

**OBSTACLES FOR DEVELOPING ALTERNATIVE  
TRANSPORTATION SYSTEMS IN SPRINGFIELD MISSOURI AREA**

A Thesis

Presented to

The Graduate College of

Southwest Missouri State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Science, Resource Planning

By

Adriana Giraldo

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# **OBSTACLES FOR DEVELOPING ALTERNATIVE TRANSPORTATION SYSTEMS IN SPRINGFIELD MISSOURI AREA.**

Department of Geography, Geology and Planning

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Master of Science

Adriana Giraldo

## **ABSTRACT**

The problem of traffic congestion in the United States has been widely studied and many remedies have been proposed. Alternative Transportation Systems have become an increasingly popular planning idea, encouraged by the federal government through *ISTEA, the Intermodal Surface Transportation Efficiency Act of 1991* and its follow-up *TEA 21 the Transportation Equity Act for the 21st Century*. Although certain cities and metropolitan areas have successfully implemented some of those alternatives, most of them have not developed effective solutions for attacking traffic congestion. Little research has focused on determining the obstacles to developing alternative transportation systems. This study aims to contribute to this gap in research by analyzing the existing situation of supply and demand for alternative transportation systems in the Springfield, Missouri area. The area of study included the municipalities that belong to the Springfield Metropolitan Planning Organization (MPO). The data was gathered through surveys, interviews and document reviews. Analysis and interpretation was done using statistics, geographic information systems, and qualitative methods. This study determined political, economic, socio-cultural and physical aspects influencing the lack of development of alternative transportation systems and proposed some policy options for developing those alternatives in the future.

**KEYWORDS:** transportation modes, traffic congestion, transportation alternatives, obstacles, Springfield Missouri.

This abstract is approved as to form and content

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Dr. Dimitri Ioannides  
Chairperson, Advisory Committee  
Southwest Missouri State University

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## INTRODUCTION

### **Transportation Problem in the United States**

Transportation is a vital facet in the economic and social development of communities around the world. The movement of goods and people between and within places has become more efficient following advances in transportation. In the United States, transportation has become highly dominated by the use of the automobile. For this reason, other modes of transportation such as public transit, bicycling and walking have been marginalized. As a consequence, traffic congestion is now one of a series of problems faced by the inhabitants not only of the large cities and metropolitan areas, but also those living in the fast growing mid-sized urban areas such as Springfield, Missouri. This problem has serious adverse economic impacts on communities because of the waste of time and money that arises when people spend hours stuck in traffic (Downs 1992). Serious congestion has also influenced the environment, since automobiles cause more air pollution than other modes of transportation such as electric buses, trolleys, and bicycles. Automobiles also have been identified as a key cause of sprawl (Ewing 1997).

### **Looking for a Solution**

In the last two decades, economists and planners have analyzed, measured, and compared the problem of traffic congestion, alternative transportation systems, and strategies to change the current auto-dependent transportation pattern (Downs 1992; Ewing 1997). The U.S. Department of Transportation enacted *ISTEA, The Intermodal Surface Transportation Efficiency Act of 1991*, and its follow-up *TEA 21, The*

*Transportation Equity Act for the 21st Century*, in which it encourages states and cities to establish alternative transportation systems to counteract the problem of congestion.

Certain cities and metropolitan areas, such as Portland OR, San Francisco CA, Atlanta GA, Washington DC, Davis CA, Madison WI, Boulder CO, Gainesville FL and Eugene OR, with varying degrees of success, have implemented transit systems, or walking and bicycling paths systems (City of Portland Oregon 2002; Porter 1998, U.S. Department of Transportation 1994). Nevertheless, most metropolitan areas and cities in the U.S have not developed effective solutions for addressing the problem.

### **Obstacles to Alternative Transportation Systems: a Case Study**

There is a lack of application of alternative transportation systems in many cities of the U.S., even though there is considerable knowledge about the problem of traffic congestion, and many different solutions and policies that encourage the development of those alternatives. Some research has focused on the barriers or obstacles for developing bicycling (Pucher, Komanoff & Schimek 1999), walking (U.S. Department of Transportation 1994) and transit oriented development in some cities of the United States.

Springfield is the third largest metropolitan area in Missouri and is considered the fastest growing in the state by the Brookings Institution Center on Urban and Metropolitan Policy. It is, like most U.S. cities, an auto-dependent community with a deficiency of non-motorized transportation or transit options, and with a spread-out land use pattern. Ninety-two percent of Missouri's workers commute to work by car (Center on Urban and Metropolitan Policy 2002).



The purpose of this study was to analyze the existing situation of supply and demand for alternative transportation systems in Springfield, Missouri (MO) area. It addressed three questions:

- What are the obstacles for developing alternative transportation systems?
- How have the political, economic, socio-cultural and physical aspects of this area influenced the demand and supply for alternative transportation systems?
- What mechanisms can be used for developing alternative transportation systems?

## **Hypotheses**

The main obstacle for developing alternative transportation systems is related to the preference and determination of Springfield MO area residents to drive automobiles according to principles and standards present in U.S culture.

The transportation and land use policies and investment in Springfield MO area in the last decades have had a substantial adverse effect on the development of alternative transportation systems.

The current land use pattern in Springfield MO is a significant obstacle to the development of alternative transportation systems.

The most vulnerable groups of the population, elderly, younger and low-income citizens, are more likely to use alternative transportation systems.

## **Objectives**

This study has three main objectives:

- To determine the relationship between the attitude of the Springfield MO area residents and the lack of alternative transportation systems.
- To categorize the obstacles for developing alternative transportation systems in Springfield MO area, which result from the existing land use and city planning.
- To submit recommendation or policy options for future development of alternative transportation systems in Springfield MO area.

This study is useful for the Springfield Metropolitan Planning Organization (MPO) and local governments for developing policies to encourage the growth of non auto-dependent communities. Development of alternative transportation systems in the area can be a key factor in generating a more livable community. The elderly, young, and low-income people who cannot drive or cannot afford a car need available and efficient transportation modes that allow them to independently get to places and in this way, they would have equal job, education, recreational and social opportunities. Alternative modes of transportation will also improve the environmental conditions of the region regarding the decrease of air pollution and sprawled land use pattern. Transportation modes such as biking and walking are also important in creating a healthier community in a country with obesity problems.

# **1. HISTORICAL DEVELOPMENT OF TRANSPORTATION MODES AND THE EFFECTS ON COMMUNITIES**

## **1.1 Automobile Domination**

The transportation system in the United States is mostly based on the use of automobiles. From 1904 to 1970, public policies promoted auto-oriented development by subsidizing highways and interstate systems, and supporting auto use and suburban living. By contrast, federal, state, and local governments did not promote other modes of transportation, such as public transit, bicycle, or pedestrian development (Weiner 1999). Therefore, most North American communities have become automobile dependent. An automobile dependent community is “a community that has high levels of per capita automobile travel, automobile oriented land use patterns, and reduced transport alternatives” (Litman 2002, 1). This dependency imposes a number of economic, social, and environmental costs not only on automobile users, but also on the community.

Automobile owners are directly affected by those costs and they indirectly affect other people who use other modes of transportation. Automobile dependency disperses land use patterns, making it more difficult and expensive for cities to provide an effective transit system and limiting the possibility to walk or bike in the city because the distances are too great. Other costs that the automobile dependency has caused are increased air pollution, risk of accidents, and infrastructure expenses (Litman 2002; Kay 1997). However, most Americans view the automobile not as a problem, but as a solution to many of their mobility needs (Dunn 1998). They do not realize that the traffic congestion

they hate is caused by their behavior of individuality and independence, riding in their own car alone (Downs 1992).

The government in an automobile dependent community has many difficulties offering high-quality transportation accessibility to non-drivers, since taxpayers are unwilling to subsidize transit services and facilities for non-motorized transport that are not heavily used (Litman 2002).

## **1.2 Public Transit Renaissance**

The first real effort to provide federal assistance for urban mass transportation development was the passage of the *Urban Mass Transportation Act* of 1964. In 1973, the *Federal-Aid Highway Act* permitted greater flexibility in the use of some highway funds, including their use for urban mass transportation and, for the first time, urban mass transportation planning was funded separately. These resources placed transit on a more equal balance with highways and considerably strengthened multimodal planning and implementation. Since 1973, many urban areas, such as San Francisco, Washington D.C., Atlanta, Baltimore, San Diego, Miami, and Buffalo, started seeking alternatives to the construction of freeways. Some of those alternatives, such as heavy rail systems, subways, and preferential treatment for buses, were considered to bear high construction costs. Consequently, the construction of light rail systems was seen as one of the preferred alternatives (Weiner 1999). By the 1990s, Boston, Cleveland, Newark, New Orleans, Philadelphia, Pittsburgh, and San Francisco had renovated existing lines or had replaced their existing vehicle fleets. Baltimore, Buffalo, Dallas, Los Angeles, Portland, Sacramento, St. Louis, San Diego, and San Jose had opened new light rail systems, while

Bayonne's (Northern New Jersey) and Salt Lake City's new lines were under construction. By contrast, Washington D.C and Atlanta developed heavy rail systems, because they had high density, compact land use, and enough travel demand to justify the system (Weiner 1999; Porter 1998).

Nevertheless, the widespread suburbanization of US cities had produced a disperse pattern of development that is difficult to serve through mass transit. Consequently, the number of people who use mass transit as a daily form of transportation has not increased in the way governments expected when they originally decided to build the rail systems (Dunn 1998; Gomez-Ibanez 1996).

### **1.3 Bicycle and Pedestrian Rising**

Bicycling and walking are two important and popular modes of transportation that are essentially used for exercise and recreation. They are not widely used for commuting or travel in the United States. The study "Why bicycling and walking are not being used more extensively as travel modes" produced by the U.S Department of Transportation in 1994, compared 20 cities of the U.S., analyzing levels of, barriers to, and incentives for bicycle and walking commuting. The study found that the widespread, low-density land use patterns in most of the cities coupled with automobile dependence constitute the most important reasons why people do not bike or walk more. This is because they do not want to travel such long distances every day without a car and because the roads and general infrastructure are oriented to automobile use, making it unsafe and inconvenient for bicyclists and pedestrians. It was observed that the major levels of walking or bicycling travel is present in cities with the following characteristics: "more people commuting

short distances, a high proportion of bikeways and bike lanes, a mild climate, and a large proportion of students in the population”(94).

The *Federal-Aid Highway Act* of 1978 (and subsequent legislation) includes bicycle projects in the permitted uses for highway funds, but investments in this mode of transportation started mainly with *ISTEA* in 1991 and its follow-up *TEA 21* in 1997. (Weiner 1999; Pucher, Komanoff & Schimek 1999). Before *ISTEA* was passed in 1991 most of the cities in the US, including those in the study area, directed transportation investments mainly to the development of automobile-related facilities, such as building and widening roads, bridges, highways, parking lots. Since 1991, it has been possible to use part of the highway funds in the development of alternative modes of transportation. However, these resources are still low for accomplishing a multimodal transportation system, especially in middle sized metropolitan areas.

As a result of *ISTEA*, some states and cities in the U.S. have improved bicycle and walking transportation. Currently, most states have bicycle and pedestrian coordinators and programs. In April 2004, eleven cities were awarded by the League of American Bicyclist with the “bicycle friendly community” designation, joining twenty seven other cities that had been designated in previous years. This yearly award is given to those communities that develop facilities and programs to encourage bicycling for transportation, fun, and fitness. The evaluation criteria include:

The physical environment for bicycling -- on-street facilities, trails, parking etc; education programs to promote a "share the road" ethic among bicyclists and drivers; promotional initiatives to persuade people to ride or ride more often; enforcement of traffic laws for both motorists and bicyclists; future plans and evaluation techniques to improve conditions further (League of American Bicyclists 2004, paragraph 6).

As an example of these improvements in bicycling, Boulder, Colorado, which won the gold level in 2004, invested \$4.5 million (19%) of its approved 2003 transportation budget on bicycle mode operations/maintenance and enhancement initiatives. Ten percent of all resident trips and 16 percent of all commuting trips are made by bicycle and nearly seven percent of residents view bike commuting as their primary mode of travel to work, according to the Census. Bike lanes have been delineated in 78 percent of Boulder's arterial streets. "Courtesy is Contagious" is the name of the successful educational campaign that started since June 2002 (League of American Bicyclists 2004).

The 1990s witnessed a dramatic increase in funding for bicycling facilities in the US. Nevertheless, many states and MPOs have simply met the letter of the law by mentioning bicycling, without proposing or enacting policies and programs to improve conditions for bicycling.

The Missouri Department of Transportation started a Bicycle/Pedestrian program in 1991 with the purpose of encouraging and coordinating efforts to improve conditions for walking and bicycling. Engineering, education, enforcement, and encouragement are the four factors that this program seeks to sustain (MoDOT 2003). Projects directed to improve this mode of transportation in local communities have, since then, found better support from the state government.

#### **1.4 Transportation and Land Use Relation**

Transportation decisions have significant total impacts on land use patterns. In addition to increasing the amount of land required for roads and parking facilities,

automobile-oriented transportation tends to produce sprawl, which reduces development densities, disperses destinations, supports single-use development patterns that require greater mobility to reach activities (jobs, shopping, recreation, etc.), and reduces transportation options (such as walking, cycling, public transit) (Litman 2003; Newman&Kenworthy 1999). In order to combat sprawl, a new planning idea has been developed, called Transit Oriented Development (TOD). TOD refers to residential and commercial areas designed to maximize access by transit and non-motorized transportation. This kind of development seeks a land use pattern where people live closer together and have more shopping and employment destinations, reducing trips and increasing the alternative transportation systems such as bicycling, walking and public transit.

One major study predicted that Transit Oriented Development would reduce single-occupant vehicle commuting by 22.5%, increase transit and non-motorized travel by 27%, and reduce congestion by 18% compared with increasing highway capacity (1000 Friends of Oregon 1997, 15).

### **1.5 Alternative Modes of Transportation: New Tendency**

New strategies have been developed to alleviate suburban traffic congestion under the general category of Transportation Demand Management (TDM) which represent fundamental changes in land use and transportation planning (Litman 2000). TDM strategies, referenced in Table 1, attempt to discourage the use of motorized vehicles through increasing alternative modes of transportation, pricing motorized vehicle related issues, and improving land use management (Litman 2000).



Anthony Downs, in his book *Stuck in Traffic: Coping with Peak-Hour Traffic Congestion* (1992), analyzed 23 different tactics for reducing peak-hour congestion using criteria related to four factors: costs of implementation, effectiveness at reducing congestion, ease of implementation, and political acceptability. The general conclusion was that most of those tactics applied individually do not have a great impact in reducing traffic congestion. For example, the implementation of parking pricing may not generate a great impact by itself. However, it will be successful if other complementary programs, such as ridesharing, guaranteed ride home, transit, pedestrian and bicycle improvements, were also executed. Downs then recommended a multifaceted approach, even though he is an advocate of imposing high costs on solo commuting by private car. He also found that the most effective tactics require regional action planning and administration across an entire metropolitan area.

**Table 1. Transportation Demand Management Strategies**

<b>Transportation Alternatives</b>	
Transit Improvements	Ways to improve and promote public transit.
Shuttle Services	Shuttle buses, jitneys and free transit zones.
Park and Ride	Programs to provide convenient parking at transit and rideshare stations.
Bike/transit integration	Ways to integrate bicycle and public transit to improve mobility.
Bicycle Improvements and Parking	Selection and location of bicycle racks, bicycle lockers and changing facilities.
Pedestrian Improvements	Ways to improve walking conditions.
Small Wheeled Transport	Accommodating roller skates, push scooters, handcarts and utility wagons for transportation.
Ridesharing	Ways to support and encourage carpooling and vanpooling.
Alternative work schedules	Flextime, Compressed Work Week (CWW), and staggered shifts used to reduce peak-period vehicle traffic.
Car-sharing	Vehicle rental services intended to substitute for private vehicle ownership.
Guaranteed Ride Home	Programs that provide an occasional subsidized ride home to commuters who use alternative modes.
Taxi service improvements	Ways to improve taxi services.
Telework (telecommuting, distance-learning)	Ways to encourage use of telecommunications as a substitute for physical travel.
HOV High Occupancy Vehicle Priority	Strategies that give transit and rideshare vehicles priority over other traffic.
Universal Design	Transportation systems that accommodate all users, including people with disabilities and other special needs
<b>Pricing Vehicle Related Issues</b>	
Commuter Financial Incentives	Parking cash out, travel allowance, transit and rideshare benefits.
Road, Congestion and Parking Pricing	Road tolls, HOV lanes, charge motorists directly for parking. Used to reduce peak-period vehicle trips
Distance-based pricing	Charging insurance, road use fees, emission charges and taxes based on a vehicle's mileage.
Fuel Taxes	Increasing fuel taxes to fund roads, encourage energy conservation, and reduce travel demand.
Pay-as-you-drive vehicle insurance	Converting vehicle insurance premiums into distance-based charges.
<b>Improving Land Use Management</b>	
Vehicle use Restrictions	Regulatory strategies to limit automobile travel at a particular time and place.
Parking Management and Shared Parking	Strategies for more efficient use of parking and Sharing parking facilities among multiple users.
Address security concern	Improving personal safety for walking, cycling, transit and urban infill.
Traffic Calming	Roadway design features that reduce vehicle traffic speeds and volumes.
Non-motorized Facility Management	Best practices for managing and maintaining non-motorized facilities such as walkways, sidewalks and paths.
Car-free Districts and pedestrianized streets	Designing special areas and times for minimal automobile use.
Clustered Land Use	Locating common destinations close together.
Smart Growth	Land use practices to create more resource efficient and livable communities
Transit Oriented Development TOD	Multi-modal and livable communities based around transit stations.

Source: Litman 2000, 7.

## **1.6 Conclusion**

The literature review shows that both the problem of traffic congestion as well as the issue of alternative transportation systems have been widely studied for the last twenty years. However, in many urban areas in the United States, communities are automobile dependent and offer very few options to the automobile for those people who cannot drive or who wish for a multi-modal transportation system.

Some research has focused on the barriers or obstacles for developing those alternative transportation systems in the United States. Pucher, Komanoff and Schimek (1999), for example, studied cycling in 6 cities: San Francisco, Boston, Seattle, Toronto (Canada), Madison (WI) and Davis (CA). They determined the factors affecting cycling and developed seven steps to increase the use of this mode of transportation in North America. They found that bicycling has increased in the last two decades not only in the cities studied, but also as a whole. However, when compared with automobile use, bicycling is still very low. Even though climate and topography affect cycling, they are not the main reasons for low use. The low-density sprawled land use pattern found in most of the American cities constitutes the main barrier for bicycling and walking because it increases the average travel distances. Other barriers found were: culture, custom, and habit (since most American people consider cycling solely as a recreational activity); the cost, speed and convenience of other modes such as car or transit; the perceived danger; and the lack of cycling infrastructure. Those findings are in concurrence with the conclusion of another study carried out by the U.S Department of Transportation in 1994, which was previously referred to in this thesis. Both of these

studies propose steps or policy options to increase bicycling in the U.S. based on the barriers found.

Some fast growing metropolitan areas, such as Springfield, Missouri, are facing traffic congestion problems and lack of alternative transportation systems. This rapid growth brings with it the need to study the situation of transportation and determine the obstacles to implementation of those alternatives that have been widely discussed. In the same way, it is important to identify factors that influence the lack of implementation and mechanisms to counteract this gap.

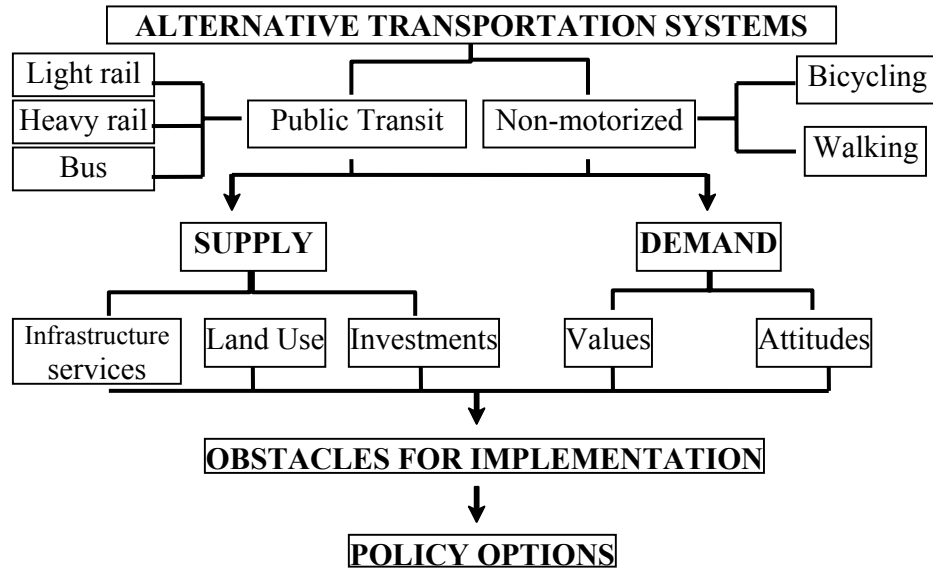
### **1.7 Theoretical Framework**

For the purposes of this study, Alternative Transportation Systems refers to those transportation systems that are different to the automobile. They include transit, bicycling and walking. The word “system” is used in order to include facilities, administration and users that relate to each alternative mode.

The existing situation of alternative transportation systems in Springfield MO area was studied through an analysis of supply and demand for each of these. The supply-side represents physical-environmental, economic, and political aspects. More specifically, supply includes the existence, viability and condition of transit and non-motorized transportation facilities, services, and roads; the relationship between land use patterns and transportation; plans, programs and regulation for the future; and public and private investment in transit or non-motorized transportation.

The demand factor characterizes socio-cultural aspects. It involves human value structures, such as principles and standards that make people choose automobiles instead

of alternative transportation systems. It also contemplates attitudes or people's disposition toward alternative transportation systems. Behavior and choices of people regarding transportation modes are studied to determine the demand for alternative transportation systems. Figure 1 illustrates the elements and factors of this study and their relationship.



**Figure 1. Theoretical Framework**

This chapter reviewed the historical context of the development of alternative transportation systems and the main elements and factors to study these systems. The next chapter will explain the methods used in this study.

## 2. METHODS

The obstacles for developing alternative transportation systems in Springfield MO area were studied using both qualitative and quantitative methods. Figure 2 illustrates this process.

### 2.1 Data Collection

The data collection process included four main activities: mapping, attitude surveys, open-ended interviews, and document reviews.

**2.1.1 Mapping.** Maps of existing alternative transportation systems in the Springfield area were done using Geographic Information Systems (GIS) ARCGIS 8.1. The database for the map was taken from the City of Springfield, City Utilities of Springfield, and Census 2000. GIS analysis of the area was a very important tool for this study, making it possible to have a geospatial understanding of the area, to localize existing alternative modes of transportation, to determine the areas that lack alternative transportation systems and to establish the main areas that may need these alternatives such as activity centers and high and medium density residential areas.

**2.1.2 Survey on Transportation Alternatives.** The goal of the survey was to determine the attitude of Springfield citizens towards the use of alternative modes of transportation but also the characteristics in the present use of biking, walking or public transit. The city of Springfield, Missouri was chosen to represent the area in this survey, because it is the only one, within the MPO, that has transit and biking as alternatives to

the automobile. Moreover, Springfield and it comprises approximately 60% of the population of the area.

Persons selected for this study were residents of Springfield who were older than 18 years. Systematic samples were applied using GIS to select all the blocks that have population in the census of 2000. Subsequently, 40 blocks were picked randomly. Then a sample interval of “3” was chosen, meaning that a survey of every third house was taken. After estimating the number of houses per block, a first house was picked at random for each block, a survey was taken from it and then every third house of that block was also surveyed.

Only one questionnaire was filled per chosen house and a maximum of three trips to each house were done on Saturday, Sunday, and one weekday at different times if people were busy or there was no answer. This assured equal opportunity of participation for everybody who was taking part in the survey.

The survey was conducted from July to September 2003. Two hundred and twenty eight people participated in the survey, 84 people refused to participate, and 88 houses were visited three times receiving no answer from the residents. A total of 400 citizens were invited to participate in the survey and a response of 57% (228 people) was achieved. This sample has an error of approximately 6.5% at the 95% confidence level.

To maintain privacy and confidentiality, the questionnaire did not include the name or address of the respondents, and other personal questions such as age and income were treated as ranges.

One of the blocks that was randomly selected contains two dorms from Southwest Missouri State University, and therefore fifty-nine surveys, of the 228 total, came from these residents. These surveys very likely inflated the number of people using bicycle and walking the short distances to go to school.

**2.1.3 Documents Review.** Historic and recent government documents related to transportation in Springfield area were analyzed, comprehensive plans, transportation plans, transit reports, and other general literature.

**2.1.4 Interviews.** Open-ended interviews were conducted with decision makers and other key people with regard to transportation planning in the Springfield area in April 2004.

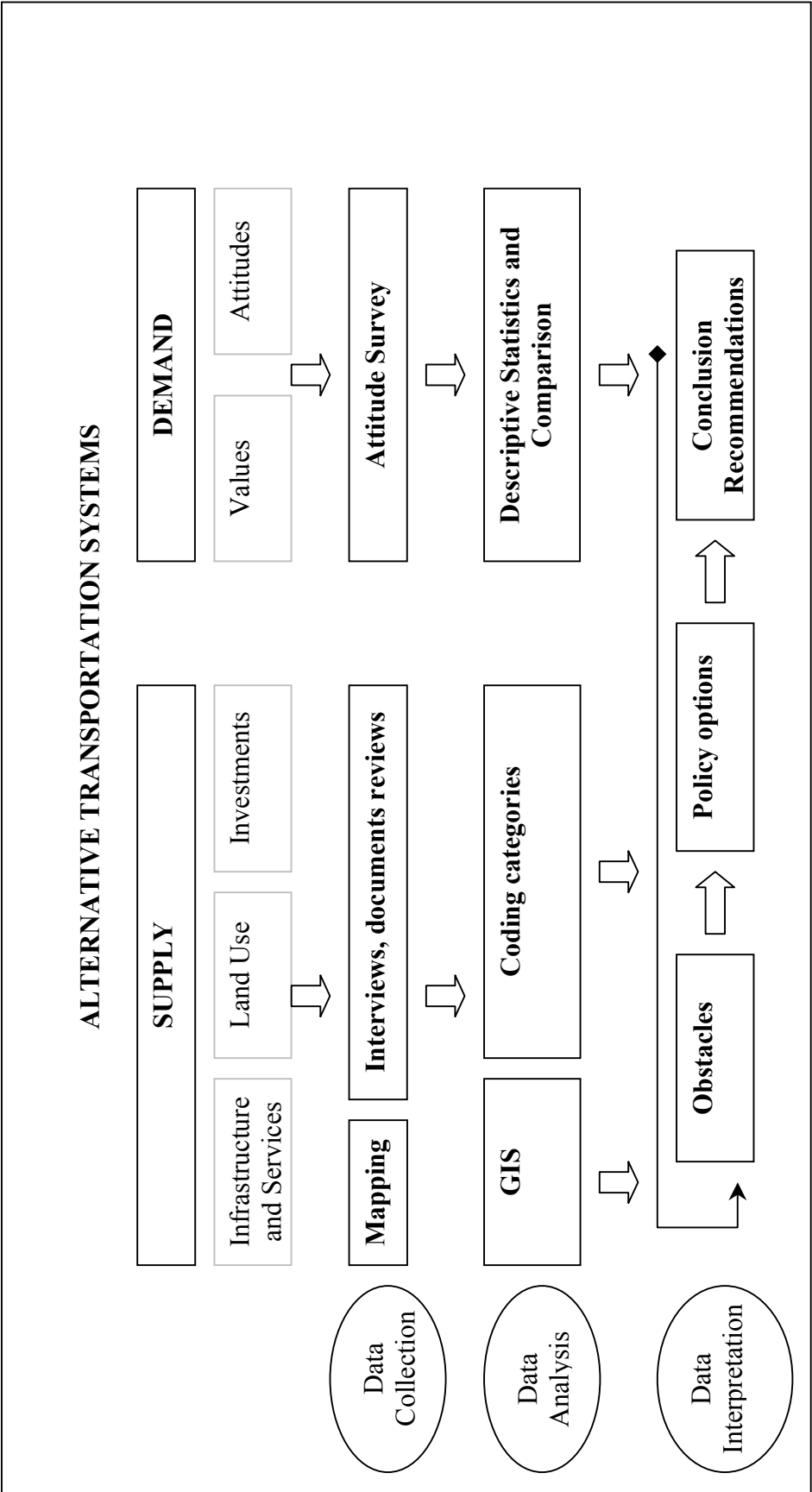
**Table 2. Stakeholders interviewed during the study process.**

<b>Name</b>	<b>Title</b>	<b>Organization</b>
Natasha Longpine	Associate Planner	Southwest Missouri Council of Governments
Frank Miller	Senior Transportation Planner	Missouri Department of Transportation MoDOT
Dan Rudge	Executive Director	Ozark Transportation Organization OTO
Fred Marty	Vice-president Administrative Services	Southwest Missouri State University
Carol Cruise	Senior Manager-transit services	City Utilities of Springfield
Terry Whaley	Executive Director	Ozark Greenways
Bruce Abid-Yadzi	Bicycle advocacy committee	Springbike bicycle Club
Ralph Rognstad	Director Planning and Development Department	City of Springfield
Jim Dow	Facilities Management	Springfield Public Schools
Steve Childers	Planner	City of Ozark
Brian Bingle	Planning and Development Director	City of Nixa
Wally Schrock	Planner	City of Republic
Carl Carlson	City Administrator	City of Willard
Paul Engel	Planning Commission Secretary	City of Battlefield
Kevin Lowe	Highway Administrator	Greene County



## **2.2 Data Analysis**

The data collected in the attitude survey was coded and analyzed by computer using descriptive statistics and comparisons. The results from the data analysis were interpreted to define the obstacles for developing alternative transportation systems, suggest some policy options, and give recommendations for further research.



**Figure 2. Methods**

### **3. STUDY AREA**

The Area of study includes the municipalities that belong to the Metropolitan Planning Organization, Ozark Transportation Organization (OTO). Figure 3 shows the location of the study area, which for the purpose on this study has been called “Springfield MO area”, which covers most Greene County and Northern Christian County including the urbanized area defined by Census 2000: Springfield, Republic, Willard, Stratford, Battlefield, Nixa and Ozark.

The City of Springfield is the main core of the Springfield MO Area. It is a regional retail sales, service and employment center, served by Interstate 44 and US highways 60 and 65 that connect the city to others surrounding towns. These towns have characteristics of suburban dormitory communities with a sprawled development pattern, a fast growing population and high level of out-commuting mainly to the city of Springfield.

#### **3.1. Springfield MO Area: an Auto-dependent Community**

The Springfield MO area could be classified as an auto dependent community, which is characterized by high level of automobile use and automobile related facilities and scarce development of alternative transportation systems. According to the commuting data of Census 2000, more than 80% of the population in Springfield and adjacent towns drive alone to work, around another 10% carpool, and very few use other transportation choices such as public transit, bicycling and walking (See figure 4).

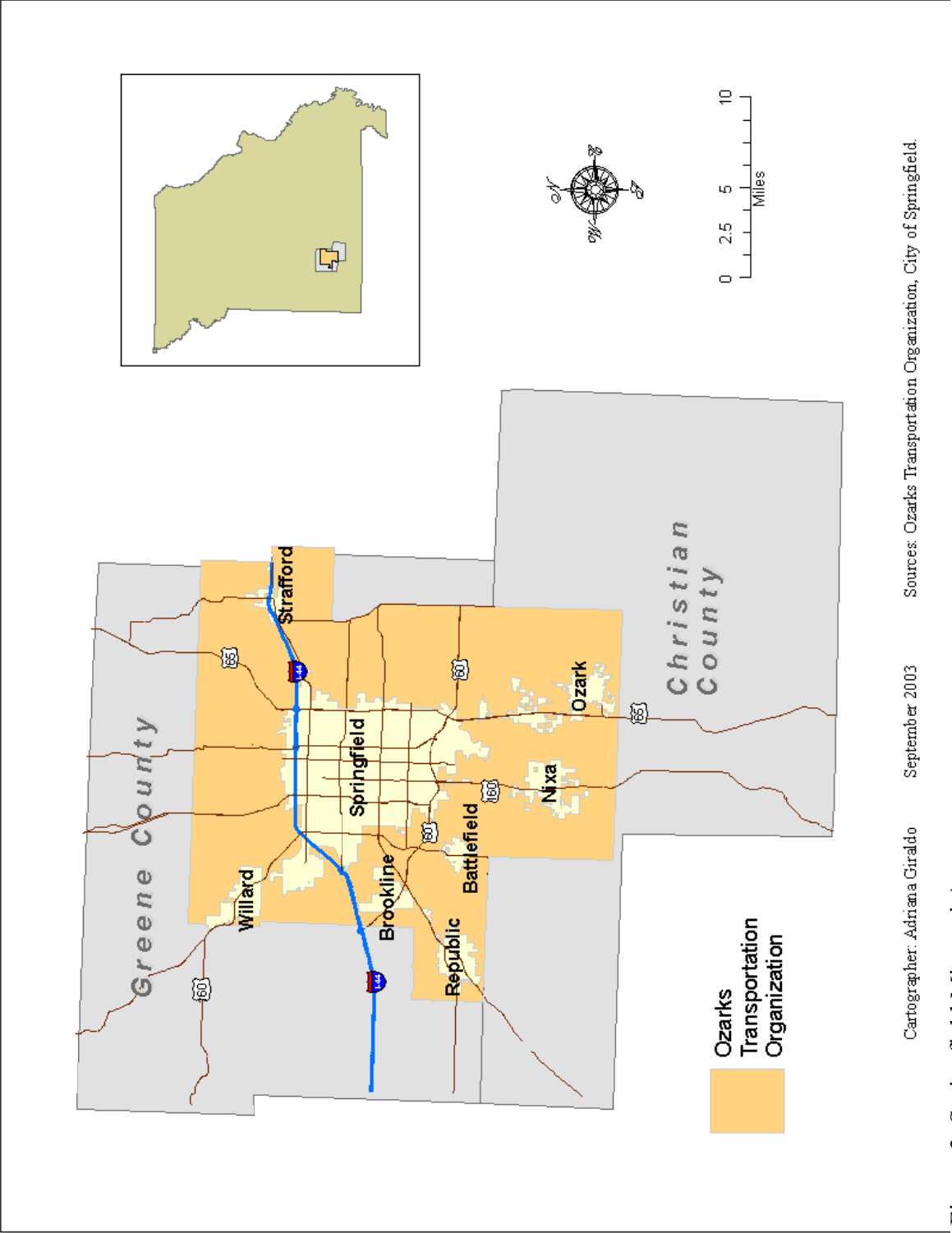
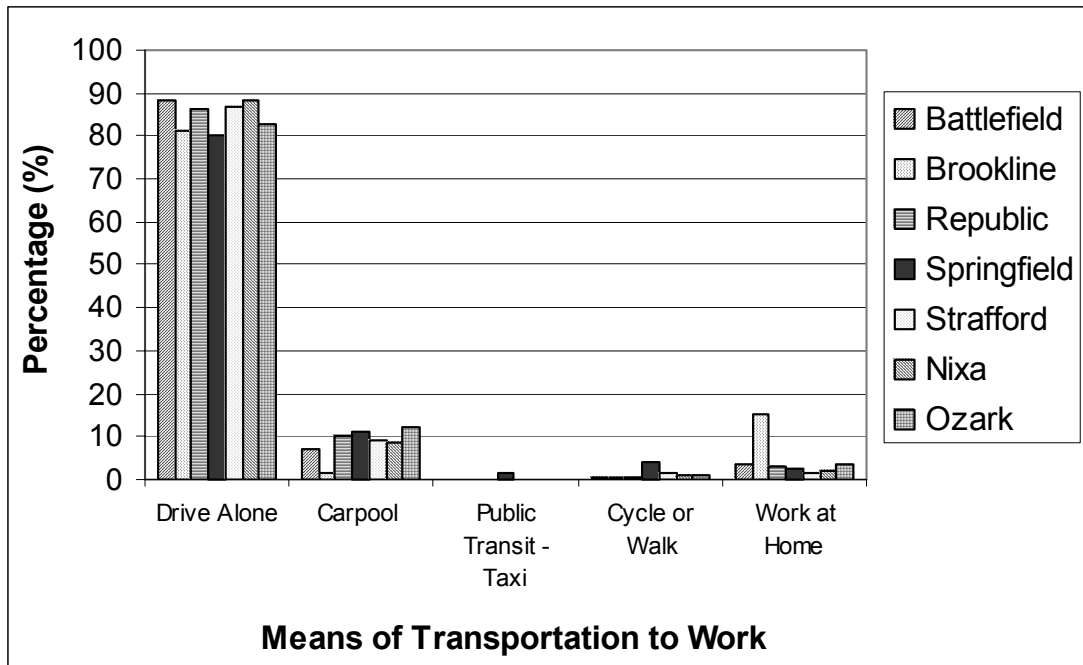
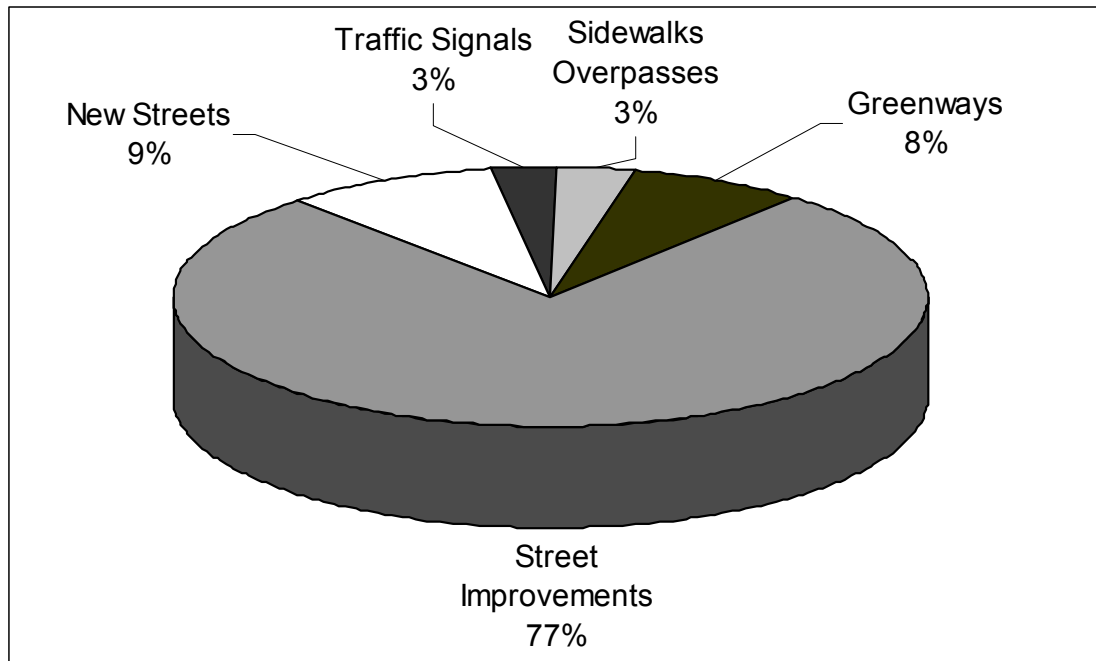


Figure 3. Springfield Missouri Area



**Figure 4. Commuting Patterns in Springfield MO area (Census, 2000)**

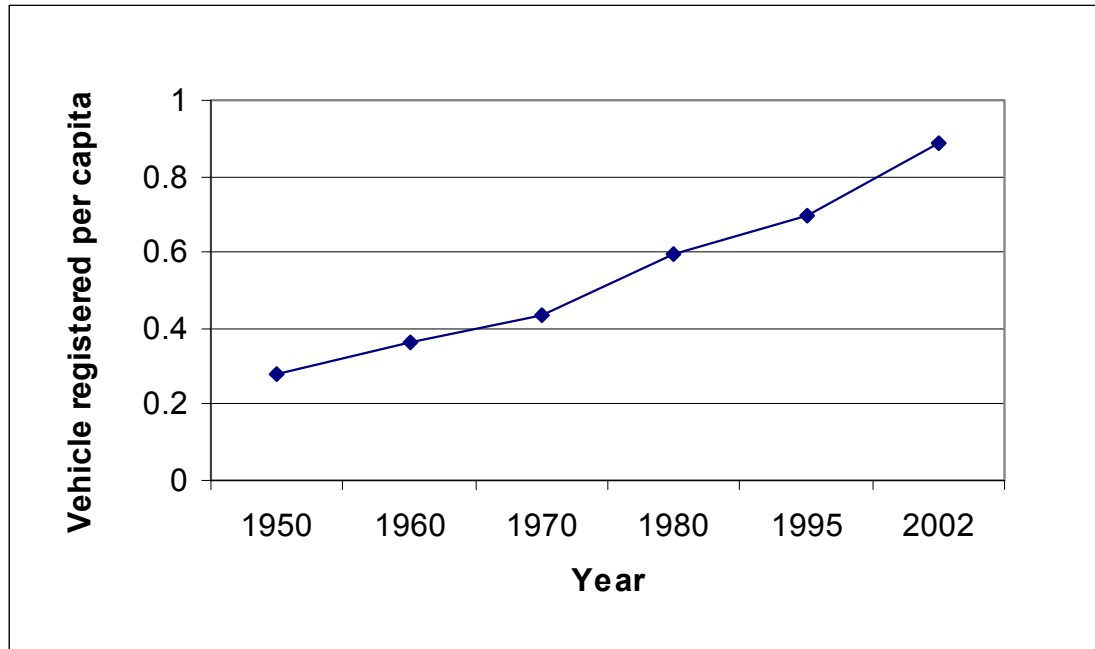
The transportation investments in the study area are mainly targeted toward automobile related improvement projects. In the City of Springfield, for example, the *Capital Improvement Program - CIP* for the fiscal year 2003-2008 designated only 11% of its transportation investments to the development of non-motorized transportation facilities such as sidewalks, overpasses and greenways, while the remaining 89% was chosen to be invested in automobile oriented activities, mainly street improvements (See figure 5). In the last decade, however, some of the streetscape projects developed in the City of Springfield have benefited alternative transportation modes, since this projects aim to enhance the aesthetics of the street, calm traffic, and improve conditions for bicyclists and pedestrians.



**Figure 5. City of Springfield Transportation Investments CIP 2003-2008.**

Transportation investments and commuting patterns in the area are directly related to the high automobile use, which is growing at a greater rate than that of the population (Vision 20/20 Transportation Plan, 2001, p.21). As an example of this, figure 6 shows the increase in passenger vehicles registered per capita in Greene County from 0.3 vehicles per capita in 1950 to almost one vehicle for every person in 2002.

According to the *Highway Statistics 2001* the Daily Vehicle Miles Traveled (DVMT) in Springfield Area was 4,119,000, which translates to a 22.9 DVMT per capita (U.S. Department of Transportation, 2001). These data confirm that there is a high amount of car use in addition to having a large number of registered vehicles.



**Figure 6. Passenger Vehicles Registered per Capita, Greene County 1950-2002**

Source: City of Springfield, 1979; Vision 20/20 Transportation Plan, 2001.

### **3.2. A Historical Understanding of Land Use and Transportation Policies in the Study Area**

**3.2.1. Urban Development of Springfield Prior to Automobile Arrival.** In Springfield, like many other cities of the U.S., land use and development have been closely related to transportation patterns. In 1838, Springfield was incorporated as a town, with 132 acres of land, 15 businesses and 250 inhabitants living around the public square (Hogg 1934). At that time, walking was the main mode of transportation and the settlement was pedestrian oriented with a grid-type layout and a mixed use pattern.

The railroad came for the first time to the area in 1870. The first Atlantic-Pacific passenger train located its depot one and a half miles north of the city of Springfield. As a consequence of this location, the new town of North Springfield started taking form (Hogg 1934; Taylor 2003). Both towns had a similar structural form, a “main business

center with industry adjoining the railroad or major roads and waterways” (City of Springfield & Missouri State Highway Department 1963, 100).

Urban public transportation started in 1881 with horse-drawn cars that ran from the square of Springfield to North Springfield on a loop that followed Boonville, Commercial, Benton and St. Louis streets (See Figure 7). Four years later, the streetcars were electrified (UMTA 1975; Glazier 2003). Transit connected Springfield and North Springfield and encouraged a parallel growth of both towns, until they were consolidated in 1887 (Glazier 2003). While the streetcar was the main mode of transportation, the development of Springfield remained generally compact in between Kearney, Kansas, Catalpa and Delaware streets (City of Springfield & Missouri State Highway Department 1963).

**3.2.2. Influence of the Automobile in the Urban Form of Springfield.** In 1915 more than two hundred jitney automobiles started operating in Springfield as pay cars that offered flexible routes and times that people preferred. The Jitneys’ operation was not regulated at the beginning, which put the streetcars at a disadvantage, since their operators had to pay a portion of the costs of paving the streets that contained tracks. In 1935, seven streetcar routes served the older parts of the city and six bus routes operated in the newest developments south of the public square core. In 1937, the last streetcar ran and eighteen new buses started serving the entire city (UMTA 1975).



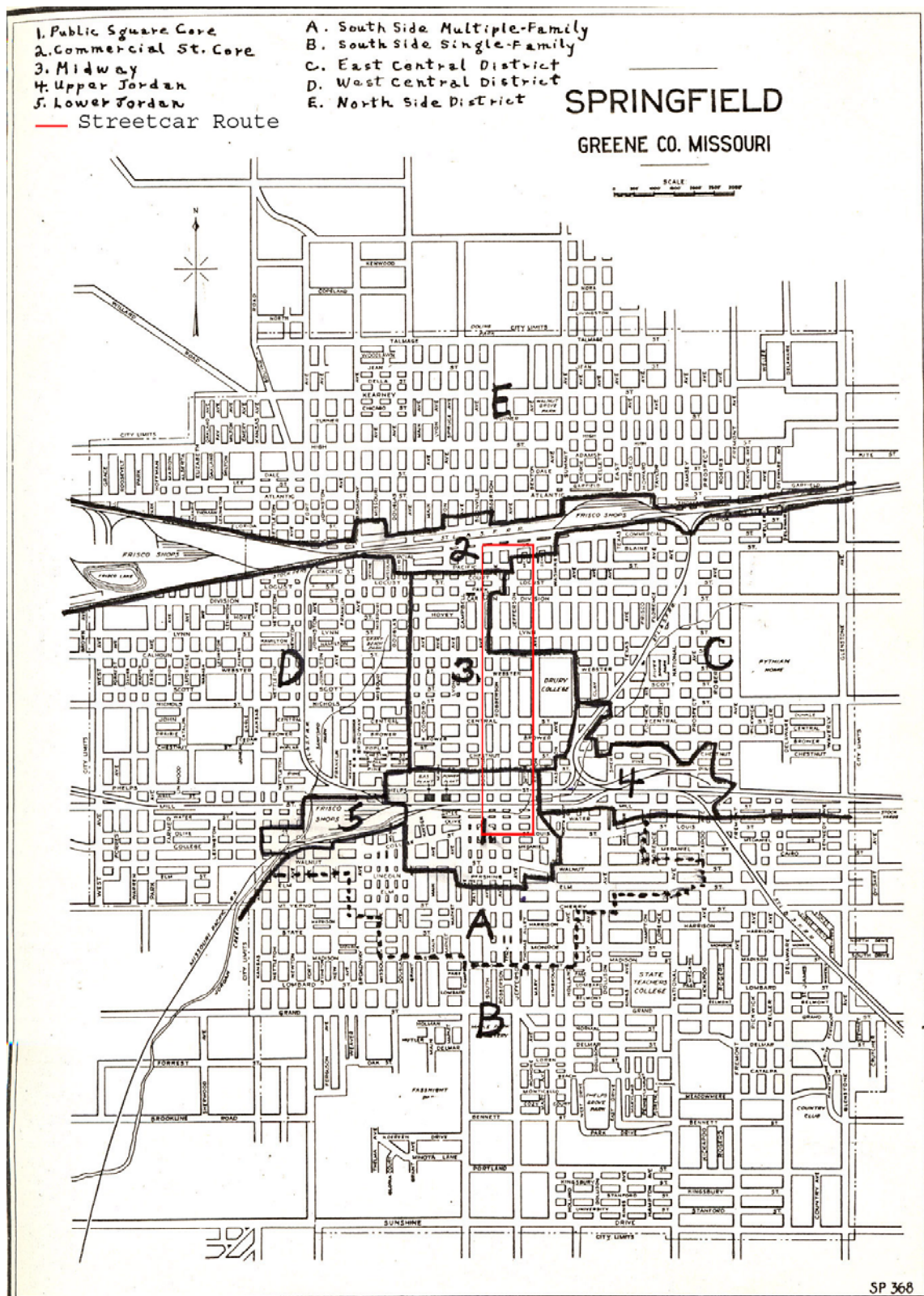


Figure 7. Streetcar route, Springfield 1881. Adapted from Hogg 1934.

Since the beginning of the 20<sup>th</sup> century, the use of automobiles was highly encouraged for local, state and federal governments, through transportation policies such as the *Federal Highway Act* of 1916, the State of Missouri's *Centennial Road Law* of 1921 and other local projects. The use of automobiles increased rapidly in the U.S. For instance, the number of cars registered in the state of Missouri went from 180 cars in 1900 to 671,259 cars in 1930 (FHWA 2003). Influenced by this increasing automobile use, the Springfield urban area expanded its limits in 1926 to include Sunshine, Talmage, Glenstone, Kansas and West Avenue. Before this, Springfield's urban form had been mainly concentrated between the square and Commercial street and had a rectangular street pattern. Commercial activity was clustered along corridors that had been served by the streetcar; industrial development was found along the railroad trafficways, and residential places occupied land around the two cores of the central square and Commercial Street. Figure 7 illustrates the early urban pattern of Springfield (Hogg, 1935).

In the 1930s, developments of new low-density residential areas in the southeast part of town were influenced by zoning restrictions that did not allow scattered commercial areas, but allowed neighborhood commercial centers at strategic places situated on major street intersections. These centers were also a response to the improvement in the highway systems through the city (Hogg, 1935).

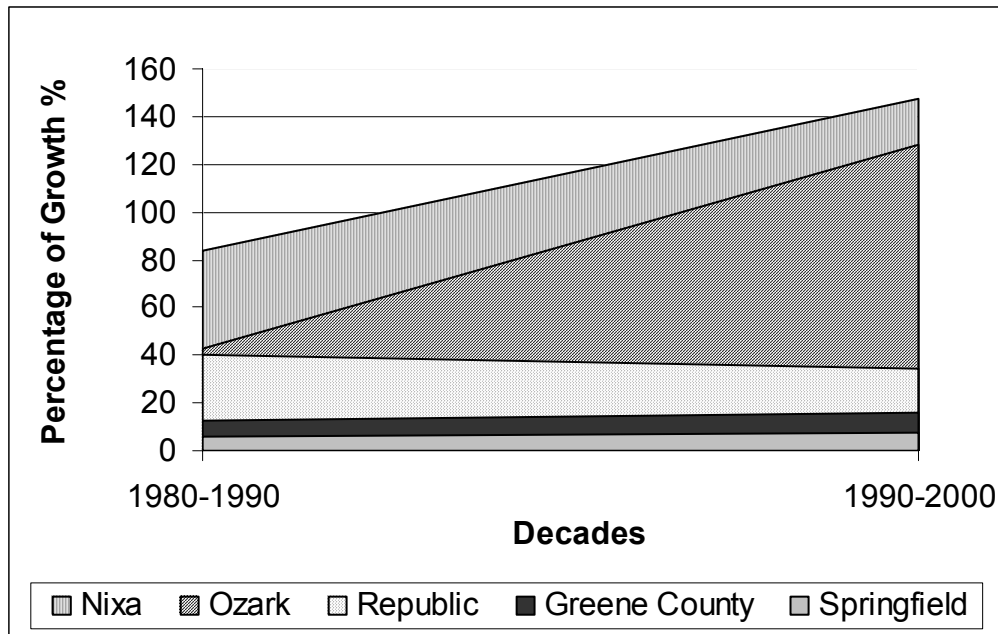
After World War II, the increased development of interstates and highways generated easy access to the inner city from the outer city. Therefore, low-density residential development and commercial activity expanded along major streets and highways, mainly Kearney, Campbell, Glenstone and Sunshine (City of Springfield &

Missouri State Highway Department, 1963), promoted by the high use of private automobile that was a convenient and inexpensive mode of transportation. By the 1950s, traffic congestion had started to become a problem in Springfield. The solution given, then, to this problem was to make the automobile the most efficient mode of transportation. For instance, the urban Trafficway Program that was financed by federal, state and local government focused on road construction, widening and improvements, and the construction of bridges (City of Springfield, City Council 1958). Between 1950 and 1960, the population of Springfield increased at a high level compared with the other decades, with migration being an important factor contributing to this growth. In 1955, the city limits were expanded to include an area of 34.80 square miles, from 13.68 in 1926. Springfield's urban form and land use followed the general spread out pattern of most of the cities in the United States, a pattern that would dominate the city for the rest of the 20<sup>th</sup> century.

New developments in the Springfield area since 1970 were mostly located in the southeast, southwest and northwest fringes. Improvements in the thoroughfare system south of Sunshine Street, such as the widening of Battlefield Road, the upgrading of M Highway to a freeway status and the extension of Kansas Expressway and West Bypass, had a strong influence on these locations. Residential, commercial, and office developments were mainly concentrated in these areas. Industrial development was mostly located in the northwest and northeast of Springfield because of its proximity to the airport, Interstate 44 and the Burlington Northern Railway.

During the last decade of the 20<sup>th</sup> century, new housing developments outside the city limits increased the population of Greene County, which grew at a higher rate than

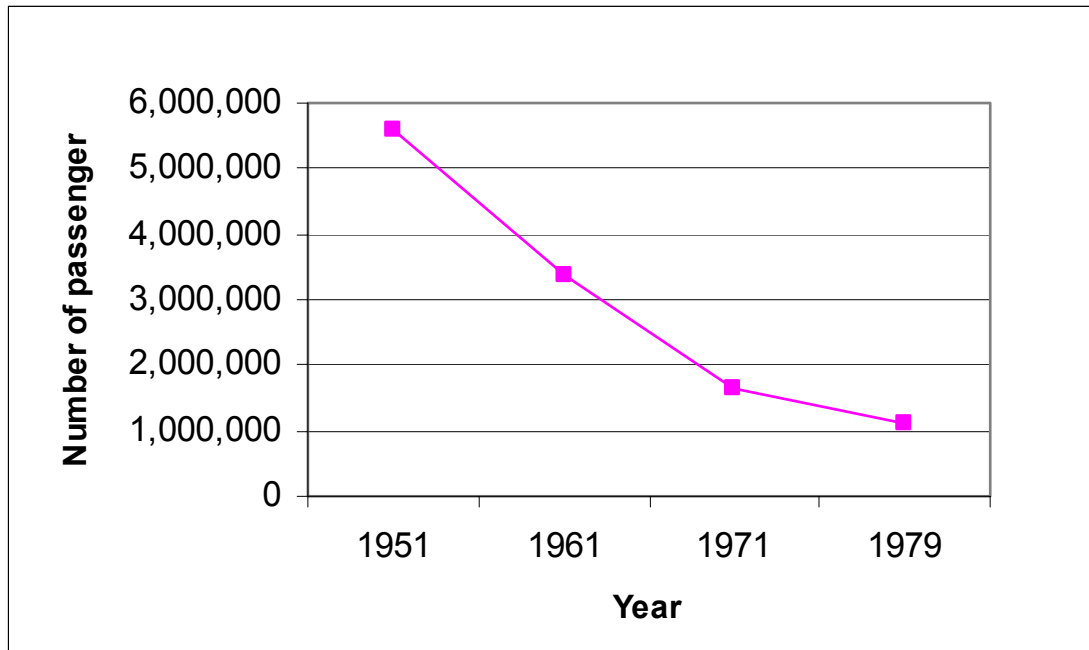
the population in Springfield. Figure 8 compares the rate of population growth in Springfield and neighboring communities in the 1980s and 1990s. The graph shows the rapid growth of the neighboring cities Nixa and Ozark located in Christian County, which grew 148% and 128% respectively in the 1990s, while population in Springfield grew only 8% in the same period.



**Figure 8. Population Growth in the Springfield MO Area 1980-2000 (Census, 2000)**

**3.2.3. Impact of Urban Sprawl on the Development of Alternatives to the Automobile.** The automobile domination present in many U.S. cities has made it really difficult for the transit system to be an efficient and self supported transportation mode. Springfield has not been the exception. Even though the transit system in Springfield has operated on a continuous basis since the end of the 19<sup>th</sup> century, its operation after the 1950s has been subsidized by the City Utilities ratepayers, the Federal Government, and the state government. Changes in modal transportation choices have been one of the main reasons for the decline in ridership that has translated into low passenger revenues. Figure

9 shows the dramatic decrease in bus ridership in Springfield between 1951 and 1971 of 40% of ridership (City of Springfield & Missouri State Highway Department 1963; UMTA 1975; City of Springfield 1980).



**Figure 9. Springfield Transit Ridership 1951-1979**

After the US government enacted the *Urban Mass Transportation Act* of 1964 that authorized the Secretary of Transportation to provide funds for public transportation matching 2/3 of federal funds to 1/3 of local funds, Missouri's Governor Hearnes created the Governor's Task Force on Public Transportation with the purpose of making greater use of mass transit facilities (Simpson and Curtin 1972). In 1975, the Urban Mass Transit Administration (UMTA) prepared a Transit Development Program to analyze the bus system in Springfield. Some of the reasons why Springfield citizens did not seem attracted by the bus service were that:

The car is a more flexible transportation mode, there is ample and free parking available in the Springfield area, the car is faster than the bus, and consequently bus

travel times appear excessive in a city where the typical trip by car average is 8.5 to 10 min (UMTA 1975, 13).

The Transit Development Program also found some factors that may have helped to raise transit ridership such as increasing automobile fuel and maintenance costs, gas shortages, increase in the population of senior citizens, increase in attractiveness of the town square, and improvement of the bus fleet. In the 1970s, the downtown area competed with major suburban commercial developments that put pressure on the bus system to become decentralized. This meant the establishment of new bus routes to serve suburban developments that did not have as a final destination the town square, which was how the system had been working since the beginning of the transit operations.

In the 1970s, the oil embargo led to a national energy crisis and increases in gas prices. This event urged the federal government to think about bicycling and walking as alternative modes of transportation. For example, with the purpose of encouraging walking in the Central Business District, an auto-free pedestrian zone was created in 1975 around the public square in the Park Central Mall. This trial was not successful, due to the complaints of citizens who considered it an obstacle for their mobility, and business owners who blamed the reduction of clients on this project (City of Springfield, Planning and Zoning Department 1981). In 1976, Springfield's Pilot Bike Route was one of 41 National Bikeway Demonstration Projects to be funded by the US Department of Transportation – Federal Highway Administration. In 1979, twenty miles of bike lanes and signed bike routes were striped along National, Grant, Bennett, Dale and High Street. Unfortunately, “due to problems in the bidding process the pilot program did not reach the process of ramp construction” and the existing bike lanes were eliminated in 1981 with a recommendation that less heavily traveled streets be considered for any future bike

route designations (City of Springfield, Planning and Zoning Department 1981). In order to reduce the use of auto fuel in this period, many other alternatives to the automobile were analyzed but not implemented, including carpooling, ridesharing, transit improvements, auto free areas and park & ride, among others (SATS 1981). Even though alternative transportation to the automobile was proposed and pilot projects were developed, they were not successful, due in part to lack of funding and little support from the citizens. In 1980, it was estimated that 98% of all trips made by Springfield residents were made by automobile (City of Springfield, Planning and Zoning Department 1982).

Nowadays, Springfield MO area can be considered auto-oriented. People drive everywhere for almost every reason. The development of dormitory communities surrounding the city of Springfield results in high commuting times. The Census 2000 data show a high mean travel time to work in the area that may result from the high volume of people commuting from the neighboring cities mainly to Springfield. For instance, 54.4% of the population of Christian County commutes every day to Greene County (Missouri Department of Economic Development 2003).

**Table 3 Mean Travel Time to Work in Greene and Christian County MO**

	<b>Greene County</b>				<b>Christian County</b>	
	<b>Battlefield</b>	<b>Republic</b>	<b>Springfield</b>	<b>Strafford</b>	<b>Nixa</b>	<b>Ozark</b>
<b>Mean Travel Time to Work (minutes)</b>	20	25.1	17	22.4	23.8	21.6

**Source: Census 2000.**

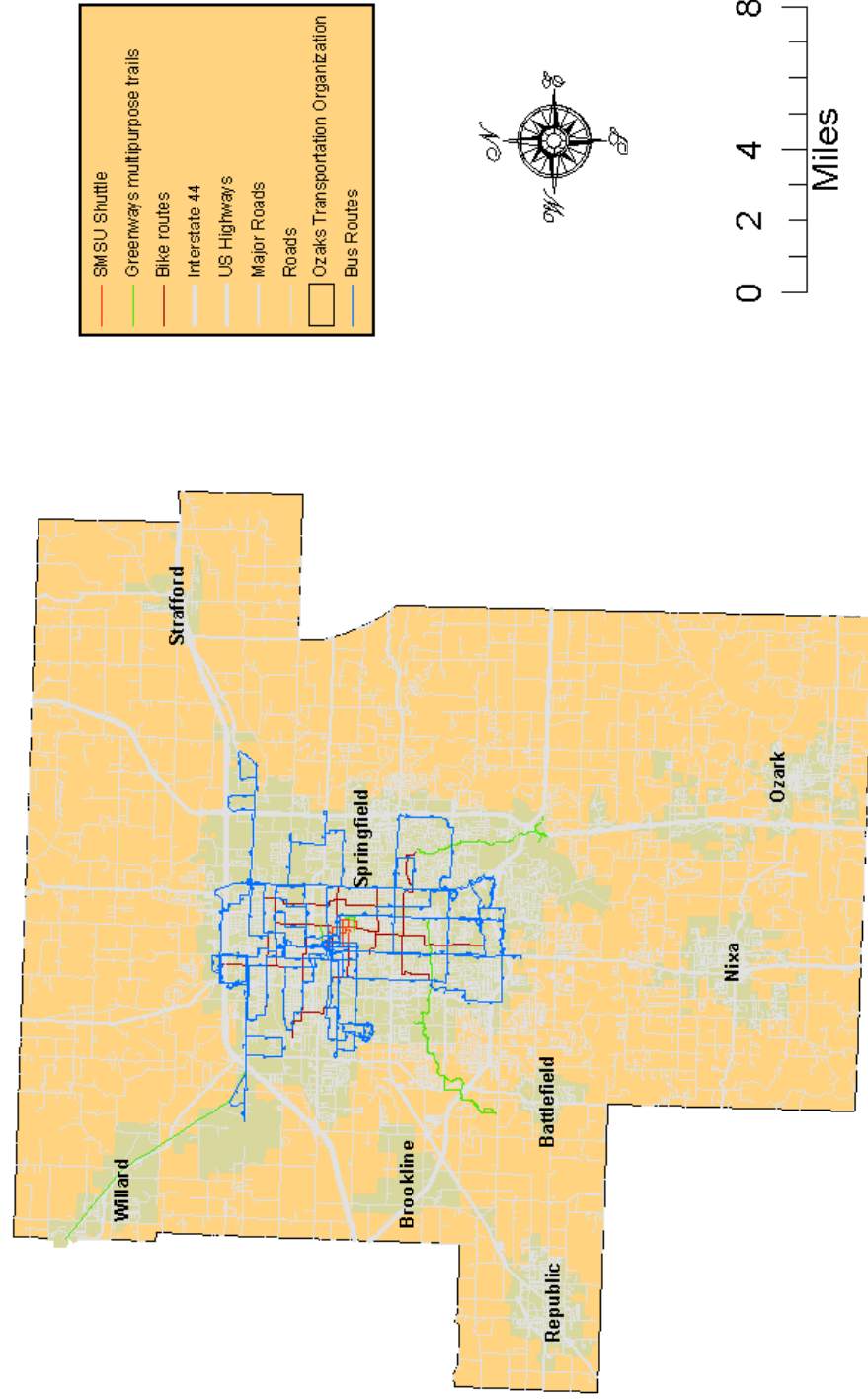
## **4. SUPPLY OF ALTERNATIVE TRANSPORTATION SYSTEMS**

### **4.1. Springfield MO, an Area with few Alternatives to the Automobile**

The Springfield MO area is well served by highways and roads compared to other transportation modes. Most of the trips are made by automobile and the area is facing problems of traffic congestion on major roads entering the city of Springfield, due to the large volume of vehicles that come into the city every day from neighboring communities, which is estimated to be 125,000 vehicles (Arnold 2003).

Planning for the implementation of alternative transportation systems in Springfield MO area has witnessed substantial progress in the last 15 years, compared to the rest of the 20<sup>th</sup> century. However, the supply of alternative modes of transportation is still very low for a livable community. Figure 10 illustrates the actual provision for roads, transit and bicycle/pedestrian paths. It can be visually recognized that the provision for alternatives to the automobile are still very low when analyzed at a regional level. It can be seen that most of the existent alternative modes are located in the City of Springfield and are focused on the Central Business District. The only neighboring community that offers an alternative to the automobile is the City of Willard, which is connected to northwest Springfield through the Frisco Highline Trail. This 6-mile gravel bicycle/pedestrian path connects to the City Utility bus system, which make it suitable as a choice for commuting from Willard to Springfield. In contrast, people from Nixa, Ozark, Strafford, Battlefield and Republic who travel to Springfield have just one alternative, which is to use their cars.





Cartographer: Adiana Giraldo November 2003 Sources: Ozarks Transportation Organization, City of Springfield, City Utilities, SMSU

The data presented in this chapter was extracted directly from the interviews with stakeholders from the Springfield MO area.

**4.1.1. Transit Improvements.** The Springfield MO area has three transit systems: the City Utilities transit services, the SMSU Shuttle System and OATS transportation service. For the purpose of this study, OATS services were not analyzed, because it is not a public service and it mainly serves older and/or disabled people. The existing transit systems only serve the City of Springfield.

City Utilities Bus. The existing transit service is operated by City Utilities (CU) of Springfield and, therefore, it only serves places located inside the city limits. The CU bus, like the other transit systems in Missouri, operates at a loss and it is "...far from being self sufficient and must rely upon a variety of different funding sources to cover its annual operating expenses" (Urbitrans Associates 2002, 23). It collects revenues from passenger fares and advertising, receives subsidy from federal/state government (grants which assist with operating expenses, not capital grants) and the amount remaining is absorbed by the electric and gas customers of City Utilities. The CU bus service faces the challenge of being effective in a low density, spread out city with very low ridership. In 2003 the ridership was only 1,529,264. Nevertheless, it is important to point out that this number has been increasing since 1997 when the passenger ridership was 1,075,215.

According to the *Vision 20/20 Transportation Plan* "the fixed route transit system should attempt to operate a bus within a quarter mile of every resident of Springfield" (64). Following this standard the service area of the CU bus in 2002 was 52 square miles, which accounts for 64.2% of the total area of Springfield. The locations that are not served by the bus are mainly newer residential areas that present a very low density and

ridership, thereby making the bus service operation unfeasible. However, CU bus has improved its overall efficiency after the *City Utilities 1995 Transit Plan*. Many transit routes have been restructured and fares have been changed according to the recommendations of the fixed route advisory committee which includes bus passengers, office staff and bus operators (Vision 20/20 Transportation Plan 2001, 61). Currently the CU bus serves the City of Springfield with 14 weekday routes; nine of them have service every 30 minutes and the other five routes run every hour. On Saturdays the service is reduced to 13 routes running every hour, and night/Sundays/major holidays fixed routes are very limited, with only three routes offering hourly service.

In order to promote the connection of bicycle and transit systems, two bike racks were installed on each city bus in March 2001 and three years later, two bike lockers were installed at the Park Central Transfer Facility with funding raised by the City and bicycle advocacy groups that were matched with state and federal government grants.

One of the problems encountered by the CU bus systems is the lack of sidewalks that allow a safe connection for riders from their homes or work places to the bus stops. In 2002 City Utilities and the City of Springfield partnered together to construct bus turnouts at high traffic bus stop locations. Sidewalks to connect these new facilities on State roads had to be built by CU with MoDOT permission.

Southwest Missouri State University (SMSU) Shuttle Bus. SMSU implemented a shuttle service in 1988 to transport students and staff on campus within 5 minutes to reduce car traffic and demand on parking. SMSU also built a Park and Ride transfer facility that is utilized as the primary service hub. Even though SMSU Shuttle has had a decent and increasing ridership (700,255 passengers in 2001), the demand on parking has

increased. Therefore in 2004 the university expected to start constructing a new Intermodal Transfer Facility. The SMSU Shuttle is free to all students, staff, and any citizen traveling among different destinations on campus, adjacent neighborhoods and downtown of the City of Springfield. Because of this characteristic this transit system is eligible for state and federal grants for capital projects competing with the CU bus. Other operating costs are covered by students' fees. At present, SMSU shuttle serves the campus with five weekday routes, all running about every five to ten minutes, with the exception of the orange route that runs about every fifteen minutes when classes are in session. The night route serves all areas of the campus after 6:00 PM. Buses operate about every ten to fifteen minutes until midnight. In summer and during intersessions the SMSU shuttle service is reduced to two routes serving the entire SMSU area and therefore the frequency of service decreases to every 15 minutes.

Figure 11 zooms into the City of Springfield showing the existing transit routes with a buffer of one fourth of a mile. This is a distance that is considered suitable for a person to walk to a bus stop, which is usually located every two blocks. It can be noticed that the bus serves areas surrounding main roads and the Central Business District. The areas that are not covered are mainly located closer to city limits and characterized by being low density residential areas (subdivisions).

Figure 12 illustrates major destinations in the City of Springfield that generate high amount of trips such as the 30 major employers, elementary, middle, high schools and colleges, health care centers and commercial centers. Most of these major destinations are within the CU bus service area.

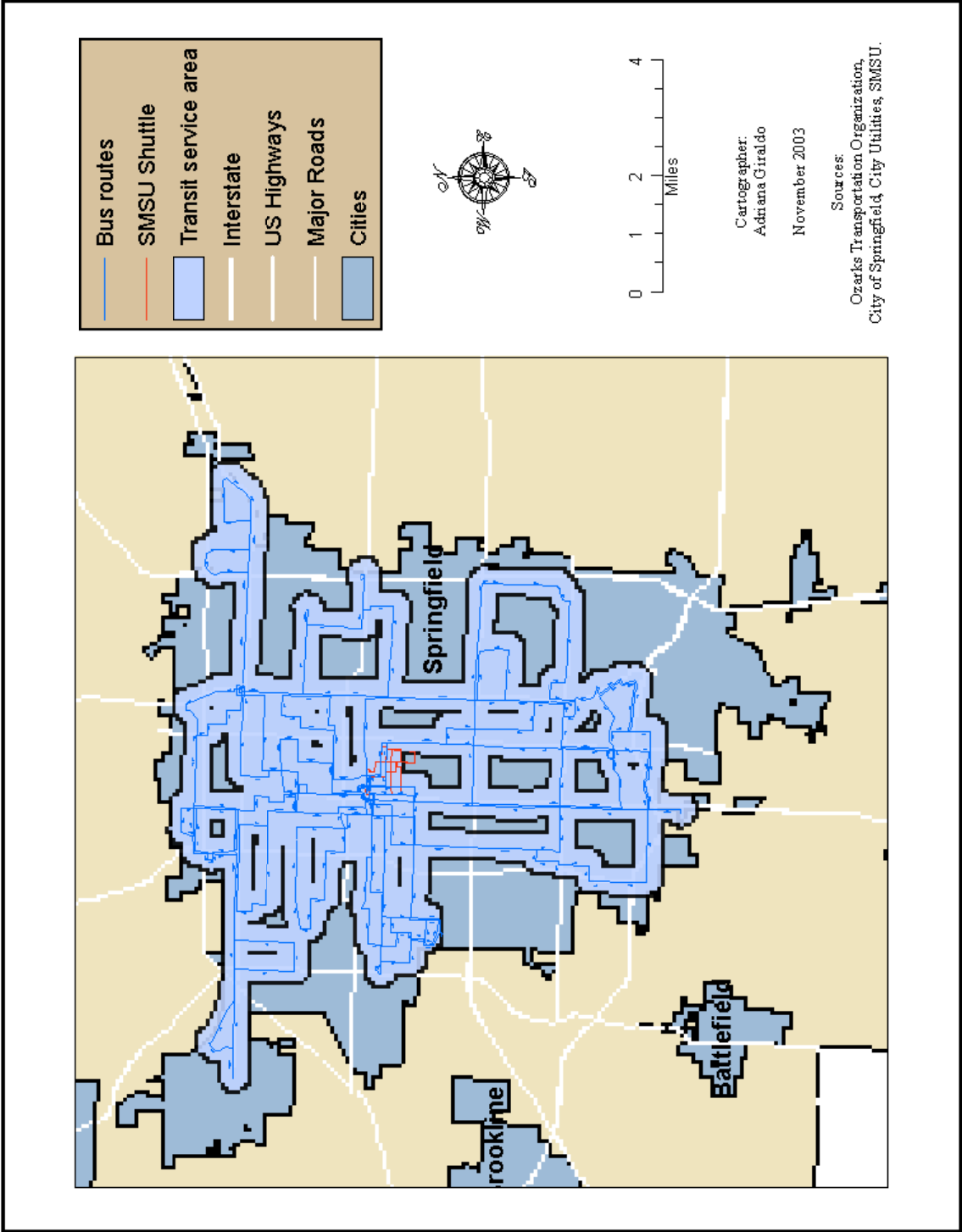


Figure 11 Transit Service Area

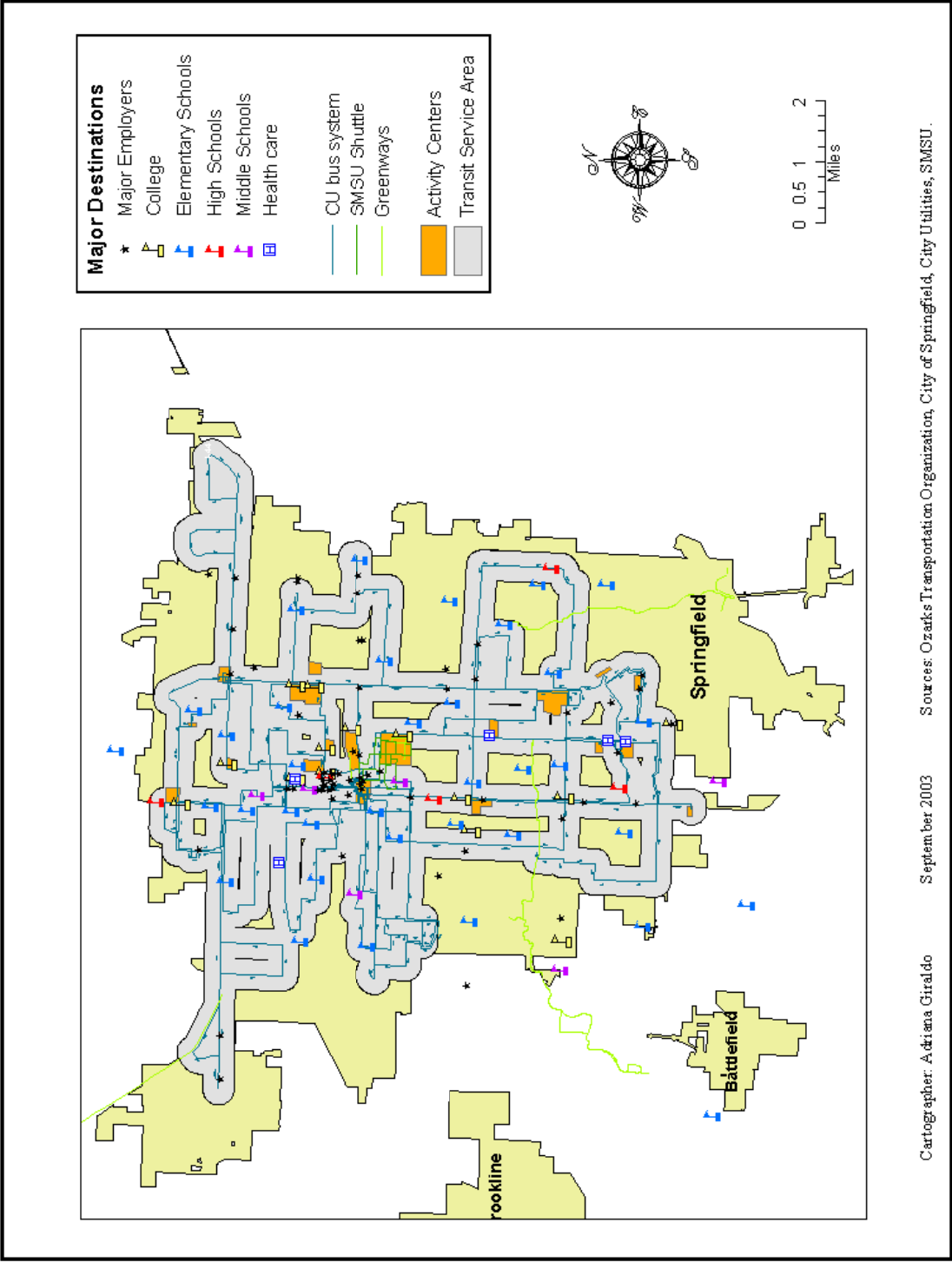


Figure 12 Major Destinations and the Transit Service Area

It might be concluded that the main problem of the transit service in the City of Springfield is not so much coverage as it is time. Responding to a low demand and a low population density, the bus service has tried to improve its efficiency by running long, loop shaped routes at a maximum frequency of 30 minutes, which cannot compete with the efficiency in time for the same trip made in a car.

**4.1.2. Improvements on the Bicycle System.** Unlike the bus system, the bicycle system as an alternative mode of transportation in Springfield MO area has been implemented only recently, in the last 15 years. The first five miles of greenways that included bicycle/pedestrian paths in the City of Springfield were built in 1991. Presently, Springfield MO area has 29 miles of bicycle/pedestrian paths, which are the SMSU bike path, South Creek Greenway, Jordan Creek Greenway, Galloway Creek Greenway, Ward Branch Greenway, James River Greenway and Frisco Highline Trail. Bike lanes on roads have had a slower development than bike paths. The City of Springfield has marked only one half of a mile of bike lanes on east Trafficway Street and Boonville Avenue, while Greene County has four miles on west Battlefield road. Bicycle parking has been provided by some businesses and in the City of Springfield's downtown area. In October 2004, the City Council passed an ordinance amending the Land Development Code of the City of Springfield to establish minimum off-street parking requirements and accompanying design standards for new development. Any other MPO jurisdiction has a bicycle parking ordinance yet.

In 1998, the Public Works Department of the City of Springfield designated and marked 25 miles of streets as bicycle routes or "streets that the city traffic engineers has deemed suitable and that provide access to major destination and continuity to travel

across neighborhoods” (City of Springfield 2003). At present, these routes have been expanded to a total of 54 miles throughout the city. However, bike routes have not played an important role in encouraging biking. They are meant to make on-street biking safer and more organized, but these routes do not give bicyclists an exclusive space on the street that may be respected by other transportation modes, and there is not enough education for both drivers and cyclists to share the street. Therefore, in this study, bike routes are regarded as important programs to improve bicycling awareness, but not as an alternative transportation system.

There are two bicycle advocacy groups in the area. Ozarks Greenways Inc. was created in 1991 as a citizens’ group dedicated to the preservation of green space through the creation of linear parks. It encourages citizens to participate in the creation and maintenance of bicycle/pedestrian trails along greenways (Ozarks Greenways 2003). Springbike Bicycle Club, which had originally focused on recreational cycling, created four years ago a bicycle advocacy committee with the objective of promoting the implementation of bicycling as an enjoyable and safe transportation mode for the community. (Springbike Club 2003). Both of these groups promote bicycling and walking through educational programs and events aimed at increasing awareness about these alternative modes, and through proactive participation in the Springfield area’s planning process by being part of the Metropolitan Planning Organization’s Technical Advisory Committee. The latter group annually reviews the Capital Improvement Program and the Comprehensive Plan of the City of Springfield, analyzes the congruence of CIP projects and the strategies recommended in the Comprehensive Plan, and presents anomalies to the City Council in public hearings.



The City of Springfield has also organized “May is National Bike Month” since 2001. This event is planned by the bicycle advocacy groups and other related organization in the city with the purpose of promoting the use of bicycles as alternative modes of transportation. The event includes the following programs:

Bike Springfield. Bike tours designed to promote bicycling in Springfield, increase awareness among the bicyclists of facilities available for bicycling and rules for bicycling on streets, and increase awareness among motorists that bicyclists are present on the streets of Springfield.

Bike to work week. This program aims to encourage bicycle commuting among the employees of the area. Businesses with the highest percentage of bicycle commuters win an award. There are multiple categories depending on the size of the businesses.

Bus, bike, car challenge. This is a race between three different modes transportation for commuting. The same person commute every day in a different mode to compare all three at the end. It provides information in cost and time differences between them.

In 2003, Springfield applied for acceptance into the League of American Bicyclists’ Bicycle Friendly Community Program. Even though the designation was refused, the League gave recommendations on how to make Springfield a Bicycle Friendly Community. These recommendations and others related to the implementation of the Bicycle System portion of the *Vision 20/20 Transportation Plan* were presented by bicycle advocacy groups to the City Council on November 2003, when the Capital Improvement Program 2004-2009, Council Bill 2003-371, was reviewed for approval. In October 2004, the City Council formally initiated the process of changing the City Code

to require bicycle parking for new development projects. Moreover, the Traffic Advisory Board formally accepted a document describing criteria for bicycle lanes and routes. The Board also formed a Bicycle Subcommittee to take that document to the next level, identify future bike routes, and review upcoming street improvement projects for integration into the bike system.

**4.1.3. Improvements on the Pedestrian System.** During most of the 20<sup>th</sup> century, the pedestrian system in the area was disregarded by the government and the community, so most of the developments did not include sidewalks. However, changes in school busing policies made people in the area realize that sidewalks were a necessity for the safety of the kids who will have to walk or bike to school. In 1989 citizens of Springfield voted for a ¼-cent sales tax to be used for building, repairing and maintaining sidewalks. The R-12 School District's Parent-Teacher Associations (PTA) and Public Works Department of the City of Springfield identify the streets where it is essential to build or maintain sidewalks in order to provide safe travel for students who have to walk to school. At this time, Springfield has 1300 miles of sidewalks, 974 miles more than in 1981. This achievement is very important for the safety of students. Since 2002, the limit for school bus eligibility was increased to 1 ½ miles for elementary and 3 ½ miles for middle schools, meaning that those students leaving within 1½ miles and 3 ½ miles respectively are not eligible for school bus service. (Riley 2002).

Greene County does not have a tax base to pay for sidewalk construction. In 1999, county officials created a "sidewalk fee" of \$8 a linear foot in lieu of sidewalks as a funding alternative to allow builders to pay for sidewalks instead of building them in remote places. The money collected is used as a match for getting federal funding for

sidewalks (Riley 2002). Other neighboring communities such as Nixa, Ozark, Republic, Battlefield and Willard, have over the last few years started to require the development of sidewalks at least on one side of the street.

In the 1990s, Southwest Missouri State University created an auto-free zone on Hampton Street with limited access to shuttle services, bicyclists and pedestrians. The university's goal is to be auto-free by encouraging alternatives such as bicycling, walking or transit.

In most of the Springfield MO area walking is still a dangerous and not pleasant mode of transportation, because of the lack of continuity in the sidewalk system and other factors such as street design in subdivisions, the lack of medians, overpasses or underpasses, and the short timing of pedestrian signals on some highways or major roads. These factors have also limited biking and transit ridership as is expressed by the City of Springfield Community Development Department in 1984, "Difficulty in crossing major streets also tends to discourage the use of transit service along those streets, especially among the elderly" (p. 228).

Bicycle and pedestrian facilities do not have good connections between one another, neighborhoods and bus stops. Currently it is difficult for many citizens living in low-density residential areas to access the greenways or bus stops from their houses, because of the deficiency in provisions of sidewalks or pathways that link them.

**4.1.4. Transportation Demand Management Strategies.** Finding alternatives to the automobile also include the development of strategies to manage demand for transportation. The Springfield MO area has implemented mainly two TDM strategies: ridesharing and park and ride. The MPO Ozarks Transportation Organization, together

with the Chamber of Commerce is currently promoting these strategies through a new program that will start in the second semester of 2004 called “Work Force Development Services” that is a regional ridesharing transportation services program directed to major employers in the area. The program looks to help improving business in the region through transportation alternative programs encouraging, in that way, the use of alternative modes by improving commuters’ transportation efficiency. The program will identify major employers and their problems in recruiting new employees or keeping existing employees. It will also identify parking problems. Then it will suggest transportation programs that will help solve the problem, such as parking and shuttle, carpool, vanpool, flexible work hours, and telework. To be eligible for the program the trips have to either begin or end within the boundaries of the MPO. Other programs will be developed as well in order to encourage more people to participate in the ridesharing program. These are Guaranteed Ride Home, Commuter club (coupons for regional products that will be given as incentives to people who uses alternative modes), employers’ incentives (vanpool or transit pass to the employees as part of their benefits), and education programs.

## **4.2. Land Use Planning and the Development of Alternative Transportation Systems in Springfield MO area**

**4.2.1. Influence of Comprehensive Plans in the Implementation of Alternative Transportation Systems.** In the planning history of the City of Springfield, transportation has been analyzed as a function of land use. However, the concept of this relationship has changed. The *Springfield Comprehensive Plan* of 1964 aimed for a

compact community development to eliminate sprawl that was characterized by isolated residential areas and commercial strips along the roads. It also intended to generate interconnectivity between residential, commercial and employment areas by transit, thoroughfares, and sidewalks (City of Springfield & Missouri State Highway Department 1967). Nevertheless, the plan principles were mainly directed to improve the overall street network.

The *Springfield Area Transportation Plan* of 1987, a component of the Springfield Master Plan, included alternative modes of transportation such as transit, bicycles and pedestrian schemes, but it planned them as separate elements, not as systems that interconnect together to be more efficient. Transit was then the only other mode of transportation that had been planned as an alternative to the automobile for dependent people and also for those who ride by choice. The *Short-Range Transit Plan* of 1980 developed planning procedures, standards, and guidelines to measure the performance of the Springfield bus system. The pedestrian system was planned with a focus on the safety of students. According to the changes in the R-12 School District (Springfield Area) busing policies, students who lived less than a mile from school could not take the school bus, so they either had to walk, ride a bike, ride the city bus or be taken by their parents. Bicycling was not seen as a feasible means of transportation for the area after the failure of the bike route pilot project. In conclusion, alternative modes of transportation in Springfield area under the *Springfield Area Transportation Plan* of 1987 were taken as elements that a plan should include. They were not seen as important solutions to traffic congestion or real alternatives for commuting. Also, they were not implemented as an integrated network. They were parts of a whole, not a whole in itself.

The Neighborhood plans, elements of the Springfield Master Plan, generally supported a single family low-density development pattern that would not produce traffic exceeding the capacity of the existing roads. This low-density development made unfeasible the implementation of efficient transit, bicycle and pedestrian systems. However, these plans encouraged the concentration of offices and commercial uses near the intersection of major streets, instead of building commercial strips along streets that had been a common characteristic for most of the 20<sup>th</sup> century. They also used multifamily housing to buffer single family residential areas from commercial areas. Nevertheless, mixed use in selected areas was not permitted even though this might have facilitated the implementation of alternative transportation systems in Springfield.

In 1994, Springfield's citizens and staff from the City of Springfield and Greene County developed the "Vision 20/20 Creating the Future" that was the base for the *Springfield - Greene County Comprehensive Plan* adopted in 2001. This 20-year plan promotes the encouragement of a more compact and continuous growth served by a multi modal transportation system.

The *Vision 20/20 Transportation Plan* component brings something new to transportation planning in Springfield. It plans for a multimodal transportation system where the different modes of transportation relate to each other to form a network that could be used for commuting and other travel purposes. For instance, the *Parks, Open Space and Greenways Plan* intends to connect the trails along some of the greenways with other trails or bikeways of the area.

The *Vision 20/20 Growth Management and Land Use Plan* component recommends some places within the city as Activity Centers.

In those locations, plans, regulations and public investments should promote additional or new employment, intensified retail business, higher density housing and convenient transit service. Design should emphasize mixed and multiple use development, attractive public spaces and high-quality site planning and architecture. Activity Centers should be linked to the bicycle and linear open space networks. (28)

According to these recommendations, future land developments should be planned and regulated to make use of sites served by highways and other roads to minimize road building. These more compact and mixed-used patterns at activity centers should make it easier to implement transit, bicycle and pedestrian systems.

The *Vision 20/20 Transportation Plan* also takes into account Transportation Demand Management (TDM) strategies in order to minimize the number of vehicular trips on the roadway network. Some of these strategies are to encourage flexible work time to decrease peak hour travel, incentives for using transit, and ridesharing programs.

Outside the limits of the City of Springfield, the Greene County Zoning Ordinance promotes low-density residential development, since it does not allow the development of housing on a lot smaller than 3 acres, unless public water and sewer are available. The low density development around county roads and the drainage ditches along the state highways have made more complicated the provision for pedestrian and transit travel after some of these areas have been incorporated within the city.

In cities of the area, other than Springfield, land use and transportation have only been recently planned, after the need was marked by the pressure of fast growing suburban communities. Republic, Willard, Battlefield and Nixa have Comprehensive Plans and Ozark is in the process of creating its Long Range Plan. In general, planning for transportation in these cities focuses on maintenance and development of the thoroughfare system. However, pedestrian and bicycle system have started to be taken

into account especially the planning of greenway trails and sidewalk systems. Transit systems have not been planned because of lack of demand and high costs. These cities rely on the MPO for creating ridesharing programs.

**4.2.2. Subdivision Regulations Have Limited the Provision for Alternative Modes of Transportation.** Prior to 1978, subdivision regulations in Springfield discouraged walking as a mode of transportation, since they did not require the builder to construct sidewalks. Therefore, by this year many areas of the city had been developed without any provisions for pedestrian facilities. From 1978, subdivision regulations started requiring developers to build sidewalks on both sides of the street in residential areas with densities of more than 5 dwelling units per acre; on only one side if densities were 3 to 5 units per acre; and on both sides in non-residential areas (Vision 20/20 2001). On the other hand, the state's policy by this time was not to require sidewalks along the roads maintained by the Missouri Department of Transportation (MODOT). "In 1987 the MODOT had only five miles of sidewalks on portions of Kearney Street, Sunshine Street and Glenstone Avenue... most of the other state-maintained roads such as Campbell Avenue and Kansas Expressway had few if any sidewalks" (Vision 20/20 Transportation Plan 2001, 113). Also, Greene County was less demanding in requiring provision for pedestrian travel, since its Subdivision Ordinance required sidewalks only on one side of secondary arterial, collector, and land access streets in residential areas. This ordinance did not require sidewalks on minor land access streets, unless it was necessary for school-age children traveling from their home to a school bus pick-up point or school (Vision 20/20 Transportation Plan 2001). The smaller cities of the area Willard, Republic, Battlefield, Nixa and Ozark recently started requiring the developers to build sidewalks



on one side in residential areas and on both sides in commercial areas, collector and arterial streets.

**4.2.3. Regional Planning.** Before the Census of 2000, the Metropolitan Planning Organization (MPO) Ozark Transportation Organization (OTO) did not include Nixa, Ozark and northern Christian County. Therefore, these communities were not eligible for funding and most of the transportation investments were centered on the City of Springfield, since it encompassed the majority of the population of the area. After the Census of 2000, the MPO changed status to a Transportation Management Area (TMA) based on an increase in population in its urbanized area that exceeds 200,000 people, a result of the inclusion of two fast growing communities in the area, Ozark and Nixa, plus northern Christian County. Because of the new status, the MPO now receives more money from the federal government to be invested in transportation projects in the area. Currently there are seven criteria for prioritization of transportation projects, and “transportation and land use” is being added to the list of criteria.

The extension of the MPO to northern Christian County represents an important step in the process of achieving a level of regional transportation planning in the Springfield Area. OTO includes other important organizations in the region such as Southwest Missouri Council of Governments (SMCOG), City Utilities, Ozarks Greenways and MoDOT. During 2003, the *Vision 20/20 Transportation Plan* underwent an update process for the next 5 years and, as a result, citizens from northern Christian County, Ozark and Nixa were included in the planning process.

**4.2.4. Effect of Development Densities on Supply of Alternative Transportation Systems.** “Density Patterns are obviously closely linked to

transportation...Many studies have shown that the intensity of development in a city has a highly significant effect on travel distances and modal splits” (Newman&Kenworthy 1999, 100). The traditional low-density developments, which have characterized Springfield’s urban pattern throughout most of its history, have made the implementation of alternative transportation systems such as transit, walking and biking especially difficult. In the City of Springfield the population density decreases as distance from the core increases. The existing transit service usually covers areas where the population density is higher; in this case those towards the center and the north part of city. Figure 13 shows the population density of the Springfield MO Area by Transportation Analysis Zone.- TAZ according to the Census 2000. This figure also demonstrates that the City of Springfield has the highest density in the region. The other jurisdictions still have very low density.

The City of Springfield, in its *Annual Assessment Report 1992* of the City Utilities Transit System, studied the influence of the population and employment densities in the performance of the bus service. The study found that “the population and business firms are too dispersed to allow efficient, high-quality transit provision.” It also concluded that “The low-density development pattern produces demands for better streets but not more transit service and there is little upward pressure on land prices to make non-auto trips and higher parking fees attractive or likely” (23).

Bernick & Cervero (1997) showed that density is the biggest factor in determining the level of public transit use in a city, yet mixed land use adds the extra component of encouraging walking (in Newman&Kenworthy 1999). The *Vision 20/20 Comprehensive Plan* of 2001 encouraged mixed-use developments through the creation of Activity

Centers where multimodal transportation systems are required. The location that were identified as potential Activity Centers and major destination in the city are partially covered by a bus route. However, they have neither a pedestrian friendly design; nor connections for walking or biking. These activity centers are supposed to have a regional use, but there is a limitation to this, the existing transit system is only for the City of Springfield. Then, people who commute or travel from other neighboring cities do not have any other choice than to use a private automobile.

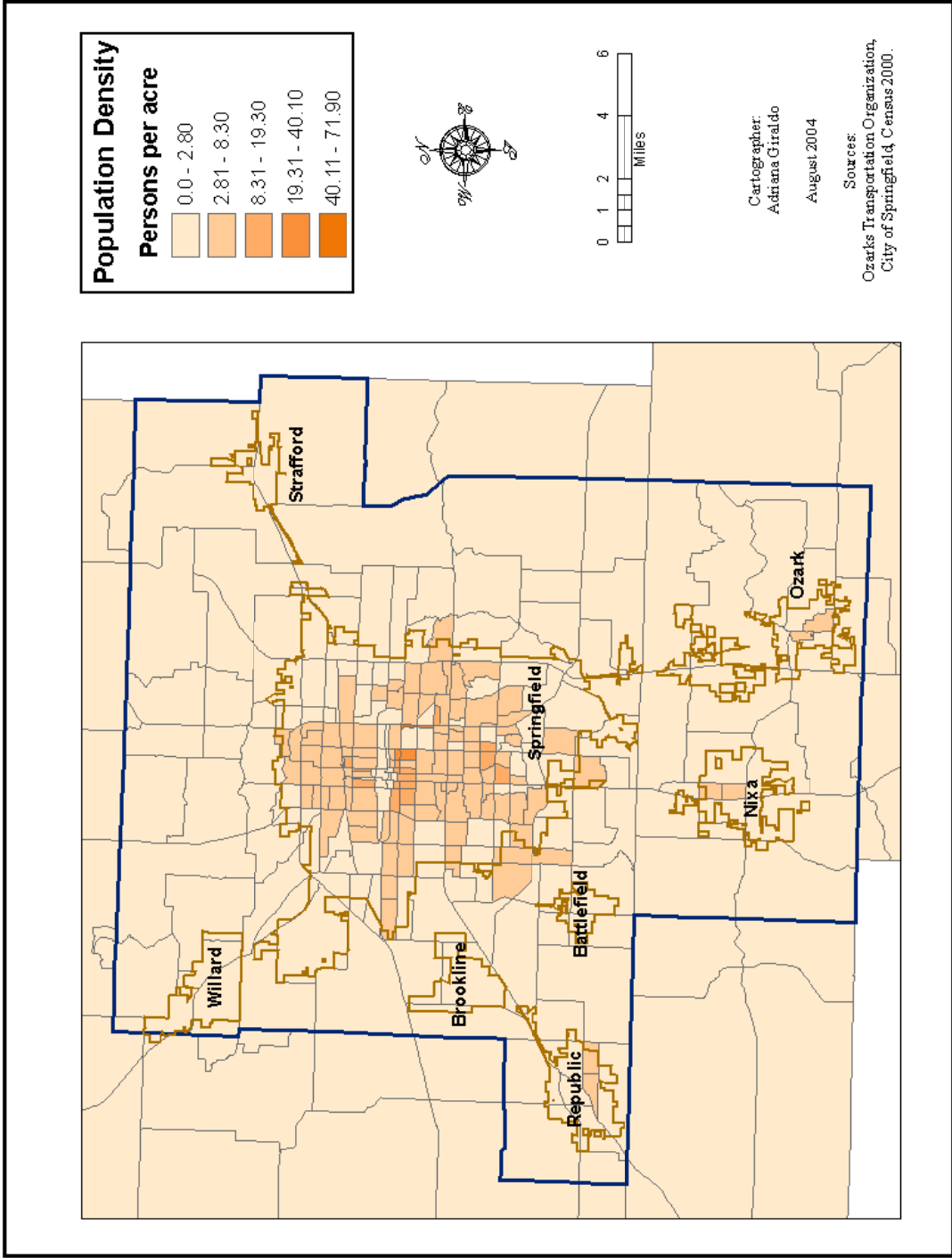


Figure 13 Population Density by Transportation Analysis Zones

## **5. ANALYSIS OF THE EXISTING DEMAND FOR ALTERNATIVE TRANSPORTATION SYSTEMS IN SPRINGFIELD MISSOURI AREA**

The previous chapter analyzed the existence, viability, and condition of transit and non-motorized transportation facilities, services, and roads; the relationship between land use patterns and transportation; plans, programs, and regulations for the future; and public and private investment in transit or non-motorized transportation. In short it offered a picture of the supply of transportation alternatives. This chapter focuses on the demand for alternative transportation systems. The analysis of the data collected on the survey shows the actual use of multimodal transportation and people's disposition or attitudes toward the use of transit, bicycling, and walking as modes of transportation.

### **5.1. Demographic Characteristics of the Sample**

The demographic composition of the population is a very important factor that should be taken into account when analyzing data related to transportation alternatives. Classification by age, income, sex, and occupation can lead to a clearer understanding of ways to best overcome the barriers for implementation of multimodal transportation systems.

The survey on transportation alternatives was conducted through a random sample of 228<sup>1</sup> people older than 18 years living in the City of Springfield. The survey form and the comparison between percentages of population in the Census 2000 and this study's

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<sup>1</sup> For details on the sample selection please refer to the methods.

survey can be found in the Appendices A and B to this document. Fifty five percent of the respondents are females and 45% are males. Two dorms of the Southwest Missouri State University (SMSU) were included in the sample and the surveys conducted there accounted for 25% of the total. Taking into account that only students under 24 years of age live there, the percentage of younger people in the sample (21%) is considerably higher than the group represented on the Census 2000. Sixty one percent of the survey respondents have an approximate annual income under \$20,000. This high percentage of low income people may be the result of the high number of students surveyed and the fact that higher income families are mostly located in suburbs outside city limits, areas that were not included in the survey. Almost one third (34%) of the respondents are students, while hourly and technical workers, professionals, and retired people were represented by 23%, 14% and 13% of the sample respectively. See Appendix B.

The sample distribution by age, income and occupation may reflect some features of the city and the important role that it plays at the regional level. For instance, the percentage of younger people and students is a sign of Springfield's function as college-town; retired people choose to live close to the city's hospitals and health centers; and the high percentage of low income people might mirror the sprawl land use pattern, characterized by wealthier newer subdivision located on the outskirts of the cities, and older, less expensive properties closer to the city's core. Therefore, it is important to note that commutes to work are not the only trips that need to be considered when studying the transportation system in this city. Other trips to consider are school trips, shopping, and recreational trips that may possibly be the most common travel purposes for students and retired people. Because of this, the survey examined behaviors, awareness and attitudes

of Springfield citizens toward existing transportation options such as automobile, bus, bicycling, and walking for all trip purposes.

## **5.2. Statistical Analysis of the Sample**

The survey on transportation alternatives conducted in this research was also used to evaluate one of the hypotheses of this study, which assumes that “the most vulnerable groups of the population, elder, younger and low-income citizens, are more likely to use alternative transportation systems”. In order to test this theory, the results of the survey were analyzed statistically using chi-square test. This analysis showed that there is a small difference (significance level of 0.001) between age groups, and income groups in term of their choice for an alternative transportation instead of automobile. In other words, age and income did not directly affect the decision of the people surveyed to choose alternative transportation instead of driving an automobile.

The statistical analysis did not show a major significance in the hypothesis. The following section of this chapter evaluates the use of alternative modes by age, and income groups.

## **5.3. Use of Alternative Modes to Commute to Work and to Go to School**

The first section of the survey collected data about modal split for two trip purposes: commuting to work and school. The primary purpose was to compare the use of automobile (car, truck, van, and motorcycle) to other alternative modes. The survey did not particularly ask people if they drive alone, but it can be inferred that they do, because carpool and vanpool was considered as a separate category.

People were asked what modes of transportation they use for commuting to work and to school, and how many days within a “typical” week they utilize each mode. The modes were classified according to the frequency; they were “primary” if they were used four to five days a week and “secondary” if they were used one to three days a week. The same classification was used by the Metropolitan Washington Council of Governments in the *Commuter Connections State of the commute 2001: Survey Report*.

Frequency was also analyzed taking into account people who use alternative modes at least one day a week, because they may be more receptive to use transportation alternatives if conditions for transit, bicycling, and walking are improved. In contrast, those who use an automobile every day may perhaps be strongly attached to this mode of transport as their only transportation choice.

The use of an automobile appears to be the most common “primary” and “secondary” commute mode. Figure 14 shows the percentage of commuters who use each mode at least once a week. Seventy two percent of the respondents who commute use an automobile at least once a week. Of these respondents, 60% use it four to five days a week, and 13% use it one to three days. This result was expected to a certain degree, because of the historical lack of investments and development of facilities for alternative transportation systems analyzed in the previous chapter. Walking and carpool/vanpool are the other two preferred modes, but with very low percentages (9% and 7% respectively).

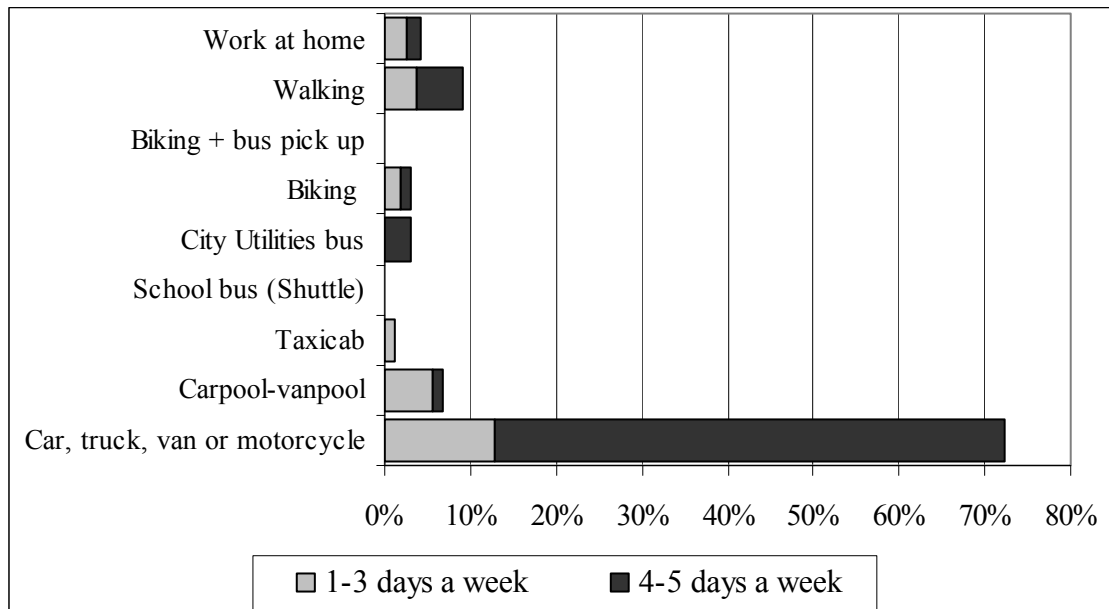
In the trips to school, however, alternative modes start playing a more important role in transportation of people. Figure 15 shows how walking becomes the main mode being used by 51% of respondents, while the automobile accounts for 30%. However,



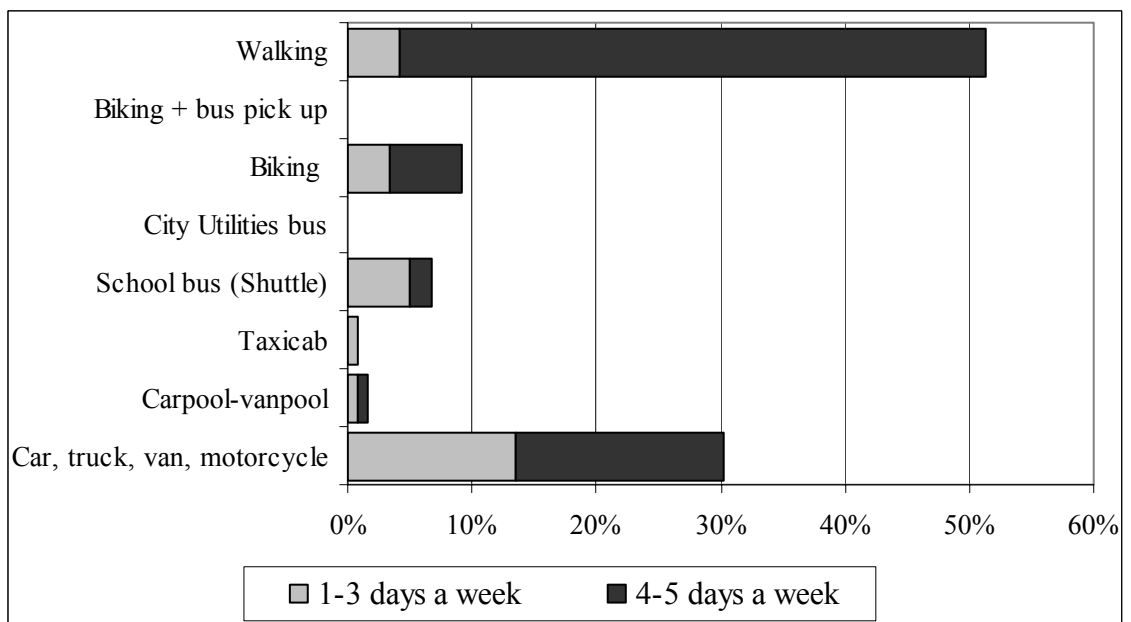
13% of these last respondents use an automobile occasionally (one to three days a week).

Biking and school shuttle were used by just 9% and 7% of the survey respondents

respectively.

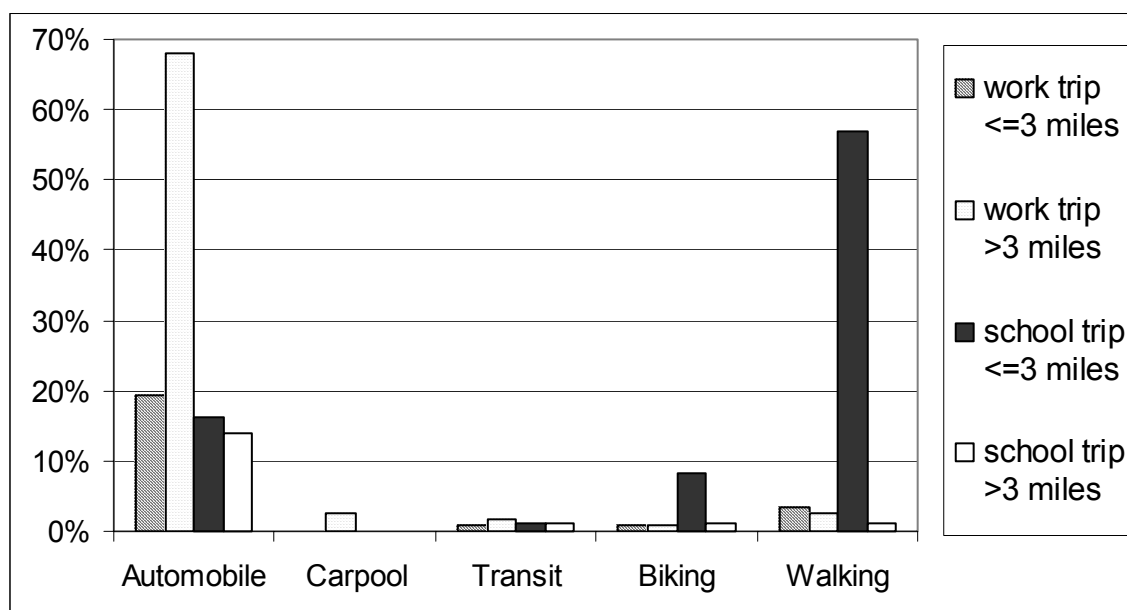


**Figure 14. Modal split for commuting to work**



**Figure 15. Modal split for school trips**

The predominance of walking as the “primary” mode of transportation to school may in part be a response to the 25% of respondents who randomly came from two of the SMSU dorms who do not drive on campus. Nevertheless, approximately another fourth of the respondents walk to school but do not live on campus. Usually, college students live within walking distances from their College and that may be an incentive for them to choose walking as their main transportation mode. This is especially the case when driving has been discouraged indirectly by the lack of parking available at school during peak hours. SMSU policies also discourage driving to campus by parking pricing policies and by transit services, new shuttle route open in 2004 that serves closer neighborhoods to the west with high population of students. For instance, figure 16 shows that 57% of respondents who go to school travel on foot 3 or fewer miles.



**Figure 16. Distance of commuting to work and school trips by mode.**

Conversely, this figure illustrates that 19% of the commuters to work and 16% of the students are those whose primary mode is by automobile even though they travel 3

miles or fewer. This portion of the population needs to be considered as potential users of non-motorized transportation (biking and walking) and targeted for future bicycle/pedestrian programs.

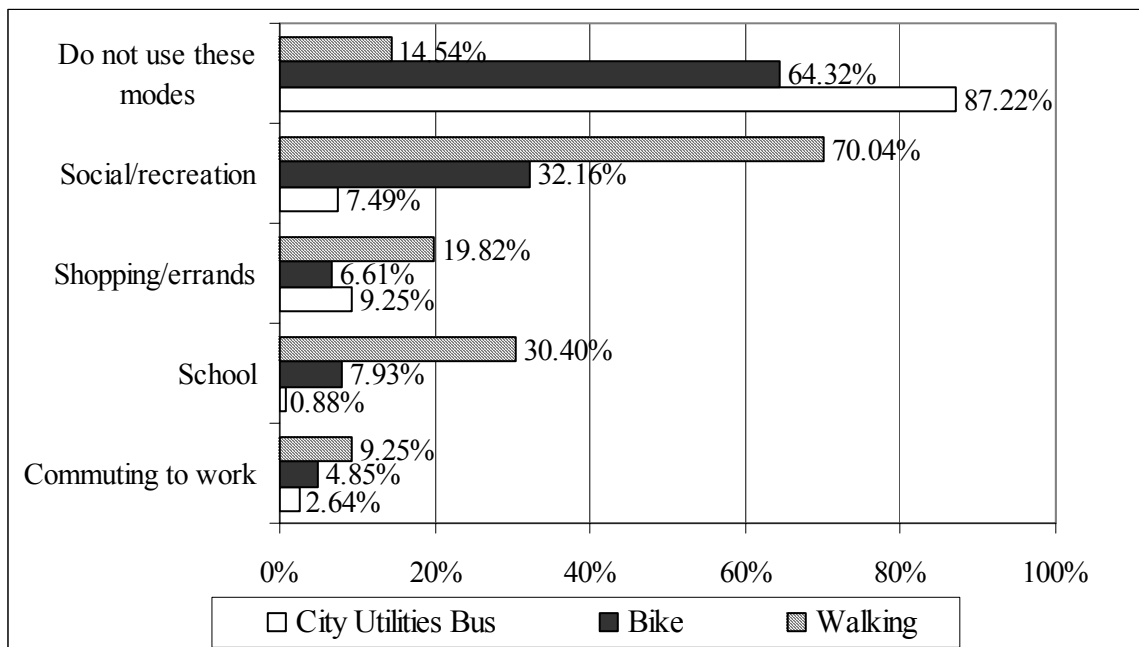
This part of the research had some limitations on sample sizes and it needs to be clarified that the calculations may not be very accurate, because not everybody measures the distance of their trips, and sometimes the assumptions of the respondents might not be correct.

#### **5.4. Current Use of Existent Transportation Modes in Springfield**

The second section of the survey focused its attention only on existing alternative modes of transportation, without comparing these to automobile use. It explores trip purposes and frequency in which they are used. It also relates these topics to the age and income of the participants, in order to find the relations between these factors.

As seen in figure 17, the CU bus service appears to be the least popular transportation mode for all purpose trips, followed by biking. Only 13% of the respondents use the bus, compared to 36% who use bicycles and 85% who walk as an alternative to the automobile for any purpose. However, most of the people who walk and bike are doing it just for recreation. It is important to note that 30% and 20% of the respondents walk to school and for shopping and errands respectively, which might be due to the number of students surveyed as explained earlier. Most of the respondents use their bikes primarily for recreational purposes (32%), compared to 7%, 8% and 5% that use them for shopping and errands, school, and work, respectively. These results suggest that for the utilitarian trips such as shopping and running errands, commuting to work, and commuting to school the respondents mostly use automobiles.

The fact that this survey was conducted during the summer may have been another factor influencing the frequency in which people bike or walk, especially for recreational and social purposes. Future research on this topic would need to study the influence of seasons on the use of transportation alternatives.



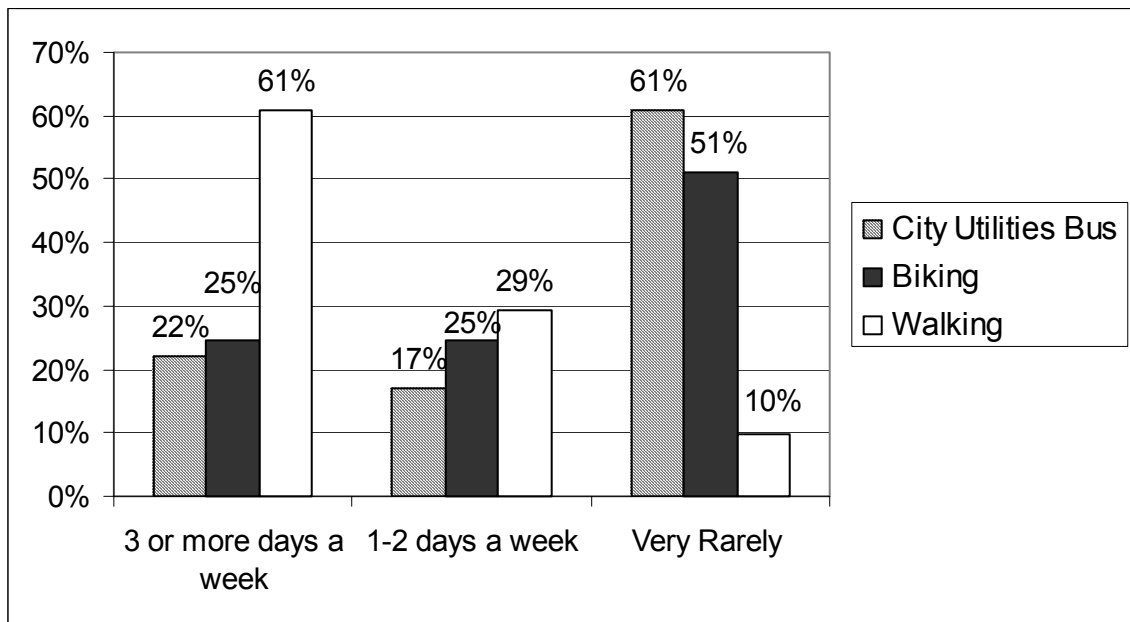
**Figure 17. Use of alternative modes by purpose trip.<sup>2</sup>**

The analysis of trip purposes gives a general idea of how the respondents use alternative modes; however, it does not demonstrate the frequency at which they are being used. The following analysis studies each one of the alternative modes by frequency, and at the same time it relates them with the income and age characteristics of the respondents.

The most frequently used alternative mode for all purposes is walking. Sixty one percent of the respondents whose alternative mode is walking use this mode 3 or more

<sup>2</sup> Note that respondents who use transportation alternatives could choose more than one mode, so the percentages for each mode do not add to 100%.

days in a “typical” week, 29% use it one or two days a week and only 10% walk for a purpose a few times a year. By contrast, the frequency trend for the other two modes is the opposite. From those respondents who choose biking or transit as their alternative modes, slightly more than half (51% and 61%) ride bicycles or the CU bus respectively, no more than a few times a year for all purposes, one fourth of the users ride very often and one fourth ride occasionally during a week (1-2 days).

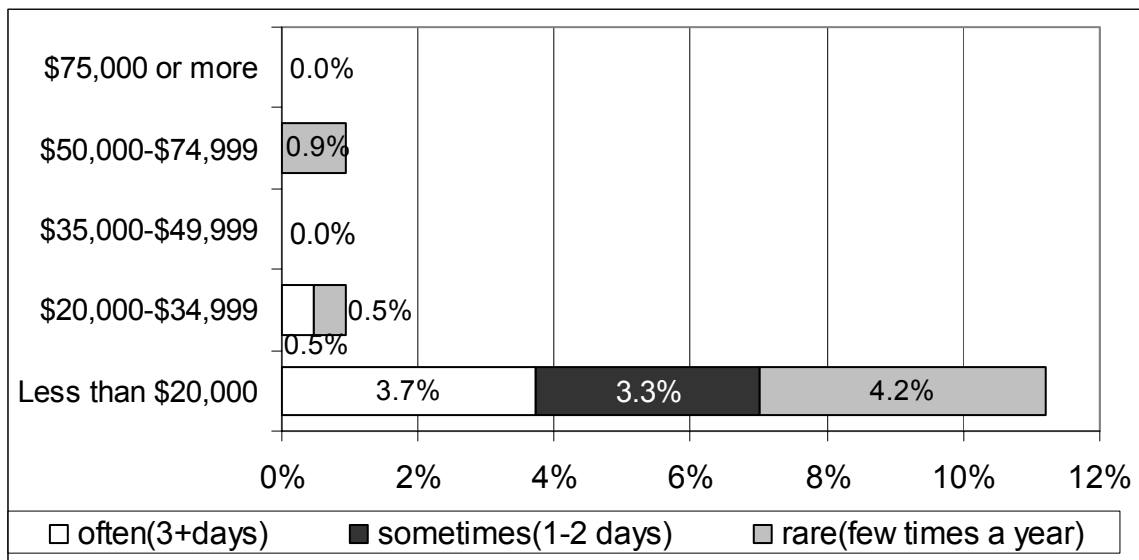


**Figure 18. Frequency in using transportation alternatives for all purposes.**

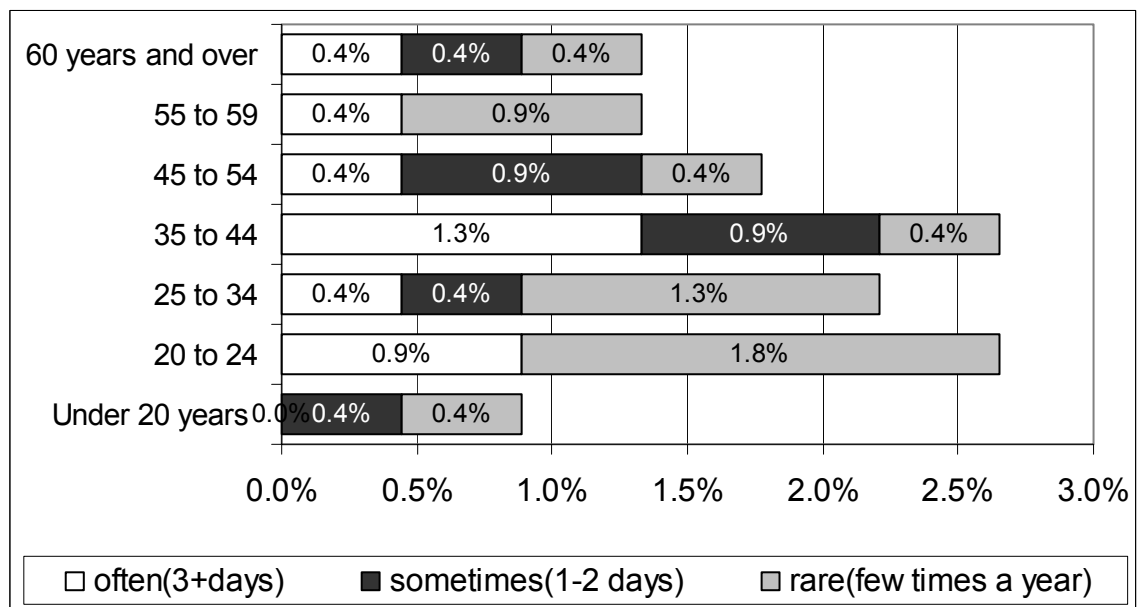
**5.4.1. City Utilities Bus.** Figures 19 and 20 illustrate the relationship of the age and income of the respondents to the frequency of use of transit services. Figure 19 implies that mostly low income people use transit as an alternative mode to the automobile. One of the higher income groups uses the bus only very rarely.

Transit usage is more evenly distributed throughout the age groups than through the income groups. However, compared to the other age groups, the younger group (18 to

20 years old) hardly ever uses the bus. By contrast, a little more people from age groups older than 20 years use the CU slightly more frequently than the younger people. It is important to notice that this survey did not include teenagers (younger than 18 years) who may more frequently use the bus to go to school.

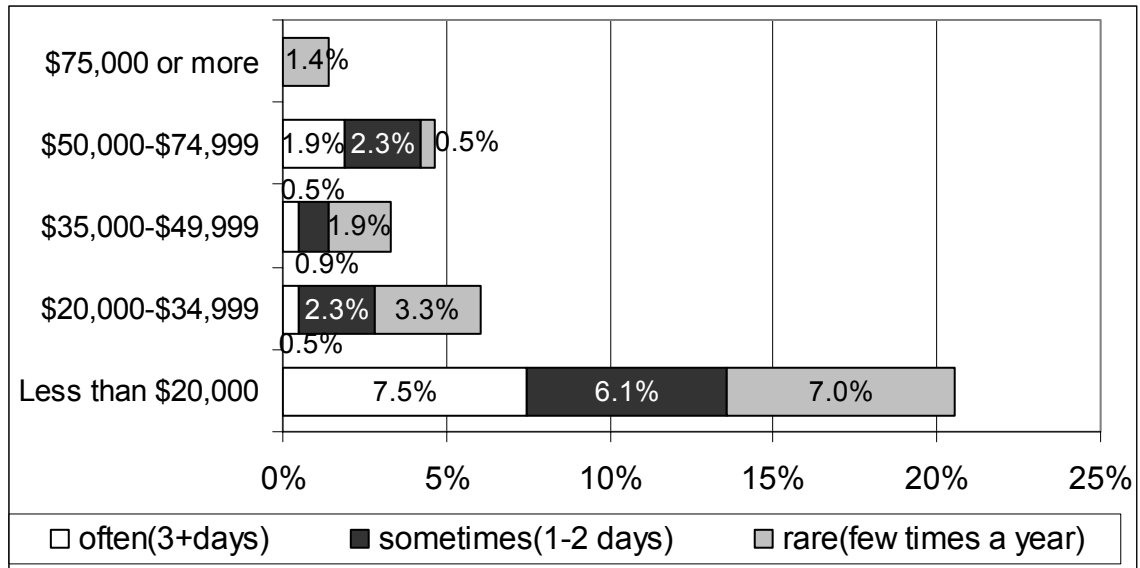


**Figure 19. Transit use for all purposes by income and frequency.**

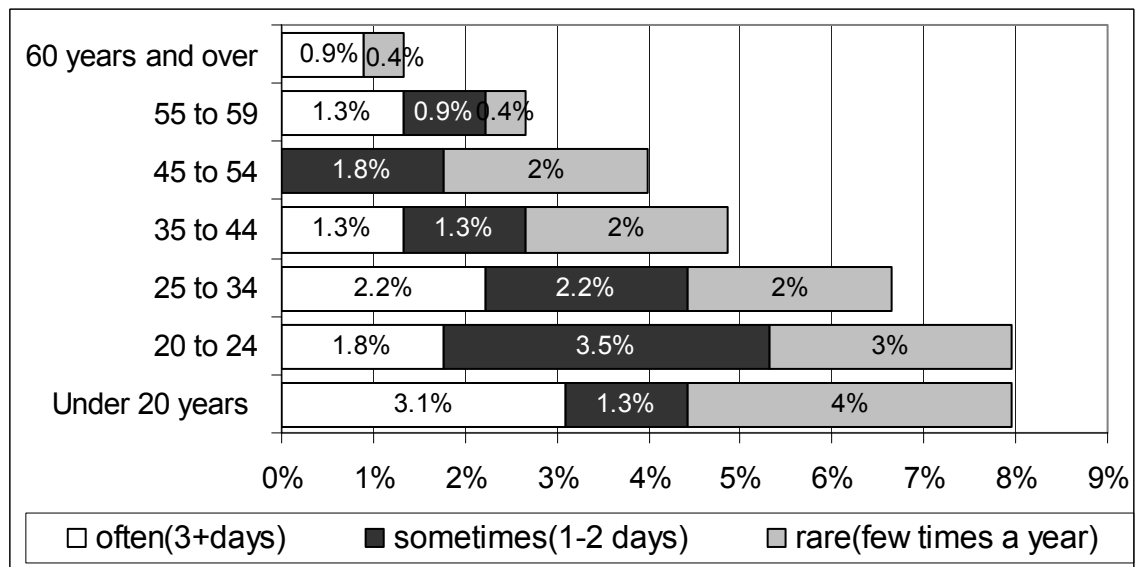


**Figure 20. Transit use for all purposes by age and frequency.**

**5.4.2. Biking.** The analysis of bicycle usage as alternative transportation for all purposes by income and age groups is illustrated in Figures 21 and 22.



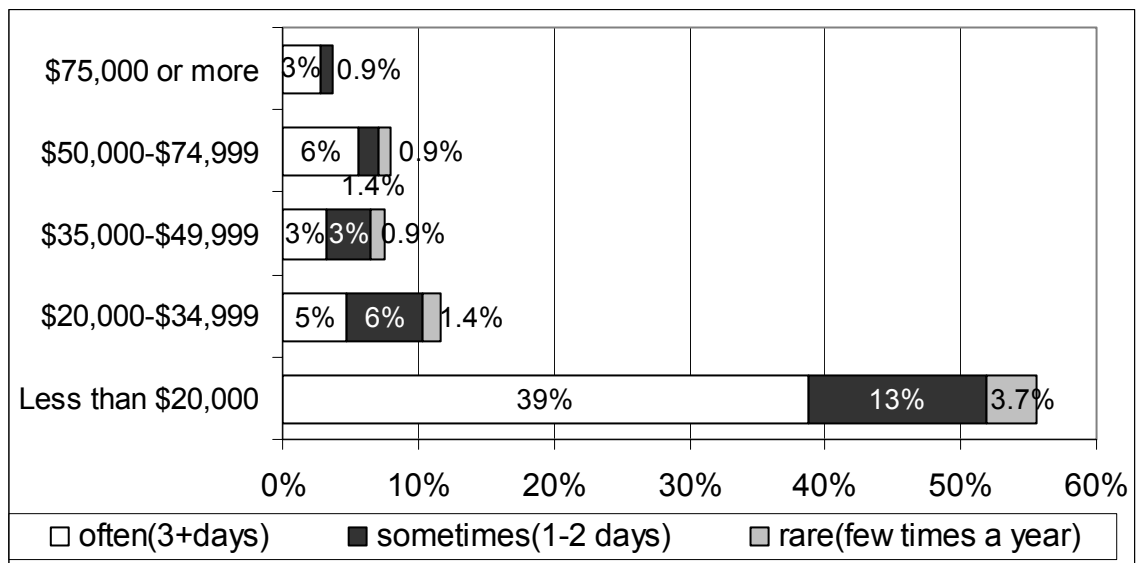
**Figure 21. Biking for all purposes by income and frequency.**



**Figure 22. Biking for all purposes by age and frequency.**

Low income people ride bikes more frequently for diverse purposes. This supports one of the characteristics in the mentality of many people in Springfield who generally think that only poor people ride bikes or ride the bus; they do not consider biking as a personal choice. The analysis by age group shows a trend where the usage of bicycle as alternative transportation increases slightly as age decreases.

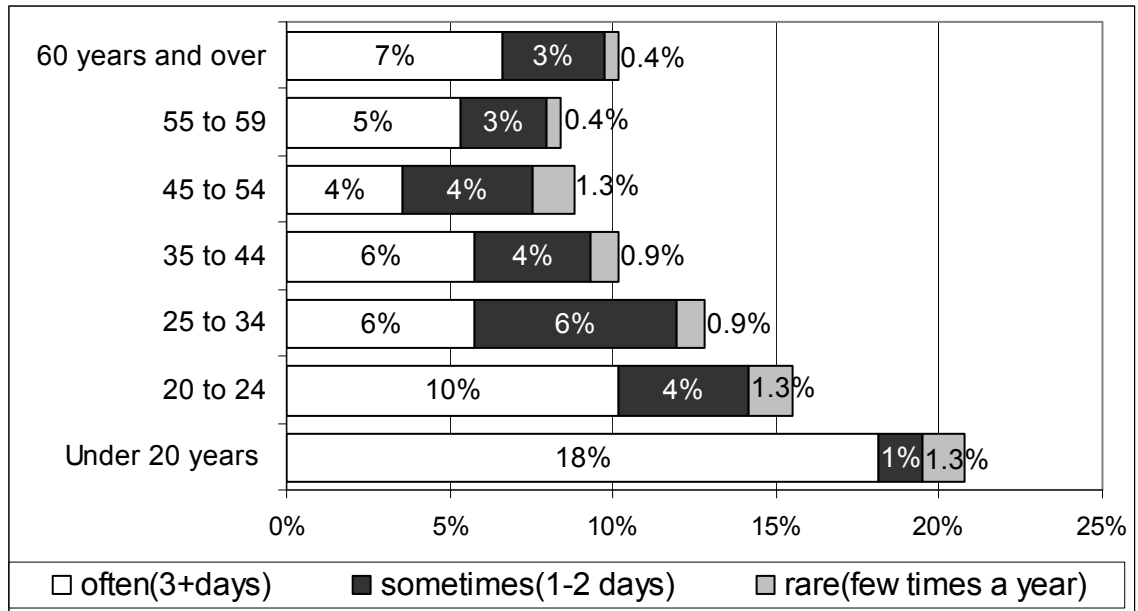
**5.4.3. Walking.** Figure 23 illustrates that most of the people who walk as an alternative mode of transportation are low income. The lower income group more likely is represented by students who walk to school.



**Figure 23. Walking trips for all purposes by income and frequency.**

The distribution of people who choose to walk as an alternative mode of transportation for any purpose by age groups and frequency is presented in figure 24. The more frequent users are in the youngest age group (under 20 years), followed by the age group of 20-24 years. The other groups representing people older than 25 years, show similar patterns with some variation in frequency.





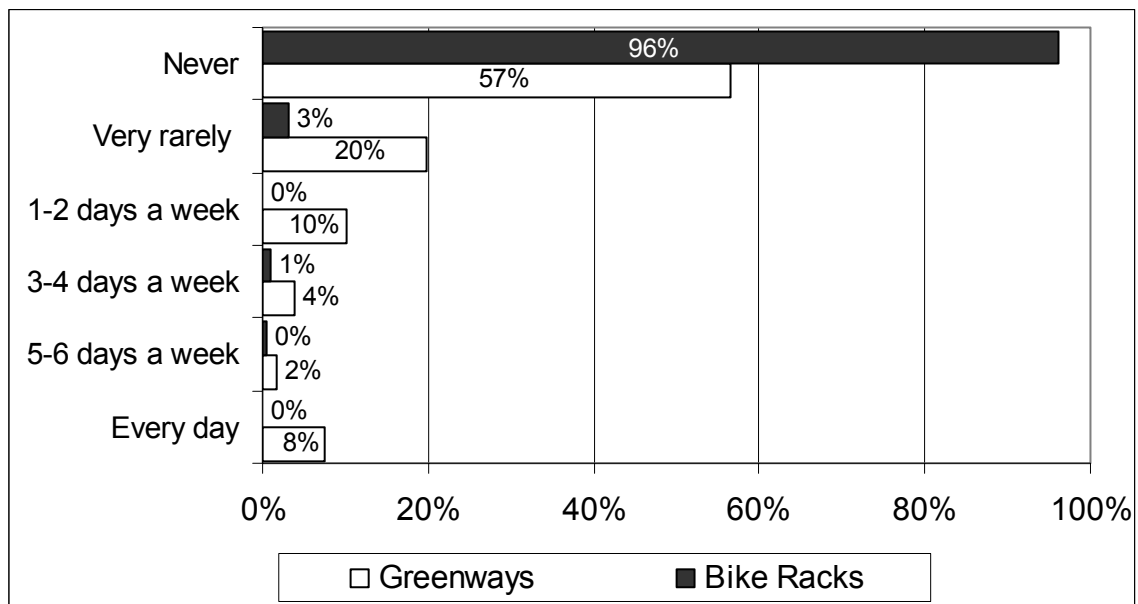
**Figure 24. Walking trips for all purposes by age and frequency.**

### 5.5. Facilities for Alternative Modes: Are They Used, Are They Enough?

The process of implementation of alternative transportation systems have started seeing some progress with the development of Greenways (bicycle/pedestrian paths) and the installation of bike racks on CU buses. Therefore, it was necessary to ask people how frequently they use these facilities. Figure 25 shows that most of the respondents (96%) have never used the bike racks. Moreover, none of those respondents who used biking and bus pick-up for commuting or going to school, have used greenways and/or bike racks. This implies that the 4% of respondents that do use these facilities, most probably use them for shopping, errands or recreational purposes.

The respondents used slightly more the bicycle pedestrian paths along Greenways than the bike racks. However, more than half of the respondents (57%) still have never used Greenways trails and 20% use these very rarely, just a few times a year. The high percentage of the population who bike and walk for recreational purposes (refer to the

previous subtitle), and the lack of connectivity of the bike/pedestrian paths to residential and commercial areas through sidewalks or bike lanes studied in the prior chapter, suggest that the remaining 23% of the respondents who use the Greenways, use them mainly for recreational purposes. Although recreational trips are very important for the mental and physical health of the citizens, they do not have much influence in reducing traffic congestion. Therefore, new strategies need to be implemented to make these existing facilities part of an alternative transportation system that can be enabled for commuters to get to work and students to get to school.



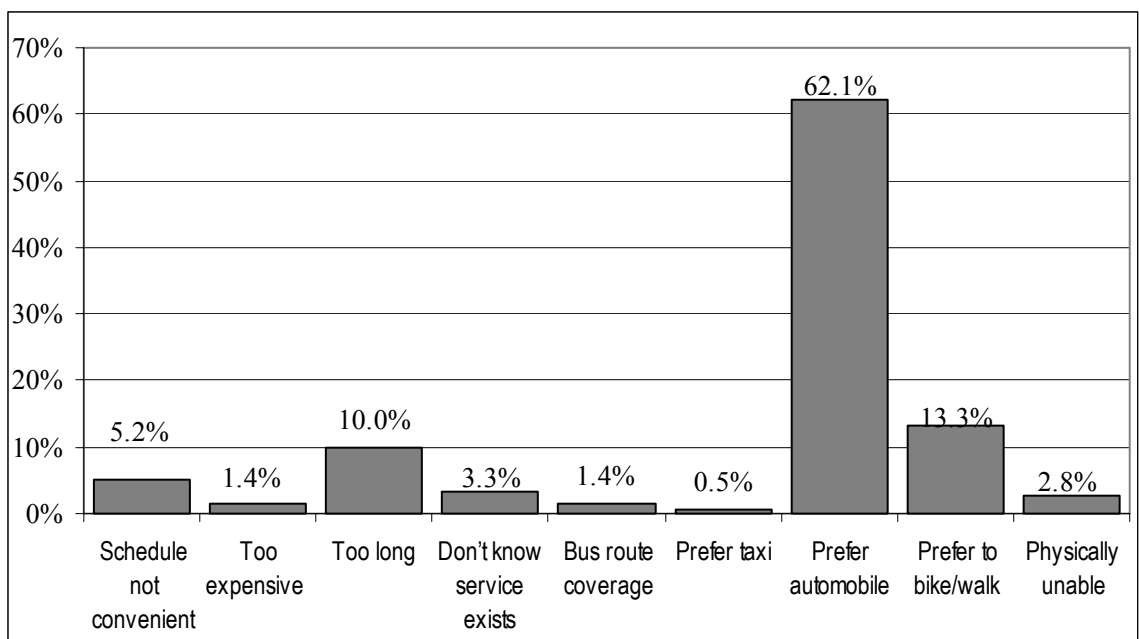
**Figure 25. Percentage of people using bicycle/pedestrian facilities.**

The survey also asked people if there was bicycle parking in their work place and/or school. Ninety three percent of the respondent who go to school indicated that bike parking was available, compared to only 37% of the commuters. Colleges and universities have been more successful in providing bike parking than businesses in the

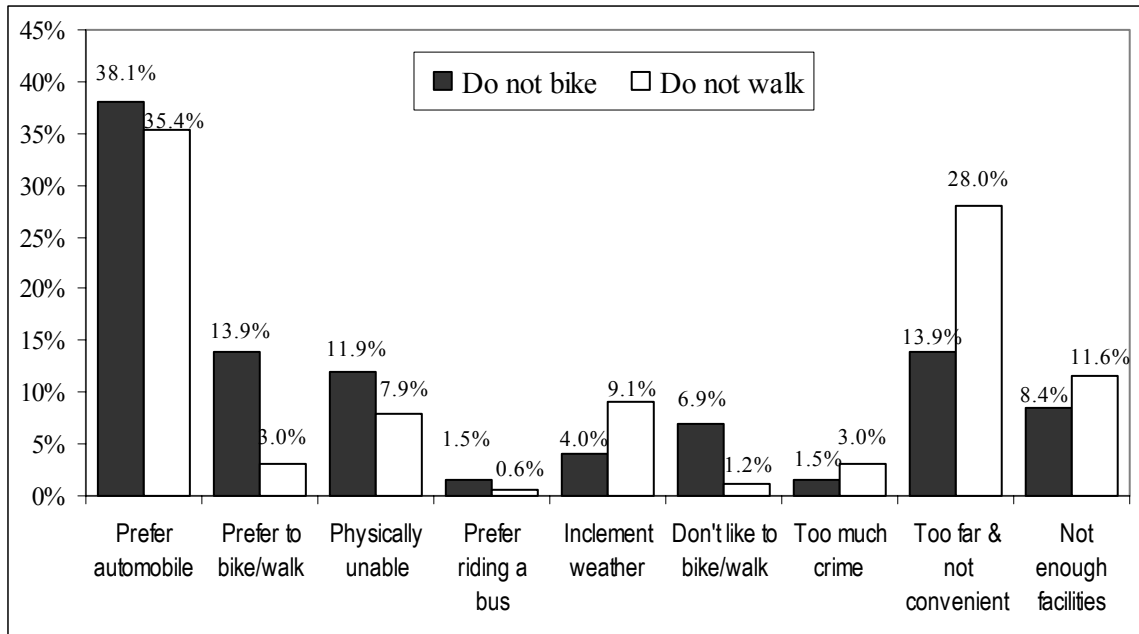
area. This fact is expected to change in few years as a consequence of the application of the bicycle parking ordinance, recently passed.

### 5.6. Attitudes of Springfield Citizens toward the Use of Transportation Alternatives.

In order to make a complete analysis of the supply of alternative transportation systems in Springfield, the survey did not just ask people objective questions about the type and frequency of use of existing modes. However, it included a section with more subjective questions that showed what people think and their attitude towards the use of transportation alternatives. Figures 26 and 27 show the reasons why respondents do not use the CU bus, biking and/or walking as an alternative transportation mode.



**Figure 26. Main reasons why people do not use City Utilities bus in Springfield**



**Figure 27. Main reasons why people do not walk or bike in Springfield**

**5.6.1. Preference for Automobile.** The main reason for people not to use these modes is basically their preference for the automobile. From the respondents who do not use the CU bus or who do not bike or walk as an alternative transportation mode for any purpose, 62%, 38% and 35% respectively expressed they prefer to use automobiles, because they think they are more convenient, comfortable, fast, and they give them independence.

**5.6.2. Things Are Too Far to Get to and the Modes Are Not Convenient.** Twenty eight percent of the people who do not walk and 14% of those who do not bike consider that long distances and inconvenience are the most important reasons behind their decision not to bike or walk for any purpose. This reason is directly related to the land-use development of the city discussed in the prior chapter. The spread out, low-density development pattern that characterizes the Springfield MO area has a direct

influence on the distance that people travel from their houses to school, work or shopping. This factor limits the use of bicycle and walking as alternative modes to the automobile.

**5.6.3. Prefer to Use Other Modes.** The respondents simply explained that they rather walk than bike (14%), or they prefer biking or walking than using the bus (13%).

**5.6.4. Physical Limitations.** Twelve percent of the people who do not ride the bicycles declared that they had a physical handicap.

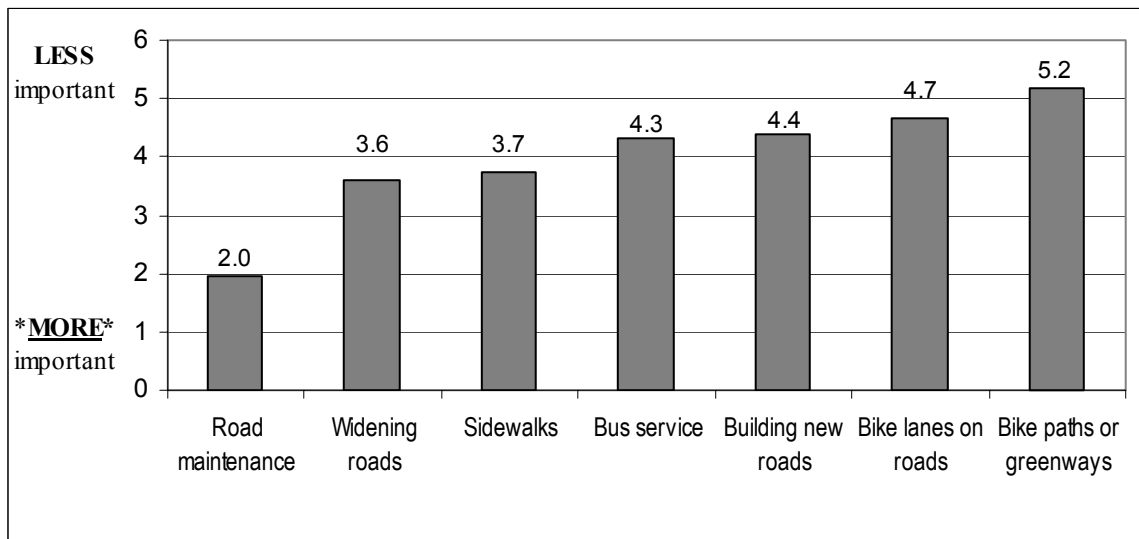
**5.6.5. Lack of Bicycle Pedestrian Facilities.** Twelve and 8% of the respondents respectively who do not walk or bike believe that the lack of sidewalks, crosswalks, bike paths, bike lanes and bike parking justifies their decision to not choose these modes.

**5.6.6. Other Reasons for Not Using the Existing Transportation Alternatives.** A low percentage of respondents who do not use the CU bus said that trips take too long (10%). High costs, inconvenient schedule hours, bus route coverage and physical limitation do not seem to be critical reasons for not using the bus, probably because of the efforts of City Utilities in the last decade to make the bus service more efficient. However, it might possibly be lack of knowledge about the CU bus service, because even though just 3% of the respondents who do not ride the bus said that they did not know there was a bus service, others may know that bus services exist, but may not be familiar with fares, schedules, and routes.

Very few respondents expressed that they do not bike or walk because of the presence of crime where they live, inclement weather, preference for bus service or that they simply do not enjoy walking or biking.

### 5.7. Opinions about Prioritization of Investments in Transportation

In order to determine the level of interest of the people towards alternative transportation systems, the survey asked them their opinion on how to prioritize government investments in transportation in the City of Springfield. The respondents ranked these investments from 1 (the most important) to 7 (the least important). Figure 9 shows the mean for each category.



**Figure 28. Importance of transportation investments ranked by Springfield citizens.**

On average the respondents consider “road maintenance” as the most important government investment in transportation followed by “widening roads”. These are categories that are expected to be chosen as the highest priority in an auto-dependent community such as Springfield. By contrast, investments on biking facilities such as “bike paths or greenways” and “bike lanes on roads” are the last two categories in which the respondents believe the government should invest. This result may mean a limitation to the future development of greenways and bicycle facilities. But this result is also a

reflection of the idea of most people about walking and bicycling more as recreational activities than as modes of transportation, and therefore they do not see investments in these modes as a priority.

It is significant to point out that people have started to notice the importance of having a pedestrian network through the city, since “sidewalks” was the third category in importance. One of the reasons for this may be that parents now realize how important sidewalks are for the safety of the pedestrian, mainly the students, for example those who live within one mile from the school and cannot use the school bus.

Investments in “bus service” are the fourth category in importance. This is an expected result for a community that does not use this service much. The problem is that citizens do not consider it a priority to invest on transit services. This may affect the transit administrator in looking for financial support from citizens, for example voting for a tax in order to create an independent transit organization that will serve the entire area.

The category “building new roads” is not considered that important. This is probably because people surveyed live in the city where the supply of road is already good. Attitudes might have been different if people living in the suburbs or on the rural-urban fringe were included.

## **6. ANALYSIS OF THE OBSTACLES FOR DEVELOPING ALTERNATIVE TRANSPORTATION SYSTEMS**

### **6.1. Introduction**

The identification and categorization of the main obstacles for developing alternative transportation systems in the Springfield, Missouri area are the result of the analysis of the supply and demand side of the transportation system discussed in previous chapters. Another important source of information for identifying these obstacles is the opinion and general perception of 15 stakeholders, members of the Metropolitan Planning Organization, Ozark Transportation Organization.

The obstacles or barriers for developing alternative transportation systems in Springfield MO area can be divided in two main categories:

- Obstacles related to the attitudes and values of people.
- Obstacles related to the existing land use and city planning.

### **6.2. Obstacles Related to Attitudes and Values of People in the Springfield MO Area.**

**6.2.1. Automobile Culture (Auto-dependency).** The main reason that the citizens surveyed gave for not using alternative modes of transportation in Springfield for all purposes is basically their preference for the automobile. Land use planning and transportation investments have had a great impact on creating this preference.

Throughout the 1900s Springfield citizens have been spoiled by public policies that have effectively subsidized highways, free parking and low gas taxes. Therefore, people have become dependent on the automobile and, additionally, this meant that pressure is exerted



on the government to prioritize auto-oriented investments such as building and widening roads.

All stakeholders who were interviewed agreed that one of the main obstacles for the implementation of alternative transportation systems relates to the culture of the automobile. Some of the comments were that “Americans love their cars”, “people are wedded to their automobile”, “people feel independent with their cars”, and “people choose to drive alone for comfort, independence and cost”.



**Illustration 1. South Campbell an auto-oriented road.**

There is, therefore, a great dependence on cars. Many restaurants and banks are “drive thru” and huge parking lots surround buildings. Many TV commercials encourage the use of the automobile. Moreover, in most people’s mind automobiles are the only mode of transportation. For example, if one asks how to get to a shop or office, the directions are always given for automobiles and the person does not even ask if one has a car. There is only a very small probability that direction would be given for using a bus. In the Springfield MO area, as in many other places in the US, having a car has almost

become a basic need, since people are in considerable disadvantage when they do not have one. People who do not own automobiles find limitations when looking for a job, a place to live or places to shop and play.

**6.2.2. Low Level of Political Acceptability towards the Development of Alternative Transportation Systems.** The top two, in term of importance, investments priorities in transportation for the people surveyed was to maintain and widen roads. By contrast, bicycle-related facilities were considered the least important. These results suggest that the existing automobile culture hinders the change to a multimodal transportation system, making it harder for decision makers to find citizens' support for this. Some of the stakeholders interviewed, especially those representing smaller communities of the MPO, concur that the current demand for alternative modes of transportation in these jurisdictions is very low and people do not want the government spending already limited transportation funds on something other than automobile related facilities.

It is important to note, however, that there is a small proportion of the population who is eager to see the implementation of a multimodal transportation system. These are the people who belong to the various advocacy groups and have been working intensely and continuously in looking for funding and support for bicycling, walking and transit.

**6.2.3. Negative Perception of Multimodal Transportation Options.** Auto-dependency in the Springfield Missouri area has indirectly generated a negative attitude within the community about alternative transportation systems. The automobile has become a symbol of status and safety. By contrast, people perceive that riding the bus, or a bike, and even walking is either dangerous or is only for people who cannot drive,

because of a disability, their age or an inability to afford a car. For example, in an interview during a study process developed by Urbitran Associates in 2002, one stakeholder answered that a problem in the existing transit services were the “‘freaky things’ that ride the bus” (58). This impolite comment and many others heard from ordinary people during the development of the present research can be taken as proof of the mindset of the local community. Because of this way of thinking, people decide not to ride the bus. This explains the survey results showing that most of CU bus riders are low income people who cannot afford a car. Many people negatively judge the existing alternative transportation systems, without ever having used any of these.

Many people do not seem able to contemplate the idea that transit, biking and walking offer suitable transportation alternatives that anyone can choose based on their convenience, their environmentally friendly nature, or because they are healthy. This way of thinking differs markedly to that found in European countries. For instance, Pucher, Komanoff, and Schimek (1999) found that in the Netherlands, Denmark and other countries, bicycling is considered a normal transportation mode that “is usual for young and old, rich and poor, and students and executives”. They also said that “Where cycling is viewed as normal, people consider doing it when it is convenient, and they have access to the necessary equipment and knowledge. Similarly, motorists exhibit more respect toward cyclists, partly because they are more likely to cycle themselves or know others who do” (21).

The survey showed that walking and biking in Springfield are modes largely used for recreational purposes. Apparently, most Springfield citizens do not contemplate the idea of biking and walking for utilitarian purposes like commuting to work or school,

shopping and performing various errands. Moreover, the existing bicycle/pedestrian paths along the greenways have played only an important role for the recreation and health of the area's inhabitants, but they have failed in term of connecting residential, commercial and employment areas.

**6.2.4. Lack of Education and Information about Alternative Modes.** Biking is a popular activity in the US. According to the 2002 National Survey of Pedestrian and Bicyclist Attitudes and Behaviors approximately 57 million people, 27.3% of the population age 16 or older, rode a bicycle at least once during the summer of 2002 in the US. However, not many of them may know how to ride it on the streets as a means of transportation. Chapter 7 of the Missouri Drivers' Guide talks about sharing the road with pedestrians and bicyclists and clearly explains that "bicycles have the same rights and responsibilities as a motor vehicle operator" (Missouri Department of Revenue 2001, 55). However, many drivers, and bicyclists seem to have never read this chapter. Many drivers still think that bicycles need to ride on sidewalks instead of the road. Therefore, sometimes drivers honk, yell or force off the street the bicycle commuters. But at the same time, many bicyclists do not respect traffic laws, so they ride against the traffic, run red lights and stops. These events increase both the bad reputation of bicyclists and the probability of accidents.

Springfield's transit service has existed for more than 100 years. However, many people do not know how to use the service, how often it runs, how much it costs or where it goes. This lack of knowledge makes it more difficult to get people from the area to use the service, or in the case they decide to use it, they often have to wait longer or they take

the wrong route. Then these people relate their bad experience with the bus service to others, thus spreading a bad reputation.

### **6.3. Obstacles Related to Existing Land Use and City Planning**

#### **6.3.1. Spread Out, Low Density Land Use Pattern. (Auto-Oriented City).**

Historically land use planning in Springfield MO area has encouraged the development of single family, low density residential areas and strip commercial areas along roads. For instance, the typical developed square mile in the Springfield MO area looks more suburban than urban, which reflects the inhabitants' cultural preference for suburban living. The resultant spread-out development pattern is one of the main barriers for implementing alternatives to the automobile. Large areas of low density residential developments and the lack of employment and shopping nodes have made it unfeasible for the CU bus to offer a cost-effective transit service within the City of Springfield and even more difficult for the other MPO jurisdictions to implement any kind of public transit. Long distances for commuting to work or school clearly make it even more difficult for the communities in the area to implement cycling or walking as modes of transportation. The USDOT *National Bicycling and Walking Study* found that distance and travel time appear to be the main deterrents to higher levels of non-motorized transportation especially of utilitarian walking.

Suburbanization is an influential factor in terms of building the automobile culture, because even people who would like to use an alternative mode are compelled to use a car when living in the suburbs. Concerning this topic the National Personal Transportation Survey of 1995 pointed out that “the myth of Americans’ love affair with

our cars may actually be a marriage of convenience. Contemporary land use patterns require the use of private vehicles, whether or not we love those vehicles” (FHWA 1995, 34).

Even though the current Springfield-Greene County Comprehensive Plan recommends the development of Activity Centers characterized by a mixed and more compact development pattern and served by multimodal transportation systems, actual policies and regulations do not entirely reflect these suggestions. Subdivision regulations discourage walking and biking, since they do not require developers to provide bicycle, pedestrian or transit facilities in low density developments. Also, each jurisdiction has different subdivision and zoning requirements that do not allow the continuity of a bicycle/pedestrian network along the region. The zoning ordinance in the City of Springfield has not encouraged mixed use zones, except within the downtown area. One attempt of mixed use in the City of Springfield was the development of Chesterfield Village in the southwest area. However, it fell short of its objective. The commercial area is still separated from the residential area; there are no residents living above the businesses to keep the area alive at night. Also the area does not provide residents with all the community services such as grocery store, child care, laundrymat, etc within walking or biking distances.



**Illustration 2. Chesterfield Village Commercial Area**

**6.3.2. Bicycle/Pedestrian and Transit Unfriendly Street Design.** Street design, especially within newer subdivisions, often limits people's ability to walk or bike. Smoother, wider streets and the lack of medians increase the risk to pedestrians and bicyclists. The lack of through streets and labyrinthine shapes limit the easy connection for non-motorized transportation. Drainage ditches and the absence of shoulders along county roads or state highways complicate the provision for bicycle/pedestrian and transit travel. This obstacle directly affects commuters' choice, given that it influences the image of safety. Bicyclists and people traveling on foot feel more secure when they have sidewalks, multi purpose paths or bike lanes that separate them from moving cars (USDOT 1994)



**Illustration 4. Lack of sidewalks and shoulders Scenic Avenue.**



**Illustration 3. Lack of pedestrian and bicycles facilities on a 45 mph road, in a residential area of Battlefield, MO.**

### **6.3.3. Lack of Facilities and Connectivity between Alternative Modes.**

Transportation alternatives developed in Springfield in the last 20 years have not been implemented as part of a comprehensive system but as separate elements. In the last few years, planners and other decision makers have realized this problem and have taken action by developing a comprehensive plan, which looks for a multimodal transportation network that links pedestrian, bicycle and bus systems making it feasible to compete in terms of speed, cost and comfort with the automobile. However, actual policies such as subdivision regulations are not completely in agreement with the plan, since they recommend, but do not require developers to provide connection from new developments to bus stops and/or bicycle/pedestrian paths. Fortunately, school busing policies have indirectly influenced the pedestrian system in the city, since the decision makers have had to rethink and improve the provisions for walking around schools. Some attempts for achieving connectivity between the existing transportation alternatives have included the installation of bike racks on CU buses, bus lockers on the transfer facility and the determination of bike routes. However, the survey shows a very low response of the



citizens to the use of bike racks on buses. Also the experience of bicyclists, including myself, demonstrate that the designated bike routes have not been a real success in term of encouraging biking.

**6.3.4. Low Level of Regional Transportation Planning.** Historically the implementation of transportation alternatives within Springfield Missouri area has been mainly centralized within the City of Springfield that is the main employment, school, commercial and health center in the region. Nevertheless, surrounding towns generate 125,000 vehicles trips daily into Springfield. The region falls short in terms of offering alternative transportation systems to people living outside the city. The extension of the Metropolitan Planning Organization (MPO) to include northern Christian County represents an important step in the process to achieve a level of regional transportation planning in the region. However, funding for transportation improvements in communities other than the City of Springfield is still very limited and therefore investments on maintaining existing roads and bridges are priorities over investments on transit, bicycles or walking systems.

An example of this barrier is the City Bus, which only serves the City of Springfield and faces a structural limitation in terms of expanding its service to other neighboring communities, because it is operated and funded by the City of Springfield utility company.

**6.3.5. Convenience, Low Cost and Speed of the Automobile Compared to Existing Alternative Modes.** Pucher, Komanoff, and Schimek in their study *Bicycling Renaissance in North America?*, found that “the low user-cost of autos is crucial in discouraging virtually all other modes...low gasoline taxes, few road tolls and ubiquitous

free parking make auto use almost irresistible in the United States”(22). This phenomenon applies to the Springfield MO area. Current transit service cannot compete with the automobile because of the former’s limitations in coverage, and frequency of service. The existing bus service is not a regional transit system; it only covers the City of Springfield. The frequency of the CU bus routes is 30 minutes and one hour. This low frequency put the bus service at a disadvantage over the flexibility of driving an automobile. Bicycling and walking are more inconvenient modes than the automobile mainly due to the long distances resulting from the spread out pattern in the area, but also as a result of other minor factors that cannot be controlled, such as inclement weather. However, for short distances trips of less than three miles, cycling and walking could be more convenient than automobile usage in saving time and money, but in the Springfield MO area the lack of adequate infrastructure limits this.

## **7. RECOMMENDED POLICY OPTIONS FOR FUTURE DEVELOPMENT OF ALTERNATIVE TRANSPORTATION SYSTEMS**

### **7.1. Introduction**

The previous chapter described the obstacles for developing alternative transportation systems in the Springfield MO area classifying them in two main categories; those related to the attitudes and values of people, and the existing land use and city planning system. The results of this study may not appear unique or innovative, since most of these obstacles can be perceived by people without performing an in-depth analysis. But the interesting product of this research is a comprehensive analysis of these obstacles and the development of an understanding that in order to solve the problem of lack of implementation of alternative transportation systems in Springfield MO area these obstacles cannot be addressed separately. This chapter recommends policy options and programs that as a whole could probably prove successful in the development of alternative transportation systems. To solve the problem of the lack of implementation of alternative transportation systems in the Springfield MO Area, it is necessary to adopt a multidimensional approach. This covers planning and infrastructure from the supply side; and education and enforcement, which could affect the demand side.

### **7.2. Advocacy Groups' Leadership**

The leadership of the existing bicycle advocacy groups in the City of Springfield has been a key factor in the improvement of alternative transportation systems. Ozarks Greenways Inc., Springbike Bicycling Club and other individual citizens should continue

participating in the MPO technical committees to provide their input in: planning and designing bicycle/pedestrian policies; matching funds to obtain new infrastructure such as bike lockers at the transit station and trailheads; educating the general public through workshops and volunteer trail building; promoting overall biking through the organization of important events such as bike month, bike to work week, and awareness rides; and informing the public about transit and non-motorized transportation related topics through their activities and websites. In the same way, new jurisdictions of the MPO need to create advocacy groups and general mechanisms for public participation for the implementation of alternative modes of transportation.

### **7.3. Regional Transit System**

The Ozarks Transportation Organization should study the feasibility of a rapid bus system or a light rail system that connects the cities of the MPO. Springfield could be considered the main hub that distributes lines to all the other cities. This system should compete against the speed and prices related to automobile use. Creating a Regional Transit Authority is necessary to operate this system, which could be connected to the current CU bus system. An example that can be taken as a model for the future development of this system is Kansas City's regional transit plan called "Smart Moves: a way to go". This Plan was cooperatively developed by Mid-America Regional Council (MARC), Kansas City Area Transportation Authority (KCATA), Johnson County Transit and Unified Government Transit in 2003. It proposes the development of neighborhood transit centers, regional transit centers, Park-N-Ride lots, Rack-N-Ride lots, and three different types of services: "Rapid Riders" service will provide fast service with limited

stops along major arterial roads; “Freeway Flyers” provide peak hour transportation to and from work; and “Local Links” connect homes, offices, neighborhoods, and local services. This plan includes bicycle-transit connections, by proposing convenient and secure bicycle parking at transit stops and transit stations. It also consider the possibility of developing Bike Stations at some regional transit hubs and/or local transit centers based on demand, for offering storage, repair services and bike rentals.

Currently, local governments in the region are studying how to improve mobility from Nixa to Springfield, considering the high amount of commuter trips between these two cities. This problem can be seen as a big opportunity for the area to generate a big change in the transportation system of the region. Instead of widening the existing road or building new ones, local governments should consider developing a rapid bus system along the existing road. This system would start in transit community centers located in focal points within Springfield and Nixa, to which people could walk, bike, or drive to from their houses. The system should have limited stops in major employment centers and be connected to bus lines or bicycles and pedestrian paths.

The existing SMSU shuttle service should also be considered part of the regional transit system, even though it only serves SMSU Campus and downtown area. Because it uses Federal money and it is public, the SMSU shuttle should offer consistent service through the week and the year from SMSU campus, downtown area and surrounding neighborhoods such as Roundtree, Phelps Grove, and the Historic Walnut Street located south, east and north of SMSU Campus respectively.

#### **7.4. Bicycle/pedestrian Network and Facilities**

The MPO should plan for a regional bicycle/pedestrian system that connects every jurisdiction of the area. It should also design model ordinances for bicycle parking; recommend street standards that include space for bicycle lanes and sidewalks; suggest minimum requirements for building bicycle pedestrian paths and advise the inclusion of bicycle pedestrian access in bridge construction. School districts and MPO jurisdictions should work together to create a safe walking and biking environment around schools, specially focus in creating separated paths and/or sidewalks since the main users will be children who are inexperienced bike riders.

Existing and future greenways, which are mainly built for recreational purposes, should also be taken as training areas for children and new bicyclists. Greenways should also be used as a marketing strategy for new developments in the area and as an advertisement for local communities as “livable cities or towns”.

#### **7.5. Multimodal Street Design**

Street standards should change to fit not only automobiles, but other modes of transportation. It is recommended to design narrower streets, wider sidewalks, and bike lanes. Bike lanes on roads are very important to make bicycling more competitive, faster and safer, so it can be a real alternative mode. Otherwise, cyclists would have to continue sharing roads with cars and to suffer the consequences of traffic congestion and intolerant, aggressive drivers.

## **7.6. More Compact, Transit, Bike and Pedestrian Oriented Development Pattern**

Springfield area's spread out development pattern is an important obstacle for the implementation of an efficient transit system. Therefore, considering density of future developments is a key element in the process of planning for a better community. Many cities in the US have started designing better communities following the Transit Oriented Development guidelines, in which the development of residential, commercial and industrial zones are connected to the development of multimodal transportation facilities such as transit centers, bicycle and pedestrian zones.

The region should consider the designation of mixed use zones in some areas of the MPO jurisdictions, especially within activity centers. These zones will have apartments, shopping, community facilities in close proximity to transit stations.

City planners should use site plan reviews to make sure that new developments are bicycle/pedestrian and transit friendly. Traffic calming strategies should be applied to existing residential, commercial and industrial zones that currently present unfriendly environments for bicyclists, pedestrian and transit riders.

## **7.7. Incentives**

In a capitalist culture, people are used to have a material reward for their work or effort. Therefore, the creation of incentives that reward people who use alternative transportation systems, instead of motorized vehicles is a key strategy in the process of implementing alternative modes of transportation in the Springfield, MO area.

The MPO should design programs with major employers including schools and Colleges. Some of these incentives can be:

- **Transit Subsidy:** Employers provide vanpool or transit passes to the employees as part of their benefits. The employees save gas money, even though the trip may take a little longer.
- **Preferential Parking:** Employers give the most convenient parking spots to employees who carpool.
- **Flexible Work Hours:** Employers allow schedule flexibility to the employees who bike or walk to work in order to avoid heavy traffic or inclement weather.
- **Guaranteed Ride Home:** Employers provide free rides to bicyclists in case of inclement weather or to carpoolers and vanpoolers in case of an emergency.

## **7.8. Disincentives**

The automobile culture and the wide provision of automobile related facilities make it really difficult for the community to decide to adopt and use alternative modes of transportation. Therefore, another strategy that needs to be addressed in order to implement alternative transportation systems is to adopt disincentives for using motor vehicles. The most common disincentive proposed in many studies is to increase the cost of automobile use through higher gas taxes, parking charges and toll roads. However, these strategies are very difficult to implement in an auto dependent community, because they have to be approved by the voters.

Some organizations in the City of Springfield, such as Southwest Missouri State University, have already started to price parking. Consequently, the area could start implementing parking pricing as the first step towards discouraging the use of motor vehicles.



Places that already price parking, universities and colleges for example, should base the parking fee depending on the distance. In that way people who live within one or two miles would pay a little more, than others to discourage driving short distances. Other employers should price parking. They can give a percentage of the employees' benefits as subsidy for parking. But this percentage can be an extra salary for those employees that use transit, bike or walk and therefore do not use parking. For example, if the employer gives \$50 a month as benefit to pay parking, an employee who rides his bike or walk to work can use that \$50 for other personal expending or to pay transit.

#### **7.9. Promotion and education**

Implementation of new alternatives to the automobile can not only focus on the supply of infrastructure and services. It is very important to target the population that will use these new facilities and encourage people to actually use them. The future implementation of alternative transportation systems in Springfield, MO area should include, then, the following steps to promote and educate the community:

1. Increase awareness about potential alternative transportation options to driving alone.
2. Develop an understanding of reasons and benefits of using alternative modes of transportation, such as saving gas and parking money, saving time from being in traffic congestion, helping to diminish air pollution and improving health conditions through exercising.
3. Promote trial use of transportation modes through programs that encourage riding the bus to determined destinations for people that never have ridden it. Other

programs include walk or bike to school days, and educational on street bike rides.

4. Follow up the programs and to reinforce education on the people that have already been targeted.
5. Increase the frequency in which people use the service.
6. Turn customers into goodwill ambassadors or advocates of the alternative modes that with their example and experiences pull other people to try out these modes.

The Springfield MO Area should continue developing annual programs to encourage non-motorized transportation, such as: “Bike Month”, “Walk to school day”, “Bike to work week”, “Awareness rides”. Local governments should also create a campaign “Share the road” in order to educate drivers and bicyclists about their rights and responsibilities, road rules and safety tips. Courses for motorists should be included in the drivers licensing process. For example a short presentation and question about sharing the road with bicyclists and yielding to pedestrians should be included in the test. Courses for bicyclists should be conducted in schools and colleges. Springbike Bicycle Club and League of American Bicyclists should continue organizing training programs for regular citizens.

Employers including universities and colleges should include in their new employee orientation process recommendations for using alternative modes of transportation. This could be accomplished by giving them information about the bus service (maps, routes, schedule, and fares), bicycling and walking (maps, routes, facilities and rules). The transit provider should be active part of this process.

Local government and developers of the region should uphold the development of greenways trails as a marketing strategy to increase the value of commercial or residential developments with an “eco-friendly label” that may attract buyers. Greenways trails can also be used to interest people to try other modes of transportation for recreation, with the potential that these people later will use these alternative modes for other purposes such as going to work or school. Greenway trailheads should also provide information about bicycle, pedestrian and transit facilities in the area.

#### **7.10. Information and Continuity**

A regional assistance and information network for alternative transportation systems should be created. This network would help people to identify their alternatives for transport within the region. It would include information about routes, schedules, fares, ridesharing programs, and events. It would also include promotion and evaluation of the satisfaction and current use of the system.

#### **7.11. Evaluation**

Estimating the benefits of the use of alternative transportation systems is necessary. The impacts of bicycling, walking and riding the bus on the reduction of energy costs, time and transportation emission, and the impact of bicycling and walking in terms of reducing obesity, are indicators that could be collected, studied and used by the local government to support present and future investments in alternative transportation within the region. This indicators also could help for getting funding from the state and federal government.

The contest “Bike, bus, car race” part of “Bike to work week” event that takes place in Springfield in May every year can be utilized as a first attempt to evaluate differences in travel time when using different modes.

Some indicators used by the Metropolitan Washington Council of Governments as part of the Commuter Connection program that could be adopted are:

- Gallons of gasoline saved
- Commuter travel costs reduced
- Commuter travel time Reduction
- Tons of NO<sub>x</sub>, VOC’s reduced
- Vehicle trips and vehicle miles traveled reduced

#### **7.12. Final Thoughts**

This study has identified the obstacles affecting the implementation of Alternative Transportation Systems in Springfield Missouri area throughout the history of the region, and has recommended general policy options that as a whole could probably prove successful in the development of these alternatives. However, further research should focus on identifying distribution of responsibilities, partnership and funding opportunities to implement walking, biking and transit systems within the Springfield Missouri area. Future studies should also center their attention on designing methods of public input that include representation for other modes of transportation within every MPO jurisdiction.

## REFERENCES

Arnold, Jeff. 26 Oct. 2003. "Each Day, 125,000 cars aim for Springfield". Newsleader. A1+.

Center on Urban and Metropolitan Policy. 2002. *Growth in the Heartland: Challenges and Opportunities for Missouri*. Washington D.C: The Brookings Institution. Available from <<http://www.brookings.edu/es/urban/missouri/abstract.htm>>.

City of Portland Oregon. 2002. "Central city transportation management plan and policy." Available from Smart Community Network, <<http://www.sustainable.doe.gov/codes/cityportland/index.html>> (accessed 18 September 2002).

City of Springfield. 2003. "Vision 20/20 The Future is Now" 25 Nov. 2003. <<http://www.ci.springfield.mo.us/vision2020/index.html>>.

City of Springfield. City Council. 1958. *A Report on Springfield Trafficways*. Springfield, MO.

City of Springfield. Community Development Department. 1984. *Southwest Springfield Development Plan*. Springfield, MO.

----. 1987. *Springfield Area Transportation Plan*. Springfield, MO.

City of Springfield. Planning and Development Department. 25 Mar. 2002. *Capital Improvements Program 2002-2007*. Springfield, MO.

----. 18 Nov. 2002. *Capital Improvements Program 2003-2008*. Springfield, MO.

- . 1992. *City Utilities Transit System 1992: Annual Assessment Report*. Springfield, MO.
- City of Springfield. Planning and Zoning Department. 1979. *Transportation Facilities Characteristics Update 1980*. Springfield, MO.
- . 1980. *Transportation Facilities Characteristics Update 1981*. Springfield, MO.
- . 1981. *Transportation Facilities Characteristics Update 1981*. Springfield, MO.
- . 1980. *Short Range Transit Plan*. Barton-Ashman Associates, Inc. Springfield, MO.
- . 1982. *Transportation Inventory and Analysis Report*. Springfield Master Plan. Springfield, MO.
- City of Springfield. Public Works Department. 2003. "Bicycle Facilities" 11 Nov. 2003 <[http://www.ci.springfield.mo.us/transportation/bike\\_facilities.html](http://www.ci.springfield.mo.us/transportation/bike_facilities.html)>.
- City of Springfield & Missouri State Highway Department. 1963. *Springfield Transportation Study: Transportation and Travel Facts*. Vol.1. Springfield, MO.
- . 1967. *Springfield Transportation Study: Future Travel and Transportation Needs*. Vol. 2. Springfield, MO.
- Daniels, Tom. 1999. *When City and Country Collide: Managing Growth in the Metropolitan Fringe*. Island Press.
- Downs, Anthony. 1992. *Stuck in traffic: coping with peak-hour traffic congestion*. Washington D.C: The Brookings Institution.
- Dunn, Jr., James A. 1998. *Driving forces: the automobile, its enemies and the politics of mobility*. Washington, DC: Brookings Institution Press.
- Ewing, Reid. 1997. *Transportation and land use innovations: when you can't pave your way out of congestion*. Chicago: Planners Press.

FHWA Federal Highway Administration. Office of Highway Information Management.

19 Feb. 2003. "Highway Statistics Summary to 1995". 20 Nov. 2003.

<<http://www.fhwa.dot.gov/ohim/summary95/index.html>>.

----. 3 Feb. 2003. "Highway Statistics 2001" 22 Nov. 2003.

<<http://www.fhwa.dot.gov/ohim/hs01/index.htm>>.

----. 1995. "National Personal Transportation Survey".

<<http://npts.ornl.gov/npts/1995/Doc/databook95.shtml>>.

Glazier, Robert C. 2003. "An Almost Condensed History of the Queen City of the Ozarks" Guide to Springfield 25. P 29.

Gomez Ibanez, Jose A. 1996. Big transit ridership, deficits, and politics: Avoiding reality in Boston. *Journal of the American Planning Association*. 62, no.1 (1996): 30-50.

Hogg, Virginia. 1934. *The Urban Pattern of Springfield, Missouri*. Saint Louis: Washington University.

Kay, Jane Holtz. 1997. *Asphalt nation: how the auto took over America, and how we can take it back*. New York: Crown Publishing.

League of American Bicyclists. 2004. "League Honors Eleven New Bicycle-Friendly Communities to Kick Off National Bike Month TM" Press release. April 29, 2004. <<http://www.bicyclefriendlycommunity.org/May2004PressRelease.htm>>.

Litman, Todd. 2000. "An economic evaluation of smart growth and TDM: Social welfare and equity impacts efforts to reduce sprawl and automobile dependency."

Victoria, Canada: Victoria Transport Policy Institute. Available from

<[http://www.vtpi.org/s\\_growth.pdf](http://www.vtpi.org/s_growth.pdf)>.

- Litman, Todd. 2002. "The cost of automobile dependency and the benefits of balanced transportation." Victoria, Canada: Victoria Transport Policy Institute. Available from <<http://www.vtpi.org/autodep.pdf>> (accessed 14 November 2002).
- Litman, Todd. 2003. "Evaluating transportation land use impacts." Victoria, Canada: Victoria Transport Policy Institute. Available from <<http://www.vtpi.org/landuse.pdf>>.
- Metropolitan Washington Council of Governments. 2001. "Commuter Connections State of the commute 2001: Survey Report". Draft October 16, 2001. Prepared by LDA Consulting.
- Mid-America Regional Council (MARC), Kansas City Area Transportation Authority (KCATA), Johnson County Transit and Unified Government Transit. 2003. "Smart Moves: a new way to go". <<http://www.marc.org/kcsmartmoves/>>.
- Missouri Department of Economic Development. 2003. "Labor Market Information". 21 Nov. 2003. <<http://www.works.state.mo.us/lmi/index.htm>>.
- Missouri Department of Revenue. 2001. "Missouri Driver Guide". Division of Motor Vehicle and driver licensing. <<http://www.dor.mo.gov/mvdl/drivers/dlguide/chapter7.htm>>.
- MoDOT. 2003. "Bicycle/pedestrian program" *Missouri Department of Transportation*. Available from <<http://www.modot.state.mo.us/othertransportation/bicyclepedestriangeneralinformation.htm>> (accessed 22 September 2003).
- Newman, Peter and Jeffrey Kenworthy. 1999. *Sustainability and cities: Overcoming automobile dependence*. Washington D.C: Island Press.



Ozarks Greenway Inc. 2003. 11 Nov. 2003

<[http://www.ozarkgreenways.org/greenway\\_info.html](http://www.ozarkgreenways.org/greenway_info.html)>.

Porter, Douglas R. 1998. Transit-focused development: A progress report. *Journal of the American Planning Association* 64, no. 4 (1998): 475-488.

Pucher, John, Charles Komanoff and Paul Schimek. 1999. Bicycling renaissance in North America? Recent trends and alternatives policies to promote bicycling. *Transportation Research Part A* 33, no.7/8 (1999): 625-654. Available from <<http://www.vtpi.org/pucher3.pdf>>.

Riley, Claudette. 1 Sept. 2002 "Where the Sidewalks End". Newsleader: A1+.

SATS-Springfield Area Transportation Study. 1981. *Transportation Fuel Emergency Strategies*. Summary Report. Springfield, MO.

Springbike Bicycle Club. 2003. 11 Nov. 2003. <<http://jrtwebdesign.com/springbike/>>.

Simpson & Curtin. 1972. *Financing Public Transit: Financial Requirements of the Public Bus System Serving the State of Missouri*.

Taylor, Mabel C. 2003. "When the Railroad Came to Town" Guide to Springfield 25. P 24 - 26.

UMTA Urban Mass Transit Administration. 1975. Missouri Transportation Associates. *Transit Development Program*. Springfield, MO.

Urbitrans Associates, Inc. City of Springfield. 2002. *Springfield Planning and Organizational Management Services Study*. Urbitrans Report.

U.S. Census Bureau. 9 Sept. 2003. "United States Census 2000". 16 Oct. 2003. <<http://www.census.gov/main/www/cen2000.html>>.

U.S. Department of Transportation. 1991. *ISTEA: Intermodal Surface Transportation Efficiency Act of 1991*. Washington D.C.

U.S. Department of Transportation. 1997. *TEA 21: The Transportation Equity Act for the 21st Century*. Washington D.C.

U.S. Department of Transportation. 1994. *National bicycling and walking study*. Case study # 1, *Reasons why bicycling and walking are not being used more extensively as travel modes*. Federal Highway Administration Publication No. FHWA-PD-92-041. Available from *National Center for Bicycling and Walking* <<http://www.bikewalk.org/PDF/CASE1.PDF>>.

US Department of Transportation's National Highway Traffic Safety Administration (NHTSA) and Bureau of Transportation Statistics. 2002. *National Survey of Pedestrian and Bicyclist Attitudes and Behaviors*. <<http://www.bicyclinginfo.org/survey2002.htm>>.

Vision 20/20. 2001. *Transportation Plan*. Springfield-Greene County Comprehensive Plan. Springfield, MO.

----. 2001. *Parks, Open Space and Greenways Plan*. Springfield-Greene County Comprehensive Plan. Springfield, MO.

----. 2001. *Growth Management and Land Use Plan*. Springfield-Greene County Comprehensive Plan. Springfield, MO.

Weiner, Edward. 1999. *Urban transportation planning in the United States: A historical overview*. Revised and expanded edition. Westport, CT: Praeger Publishers.

1000 Friends of Oregon. 1997. "Making the connections: A summary of the LUTRAQ project." Portland: 1000 Friends of Oregon. Available from  
<<http://www.friends.org/goods/pdfs/vol7/change.pdf>>.

# APPENDICES

## APPENDIX A

### **SOUTHWEST MISSOURI STATE UNIVERSITY SURVEY ON TRANSPORTATION ALTERNATIVES**

This Survey is oriented to determine the attitude of Springfield citizens towards the use of alternative modes of transportation, such as biking, walking or public transit. Your help is very important to achieve the purpose of this research. Therefore, I request as a favor that you fill out this questionnaire. It will take you just 10 minutes. The data from this survey will be used with anonymity and confidentiality.

#### **1. If applicable, what mode of transportation do you use to go to work?**

*Please circle the number of days a week that you use each different mode of transportation*

<b>Mode typically used per week</b>	<b>Go to work – No. of days a week</b>				
CAR, TRUCK, VAN OR MOTORCYCLE	1	2	3	4	5
CARPOOL-VANPOOL	1	2	3	4	5
TAXICAB	1	2	3	4	5
SCHOOL BUS	1	2	3	4	5
CITY UTILITIES BUS	1	2	3	4	5
BIKING	1	2	3	4	5
BIKING + BUS PICK UP	1	2	3	4	5
WALKING	1	2	3	4	5
WORK AT HOME	1	2	3	4	5

#### **2. If applicable, what mode of transportation do you use to go to school**

*Please circle the number of days a week that you use each different mode of transportation*

<b>Mode typically used per week</b>	<b>Go to school – No. of days a week</b>				
CAR, TRUCK, VAN OR MOTORCYCLE	1	2	3	4	5
CARPOOL-VANPOOL	1	2	3	4	5
TAXICAB	1	2	3	4	5
SCHOOL BUS	1	2	3	4	5
CITY UTILITIES BUS	1	2	3	4	5
BIKING	1	2	3	4	5
BIKING + BUS PICK UP	1	2	3	4	5
WALKING	1	2	3	4	5

**3. Trip Length.** Please write on the blanks

TO GO TO WORK \_\_\_\_\_ MILES \_\_\_\_\_ MINUTES

TO GO TO SCHOOL \_\_\_\_\_ MILES \_\_\_\_\_ MINUTES

**4. Do you use the City Utilities bus for the following purposes?** Please circle all that apply

1. COMMUTING TO WORK
2. SCHOOL
3. SHOPPING/ERRANDS
4. SOCIAL/RECREATION
5. I DO NOT USE THE CITY UTILITIES BUS

**5. How often do you use the City Utilities bus service?** Please circle one

1. EVERY DAY
2. 5-6 DAYS A WEEK
3. 3-4 DAYS A WEEK
4. 1-2 DAYS A WEEK
5. VERY RARELY (few times a year)
6. NEVER

**6. If applicable, what are your reasons for not using the City Utilities bus more often?** Please circle all that apply

1. PREFER AUTOMOBILE
2. PREFER TAXI
3. PREFER WALKING OR BIKING
4. BUS ROUTE DOES NOT COVER AREA WHERE YOU LIVE
5. SCHEDULE HOURS NOT CONVENIENT
6. IS TOO EXPENSIVE
7. TAKES TOO LONG
8. I DID NOT KNOW THERE WAS A BUS SERVICE
9. PHYSICALLY I AM UNABLE TO RIDE THE BUS

**7. From the reasons that you chose in the last question, which one do you consider to be the most important?** Please circle one

1      2      3      4      5      6      7      8      9

**8. Do you ride a bike for the following purposes?** Please circle all that apply

1. COMMUTING TO WORK
2. SCHOOL
3. SHOPPING/ERRANDS
4. SOCIAL/RECREATION
5. DO NOT RIDE BIKES

**9. How often do you ride a bike?** Please circle one

1. EVERY DAY
2. 5-6 DAYS A WEEK
3. 3-4 DAYS A WEEK
4. 1-2 DAYS A WEEK
5. VERY RARELY (few times a year)

**10. If applicable, what are your reasons for not riding a bike more often?**

Please circle all that apply

1. PREFER AUTOMOBILE
2. PREFER TAXI
3. PREFER RIDE A BUS
4. PREFER WALKING
5. PHYSICALLY I AM UNABLE TO BIKE
6. INCLEMENT WEATHER
7. I DO NOT LIKE TO BIKE
8. THERE IS TOO MUCH CRIME TO BIKE WHERE I LIVE
9. THINGS ARE TOO FAR TO GET TO AND IT IS NOT CONVENIENT TO BIKE
10. IT IS HARD TO BIKE WHERE I LIVE BECAUSE THERE ARE NOT BIKE PATHS, BIKE LANES AND BIKE PARKING

**11. From the reasons that you chose in the last question, which one do you consider to be the most important?** Please circle one

1   2   3   4   5   6   7   8   9   10

**12. Do you walk for the following purposes?** Please circle all that apply

1. COMMUTING TO WORK
2. SCHOOL
3. SHOPPING/ERRANDS
4. SOCIAL/RECREATION
5. DO NOT WALK

**13. How often are your walking trips?** Please circle one

1. EVERY DAY
2. 5-6 DAYS A WEEK
3. 3-4 DAYS A WEEK
4. 1-2 DAYS A WEEK
5. VERY RARELY (few times a year)
6. NEVER

**14. If applicable, what are your reasons for not walking more often?** Please circle all that apply

1. PREFER AUTOMOBILE
2. PREFER TAXI
3. PREFER RIDE A BUS
4. PREFER BIKING
5. PHYSICALLY I AM UNABLE TO WALK
6. INCLEMENT WEATHER
7. I DO NOT LIKE TO WALK
8. THERE IS TOO MUCH CRIME TO WALK WHERE I LIVE
9. THINGS ARE TOO FAR TO GET TO AND IT IS NOT CONVENIENT TO WALK
10. IT IS HARD TO WALK WHERE I LIVE BECAUSE THERE ARE NOT ENOUGH SIDEWALKS OR CROSSWALKS

**15. From the reasons that you chose in the last question, which one do you consider to be the most important?** Please circle one

1   2   3   4   5   6   7   8   9   10

**16. How often do you use the following facilities in Springfield?** *Please check one*

	Every day	5-6 days a week	3-4 days a week	1-2 days a week	Very rarely	Never
GREENWAYS (Bike and walking paths)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BIKE RACKS (Installed on city buses)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**17. Does your work place or school have bike parking?** *Please check one for each place*

	Work place	school
1. YES	_____	_____
2. NO	_____	_____
3. DO NOT KNOW	_____	_____

**18. If you did not have a car, which mode of transportation would you prefer?** *Please circle one*

1. BUS
2. BIKE
3. WALK
4. BIKE AND BUS
5. CARPOOL, VANPOOL
6. TAXICAB

**19. In order of importance, rank how you think government investments in transportation should be made.** *From 1 to 7 being 1 the most important and 7 the least important*

_____	ROAD MAINTENANCE
_____	WIDENING ROADS
_____	BUILDING NEW ROADS
_____	BIKE LANES ON ROADS
_____	BIKE PATHS OR GREENWAYS
_____	SIDEWALKS
_____	BUS SERVICE

**The following questions are for statistical purpose only. It will help us to make sure that the survey sample is representative of the Springfield population.**

**20. Your age.**

1. Under 20 years
2. 20 to 24
3. 25 to 34
4. 35 to 44
5. 45 to 54
6. 55 to 59
7. 60 to 64
8. 65 to 74
9. 75 to 84
10. 85 years and over

**21. Your sex.**

1. Male
2. Female

**22. Your Occupation.**

\_\_\_\_\_

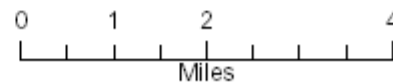
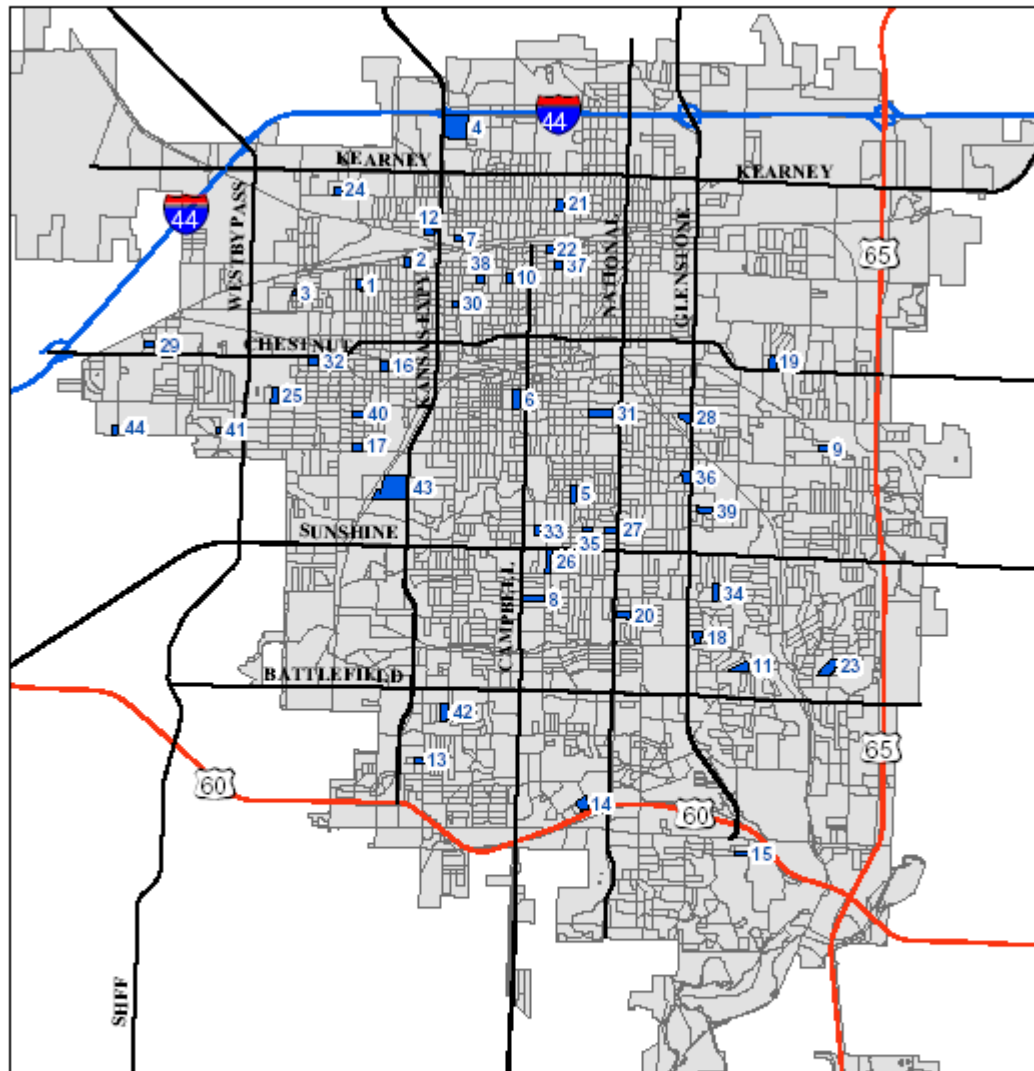
**23. Approximate annual income.**

1. Less than \$10,000
2. \$10,000-\$14,999
3. \$15,000-\$24,999
4. \$25,000-\$34,999
5. \$35,000-\$49,999
6. \$50,000-\$74,999
7. \$75,000-\$99,000
8. \$100,000-\$149,999
9. \$150,000 or more



## APPENDIX B

### BLOCKS SURVEYED IN SPRINGFIELD MISSOURI



Cartographer: Adriana Giraldo

August 2003

Source: City of Springfield, Census 2000.

**Figure 29. Blocks surveyed in Springfield, Missouri**

APPENDIX C. COMPARISON BETWEEN DEMOGRAPHICS IN THE CENSUS 2000  
AND THE SURVEY ON TRANSPORTATION ALTERNATIVES

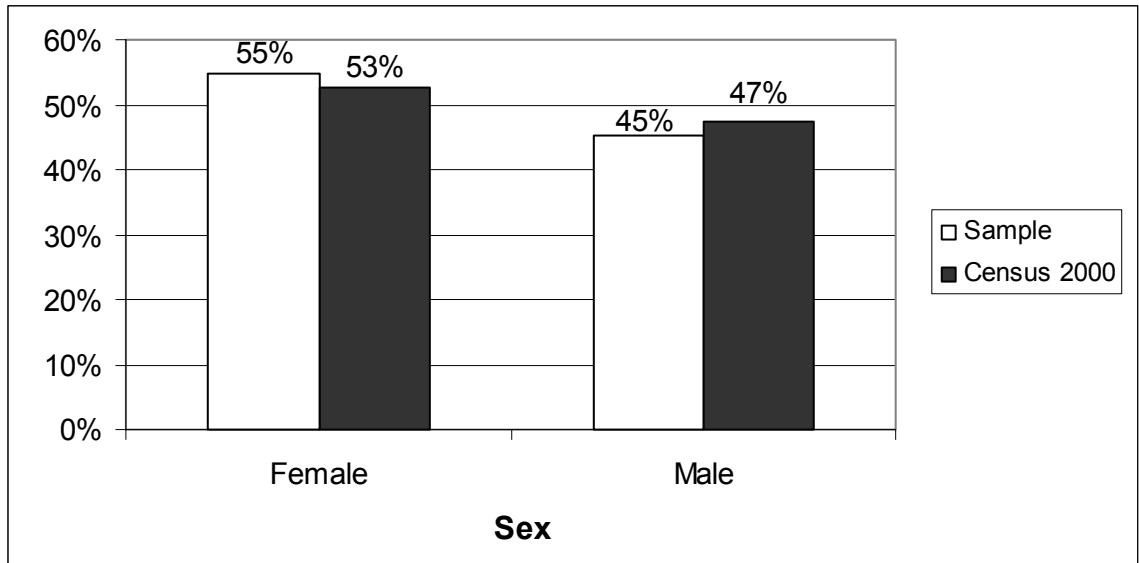


Figure 30. Distribution of the population by sex.

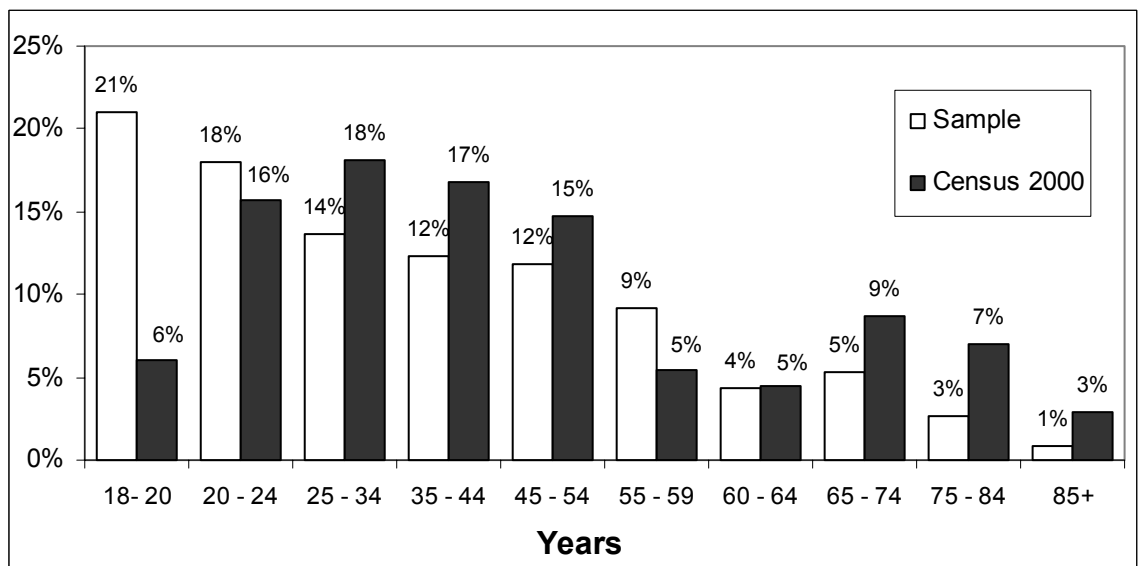
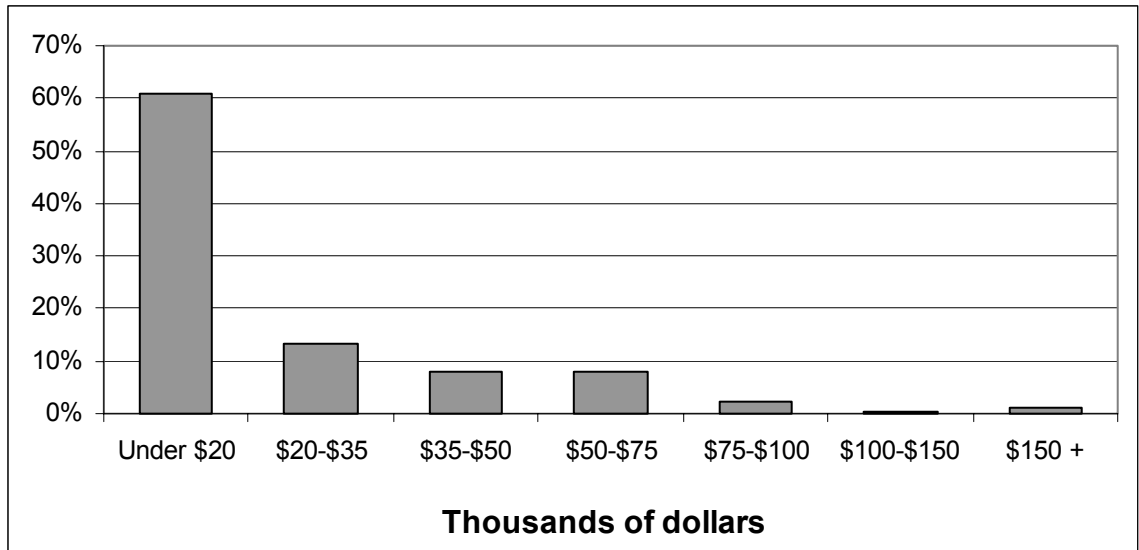
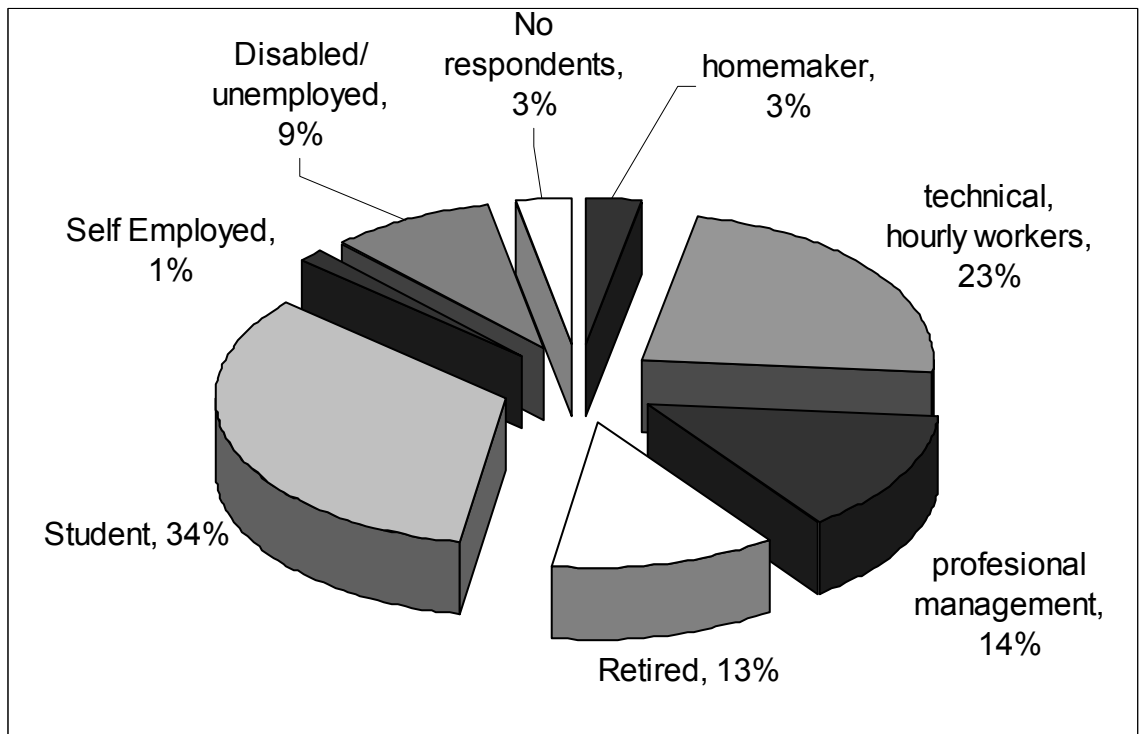


Figure 31. Distribution of the population by age.



**Figure 32. Income distribution of the sample**



**Figure 33. Sample distributed by occupation**