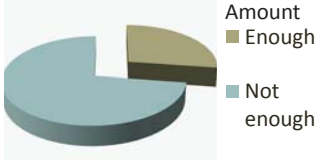
How long do you walk on average per week?



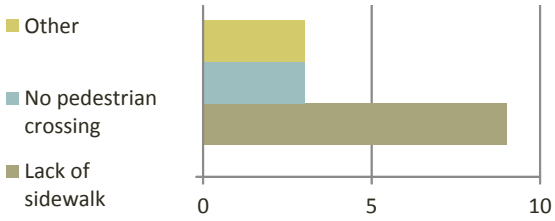
How often do you participate in outdoor activity in a given month?



What do you think about recreation facilities in this area?

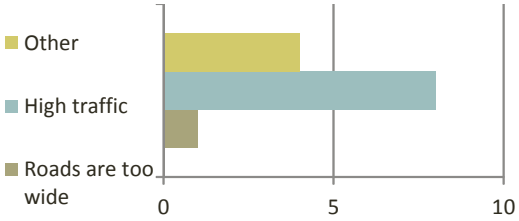


In your opinion, what prevents people from walking in this area? (there can be more than one answer)



- Other reasons: dangerous in some areas, dogs, lack of park

In your opinion, what prevents people from biking in this area? (there can be more than one answer)



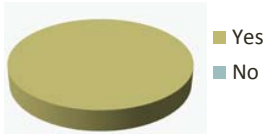
Other reasons:

- no bike lane
- Weather
- No driving enforcement to respect bikers

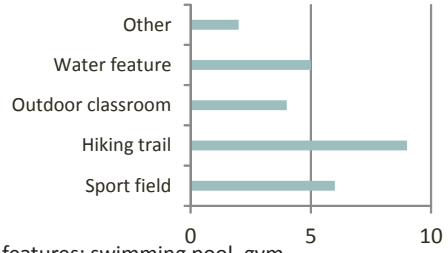
Where do you usually go to do outdoor activities/to excercise?

- Fountain City Park - (8 miles)
- Ijam Nature Center - (8 miles)
- New Harvest Park - (5 miles)
- Holston River Park - (4 miles)
- YMCA
- Around neighborhood

If there was a park in your area, would you be willing to use it for outdoor activities?

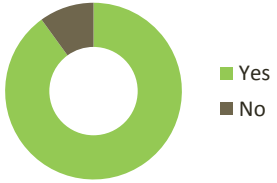


What would you want to have in the park?

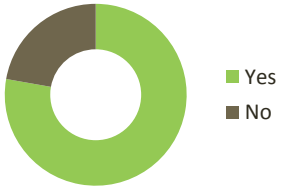


- Other features: swimming pool, gym.

Do you think a community garden is a need in your neighborhood?



Would you be willing to participate in a community garden if there is one close to your neighborhood?



Vita

Maudy Indriani Budipradigdo was born in Semarang, Central Java, Indonesia. She attended Sekolah Kristen YSKI from kindergarten to high school. After graduating from high school, she attended Universitas Kristen Petra, Surabaya, Indonesia where she received a Bachelor of Arts degree in Architecture. She enrolled in the master of Landscape Architecture University of Tennessee in Knoxville, Tennessee in August, 2008 and expects to receive her master degree in August, 2011.