



NON-MOTORIZED TRANSPORTATION PLANNING Resource Book





Table of Contents

DISCLAIMER 4

STUDENT PRACTICUM PROGRAM..... 5

SCOPE OF SERVICE AGREEMENT 6

ACKNOWLEDGEMENTS 7

(1.0) INTRODUCTION 8

 (1.1) NON-MOTORIZED TRANSPORTATION PLANNING 10

 1.1.A. Master Planning..... 11

 1.1.B. Municipal Ordinance 11

 1.1.C. Site Plan Review 12

 (1.2) MOTIVATIONS TO PLAN FOR NON-MOTORIZED TRAVEL..... 13

 1.2.A. Changes in Public Opinion..... 14

 1.2.B. Creating Active Communities..... 20

 1.2.C. Smart Growth 24

 1.2.D. Sustainable Benefits from NMT Networks 27

(2.0) METHODS 35

 (2.1) NMT VARIABLES..... 36

 (2.2) INVESTIGATION 38

 (2.3) LIMITATIONS 44





(3.0) EXISTING CONDITIONS.....53

 (3.1) SOCIOECONOMIC FACTORS INFLUENCING NMT53

 3.1.A. NMT Bicycle User Profile53

 3.1.B. NMT Pedestrian User Profile56

 3.1.C. Socioeconomic Conditions Affecting NMT Systems & Usage61

 (3.2) FACILITIES AND INFRASTRUCTURE79

 (3.3) LAND USE PATTERNS90

 3.3.A. Street Networks & Connectivity91

 3.3.B. Density.....96

 3.3.C. Land Use Diversity98

 3.3.D. Land Use Patterns in Lansing.....100

 3.3.E. Conclusions115

 (3.4) SCHOOLS116

 (3.5) PUBLIC SAFETY IN THE NMT ENVIRONMENT.....125

(4.0) DESIGN GUIDELINES139

ANNOTATED BIBLIOGRAPHY144

NMT PLANS REVIEWED.....148

GLOSSARY OF NMT TERMS150

TOOLS.....158





Disclaimer

This document was produced during a class project, through effort of both degree-seeking graduate and undergraduate students in the Urban and Regional Planning program at Michigan State University. This project was completed in fulfillment with course requirements for UP 894, instructed by Dr. Rex LaMore and Dr. Zenia Kotval. The content and direction for this document was decided cooperatively between the project team and the Mayor's Task Force on Walking and Bicycling, in participation with the Michigan Department of Transportation, the City of Lansing's Department of Planning and Development, and Michigan State University, amongst others.

The opinions, findings and conclusions in this publication are the authors' and not necessarily those of the Michigan Department of Transportation, the City of Lansing, or Michigan State University. This document is not an approved plan for the establishment of policy and law, nor has it been approved or ratified by any elected body within the City of Lansing. The intention of this document is to serve as a handbook for the Mayor's Task Force on Walking and Biking, which will develop the non-motorized transportation section of the forthcoming City of Lansing Master Plan.

Both the Client and Team understand that this project will concern itself primarily with the area within the corporate boundaries of the City of Lansing. As such, policies recommendations will be made on a citywide basis, and not for specific locations within the study area. It is understood that corridor level study should be undertaken before any policy recommendations are implemented.

For additional questions, please contact: Michigan State University, Dept of Urban and Regional Planning, 101 UPLA Building, East Lansing, MI 48824. Phone: (517) 353.9054. Fax: (517) 355.7697 or the City of Lansing, Parking and Transportation Office, c/o Mr. Andy Kilpatrick, 219 N. Grand Avenue Lansing, MI 48933. Phone: (517) 483.4248. Fax: (517) 484.4395. Thank you.





Student Practicum Program

The Urban and Regional Planning Program, as part of both undergraduate and graduate curricula, requires students to take a course in their final year called "Practicum". This is the Program's capstone course which creates the opportunity for students to work with communities to help them reach their goals and for the students to gain valuable and realistic, hands-on experience. While many other classes have opportunities for students to work with communities on a variety of projects, practicum is the only class that is solely dedicated to that purpose.

Practicum is a unique experience where students guided by faculty, practicing planners, and community members converges to complete a project the community has requested within one semester. Practicum occurs every spring semester and must be completed by all students. Each group is assigned a project to complete within the semester. During the semester there may be several meetings with community members, faculty, and other advisors. The student's final product is typically a report and a presentation to their client. Practicum is administered under the Urban Planning Partnerships as one area where community service and outreach may be attained.

Urban Planning Partnerships (UPP) is an outreach initiative within Michigan State University's Urban and Regional Planning Program. The MSU Urban and Regional Planning Program, over 50 years old, trains graduate and undergraduate student planners. It is located within the School of Planning, Design and Construction, which is part of the *College of Agriculture and Natural Resources* and the *College of Social Science*. Urban Planning Partnerships is sponsored in part by Urban Collaborators, an initiative based within MSU Extension.

For more information, please contact: Michigan State University, Dept of Urban and Regional Planning, 101 UPLA Building, East Lansing, MI 48824. Phone: (517) 353.9054. Fax: (517) 355.7697





Scope of Service Agreement

Lansing Mayor Virg Bernero established a task force on walking and bicycling on October 20, 2006. It is the goal of the Lansing non-motorized transportation student project team (the Team) to support the Task Force (the Client) as it seeks the best possible policy. The practicum team produced a *Non-Motorized Transportation Planning Resource Book* for the City of Lansing that is:

- 🚲 Consistent with the non-motorized transportation components of the *Tri-County Regional Planning Commission Long Range Plan*, Michigan Department of Transportation's 5 year plan.
- 🚲 Complements the non-motorized transportation plans of surrounding communities.
- 🚲 Develops resources supporting development of a comprehensive, citywide non-motorized transportation system.
- 🚲 Recommends strategies for implementation of policy.

In order to meet these objectives, the Team provided the Client with the following services and deliverables:

- 🚲 A collection of data demonstrating existing conditions, assets, and liabilities including existing bicycle and pedestrian infrastructure and facilities, existing demographic conditions influencing levels and attributes of non-motorized transportation, and existing policy influencing levels and quality of non-motorized transportation. Where appropriate, this data will be mapped using GIS.
- 🚲 An analysis of existing conditions and development of goals statement for subsequent policy.
- 🚲 Recommendation of policy to create a "coordinated" non-motorized transportation system.
- 🚲 Policy recommendations will be provided in three distinct areas: 1) alteration and improvement of physical infrastructure and will include design standards for automotive thoroughfares, multi-use paths and pedestrian sidewalks, wayfinding mechanisms, traffic signalization, and bicycle and pedestrian facilities; 2) social programs that encourage expanded pedestrian and bicycle transportation; 3) key resources for implementation will be identified and recommended.
- 🚲 Creation of a final document
- 🚲 Public presentation of the final report to the Client at a time to be determined.





Acknowledgements

The practicum team for this project consisted of: Mr. Matthew Brinkley, MURP; Mr. Daniel Guild, MURP; Mr. Kasif Khowaja, BSURP; Ms. Suzanne Miske, MURP; Mr. Hyung-Jun Park, BSURP; Ms. Hillary Lewis-Reimers, BSURP, Mr. Quinton Robinson, BSURP; and Ms. Janet Strauss, MURP, *who are all student candidates for the degrees listed*. They would like to recognize the following people who helped and contributed to the development of this resource.

Firstly, the practicum team would like to acknowledge Dr. Zenia Kotval and Dr. Rex LaMore, the faculty advisors for this project for their advice, consultation, perspective, and support. In addition, the project team would also like to acknowledge Mr. Andy Kilpatrick, from the City of Lansing's Department of Planning and Development for serving as the City of Lansing's client liaison for this report. Also, the project team would like to thank Mr. Paul Hamilton and Ms. Laura Tschirhart from the Tri-County Regional Planning Commission. Finally, the project team would like to recognize all the community leaders who are serving on the Mayor's Task Force, which includes the following:

Infrastructure Committee: Lyndon Babcock, People for Transportation Options; Josh DeBruyn, MDOT; Jane Dykema, City of Lansing, Public Works; Eric Glohr, Lansing Community College; Lina Goodwin, Northwest; Nancy Krupiarz, Michigan Trails & Greenways; Sarah Panken, Governor's Council on Physical Fitness; Nate Rowen, Lansing School District; Steven Shaughnessy, MDOT; Deidre Thompson, MDOT; Peter Stoughton, Delhi Township

Education Committee: Alicia Armstrong, Community Partners in Health; Dave Emmons, Lansing Police Department; Jen Hoffman, Allen Neighborhood Center; Joel Maatman, Lansing School District; Nicole Mankowski, Mayor Bernero's Office; Tracy Carney-Miller, Delhi Township; Tim Potter, MSU Bikes; Jamie Schriener-Hooper, Old Town; Bill Savage, Tri-County Bicycle Association; Janine Sinno, Ingham County Health Department; Chris Thelen, Consumers Energy; Jessica Yorke, Mid-Michigan Environmental Action Council.





(1.0) Introduction

Tremendous opportunities exist, within the City of Lansing, for the creation of a complete non-motorized transportation (NMT) system. Growing populations of pedestrians and bicyclists already rely on non-motorized modes of travel to commute to-and-from work, school, and recreational facilities throughout the city. A strong commitment by the City's policy-makers, staff and local residents to improve the non-motorized network will help ensure that progress continues to be made to the system, and subsequently, to the community as a whole.

The non-motorized transportation planning process provides the City with a forum for community dialogue, stakeholder participation, and community priority identification. Similarly, the planning process also provides an opportunity for developing achievable goals. Drawing from successful models of non-motorized transportation in other communities, combined with place-based creativity specific to Lansing, citizens and planners can blend proven techniques with the local community's needs. Successful NMT planning should capture these findings and set short- and long-term objectives, while limiting potential barriers to achieving these goals. Because plans inform future policy and development, their significance cannot be overemphasized.

Most recently, Mayor Bernero announced in his *2007 State of the City* address that he would like to see Lansing become a leader in municipal sustainability and conservation. Moving forward, the Mayor has recently signed the *U.S. Mayor's Climate Protection Agreement*, committing the City to significant reductions in greenhouse gas emissions that contribute to global warming. In addition, Mayor Bernero has announced that Lansing will become the second city in the nation to accept the U.S. Environmental





Protection Agency's *Energy Star Challenge*.¹ It is the hope of the team that an effective non-motorized transportation policy and plan will further complement Lansing achieving this leadership.

The future offers an exciting vision where fewer cars are necessary, and a more integrated network of trails, walkways, and bicycle routes exist to give access to all residents and provide for a vibrant, safe city. Non-motorized transportation will hopefully play a vital and increasingly important role as the City of Lansing moves forward into the 21st century. To this end, the purpose of the Handbook is to assist the *Mayor's Task Force on Walking and Bicycling* in their efforts to help Lansing become a state leader in high quality, non-motorized transportation. Using this Handbook as a guide, the *Task Force* can add sound policy to a set of planning fundamentals and existing infrastructure.



¹ "Text of 2007 State of the City Address". *Lansing State Journal*. Jan 29, 2007 Online: www.lsj.com/apps/pbcs.dll/article?AID=/20070129/NEWS01/607290341/1225/NEWS01 .





(1.1) Non-motorized Transportation Planning

Non-motorized transportation systems are developed professionally by city planners in collaboration with engaged citizens. Urban planners are experts who guide the physical development and orderly spatial organization of urbanized places. This includes the physical facilities or improvements to the land which are made to accommodate the efficient, safe, and pleasurable movement through cities. Urban functions addressed encompass land use, transportation, housing, open space, recreation, social services, and conservation of environmental and historic resources.²

Transportation Planning, a sub-specialty within the field of city planning, is a continuing, comprehensive and collaborative process to encourage and promote the development of multimodal transportation systems to ensure safe and efficient movement of people and goods while balancing environmental and community needs.³ Non-motorized transportation (NMT), which is also known as 'active transportation' or 'human-powered transportation', includes walking, bicycling, non-motorized watercraft, small-wheeled transport (skates, skateboards, push scooters and hand carts), and wheelchair travel.⁴

In cities throughout the United States, and here in Lansing, three main planning processes can be used to create successful non-motorized transportation networks. These three processes, the master planning process, municipal ordinance, and the site plan review process, are expanded on in the next sections.

² The Comprehensive Plan of Fairfax County, VA. June 20, 2005. Online: <http://www.fairfaxcounty.gov/dpzi/>

³ Glossary of the Federal Highway Administration. U.S. Department of Transportation. February 16, 2007. Online: plan4operations.dot.gov/Glossary.asp

⁴ Online TDM Encyclopedia. "Non-motorized Transportation Planning: Identifying Ways to Improve Pedestrian and Bicycle Transport". *Victoria Transport Policy Institute*. 12/14/2005. Online: www.vtpi.org/tdm/tdm25.htm





1.1.A. Master Planning

In the master planning process, community members create a vision for the development of their community and then outline the steps needed to reach it. The process differs from one community to another, but, typically, goes through several stages characterized by different tasks and different actors. At the beginning, professional planners inventory community assets, identify current land use, and project future land requirements. These planners also analyze the local economy, trends in population growth, and the transportation system. These findings are typically presented to local citizens for feedback about desired community goals. Alternative plans for achieving those goals are formulated, and ultimately a preferred path is selected, through collaboration between active citizens and professional planners.⁵

After a hiatus of several decades, the City of Lansing, has recently committed itself to updating its Master Plan for the entire city. This document will guide the planning and development of the city for the next several decades. It will be the responsibility of the *Task Force* to make sure that any section on municipal transportation includes a strong commitment, and practical vision for the creation of sustainable, non-motorized transportation networks and components throughout the city.

1.1.B. Municipal Ordinance

A municipal ordinance is an act of a local legislature (Lansing City Council) taken pursuant to authority specifically delegated to local governments by the state legislature. Two primary sets of codes outline the rules and regulations concerning pedestrian and bicycle traffic in Michigan, the Michigan Vehicle Code (MVC) and Michigan's Uniform Traffic Code for Cities, Townships, and Villages (UTC). Both codes are available to communities for adoption by reference. The state codes are modeled on national codes so that as

⁵ *Design Guidelines for Active Michigan Communities*. "Chapter 7: Steps for Creating an Active Living Community". Online: <http://www.mihealthtools.org/>.





drivers and pedestrians travel throughout the country there are similar sets of rules wherever they go. The National Manual of Uniform Traffic Control Devices MMUTCD is also an attempt to standardize signage appearance and placement along the roadway.

1.1.C. Site Plan Review

Most planning jurisdictions have established site design and project review requirements, especially in downtowns and historic districts. In the site plan review process, local governments review and approve proposed each development plan for each piece of property throughout the city. This review ensures that the proposed land use or activity complies with applicable local ordinances⁶ and state statutes. Good development plans will also be compatible with the character of the surrounding area, the adjacent land uses, the natural environment, the capacities of public services and facilities, and residents' health, safety, and welfare. Typically, Michigan communities require the planning commission to review a project before it goes on to the governing body. Through a standard review process, the planning commission ensures that the proposed project meets all zoning ordinance requirements . It is important to remember, however, that not every project will go before the planning commission . Smaller projects may be handled by planning staff, or even the city or township manager. Some planning departments invite developers to pre-application conferences to discuss elements of the development project and the procedures of local site plan review. Pre-application conferences can facilitate smoother and speedier reviews; they also provide a wonderful opportunity to talk about local objectives like enhancing walkability and bikeability.⁷

⁶ Lansing municipal ordinances pertaining to Site Plan Review include: Ordinance 636, Section 1242.04 – 1242.06, 3-7-83

⁷ *Design Guidelines for Active Michigan Communities*: "Chapter 7: Steps for Creating an Active Living Community". Online: <http://www.mihealthtools.org/>.





(1.2) Motivations to Plan for Non-Motorized Travel

All throughout the industrialized world, there are increasing motivations for the implementation of municipal NMT networks. Communities throughout Asia, Europe, and Latin America are all embracing non-motorized transportation, due to their shifting cultural and economic realities. Here in the United States, non-motorized transportation networks and components have historically been neglected in the design and modernization of transportation infrastructure.

For decades, plans, throughout the country, for new road construction and upgrades (e.g., overpasses, separate lanes, or shoulders) have not always considered or provided physical infrastructure for NMT users. This lack of planning for NMT has been credited by activists and bureaucrats alike for the resulting higher rates of traffic accidents and the general withdrawal of pedestrians and bikers from city streets. The result of neglecting NMT in transportation planning is a transportation system that favors motorists to the detriment of pedestrians, bicyclists, those who cannot afford cars, and the physically challenged.⁸ Despite decades of federal and state policy ignoring NMT users, new motivations are causing policy-makers to rethink their importance. These motivations include: changing public opinion, creating active communities, smart growth strategies, and creating sustainable cities.

⁸ "Planning for Bicycling and Walking: 2005 Amendments to the Growth Management Act". Dept of Community, Trade, and Economic Development. State of Washington. August 2005. Online: http://www.cted.wa.gov/CTED/documents/ID_2321_Publications.pdf.





1.2.A. Changes in Public Opinion

In October 2002, the Surface Transportation Policy Project contracted *Belden Russonello & Stewart* to conduct a national survey on Americans' current attitudes toward walking and creating more walkable communities.⁹ The survey found that Americans would like to walk more than they are currently, but they are held back by poorly designed communities that encourage speeding and dangerous intersections and whose design is inconvenient to walk to shops and restaurants. More than half of Americans say that their communities lack shops and restaurants within walking distance and a third of the public sees changing to less auto-dependent communities as the answer to traffic. The survey further documented public support for better walking communities and specific policies such as designing streets for slower traffic speeds; using more federal dollars to make walking safer from traffic; and creating walking-friendly routes to school for children. Specifically, their *Walking Survey* uncovered these main points on the public's attitudes toward walking and the walkability of communities:

- 🚶 Americans prefer to walk rather than drive.
- 🚶 Americans are not walking due to the distance between stores, restaurants, and schools.
- 🚶 Americans would like to do more of walking for exercise or fun.
- 🚶 Americans are developing more negative feelings about the length of their work commutes.
- 🚶 Americans want livable communities.
- 🚶 Americans support policies to ensure the safety of walkers

⁹ "Americans' Current Attitudes Toward Walking and Creating More Walkable Communities" was a national random sample telephone survey of 800 adults, age 18 and older in October of 2002. The survey was conducted by *Belden Russonello & Stewart*, and was paid for by the Surface Transportation Policy Project. Online: http://www.transact.org/library/reports_html/pedpoll/pedpoll.asp

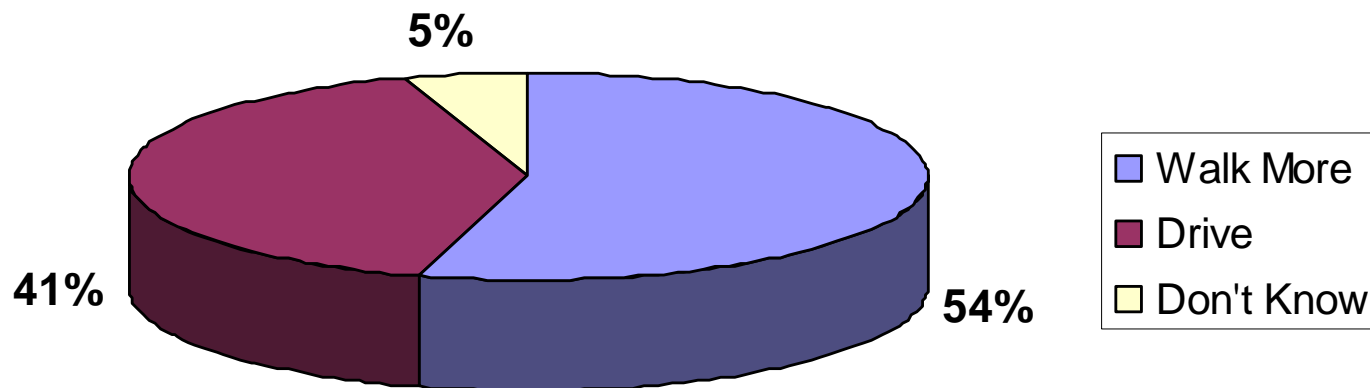




1. More than half (55%) say they would like to walk rather than drive more throughout the day either for exercise or to get to specific places. Four in ten (41%) Americans would choose driving over walking for wherever they need to go (See Figure 01).¹⁰

Figure 01

Q1. Americans Prefer Walking to Driving



¹⁰ "Americans' Current Attitudes toward Walking and Creating More Walkable Communities". Surface Transportation Policy Project. October 2002. Online: http://www.transact.org/library/reports_html/pedpoll/pedpoll.asp

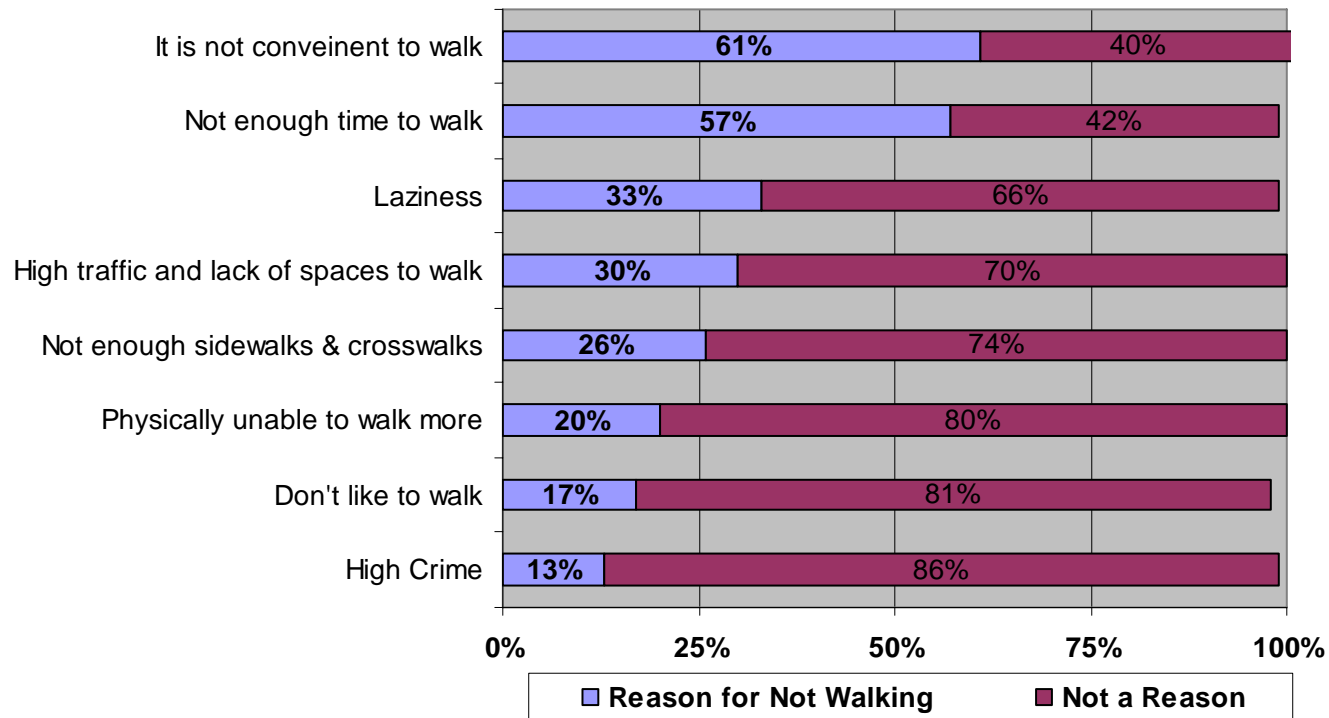




2. Why are more Americans not walking? Distance to stores, restaurants, and schools are the main reasons offered by Americans as to why they opt more often to take their car instead of walk (See Figure 02).¹¹

Figure 02

Q2. Why Americans Don't Walk More



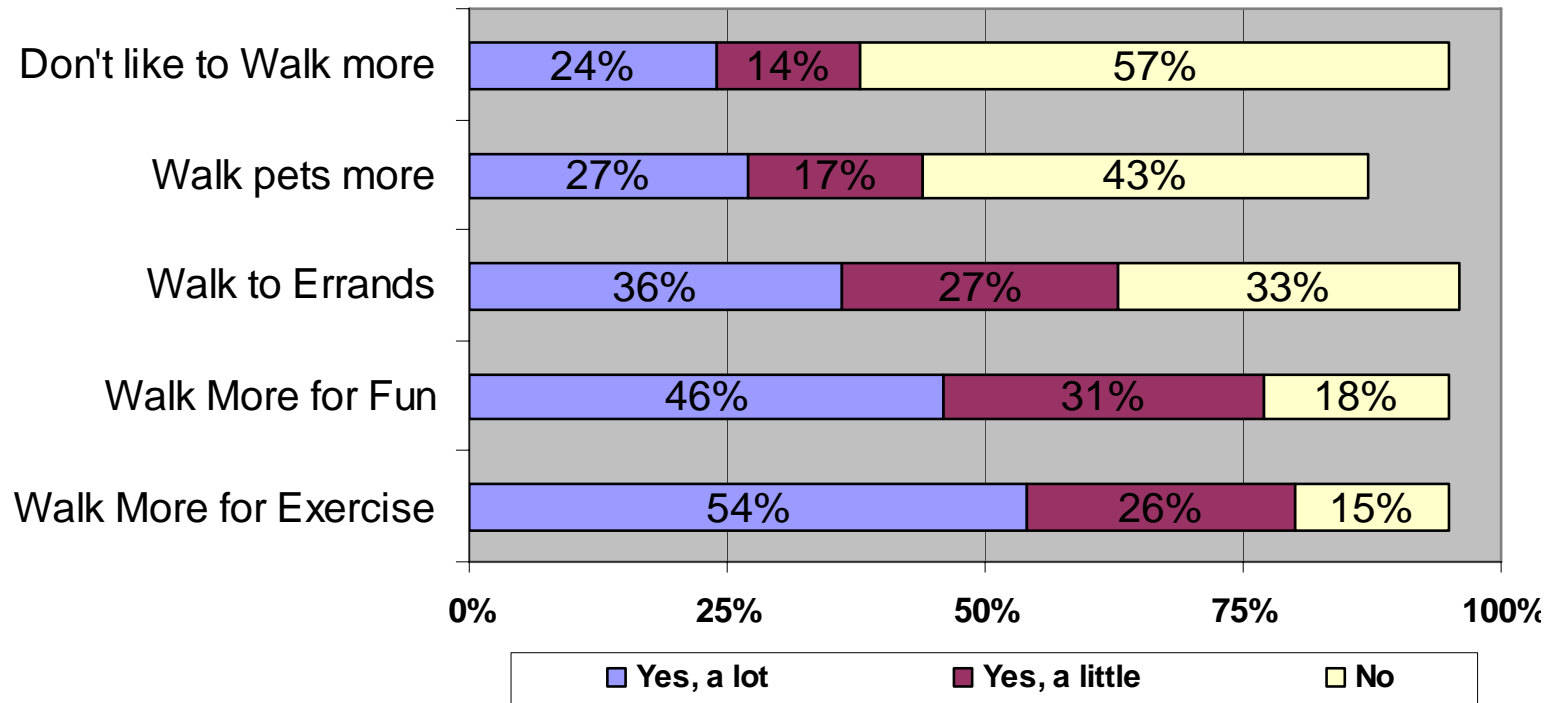
¹¹ "Americans' Current Attitudes toward Walking and Creating More Walkable Communities". Surface Transportation Policy Project. October 2002. Online: http://www.transact.org/library/reports_html/pedpoll/pedpoll.asp





3. The type of walking Americans would like to do more of is walking for exercise or fun, followed by walking to a specific destination. Majorities associate walking with exercise, relaxation and fun (See Figure 03).¹²

Figure 03
Q3. Types of Walking



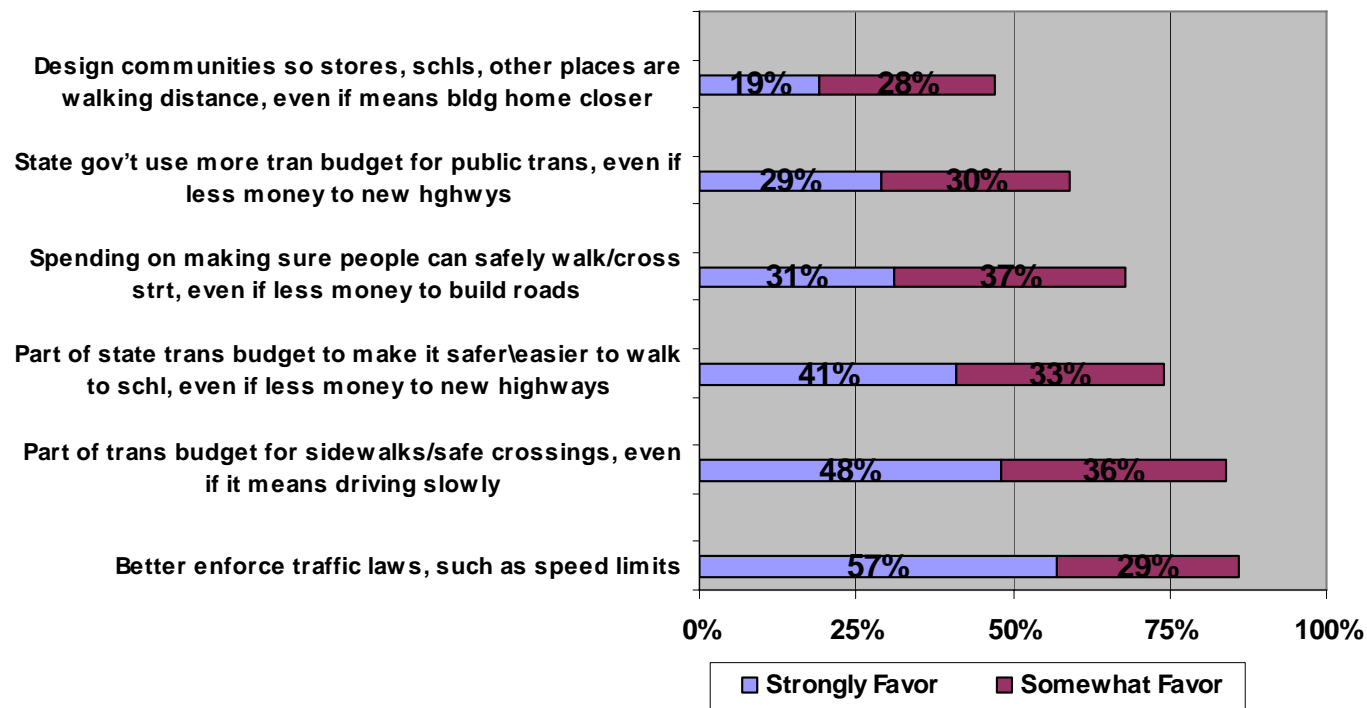
¹² "Americans' Current Attitudes toward Walking and Creating More Walkable Communities". Surface Transportation Policy Project. October 2002. Online: http://www.transact.org/library/reports_html/pedpoll/pedpoll.asp





4. Large majorities of Americans support policies to ensure the safety of walkers and to make their communities more walkable. The most popular policies focus on reducing speeding – tougher enforcement of the speed limit and designing streets with more sidewalks and safe crossings to reduce speeding (See Figure 04).¹³

Figure 04
Q4. Support for Policies



¹³ "Americans' Current Attitudes toward Walking and Creating More Walkable Communities". Surface Transportation Policy Project. October 2002. Online: http://www.transact.org/library/reports_html/pedpoll/pedpoll.asp

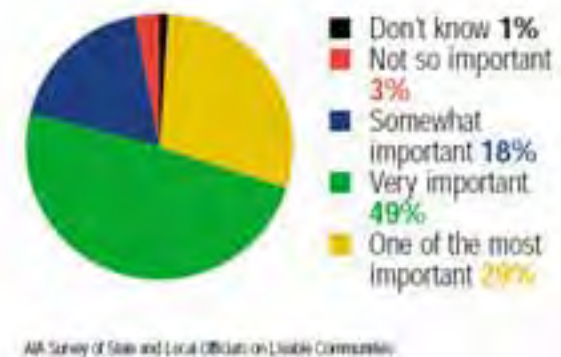
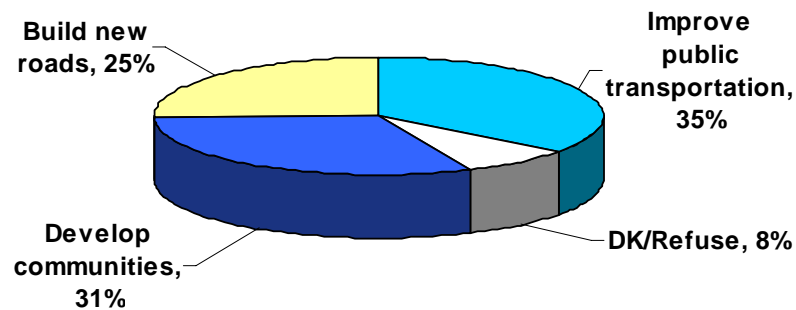




5. As commute times lengthen for many Americans and traffic becomes ever more a part of daily life, Americans are looking for alternatives and that may be why 66% choose alternatives to new roads when offered possible solutions to the traffic dilemma: Improved public transportation (35%); developing communities where people do not have to drive long distances to work or shop (31%), and then new roads (25%) (See Figure 05).¹⁴

Compared to other political and economic issues facing their communities, when asked how important “livable community” concerns, such as walkability, were to state and local officials, 49% rated it as “Very Important” (See Figure 06).¹⁵

Figure 05 & Figure 06



¹⁴ "Americans' Current Attitudes Toward Walking and Creating More Walkable Communities". Surface Transportation Policy Project. October 2002. Online: http://www.transact.org/library/reports_html/pedpoll/pedpoll.asp

¹⁵ The American Institute of Architects' *Survey of State and Local Officials on Livable Communities*, July 1999.





1.2.B. Creating Active Communities

Designing communities for active lifestyles make it easy for people to include physical activity in their daily lives. Walking to work, school, the store, or just for fun is safe and convenient. Bicyclists are respected, and roads are built for all forms of transportation, not just cars. Recreation opportunities are accessible—parks, playgrounds, and all kinds of sports facilities are located near people's homes and are open to all residents.¹⁶ Planners and public health officials are seeking ways to encourage healthy lifestyles by promoting active living.

Sedentary lifestyles are linked to obesity, cardiovascular disease, hypertension, osteoporosis, diabetes, and some cancers. This makes physical inactivity second only to smoking as a lifestyle risk factor for disease and premature death.¹⁷ Obesity, throughout the United States, has become a national epidemic over the past two decades.¹⁸ The latest data from the National Center for Health Statistics shows that 30% of U.S. adults, 20 years of age and older – more than 60 million people – are obese. Among children and teens aged 6-19 years, 16% (over 9 million young people) are considered overweight.¹⁹ This reality has caused more Americans to believe that obesity is a serious personal concern, and a growing number also believe it is a serious public health concern (See Figure 07, next page. This survey).²⁰

One of the contributing factors to obesity in our nation and our state is lack of physical activity. The belief that physical activity is limited to exercise or sports may keep people from being active. Another myth is that physical activity must be vigorous to achieve

¹⁶ *Design Guidelines for Active Michigan Communities*. "Chapter 1: The Active Living Vision". Online: <http://www.mihealthtools.org/>.

¹⁷ Ibid.

¹⁸ U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Division of Nutrition and Physical Activity, National Center for Chronic Disease Prevention and Health Promotion, Active Community Environments Initiative, Atlanta, Georgia. Online: www.cdc.gov/nccdphp/dnpa/aces.htm.

¹⁹ Ibid.

²⁰ Institute for Public Policy and Social Research. "Obesity in Michigan: Public or Private Issue?". Volume 5 - March 2003. Online: <http://www.fact.msu.edu/pdf/obesityosspolicybrief.pdf>. Accessed: March 1st, 2007.

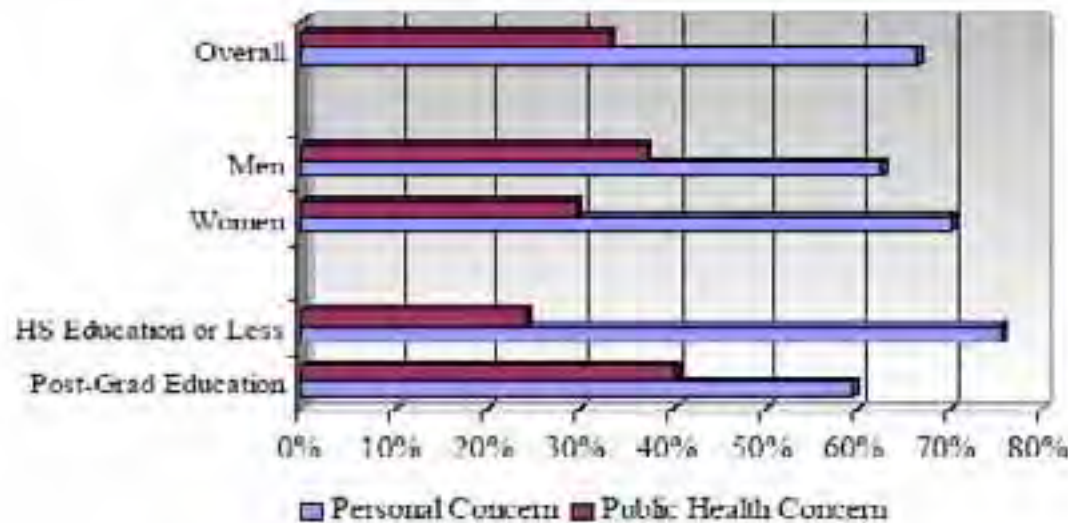




health benefits. Physical activity is any bodily movement that results in an expenditure of energy.²¹ Research shows that people are more likely to get exercise if active recreation and transportation opportunities are nearby and easy to access. This is important news, considering that in a recent survey conducted by the Michigan Department of Community Health, less than 50% of adults in Michigan reported meeting the recommended 30 minutes/day of physical activity, with 25% of the respondents admitting they participated in no leisure-time physical activity at all.

Figure 07

Perceptions of Overweight as a Personal or Public Health Concern



²¹ "Planning for Bicycling and Walking: 2005 Amendments to the Growth Management Act" Dept of Community, Trade, and Economic Development. State of Washington. August 2005. Online: http://www.cted.wa.gov/CTED/documents/ID_2321_Publications.pdf.





These statistics, among the others listed below, explain why Michigan consistently ranks among the most overweight states in the nation:²² As a result, there is growing support amongst people in Michigan for public action to address the growing obesity in Michigan communities (See Figure 08, next page).²³

1.2.B.1. General Statistics Regarding Obesity in Michigan

- ♿ Sixty-two (62%) percent of Michigan adults are overweight or obese.
- ♿ The prevalence of overweight children has tripled, in Michigan, during the last twenty years.
- ♿ Twenty-four (24%) percent of white adults, thirty-five (35%) percent of black adults, and thirty-one (31%) percent of Hispanic adults in Michigan are obese.
- ♿ The obesity rate among Michigan adults increased by eighty (80%) percent from 1990 to 2002.
- ♿ Twenty-four (24%) percent of Michigan high school students are overweight or at risk of becoming overweight.
- ♿ Twenty-eight (28%) percent of low-income children, ages 2-5 years, in Michigan are overweight or at risk of becoming overweight.

²² "Planning for Bicycling and Walking: 2005 Amendments to the Growth Management Act" Dept of Community, Trade, and Economic Development. State of Washington. August 2005. Online: http://www.cted.wa.gov/CTED/documents/ID_2321_Publications.pdf.

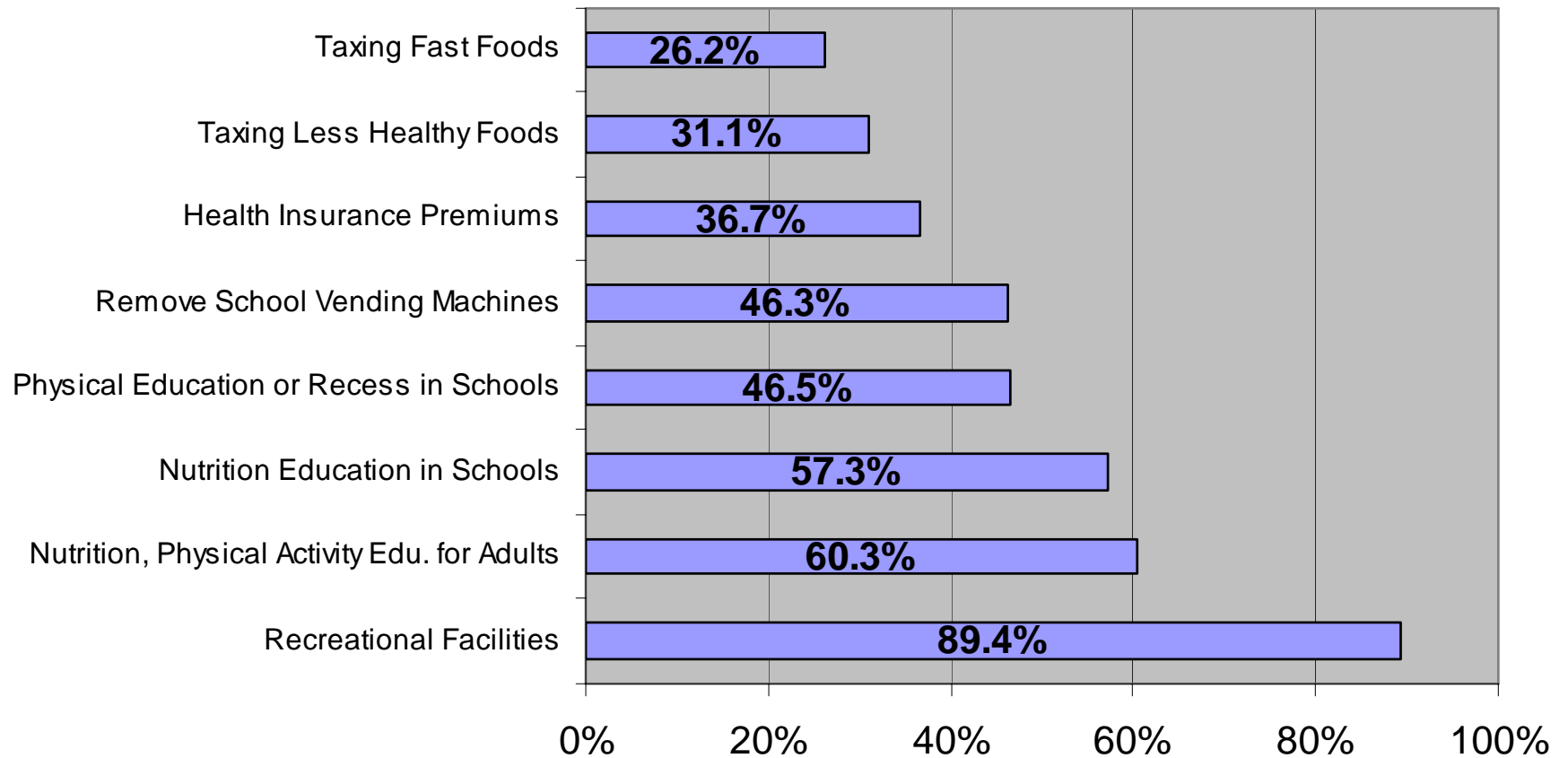
²³ Institute for Public Policy and Social Research. "Obesity in Michigan: Public or Private Issue?". Volume 5 - March 2003. Online: <http://www.fact.msu.edu/pdf/obesityosspolicybrief.pdf>. Accessed: March 1st, 2007.





Figure 08

Public Support for Methods of Addressing Obesity





1.2.C. Smart Growth

The features that distinguish smart growth in a community vary from place to place. In communities across the nation, including Lansing, there is a growing concern that current land use development patterns, dominated by what some call "sprawl", are not in the long-term interest of our cities, existing suburbs, small towns, rural communities, or wilderness areas. Though supportive of growth, communities, such as Tri-County region, are questioning the economic costs of abandoning infrastructure in the central city, only to rebuild it further out. Spurring the smart growth movement are demographic shifts, a strong environmental ethic, increased fiscal concerns, and more nuanced views of growth. The result is both a new demand and a new opportunity for smart growth (See Figures 9²⁴, next page).²⁵

In general, smart growth development techniques invest time, attention, and resources in restoring a sense of community and vitality to central cities and older suburbs. New smart growth is more town-centered, is transit and pedestrian oriented, and has a greater mix of housing, commercial and retail uses. It also preserves open space and many other environmental amenities.²⁶ Smart Growth advocates argue that communities that design by these techniques will be more attractive to prospective residents. Recent research concurs with this assessment. In a recent study, Americans claimed that when thinking about deciding where to live, having sidewalks and places to take walks for exercise or fun is important to nearly eight in ten Americans (79%), and "very" important to four in ten (44%). Having areas to walk in the neighborhood rated third on a list of seven items asked in the survey, behind feeling safe from crime and the quality of the public schools (See Figure 10, below).²⁷

²⁴ Smart Growth America. "Americans Want Smarter Growth: Here's How to Get There". Online: <http://www.smartgrowthamerica.org/SGBOOK.pdf>. Accessed: March 1st, 2007.

²⁵ Smart Growth Online. "About Smart Growth". Online: <http://www.smartgrowth.org/about/default.asp>

²⁶ Ibid.

²⁷ "Americans' Current Attitudes Toward Walking and Creating More Walkable Communities". Surface Transportation Policy Project. October 2002. Online: http://www.transact.org/library/reports_html/pedpoll/pedpoll.asp





Figure 09

Question: Here are some proposals on the development of land use policy in your state. For each one, please tell me if you strongly favor, somewhat favor, somewhat oppose, or strongly oppose the proposal.

Do Americans Want Smart Growth?

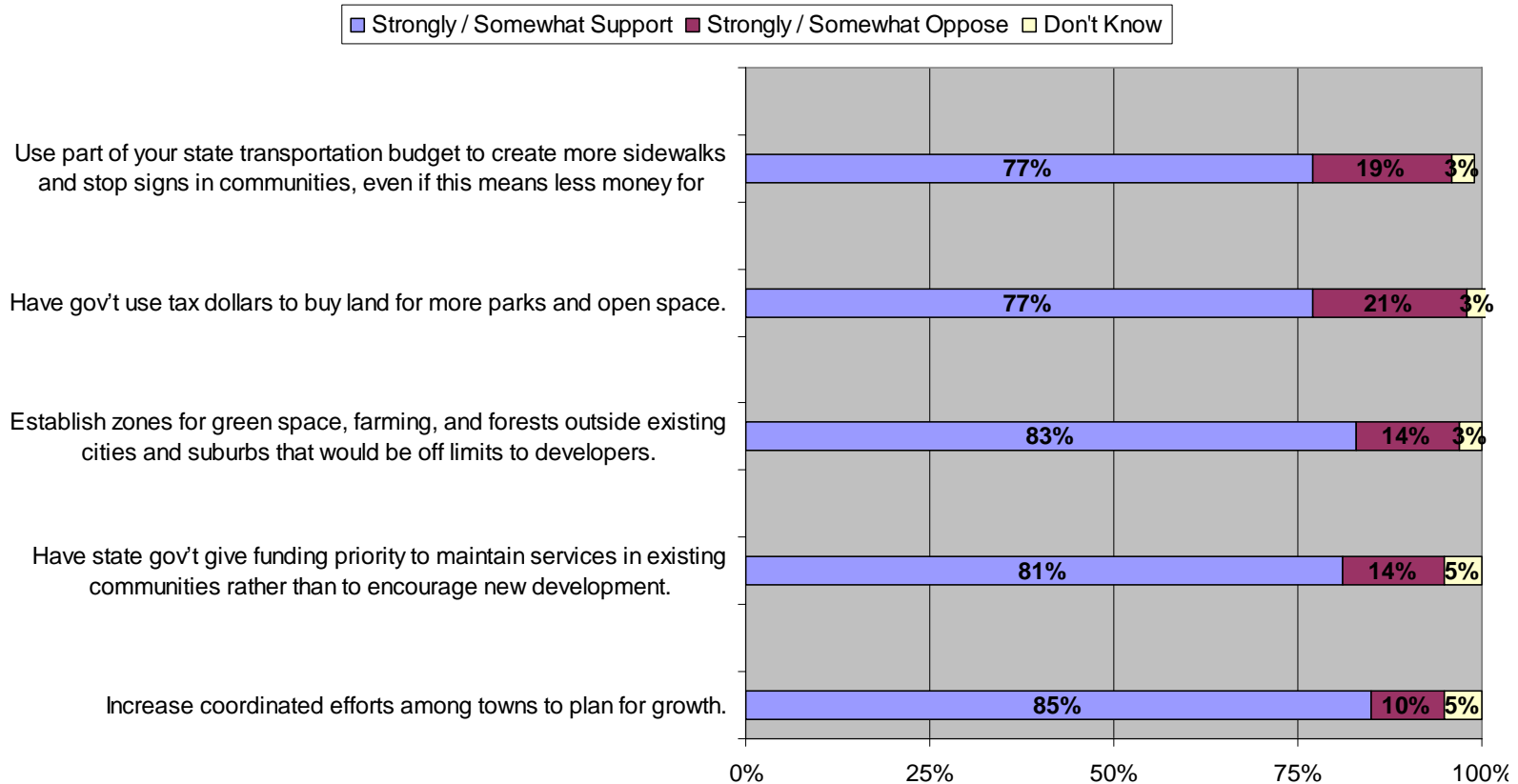
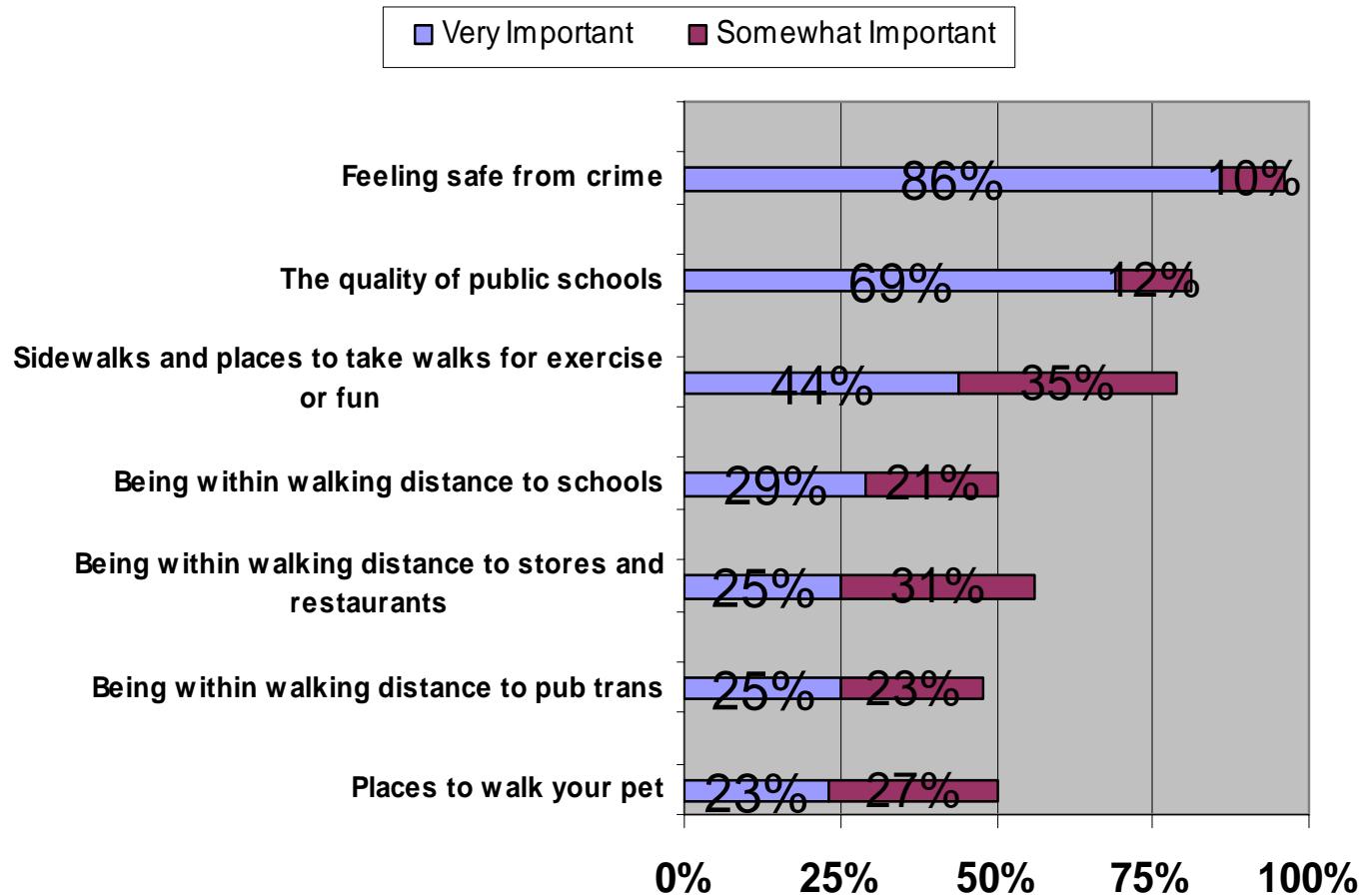




Figure 10

Factors Affecting Where People Choose to Live





1.2.D. Sustainable Benefits from NMT Networks

Sustainable development is a collection of methods to create and sustain development which seeks to relieve poverty, create equitable standards of living, satisfy the basic needs of all peoples, produce sustainable economic growth and establish sustainable political practices all while taking the steps necessary to avoid irreversible damages to natural capital.²⁸ The field of sustainable development is often conceptually broken into three constituent parts: environmental sustainability, economic sustainability, and social sustainability (See Figure 11)²⁹. A sustainable city has fewer inputs (of energy, water, food, etc.) and fewer waste products (heat, air pollution, water pollution etc) than a less sustainable city. In this context, sustainability is a relative concept. One cannot say that one city is 'sustainable' and another city is 'non-sustainable' or 'unsustainable'. Cities can be made more sustainable by means of: economics, environmental stewardship & conservation, and promotion of social welfare.

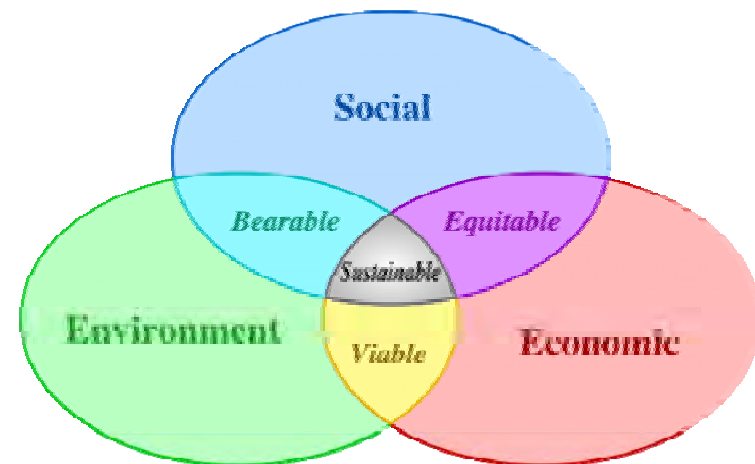


Figure 11





²⁸ U.S. Partnership for Education for Sustainable Development. Online: <http://www.uspartnership.org/>.

²⁹ Image Courtesy of Google Images. Online: <http://images.google.com>





1.2.D.1 Economic

-  **Aesthetics.** Improving the economic viability of a community by making it an attractive place to locate a business while simultaneously reducing public and private health care costs associated with inactivity. Reducing the need for downtown parking spaces and parking decks improves the aesthetics of the roadway and community by adding landscaping and medians that improve the pedestrian environment and safety, which makes the city a more attractive place to live, work, shop, and recreate.
-  **Attracting Residents.** Active community design, which includes facilities for walking and biking, makes good economic sense. Researchers working for the Cool Cities Initiative surveyed university students and recent college graduates to get an idea for what characteristics they find desirable in a community, with the end goal of economic development and retention of young professionals.³⁰ The survey identified safe streets and neighborhoods as the most highly rated attribute when choosing a place to live. Whether the respondent lived in a downtown, the suburbs, or a small rural town walkable streets and safe streets appeared on the top 10 lists of desirable community characteristics. Similar research on Fortune 500 companies of what factors attract them to regions or communities found that walkable, livable communities always rank in the top 10 attributes, over and above tax incentives.³¹
-  **Cost of Oil.** The increasing cost and subsequent dwindling global supply of gasoline make this non-renewable resource an important economic cost, incurred every day, by almost every resident in the city of Lansing. If you consider the average yearly consumption of gasoline gallons per person, multiplied by the average price, multiplied by all the vehicles owners in the City of Lansing, which is a hefty sum whose resources could be diverted elsewhere if more residents switch to increasing their use of NMT networks for their trips.
-  **Ease Expenses Incurred By Families.** Transportation expenses consume an average of 19 percent of a family's budget. The growing trend towards sprawling residential developments and physical inactivity costs the state of Michigan almost \$9 billion annually, through higher health insurance premiums, lost productivity, and increased state-funded Medicaid payments.³² With the rising cost of gasoline, providing non-motorized options empowers people to make fewer driving trips and add up to immediate savings for both individuals and families while reducing traffic on the roadways.






³⁰ MEDC. 2004. Online: <http://www.coolcities.org>

³¹ MSU Land Use Conference 2006.

³² Chenoweth. 2003.





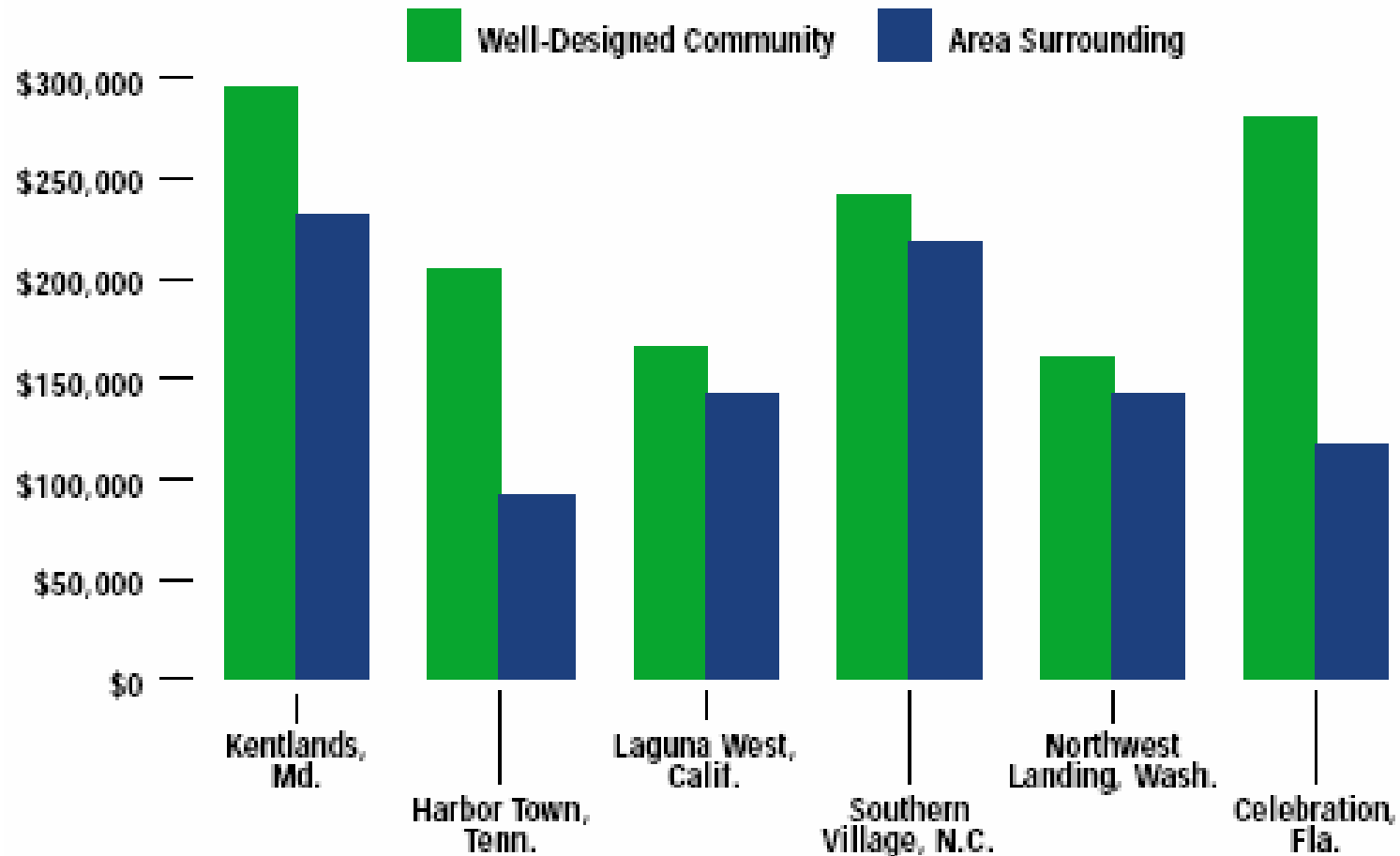
-  **Fiscal Sense.** Integrating sidewalks, bike lanes, transit amenities, and safe crossings into the initial design of a project spares the expense of retrofits later. By fully considering the needs of all non-motorized travelers (pedestrians, bicyclists, and persons with disabilities) early in the life of a project, the costs associated with including facilities for these travelers are minimized.
-  **Foot and Street Traffic.** Communities with pedestrian friendly downtowns may enhance economic vitality by encouraging visitors to stop and shop at businesses. In addition, bicycle and pedestrian facilities are much less expensive to build and maintain than auto-related infrastructure.
-  **Increased Property Values.** The value people place on bicycle and pedestrian facilities can be reflected in increased real property values and increased marketability for property located near trails and open space.³³ One study estimates that houses located in developments that incorporate good design principles – including walkability – command a premium of anywhere from 4 to 25 percent of the home's value, compared to houses in surrounding areas (See Figure 12, next page).³⁴
-  **Recreation.** The economic impact of multi-use linear trails can also be significant. A study conducted by MSU and funded by MDOT evaluated two bike related events, which took place on the Pere Marquette Trail. In 1999, the Midwest Tandem Rally and the Michigander Ride included a portion of the ride along the Pere Marquette Trail. As a result of the study it was determined that participants and their parties spent \$207,000 in conjunction with the event, of which \$103,000 was spent during the event, with approximately 500 hotel nights generated in the local areas. The Midwest Tandem Rally participants and their parties spent \$260,000 in conjunction with the event, of which \$218,000 was spent during the rally, with approximately 1,100 hotel room nights generated in the local area. With tourism being one of Michigan's top three industries, the economic impact of bicycle tours and recreational users should not be under-estimated.
-  **Tourism.** Tourism is one of the State's top three industries, and many people come to Michigan to bicycle. Bikes are allowed on all non-freeway paved and non-paved roads in the state and in all 97 state parks and recreation areas. Bikes may also be operated on all designated public bike paths. The systems of roads through both peninsulas, many of which have low traffic volumes make excellent bike routes. These roads not only promote opportunities for scenic bike riding, but also provide access to recreational areas. In addition, the North Country National Scenic Trail passes through Michigan and many parts are accessible to bicyclists and hikers.

³³ "Economic Impacts of Protecting Rivers, Trails and Greenway Corridors, Rivers, Trails and Conservation Assistance Program". National Park Service. 1995. Online: www.nps.gov/pwro/rtca/propval.htm





Figure 12

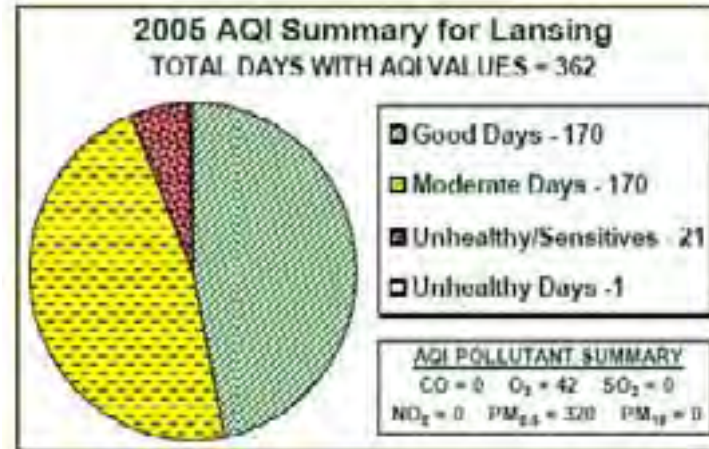




1.2.D.2 Environmental

Air Quality. The Environmental Protection Agency has set standards for determining and monitoring the quality of air. In Michigan, air quality is determined by hourly monitors that test for fine particles, ground-level ozone, carbon monoxide, sulfur dioxide and nitrogen dioxide. The Air Quality Index (AQI) tells people whether the air they breathe is currently “good”, “moderate”, “unhealthy for sensitive groups”, “unhealthy”, “very unhealthy” or “hazardous”.³⁵ Lansing has never reached hazardous levels; however, there are several days when the AQI reaches unhealthy level, as Figure 13 shows.

Figure 13



Air Pollution. The number one producer of carbon monoxide is automobiles and other mobile sources. NMT networks reduce the need for automotive travel, which subsequently reduces the water, air, and noise pollution associated with automobile use by shifting local trips to walking or bicycling. If each resident of an American community of 100,000 replaced one car trip with one bike trip just once a month, it would cut carbon dioxide (CO₂) emissions by 3,764 tons of per year in the community.³⁶

³⁵ "The Air Quality Index." Online: <http://www.deq.state.mi.us/documents/DEQ-AQD-AQIFACTS.PDF>. Dept: MDEQ. May 2005. Retrieved: 3 Mar 2007.

³⁶ "Ingham County, MI: A Story of Suppression Part 3: Air Quality & Asthma Indicators". October 2001. pg15. Online: http://www.peer.org/docs/mi/Ingham_air.pdf. Retrieved: March 2007.





1.2.D.3 Social

Accessibility. Throughout the nation, nearly 20% of all American have some type of physical or mental disability, and one-half of them have a serious impediment. As Table 01 shows, in the City of Lansing, 6,978 residents (which are 6.4% of the total population) suffer from some kind of disability. Improving access provides more transportation choices that are respectful of these citizen's challenges for transportation and mobility.³⁷

Table 01

2005 Lansing Residents with Disabilities	
Subject	Total
Population 5 years of age and over	109,024
With one type of disability (%)	6.4%
With two or more types of disabilities (%)	8.8%
Source: http://factfinder.census.gov/	

Options for non-drivers. NMT provides viable transportation alternatives for individuals who are capable of independent travel yet do not hold driver's license or have access to a motor vehicle at all times. Streets that provide room for bicycling and walking help children gain independence. More children walk to school where there are sidewalks, and those who use safe walking and bicycling routes have a more positive view of their neighborhood. In addition, NMT networks provide more transportation choices that respect an individual's religious beliefs, environmental ethic, and/or uneasiness in operating a vehicle.

Table 02

Lansing (Potential) Non-Drivers		
Subject	2005	2025
Population	119,675	119,961
% Ages 5-16	17.19%	17.22%
% Age 65+	9.27%	9.28%
Source: http://factfinder.census.gov/		

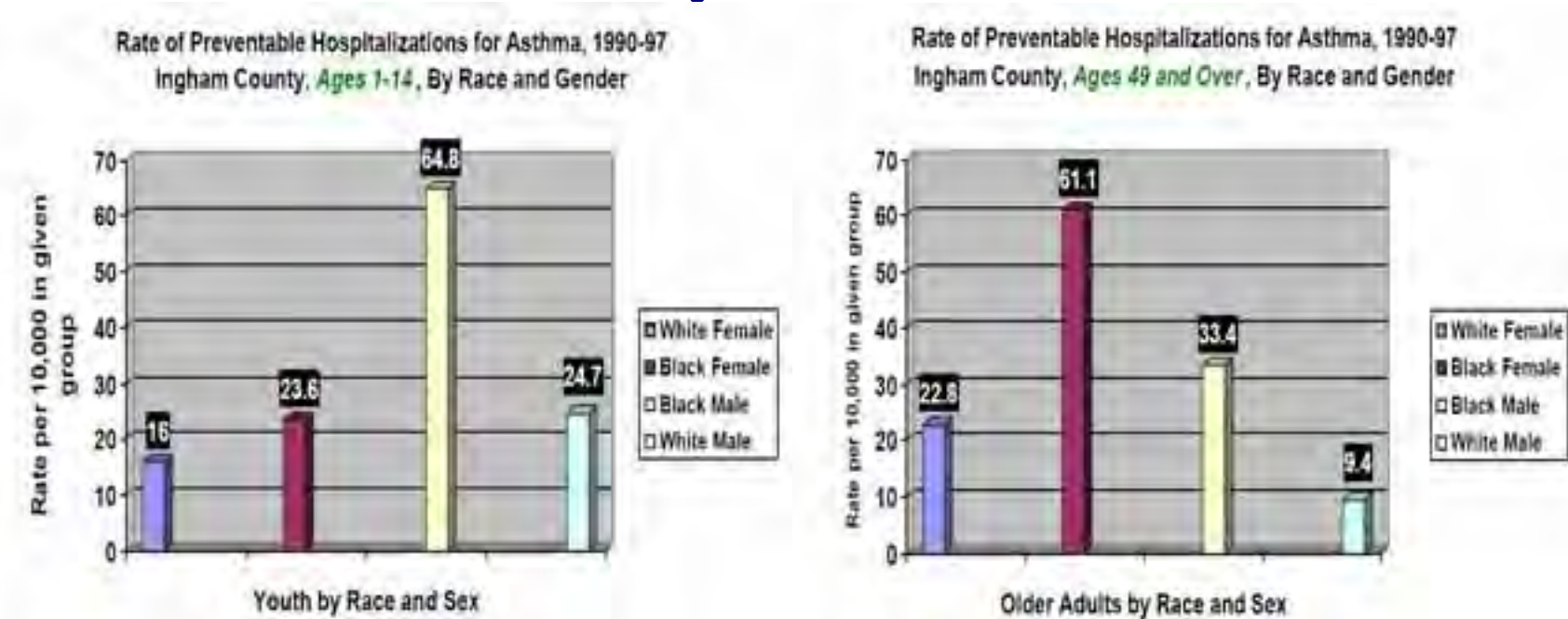
³⁷ "American Fact Finder". U.S.A. Census Information. 2005 Projections. Online: <http://factfinder.census.gov/>





Health, Air Quality Reducing the amount people use polluting, motorized transportation will create a significant reduction in pollutants that are harmful to the general population. Asthma, for example, is a health concern, at any age, but especially for children. Implementation of non-motorized transportation networks provides another method to help reduce factors, which can affect the onset of asthma and other air-pollutant health risks in youth. While current data was not available, the practicum team was able to determine the number of preventable hospitalizations in Ingham County, in two different age groups, throughout much of the 1990s. Figures 14a and 14b show this number, of which, air quality is a contributing factor.³⁸


Figure 14a & 14b



³⁸ "Ingham County, MI A Story of Suppression Part 3: Air Quality & Asthma Indicators." 31 October 2001. Online: http://www.peer.org/docs/mi/Ingham_air.pdf. Retrieved: 5 March 2007. pg 14.





 **Health, General.** Transportation and health are two concepts that are integrally related. Today, one out of every four trips is short (one mile or less) and yet 75 percent of the time they are made by automobile. In 20 years, foot travel dropped by 42 percent for adults. Walking and biking trips to school have similarly dropped 40 percent over the past 20 years.³⁹ The design and location of neighborhoods and commercial developments also greatly impacts the ability to walk/bike to and from them. Residents of homes built before 1974 walk more often than those who live in newer homes.⁴⁰ This correlation holds true for the age of school buildings as well. Students are four times more likely to walk to schools built before 1983 than those built more recently.⁴¹ All of these factors reveal that recent development patterns have led to a built environment that is primarily vehicle dependent and where considerations were not made for non-motorized travel, thus impeding the ability of people, including children, to freely and safely walk or bike out of doors.

 **Social Fabric.** Creating a stronger social fabric by fostering the personal interaction that takes place while on foot or on bicycle.

³⁹ Healthy Michigan 2010, Michigan Surgeon General's Health Status Report

⁴⁰ Berrigan & Troiano, The Association of Between Urban Form and Physical Activity in US Adults. American Journal of Preventative Medicine, Supplemental, August 2002

⁴¹ Jackson & Kochtitzky, Creating a Healthy Environment: The Impact of the Built Environment on Public Health. Planning & Zoning News, January 2002





(2.0) Methods

This reference has been prepared to help the *Task Force* assess the following question: What specific policies does the City of Lansing need to plan for and implement, in order to further the city's desire to become a state leader in non-motorized accessible transportation networks? Prior to conducting an analysis, the practicum team developed the following general researchable questions:

1. What factors have been validated in the scholarly literature for having a positive effect on participation with non-motorized transportation? What factors have been validated as have a negative effect?
2. How are other communities throughout the Tri-County region, the State of Michigan, and the other comparable cities throughout the United States planning and designing non-motorized transportation networks?
3. What is the state of existing non-motorized transportation systems and infrastructure in the city?

As a means of addressing these researchable questions, the research team has chosen to conduct a multi-tiered research design, which includes a review of the scholarly literature, a content analysis of non-motorized transportation plans from comparable cities, statistical analysis of factors affecting non-motorized transportation in the city, creating an inventory of existing assets and liabilities, and a review of best practices of non-motorized design standards.





(2.1) NMT Variables

Variables affecting NMT usage are multi-faceted and complex. The team has considered a variety of variables (See Figure 15, next page), which could, potentially, affect a user's participation in non-motorized transportation systems, and has separated them into four distinct and different categories: objective variables, subjective variables, and cross-over variables. Objective variables are based on observable, measurable phenomena, such as a user's socio-economic status, or the compactness of the community's existing land use pattern of development. Such kinds of information are available from the U.S. Census Bureau. Subjective variables are those which the interpretation of the findings is difficult to describe in numeric or concrete terms, such as the cultural values of a community. For example, communities with greater inclinations towards environmental responsibility may already have and attract the kind of people that use NMT networks.

Many variables that the Team considered had both objective and subjective elements. These are classified as the cross-over variables, which include: commute-time to work can be measured by either distance or time, but the actual perception of the degree of traffic congestion affecting commute-time is a personal perception. Public safety can be measured with crime rate statistics, but is also a matter of public perception. Weather can be forecasted, predicted, and measured, but how weather affects personal inclination to use NMT networks changes from person to person.





Figure 15

NMT Variables Chart					
Variables	Category	Examples	Variables	Category	Examples
Objective	Socio-economic:	Ablism Age Gender # of College Students Enrolled Median Household Income Poverty Rate Vehicle Access/Ownership			
	Land Use:	Population density Land Use Diversity Urban Form			
Subjective	Culture:	Environmental ethic Social Status	Trip Generators	Attractions:	Shopping Sporting Events Recreational Facilities
Cross-Overs	Commute:	Time and Distance Perceptions of Congestion		Employers:	Commercial Government Industry
	Public Safety:	Actual Crime Statistics How safe do you feel?		Schools:	k-12 Community Colleges Universities
	Weather:	Encourages/Discourages people from using NMT			





(2.2) Investigation

Analysis and recommendation regarding the implementation of NMT networks here in the City of Lansing emerged from the following techniques of investigation and synthesis. For our first researchable question, the Team asked the following question, “What factors have been validated in the scholarly literature for having a positive effect on participation with NMT? What factors have been validated as having a negative effect on participation?” In order to answer this question, a list of possible factors was created (See Figure 15, above), and the variables were then thoroughly reviewed in peer-review, scholarly literature to discover which variables were likely to be statistically significant predictors for NMT participation here in the City of Lansing. For further discussion on variables positively affecting participation of NMT networks in Lansing, please see *Section 3.0 Existing Conditions*.

The investigation for the second researchable question considered: “How are other communities throughout the Tri-County region, the State of Michigan, and the other comparable cities throughout the United States planning and assembling their own NMT plans?” This investigation consisted of creating a ‘content analysis’ for the all NMT planning documents and policy in the comparable cities. The methodology for the content analysis consisted of the following steps.

Firstly, an investigation of the scholarly literature revealed communities whose NMT plans had been validated by think tanks, university research centers, government agencies, and NMT activists for being particularly exemplary. After reviewing many of these plans, the Team chose ten different criteria for the purpose of evaluating the excellence of different NMT plans, for the purpose of making recommendations to the Task Force. The ten criteria selected were: clear policy objectives, the plan’s relationships to surrounding communities, design principles for NMT networks, transit-oriented development, legal and government policy, GIS





inventory of existing assets, socio-economic analysis, education and encouragement programming, implementation plans, and citizen involvement.

Secondly, a "scorecard" was developed to rank and assess the quality of different communities' NMT plans according to the 10 criteria, identified in the section above. Plans would be assessed on a fifty point scale, with each category receiving points if the reviewed plan mentioned items from the above categories in their planning document, regardless of length, breadth, depth, of quality. The purpose of this measurement was to provide a framework for Lansing to consider the importance of different characteristics and components within a NMT plan.

A list of approximately twenty cities was selected as comparable communities for analysis. The five surrounding municipalities to Lansing - Delhi Township, Delta Township, DeWitt, East Lansing, and Lansing Township - were included to provide the practicum team with a sense of the existing regional leadership in NMT planning, and to discover if there were current opportunities for network connection and program coordination. Five communities from throughout Michigan were randomly drawn from a list of the top 15 cities in the states according to population. These communities were: Ann Arbor, Bay City, Jackson, Marquette, and Traverse City. Five more communities were randomly drawn from a combined total group of BIG TEN conference university communities and Midwest capital cities. These communities were: Champagne, IL; Des Moines, IA, Madison, WI, Springfield, IL, and Urbana, IL. Finally, five final communities were randomly drawn out of a hat from that a list of validated leaders in NMT planning and design.⁴² The communities selected were: Boulder, CO; Chicago, IL; New Haven, CT; Portland, OR, and Seattle, WA. Finally, due to the regional importance of the Tri-County Regional Plan, and the proximity of Michigan State University, these plans were added to the list. A planning document content analysis matrix (See Figure 16, below) was created to assess the quality of non-motorized transportation planning throughout the United States, based upon these comparable cities.

⁴² "Exemplary Bicycle and Pedestrian Plans". Pedestrian and Bicycling Information Center. Online: <http://www.bicyclinginfo.org/pp/exemplary.htm>. Retrieved March 1st, 2007.



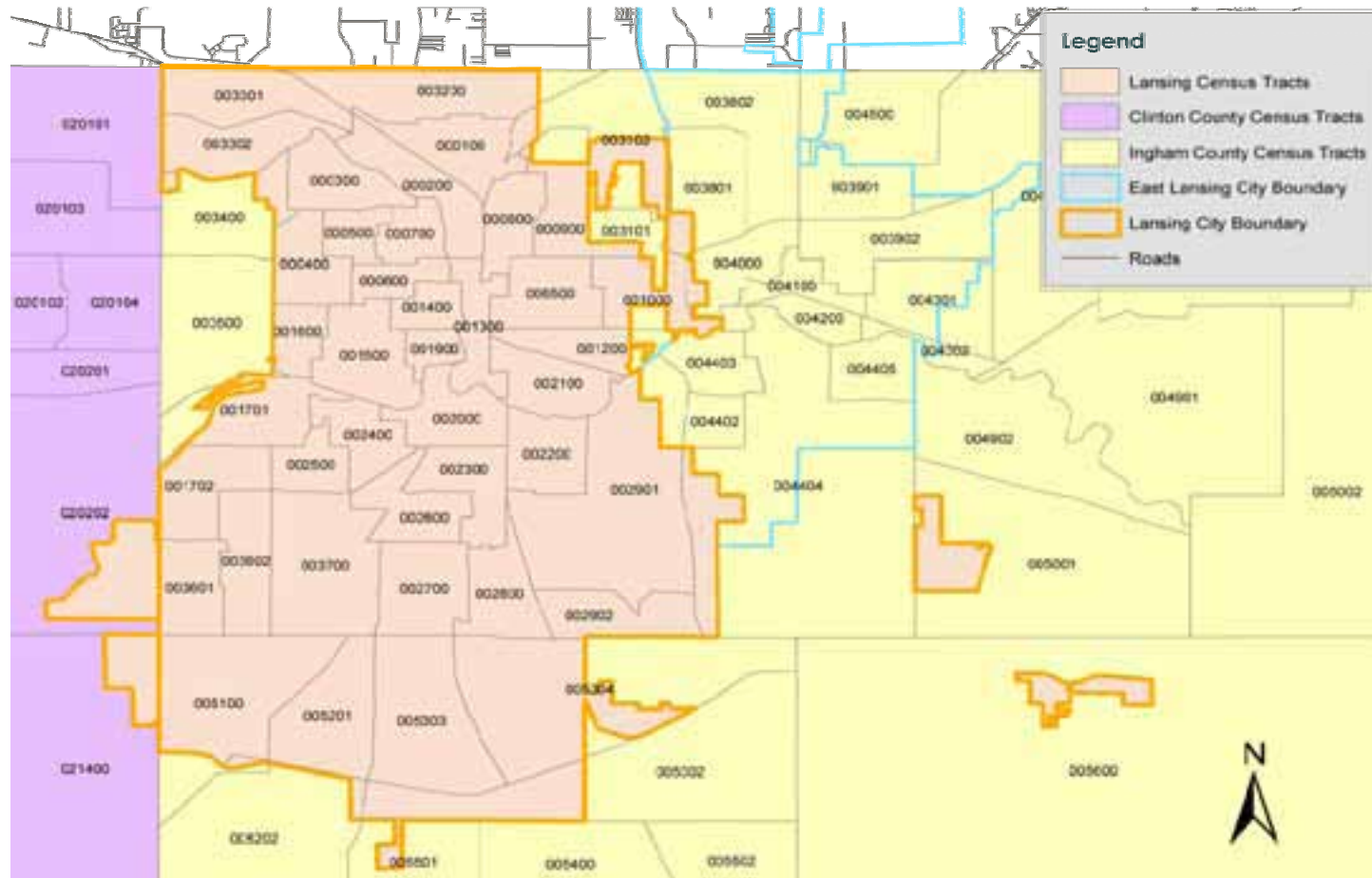


The practicum team's third and final researchable question was "What is the state of existing non-motorized transportation systems and infrastructure in the city?" The investigation consisted of a GIS-based analysis of existing conditions and assets in the City of Lansing, GIS-based suitability maps for the creation of new NMT networks and network components at the census tract level (See Map: 2000 Census Tract Boundaries, next page). These products are available for greater review in the products section of this report.





2000 Census Tract Boundaries





Non Motorized Transportation Planning Documents - Content Analysis

Figure 16a

	1. CLEAR POLICY OBJECTIVES	2. RELATIONSHIPS Neighborhoods Surrounding County MPO's State	3. DESIGN Network Components Intermodal Facilities End-of-trip Facilities	4. TRNST-ORNTD DVLPMNT	5. LEGAL & POLICY Zoning Site Plan Review Form-based Coding Local Ordinances Complete Street	6. GIS INVENTORY	7. SOCIOECONOMIC ANALY	8. EDU / ENCOURAGEMENT Incentivs/Disincentvs Schools Employers Festivalvs/Com Events Marketing	9. IMPLEMENTATION Regional City-wide Neighborhood Corridor Political Will	10. CITIZEN INVOLVEMENT Visioning Data Collection / Development Public Access to Plan	TOTAL
Neighbors											
1 Delhi Twp, MI	5	0	0	0	0	0	0	0	1	1	7
2 Delta Twp, MI	5	5	1 1 1 1 1	5	2 2 1	0	3	1 1 1	5	1 2 1 1	33
3 DeWitt, MI	5	1	1	0	2	1	1	0	2	1	11
4 East Lansing, MI	0	4	1 1 1 1	1 1	0	0	0	1 1 1	4	1 2 1 1	27
5 Lansing Twp, MI	5	1	1	2 2	0	0	1	1	3	1	13
Regional											
6 Ann Arbor, MI	5	1	1 0 0 0 1	3	2 0 1	5	3	1 1 0 1 0	4	1 2 0 1	34
7 Bay City, MI	0	0	0	0	0	5	0	0	0	0	5
8 Jackson, MI	5	3	1 1 1	3	2 1	0	3	1 1 1	2	1 1	20
9 Marquette, MI	5	4	1 1 1 1	5	2 2 1	5	3	1 1 1	5	1 2 1 1	42
10 Traverse City, MI	5	4	1 1 1 1	3	2 1	5	0	1 1	4	1 1 1 1	23





Non Motorized Transportation Planning Documents - Content Analysis

Figure 16b

	1. CLEAR POLICY OBJECTIVES	2. RELATIONSHIPS Neighborhoods Surrounding Cities County MPO's State	3. DESIGN Network Components Intermodal Facilities End-of-trip Facilities	4. TRNST-ORNTD DVLPMNT	5. LEGAL & POLICY Zoning Site Plan Review Form-based Coding Local Ordinances Complete Street	6. GIS INVENTORY	7. SOCIOECONOMIC ANLYS	8. EDU / ENCOURAGEMENT Incentives/Discounts Schools Employers Festivals/Com Events Marketing	9. IMPLEMENTATION	10. CITIZEN INVOLVEMENT Visioning Data Collection / Development Public Access to Plan	TOTAL													
Comparables																								
11	5	2	1	2	2	0	0	5	0	1	1	4	1	1	1	4	1	2	1	23				
12	0	1	1	0	0	1	0	0	0	1	1	1	1	1	1	2	1	1	1	6				
13	5	5	1	1	1	1	4	2	2	0	5	2	0	1	0	1	0	1	0	40				
14	0	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	3				
15	5	1	1	0	0	0	0	5	0	1	1	0	0	0	0	3	1	1	1	16				
National Leaders																								
16	5	1	5	2	2	1	5	4	1	1	1	5	0	3	1	1	1	1	1	38				
17	5	3	1	1	1	5	2	2	1	0	3	1	1	1	0	0	5	1	1	1	24			
18	5	1	5	2	2	1	5	0	0	5	4	1	1	1	1	4	1	1	1	5	1	2	1	34
19	6	6	1	1	1	1	6	2	2	1	6	6	1	1	1	1	6	5	3	1	1	1	46	
20	6	6	1	1	1	1	6	2	2	1	6	1	0	0	4	1	1	1	1	6	1	1	1	33
Extras																								
Mich State University	5	0	4	2	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	1	1	17
Tri-County Master Plan	5	4	1	1	1	1	0	0	0	5	5	0	0	0	0	3	1	1	1	3	1	1	1	25





(2.3) Limitations

In order to complete statistical and GIS analysis required for this project, the Team used readily available data sources. Although the results of these methods are illuminating and can provide guidance to the Client in constructing an NMT plan, it should be understood that the nature of certain sets of data constrain the breadth of its interpretation and application. The following describe these constraints:

- 1. Socio-economic variables:** Both *NMT User Profile* and *Socioeconomic Existing Conditions* sections make significant use of data collected by the U.S. Census Bureau 2000 Decennial Census SF3. SF3 data are not 100 percent, meaning that they are sample based and do not represent actual responses. The sampling methodology may under or over report numbers of workers riding bicycles, walking, taking public transit, or driving an automobile to work. In the cases of bicycling and walking, numbers may be significantly under reported because very small numbers of respondents within the statistical reference area indicated bicycling or walking to work. Because there were so few affirmative responses to begin with, some Census Tracts might appear to have no responses and others appear to be substantially lower than might actually be the case. The effect of the paucity of these indicators in the dataset used for this report substantially weakened the statistical strength of correlations and regressions performed on these indicators. Partial geographies also present a problem for our dataset: Lansing's political boundary does, in fact, divide several Census Tracts. Most notable, perhaps, is the case of Tract 44.04 which is split between the cities of Lansing and East Lansing. Tract 44.04 contains the campus of Michigan State University within its boundaries and the data of any partial geometry will therefore be inflated.
- 2. Land use variables:** Land use diversity is aggregated at the census block level, and is based on the City of Lansing zoning map. Insofar as zoning consists only of current land uses allowable by right, and does not capture the actual land use on a site or its level of use, the indicator may not accurately reflect the true nature land use within a census block. For example, an abandoned warehouse or factory would be depicted on zoning map as a heavy industrial land use, not an as an abandoned structure or land. If such a property shared a census block with another, the land use diversity measure would be "2" despite the fact that the industrial use was not in fact in active industrial use. This is an important issue for a city like Lansing where the economic base is shifting from one dependent upon manufacturing to one dependent upon services. For corridor level NMT planning, it will therefore be extremely important for those responsible to amass an accurate description of land use as it actually exists—not as it is designated by a zoning map alone.

⁴⁴ Bureau of Transportation Statistics. Omnibus Survey: Household Survey Bicycle Travel During 2002 (Nov 2001 – Oct 2002). p. 1, Online: http://www.bts.gov/publications/omnistats/volume_02_issue_06/html/entire.html. Retrieved February 4, 2007





(3.0) Existing Conditions

Information on existing conditions and trends in usage, crash rates, and facilities can provide important background for setting policy and for making funding and programmatic decisions. These data can help identify whether existing policies and programs are successful and whether additional or revised policies and programs are needed. For example, data indicating that walkway quality is generally poor and declining might lead to the establishment of improvement programs or funds, or the establishment of a committee to provide input into improvements. Data showing increasing crash rates may indicate the need for additional funding for efforts to improve roadway safety.

~Bureau of Transportation Statistics 2003

The following section attempts to collect and analyze the many factors that potentially affect non-motorized travel behavior in the city of Lansing, Michigan. *Existing Conditions* documents the level of bicycle and pedestrian facilities like sidewalks, bicycle lanes, and shared paths and trails. This inventory has been prepared to assist the *Task Force's* efforts to construct a comprehensive non-motorized plan for Lansing. In addition, our documentation and assessment of existing conditions also addresses demographic, public safety, legal and regulatory, and land use considerations.





(3.1) Socioeconomic Factors Influencing NMT

One of the most important things to understand in developing a non-motorized plan that addresses non-motorized commuting and recreation is the relationship between a non-motorized transportation system and the community in which it is located. Only through a clear understanding of these and others factors can policy makers hope to achieve the goals and objectives envisioned by plans that attempt to capture the many benefits of expanded non-motorized travel.

Diverse groups of people use NMT systems for different purposes and ways. Accurately comprehending the motivations behind the decision to use NMT alternatives to motorized transportation can help policy makers improve the quality of services delivered to the community members. The two predominant forms of non-motorized transportation for the majority of urban America are bicycling and walking. The following section looks at the differences and similarities between these two distinct groups of NMT users and suggests some implications of those findings for non-motorized plans.





3.1.A. NMT Bicycle User Profile

Recreational & utilitarian cycling. Bicycles are used for recreation more than they are used to commute. According to the U.S. Bureau of Transportation Statistics (BTS) survey, an estimated 33 million adults rode a bicycle an average of 6 days or more during the month before the survey was conducted. Of those 33 million, “9 out of 10 ride for either recreation (54%) or exercise (33%)”, while only about “6 percent of adult bicyclists commute to school or”.⁴⁴ This data is further corroborated by the findings of a 2001 *National Household Travel Survey* that notes “The majority of daily trips occurred in personal vehicles eighty-seven (87%) percent”. Of the remaining thirteen (13%) of trips, bicycles are included with “other” undefined, transit modes, accounting for less than two (1.7%) percent of total trips.⁴⁵ Further confirming the imbalance between rates of recreational and utilitarian cycling, a 2003 survey conducted by the BTS found that roughly eighty-six (86%) of all bicycle trips were for exercise and recreation (See Figure 17, next page). In that same survey, eight percent (8%) of respondents did indicate that they cycled to work.

Although neither the BTS nor the NHT survey allows for direct analysis of these findings for individual communities or census tracts, analysis of data from the *2000 U.S. Decennial Census* does allow for such comparisons.⁴⁶ This data suggests that very few Lansing residents bicycle to their place of employment. When asked to describe the mode of transportation that they used to get to work, less than one (0.5%) percent of respondents answered that they used a bicycle to get to work (See Figure 18, next page). In absolute terms, 367 out of more than 82,269 workers indicated that they rode a bicycle to work.⁴⁷ Within the city, the U.S. Census recorded only 239 bicycle commuters out 56,449 respondents.⁴⁸

⁴⁵ 2000 U.S. Decennial Census. SF3 Table. Page 30. Analysis by Author.

⁴⁶ Ibid.

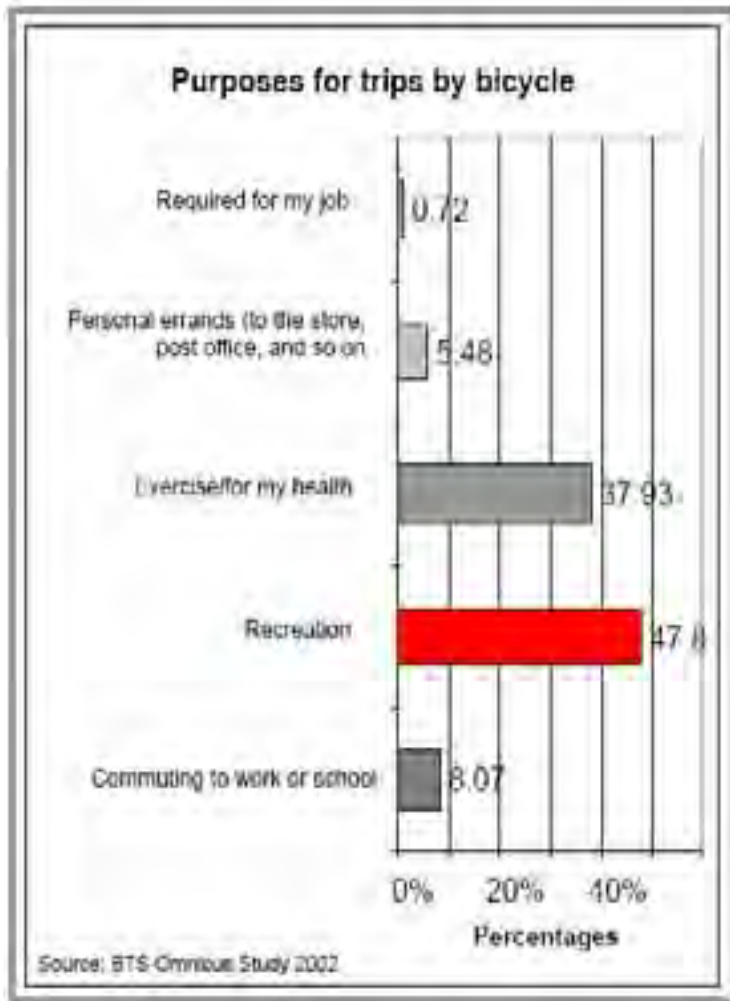
⁴⁷ Ibid.

⁴⁸ As defined by the U.S. Census *place* classification.





Figure 17 & Figure 18





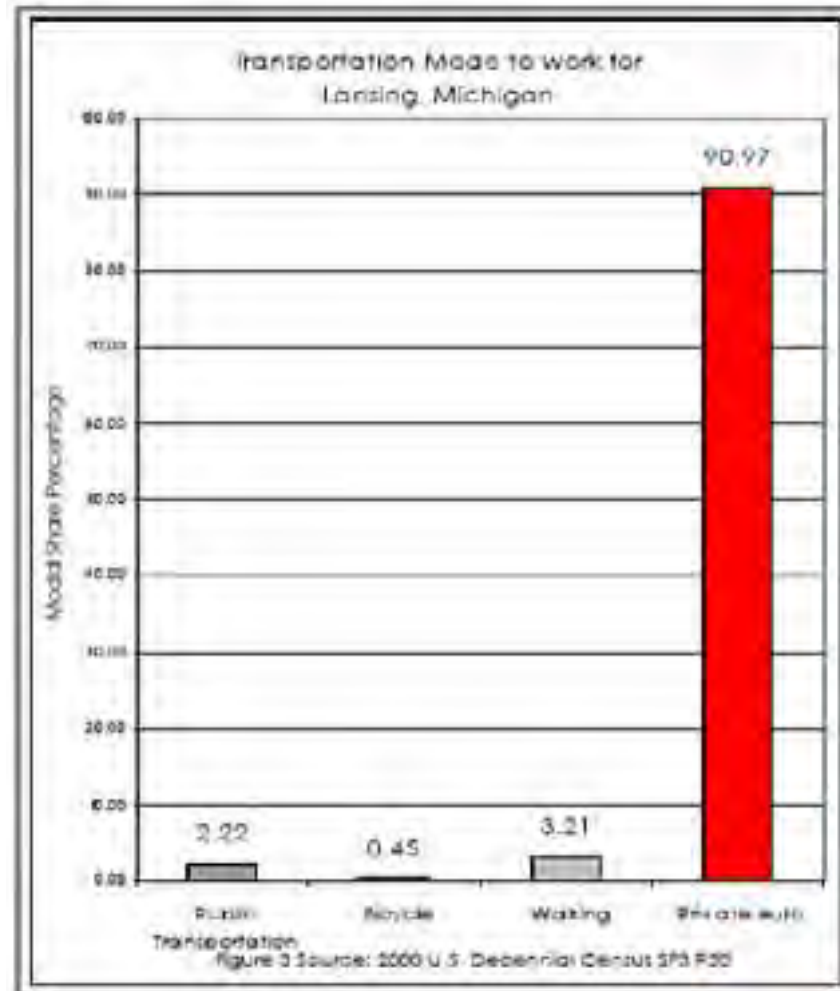
This level of bicycle commuting, nationally, corresponds with levels of bicycle commuting in other, similarly sized and situated Midwestern cities. For discussion of non-motorized plans in these communities, refer to *Section 2.2, the NMTP Content Analysis*. Only 0.47% of respondents in Springfield, Illinois indicated that they commute to work by bicycle (See Figure 18, last page). As low as these rates of bicycle commuting seem to be Springfield, IL; Lansing, and Kalamazoo, Michigan all exhibited levels of bicycle commuting that were slightly higher than the national average of less than one (0.38%) percent. At the other end of the continuum, cities like Madison, Wisconsin; Ann Arbor, Michigan; and East Lansing, Michigan all have substantially higher than average rates of bicycle commuting. Madison, Wisconsin, a Midwestern state capitol with nearly identical seasonal weather patterns, and home to another large state university, has nearly eight times (8x) the number of bicycle commuters than Lansing. Ann Arbor, Michigan which has recently adopted a non-motorized plan, has nearly six times (6x) the number of bicycle commuters.

Respondents in Lansing (See Figure 19, next page) rely on private automobiles for transportation to work. Residents of the city of Lansing, it would seem, do not use bicycles for utilitarian purposes (Possible explanations for this are explored below in Section 3.3 Land Use Patterns and Conditions). It should be noted at this point that readily available data does not allow for a thorough examination of utilitarian bicycle usage in the city of Lansing. Data recording the number of bicycle trips for utilitarian purposes other than work, for example, is not collected during the U.S. Census and the authors of this report have not been able to locate anything comparable. In order to obtain such information, members of the community, particularly cyclists, should be surveyed in order to better understand utilitarian bicycle travel in finer detail (Suggestions for such a study are contained in the *Conclusions* section of this report). For now, it can be reasonably concluded that the vast majority of Lansing cyclists bike for recreational purposes. Nevertheless, NMT is more than an occasional recreational activity for many. For some it is choice based in deeply held convictions, for others it is matter of necessity. A non-motorized plan that ignores such groups of commuters underestimates the social value of and demand for appropriate NMT facilities and services.





Figure 19





Age. U.S. Decennial Census means of transportation to work data is not disaggregated by age, so there is a lack of data concerning the age of various types of commuters at the city or census tract level. Extrapolating from nationally collected travel survey data allows for several interesting observations. Cyclists tend to be younger, according to the BTS, as sixty-six (66%) percent of cyclists are under the age of 45. Average number of cycling days does not vary greatly within both cohorts as each group can be roughly divided into a third that cycle 1-2 days/month, a third that cycle 3-5 days/month, and the third mentioned above that cycle 6 or more days a week.⁴⁹ While evidence linking age with either recreational or utilitarian cycling is not readily available, it is assumed by this study that the youngest segment, within the under 45 cohort, represent a great opportunity for expanding both utilitarian and recreational bicycling, because children, under the age of 16, do not have access to private automobiles due to age restrictions imposed on driving. Younger cyclists also represent an opportunity to expand utilitarian cycling among individuals who will spend the next 40 to 50 years of their lives traveling to and from work.

Gender. The same limitations that preclude the use of readily available U.S. Census data in the analysis of age also limit analysis of the relationship between gender and non-motorized transportation behavior within local communities like Lansing. Because this data is not delineated by gender, findings must be inferred from national studies. The same BTS study found that men were more likely to cycle than women by sixty-one (61%) to thirty-nine (39%) percent. Within each cohort, frequency of use patterns fell into equal thirds as was the case for *Age*.⁵⁰ Addressing the underlying reasons for this disparity between men and women should be a goal of further research. This research should be performed locally through the public participation component during development of the non-motorized plan or through surveys of local residents. It is plausible that gender based differences in individual perceptions of the level of safety of existing non-motorized systems account for some of this disparity. The findings of

⁴⁹ Bureau of Transportation Statistics. Omnibus Survey: Household Survey Bicycle Travel During 2002 (Nov 2001 – Oct 2002). p. 2, Online: http://www.bts.gov/publications/omnistats/volume_02_issue_06/html/entire.html. Retrieved February 4, 2007

⁵⁰ Ibid.





studies assessing this issue could greatly affect NMT policy decisions and need to be taken seriously if the city is to implement an NMT policy that achieves gender equitable solutions.

Income. Income for cyclists remains an ambiguous predictor of overall levels of bicycle use, and no study of the relationship between income and type of cycling (recreational or utilitarian) is available at this time. The 2002 BTS survey found that cyclists were somewhat more likely to have incomes over \$50,000 (58% to 42%).⁵¹ Within the \$50,000 or more and the \$50,000 or less groups, virtually equal percentages of respondents indicated that they ride 6 or more days month. Jennifer Dill and Theresa Carr, both researchers at Portland State University, found in their regressions of the relationship between bicycle infrastructure and levels of bicycle commuting that income levels were not significantly correlated with bicycle commuting in the 35 cities they studied.⁵² Bicycle commuters did, nevertheless, tend to have lower incomes than drivers suggesting that certain income levels may be associated with certain types of cycling. In Lansing, the relationship between median household income and bicycle commuting is similarly ambiguous suggesting that higher income census tracts tend to have lower levels of bicycle commuting. Census Tract 8, for example, has high percentages of bicycle commuters (3.01% to 5.00%) and the lowest median household incomes (\$11,940 to \$15,000). If compared side-by-side, lower household income appears to roughly correspond with higher rates of bicycle commuting.

But statistical analysis of the relationship between median household income and bicycle commuting to work in Lansing does not substantiate this relationship. Linear regression of these two variables reveals that household income is only weakly statistically correlated with bike commuting (Pearson coefficient -.217, $p = 0.56$), though the sign is in the correct (negative) direction (See Appendix: NMT Bicycle User Profile, Income Regression). Regression of percentage of households below the poverty line likewise

⁵¹ Bureau of Transportation Statistics. Omnibus Survey: Household Survey Bicycle Travel during 2002 (Nov 2001 – Oct 2002). p. 2, Online: http://www.bts.gov/publications/omnistats/volume_02_issue_06/html/entire.html. Retrieved February 4, 2007

⁵² Dill, J. and T. Carr (2003). *Bicycle commuting and facilities in major U.S. cities: if you build them, commuters will use them – another look*. TRB 2003 Annual Meeting CD-ROM 1-9. p. 7.



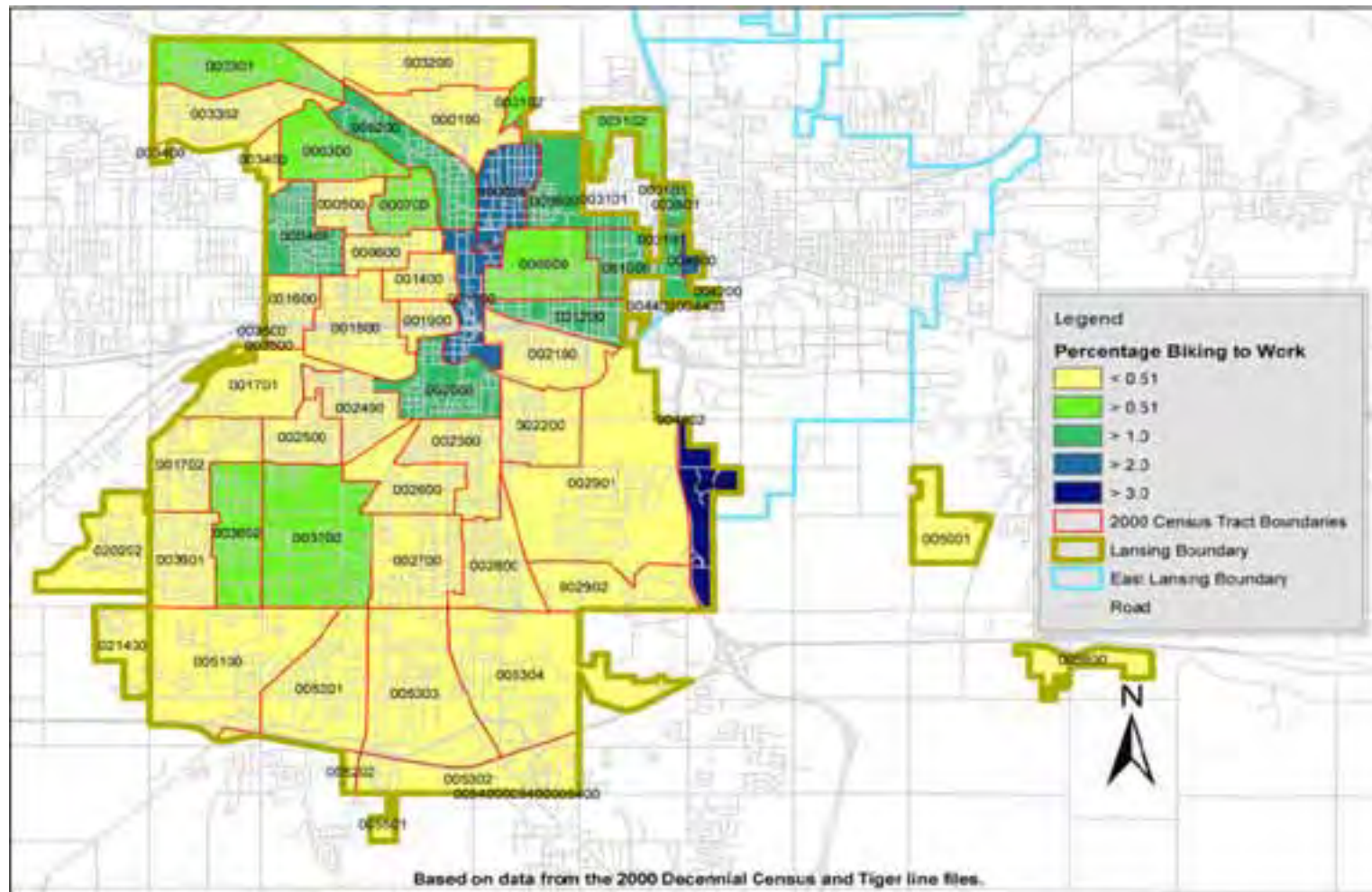


yields a weak, statistically non-significant relationship between levels of bicycle commuting (See Appendix: NMT Bicycle User Profile, Poverty Regression). Although in both cases some evidence of a relationship exists, it is too weak to be applied as evidence that income or poverty rates can predict levels of bicycle commuting. Despite its unreliability as a predictor of bicycle commuting, there are strong normative grounds that justify the consideration of income in any analysis of non-motorized transit: bicycling, and walking, can provide an inexpensive and reliable means of transportation for people lacking access to an automobile, the means to maintain and operate an automobile, or both.





Existing Conditions: Percentage Commuting to Work by Bicycle





But statistical analysis of the relationship between median household income and bicycle commuting to work in Lansing does not substantiate this relationship. Linear regression of these two variables reveals that household income is only weakly statistically correlated with bike commuting (Pearson coefficient -0.217 , $p = 0.56$), though the sign is in the correct (negative) direction (See Appendix: NMT Bicycle User Profile, Income Regression). Regression of percentage of households below the poverty line likewise yields a weak, statistically non-significant relationship between levels of bicycle commuting (See Appendix: NMT Bicycle User Profile, Poverty Regression). Although in both cases some evidence of a relationship exists, it is too weak to be applied as evidence that income or poverty rates can predict levels of bicycle commuting.

Despite its unreliability as a predictor of bicycle commuting, there are strong normative grounds that justify the consideration of income in any analysis of non-motorized transit: bicycling, and walking, can provide an inexpensive and reliable means of transportation for people lacking access to an automobile, the means to maintain and operate an automobile, or both.





3.1.B. NMT Pedestrian User Profile

Recreational and Utilitarian Walking. Pedestrians' prefer NMT for exercise and not for commuting (See previous section 1.2.A *Changes in Public Opinion*). Another survey published by the BTS in 2003 found that approximately 143.7 million U.S. residents walked, ran, or jogged outdoors, for at least 10 minutes, on at least one day, during the month, preceding the survey. The average duration of recreational walking is actually significantly longer than 10 minutes, with a high of 56.3 minutes in July. Seventy-seven (77%) percent of respondents indicated that they engaged in these activities for exercise or recreation, while fifteen (15%) percent walked to complete non-work trips, and seven (7%) percent walked to work or walked in the course of performing their job. This percentage is actually less than the eight (8.01%) percent of Americans who biked to work or bicycled in the course of performing their work.⁶²

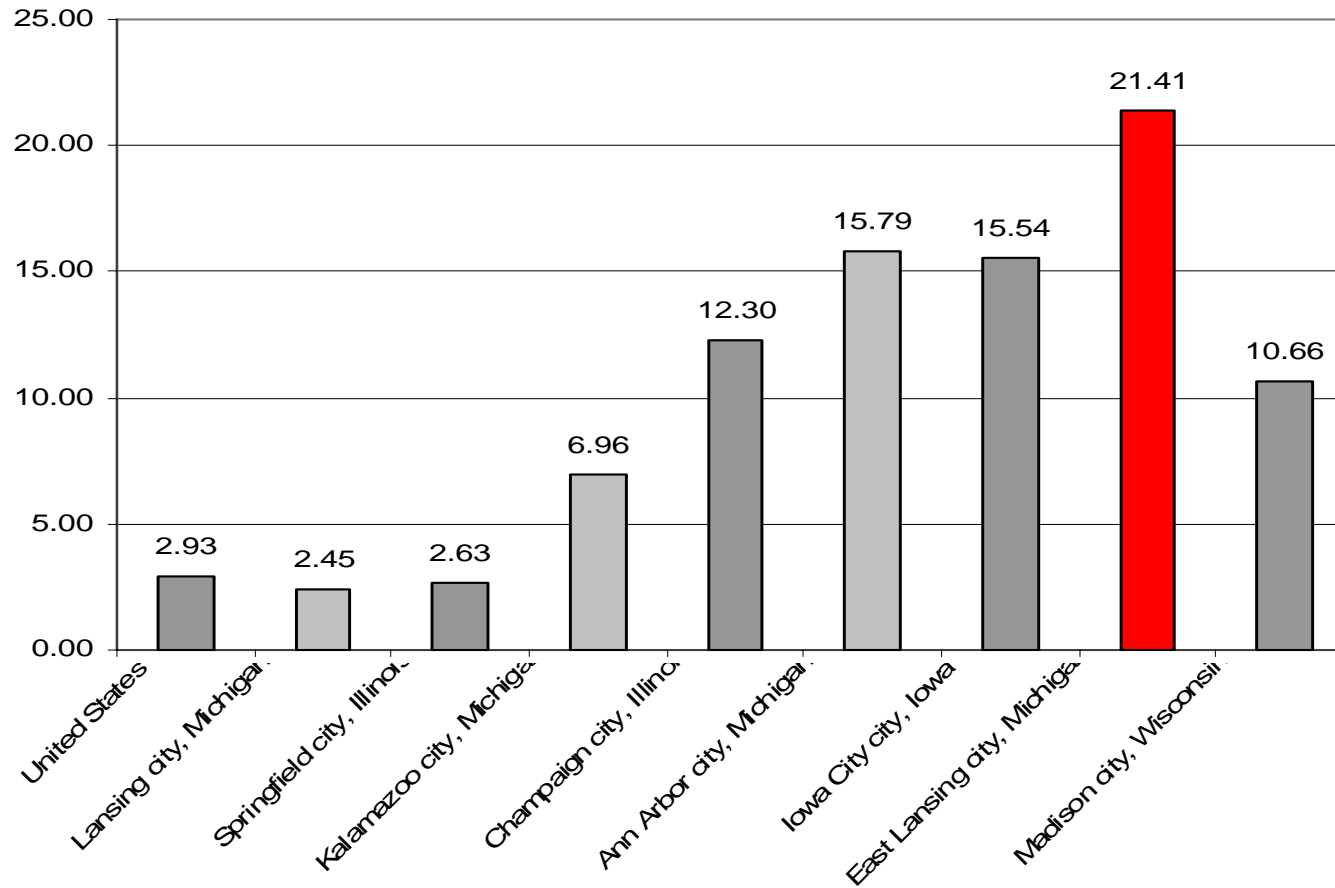
According to results from the 2000 Decennial Census (See Figure 20, next page), Lansing had much lower levels of walking to work than all of the other communities used for comparison in this section of the report. Lansing's neighboring community, East Lansing, recorded the highest levels of walking to work—no doubt due to the effect of its large population of college students and faculty. Madison, Wisconsin, which is more comparable to Lansing in terms of its socioeconomic characteristics (See comparisons below in Socioeconomic Conditions) also exhibited a much higher rate of pedestrian travel with nearly 11% of respondents reporting that they walked to work. More striking perhaps is the fact that a lower percentage of workers walked to work in Lansing than they did so nationally. The *Existing Conditions: Commuters Walking to Work* map depicts the distribution of commuter pedestrians throughout the city.

62 Bureau of Transportation Statistics. Omnibus Survey - Household Survey Pedestrian travel during 2002 (February - December 2002). Retrieved February 4, 2007, from http://www.bts.gov/publications/omnistats/volume_03_issue_01/pdf/entire.pdf.



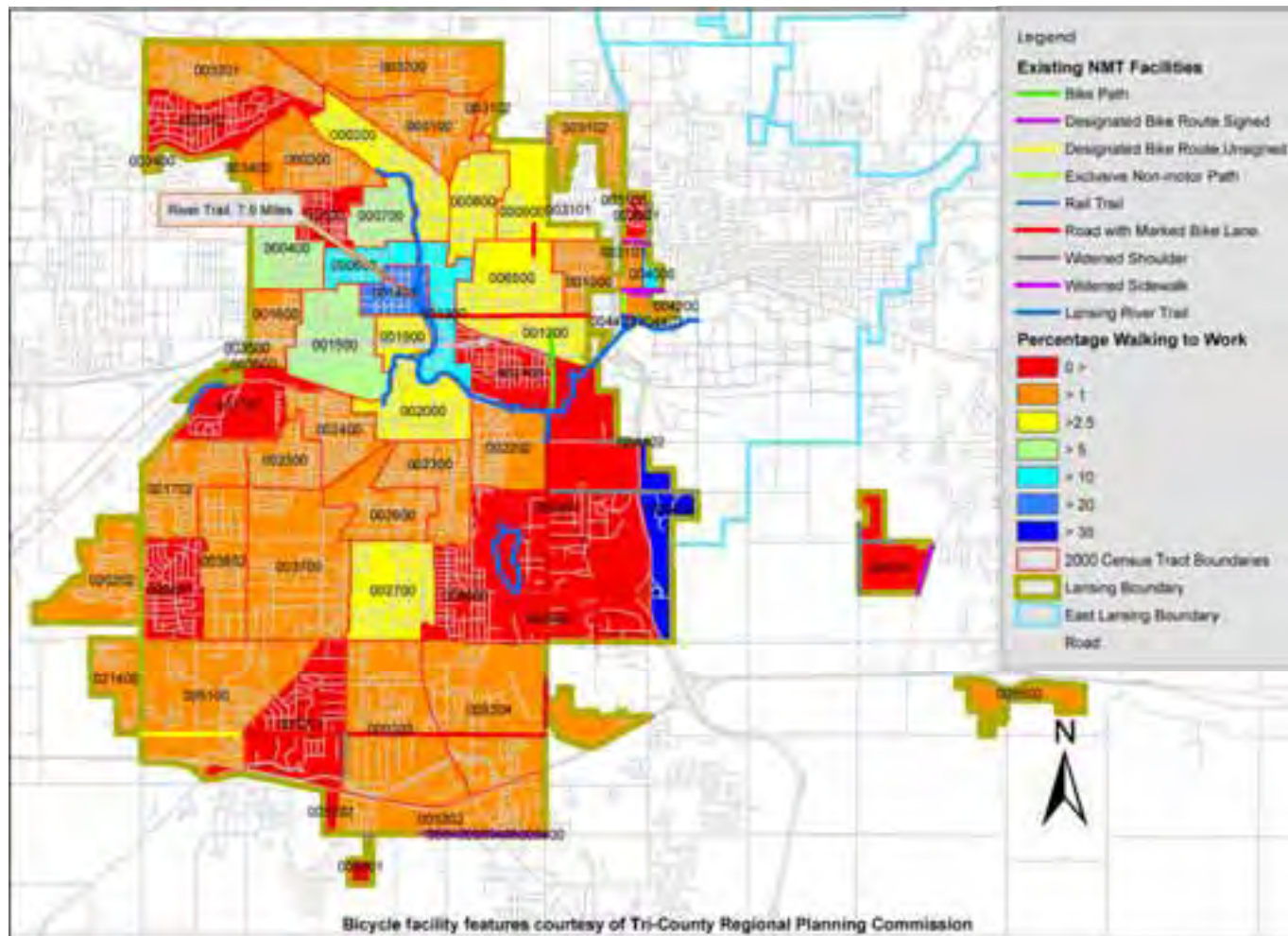


Figure 20
Walking to Work





Existing Conditions: Percentage Walking to Work & NMT Facilities





Age. At the time of this writing, the practicum research team had not obtained any studies examining the relationship between age and utilitarian walking. Indeed enhancing walkability of a community for all age cohorts is an important goal from the standpoint of creating equitable, pedestrian-friendly communities. That said, creating such a pedestrian system depends in large measure on a thorough understanding of what a given community needs from a pedestrian system. Even if the relationship between age and recreational and utilitarian walking were thoroughly understood in the aggregate, gathering local knowledge of the travel habits and preferences of pedestrians would remain an essential aspect of developing the pedestrian component of any non-motorized plan. Although age has not yet been established as an explanatory variable of need for or usage of pedestrian facilities, it is important to acknowledge pedestrian needs that may be unique to particular age groups within a community (School-aged children are discussed in greater detail in both the following sections, describing relevant socioeconomic conditions in Lansing, and again in the section on Public Safety).

Gender. The relationship between gender and travel behavior has emerged as a topic of discussion within planning and transportation literature. As with bicycling, understanding how gender influences levels of pedestrian activity, with particular attention on female pedestrians, is important for decision-making that maximizes pedestrian travel opportunities for all members of the community. Clifton and Livi (2004) recently published an interesting study of walking behavior that examined differences between male and female pedestrians in Baltimore, MD.⁶³ Their study found that men are more likely to walk for longer distances, but that women were more likely to walk more often.⁶⁴ They are also more likely to walk for recreational purposes. The most important differences, particularly from the perspective of anyone responsible for improvements to the pedestrian environment, are those concerning safety. While sixty-three (63%) percent of male respondents indicated that they walked at night, Clifton and Livi found

⁶³ Clifton, K., & Livi, A.D. (2004). Gender differences in walking behavior, attitudes about walking, and perceptions of the environment in three Maryland communities. *Proceedings of the Conference on Research on Women's Issues in Transportation, USA*, 35, 79-88. Retrieved March 3, 2007 from <http://onlinepubs.trb.org/onlinepubs/conf/CP35v2.pdf>.

⁶⁴ Ibid, pg 83.





that only fifty-four (54%) percent of women did.⁶⁵ Safety concerns also seem to be responsible for the preference of female pedestrians to walk in groups. For the female respondents in this study, concern for safety was not limited to personal security alone: the researchers also found that women were more “sensitive” to traffic hazards.⁶⁶

Gender is not necessarily a predictor of potential demand for improvements to pedestrian infrastructure or demand for future expansion or construction of pedestrian facilities. Nonetheless, gender based differences in pedestrian behaviors like those identified by Clifton and Livi and others have significant implications for communities in the midst of planning for pedestrian travel. The most obvious implication here is the need for creating safe pedestrian environments that are perceived as safe by those who are most sensitive to issues of safety. Other less obvious implications include the need to plan pedestrian facilities around needs that are unique to women. For example, because mothers are more likely to use strollers when taking young children on recreational and utilitarian walks, pedestrian infrastructure that facilitates the use of strollers (e.g. curb cuts) can improve both the perception of and the actual walkability of a place. Because gender does matter in how the pedestrian environment is perceived and used by more than half of community’s population, understanding the needs of female pedestrians within a given community is crucial to creating a pedestrian plan that truly seeks higher levels of pedestrian travel for recreation and utility.

⁶⁵ Clifton, K., & Livi, A.D. (2004). Gender differences in walking behavior, attitudes about walking, and perceptions of the environment in three Maryland communities. *Proceedings of the Conference on Research on Women's Issues in Transportation*, USA, 35, page 83. Retrieved March 3, 2007 from <http://onlinepubs.trb.org/onlinepubs/conf/CP35v2.pdf>.

⁶⁶ Ibid, page 83.





3.1.C. Socioeconomic Conditions Affecting NMT Systems & Usage

Initial steps in the planning process include identifying issues and options, collecting data, and interpreting that data. This is true whether a community is planning for economic development in a low-income neighborhood or preparing a non-motorized transportation plan. In order to better assist the Mayor's Task Force on Walking and Bicycling, an identification of existing socioeconomic conditions relevant to non-motorized transportation was conducted. The United States Census Bureau provides the most extensive data at the census tract level; therefore census tract information from the 2000 census will serve as the main source for our review of current demographic and social characteristics for the city Lansing. As discussed above, it is our belief that poverty levels, access to vehicles, income levels, and the amount of school age children in a census tract may affect use of non-motorized options as a means of traveling throughout the city for various purposes.

Poverty. When planning for non-motorized transportation, understanding the effects it has on residents in high poverty areas is very important. Typically residents in lower income neighborhoods live in older parts of the city. These areas are usually more densely populated with more units of affordable housing. As discussed further in *Existing Conditions: Land Use and the Built Environment*, higher density provides an opportunity to introduce non-motorized transportation in a unique way; for various reasons these areas are more suitable non-motorized facilities. Areas that have been built out in the last 50 years tend to be less densely populated which can pose problems when trying to implement walking/biking facilities.

In the city of Lansing sixteen (15.54%) percent of households have incomes that are below the federal poverty level⁶⁷. While sixteen (15.54%) percent is the city average, 21 of the 54 census tracts report levels higher than the average. Furthermore at least

⁶⁷ 2000 U.S. Decennial Census. SF3 Table. Page 92. Analysis by Author.

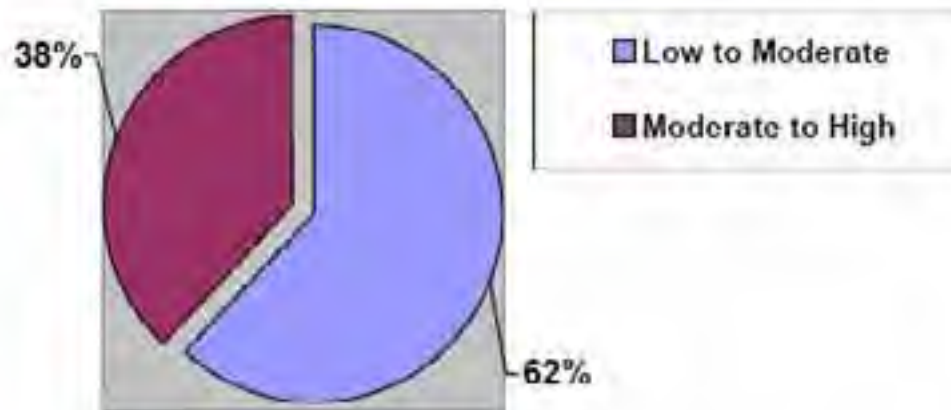




two of the tracts have thirty-nine (39%) percent of their households with incomes below the poverty level. Statistically this means that more than thirty-eight (38%) percent of Lansing census tracts can be classified as being moderate (15.54%) to high (+15.54%) poverty areas (See Figure 21, and Existing Conditions: Households below Poverty Level Map). Compared to other cities we have chosen to reference in our analysis, Lansing's poverty level is average (See Figure 22, next page).⁶⁸

Figure 21

Percentage of Census Tracts More or Less than 15% Poverty



Source: 2000 U.S. Decennial Census

⁶⁸ It should be noted, however, that several of the comparison cities are dominated by large public universities and their student populations skew measures of poverty much higher in those areas. Often, this does not reflect the socioeconomic reality of a given community. Nevertheless, the number Lansing households below poverty is not dissimilar from Ann Arbor, Michigan and Madison, Wisconsin both of which have large populations aside from students.





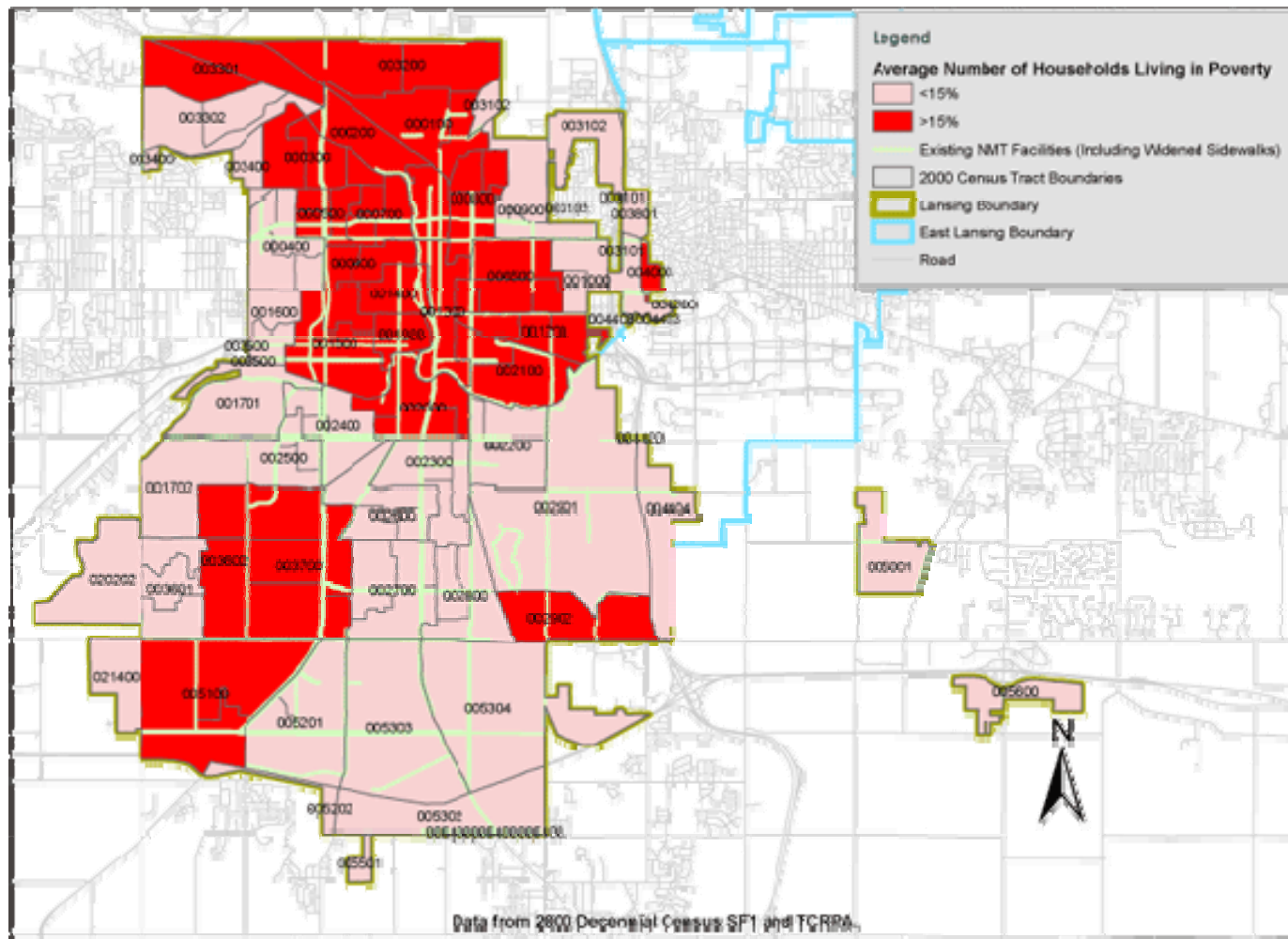
Figure 22

Lansing's Poverty related to Comparable Communities
Source: 2000 Decennial Census SF3





Existing Conditions: Percentage of Households Below/Above Poverty





Vehicle Access. For much of the last half-century Michigan has been a leader in the production of automobiles. As the state's capital, Lansing has built a reputation for automobile production that is visible in notable places around the city like Reo Town or Oldsmobile Park Stadium. In a city that is very much car-oriented access to vehicles becomes an important aspect to reflect on when planning for non-motorized transportation. The census data on vehicle ownership is reported in various ways. For the purpose of our analysis we have chosen to focus on occupied housing units with at least one vehicle available. The level of vehicle availability in different areas of Lansing can guide decisions about what type of non-motorized options best suit the needs of that area. Areas that have higher volumes of vehicle accessibility may require different approaches to non-motorized transportation planning than areas with lower vehicle accessibility rates (See Section 3.3 Land Use for further analysis).

According to the 2000 census eighty-nine (89%) of all occupied housing units in Lansing had access to at least one vehicle.⁶⁹ Compared to our reference cities, Lansing has an average level of vehicle access. Of the total census tracts in Lansing, seventeen (17) have below average levels of vehicle accessibility (See Figure 23, and Existing Conditions: Vehicle Access map). While this may suggest that most Lansing residents possess the luxury of having access to an automobile, it is important to identify those who do not have this privilege. An analysis of the poverty and vehicle access data reveals an interesting characteristic. Only seventeen (17) of the fifty-four (54) census tracts had vehicle access levels lower than the city average; however of these seventeen (17) tracts, fifteen (15) could be classified as having moderate to high poverty levels. Residents and commuters to the city of Lansing use non-motorized transportation for different reasons (See Section 1.2.A. Changing Public Opinion). Understanding their motivations to use non-motorized transportation will lead to better decision-making when implementing a non-motorized policy plan.

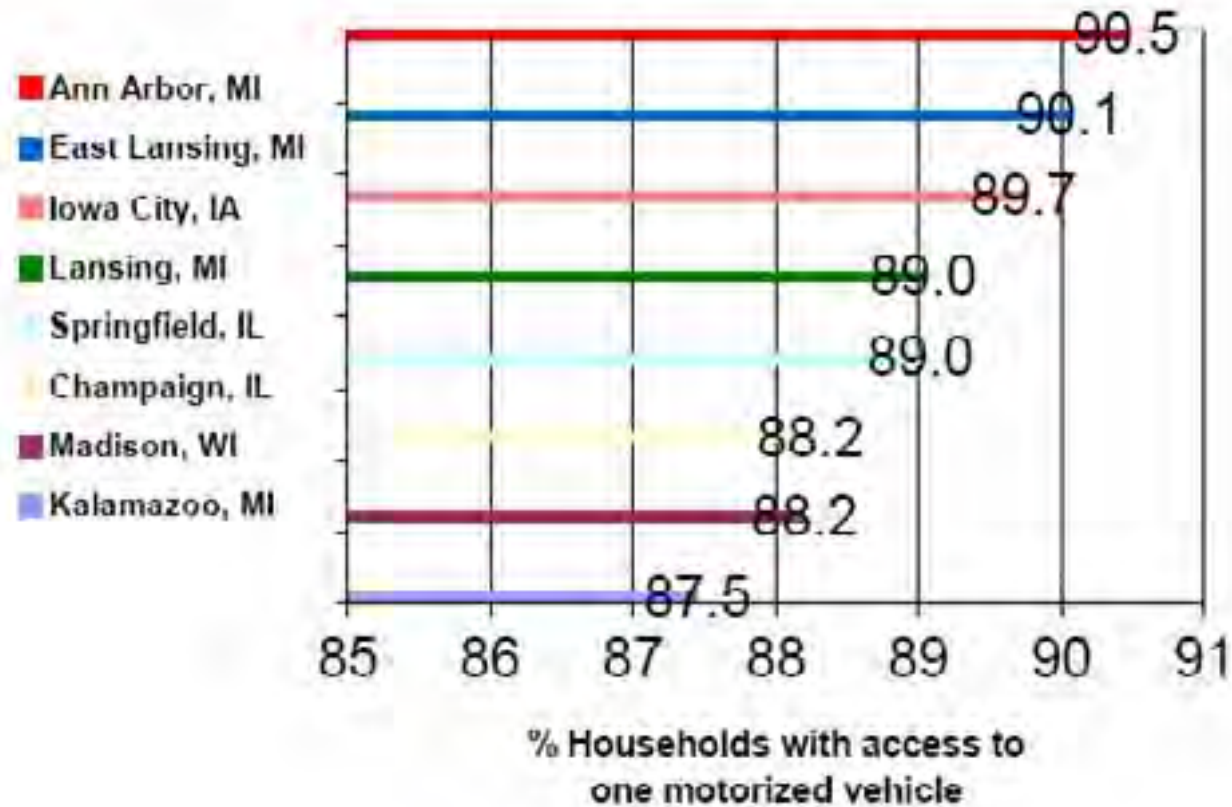
⁶⁹ 2000 U.S. Decennial Census. SF3 Table. H44. Analysis by Author.





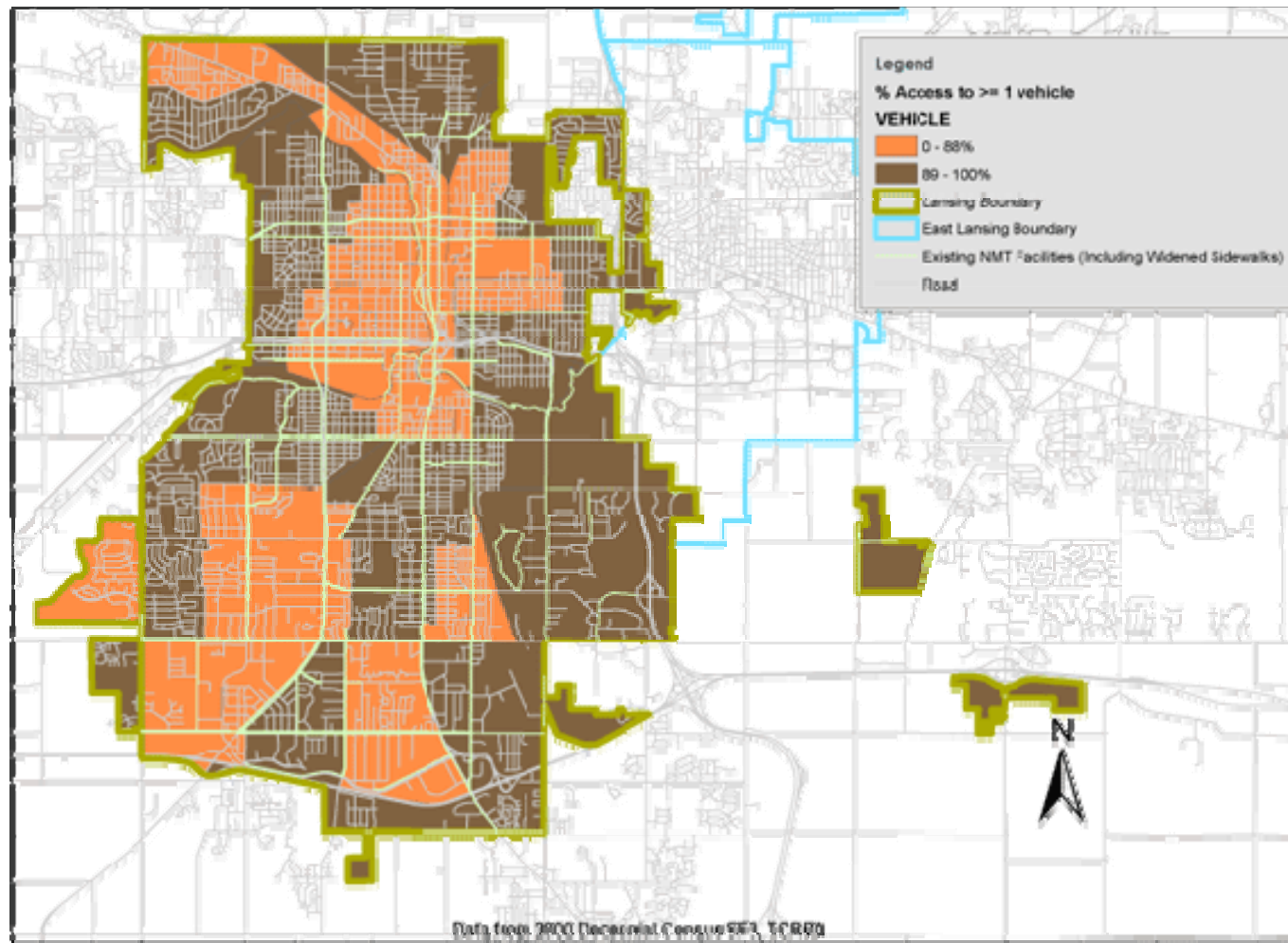
Figure 23

Vehicle Ownership
Source: 2000 Decennial Census SF3





Existing Conditions: Access to a Vehicle





Median Household Income. As mentioned above in the NMT user profiles section, the U.S. 2000 Decennial Census reported the median income for households and for families. For our analysis we have chosen to focus on median Household income. According to the United States Census Bureau, members of a household are all the people who occupy a housing unit as their common residence. This variable allows us to be more inclusive in our analysis because family is defined as a group of two or more people who reside together and who are related by birth, marriage, or adoption only includes members that are related. The median household income for the city of Lansing is \$34,833.⁷⁰ According to our analysis thirty-five (35) of fifty-seven (57) census tracts in Lansing had median household incomes at or above \$34,833 (See Lansing Median Income Map). This means that over sixty (60%) of the census tracts in Lansing can be considered moderate to high-income areas. Understanding median household income is important when making a comprehensive non-motorized transportation for several reasons. Often the implementation phase of any city plan is going to need support from members of the community. Recognizing the non-motorized transportation needs of higher income census tracts as well as lower income census tracts can lead to a wider support from those areas when trying to implement various non-motorized transportation options.

As mentioned in the NMT User Profile (See Above), income plays a role, albeit somewhat ambiguous, in non-motorized transportation usage. According to a 1991 *Harris Poll* 23% of people who made less than \$7,500 commuted by bicycle in the preceding month compared to only one (1.1%) percent of people whose income was between \$35,001 and \$50,000.⁷¹ Interestingly another trend is revealed as income increases to over \$50,001. For this income group ridership increases to seven (7.2%) percent, which shows the complexity and importance of understanding median income as it relates to non-motorized transportation planning. Other studies have not been able to detect statistically significant relationships between income and ridership.⁷² It would be

⁷⁰ 2000 U.S. Decennial Census. SF3 Table. Page 53. Analysis by Author.

⁷¹ Federal Highway Administration. National Bicycling and Walking Study.

⁷² Baltes, M. (1996). Factors influencing nondiscretionary work trips by bicycle determined from 1990 U.S. Census metropolitan statistical area data. Transportation Research Record 1538, TRB, National Research Council, Washington, D.C., 96-101. Retrieved February 12, 2007 from <http://www.enhancements.org/download/trb/1538-013.PDF>.





beneficial for any community preparing a non-motorized plan to obtain the most descriptive local data available through survey techniques as well as a vigorously participatory planning process.

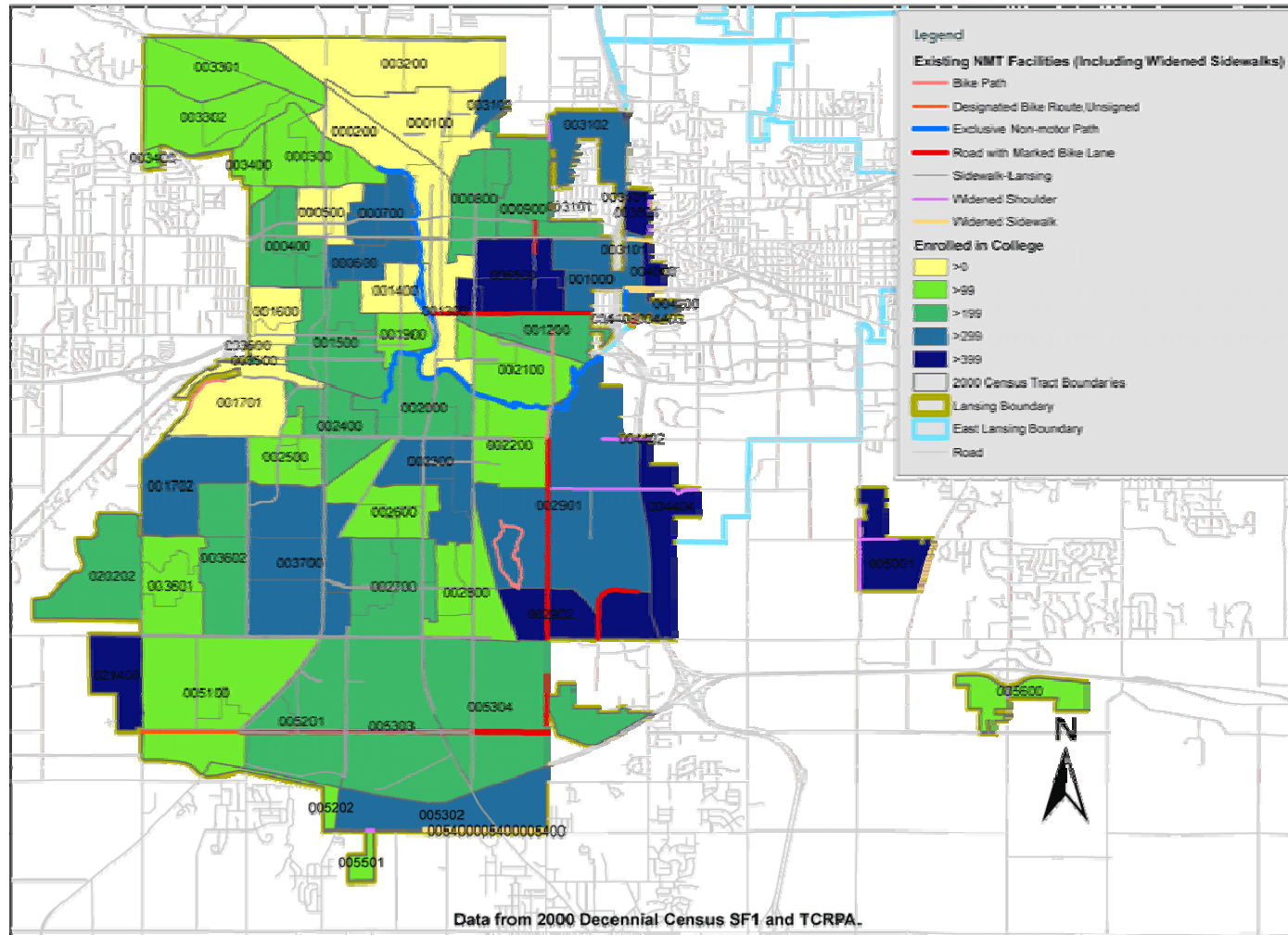
One of the demographic characteristic that we have discussed, which is closely related to income, is poverty. There is one major difference between these two measures, because low income does not necessarily equate to *being in poverty*. For example the *2006 Federal Poverty Guidelines* for a family of four set a threshold of \$20,000.⁷³ This number does not capture those families that are very close to the poverty line; they are only considered to be low income. Realizing the difference between areas that are high in poverty and the areas that are not in poverty but are low income can result in more equitable implementation of the non-motorized transportation plan.

⁷³ Federal Register.





Existing Conditions: Enrolled in College





School Aged Children / College Students. When planning for non-motorized transportation children have different concerns and issues than the average adult. For the purpose of our analysis, we looked at children from ages 5-14, as they are likely candidates to use non-motorized transportation. This segment of the population is old enough to ride bicycles, but too young to obtain a driver's license. Members of this age cohort are also disproportionately represented in pedestrian/vehicle accidents. In almost half (26 of 54) of the census tracts there are at least 290 children, ages 5-14, in each census tract.⁷⁴ Five of these census tracts have more than 500 children in the age range of 5-14. On the other side seven tracts have less than 100 children ages 5-14. An interesting characteristic of the tracts with a high or low number of children ages 5-14 is that there appears to be no correlation with poverty levels. It seems that the children in the target age range are disbursed throughout the city. Knowing where there are large concentrations of this age group along with other information is important; location of bike trails, walking paths, and locations of schools, will lead to better non-motorized transportation planning for this segment of the population.

Another important population to examine is college students. The number of college enrolled students in an area was found by Michael Baltes to be a predictor of bicycle facility use.⁷⁵ Using a multiple regression, Baltes found that the number of individuals enrolled in college was more strongly associated with bicycle commuting than other factors like income or poverty level. According to the 2000 census, there are 18,946 people enrolled in college residing in the city of Lansing. Compared to our reference cities Lansing is roughly average in terms of number of people enrolled in college (see Figure 24, next page). Considering the higher educational options in the city of Lansing and the surrounding communities it should come as no surprise that there are a large number of college students within its borders. The location of the very highest concentrations of college students should be noted: the three census tracts with the highest densities of college students are (somewhat predictably) adjacent to the city of East Lansing

⁷⁴ 2000 U.S. Decennial Census. SF3 Table. PCT 23. Analysis by Author.

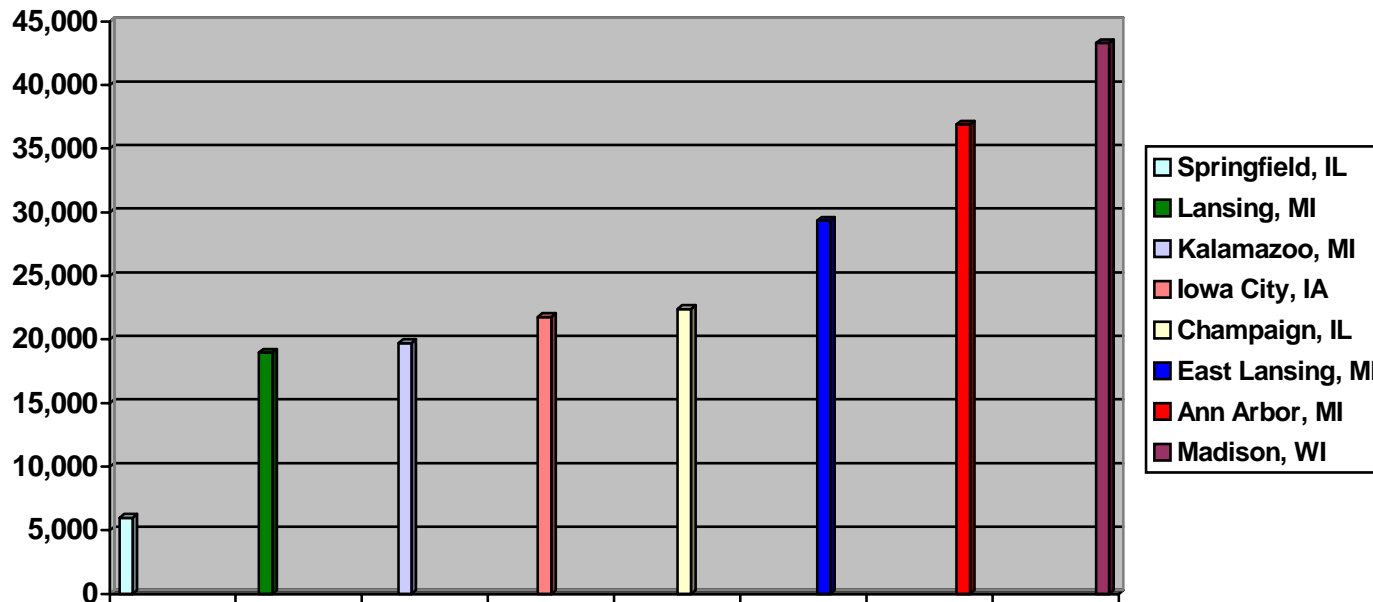
⁷⁵ Baltes, M. (1996). Factors influencing nondiscretionary work trips by bicycle determined from 1990 U.S. Census metropolitan statistical area data. Transportation Research Record 1538, TRB, National Research Council, Washington, D.C., 100-101. Retrieved February 12, 2007 from <http://www.enhancements.org/download/trb/1538-013.PDF>.





(See *Enrolled College Students Map*, next page). That notwithstanding, census tracts with medium densities of college students are dispersed throughout the rest of the city.⁷⁶

Figure 24
Number of College Students
Source: 2000 Decennial Census SF3

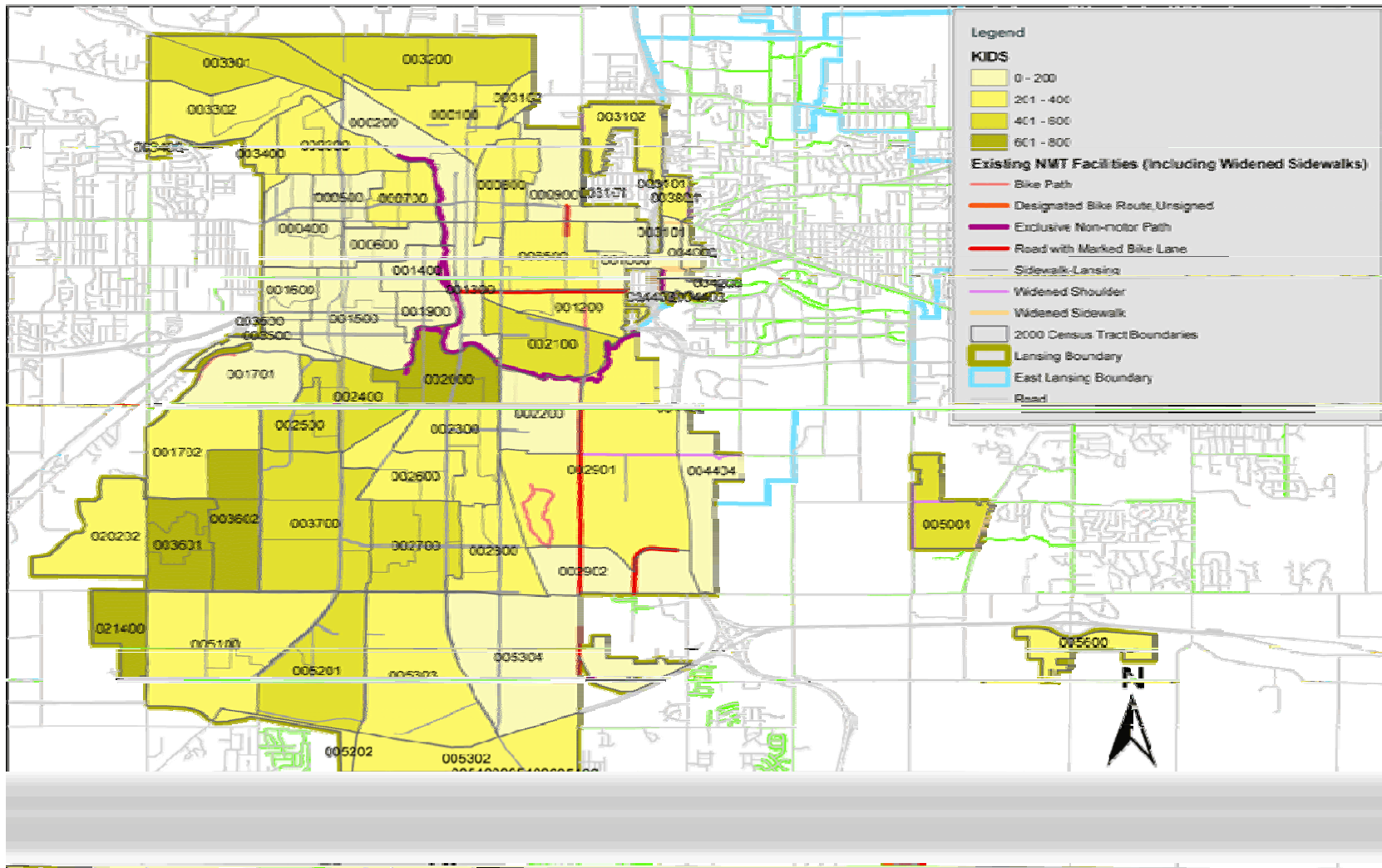


⁷⁶ It is important to note that due to the fact that several of the census tracts in Lansing are partially contained in other cities some of the school age/college student data may be misleading. For example tract 44.04 reports that there are 3,672 people enrolled in college, the highest number of any census tract in Lansing. However only a small portion, geographically speaking, of this tract is contained in the city of Lansing (See Lansing Census Tracts Map). The largest portion of the tract is located in East Lansing, home to one of the largest college populations in the United States. Closer inspection of these cases is needed to verify the data available through the census.



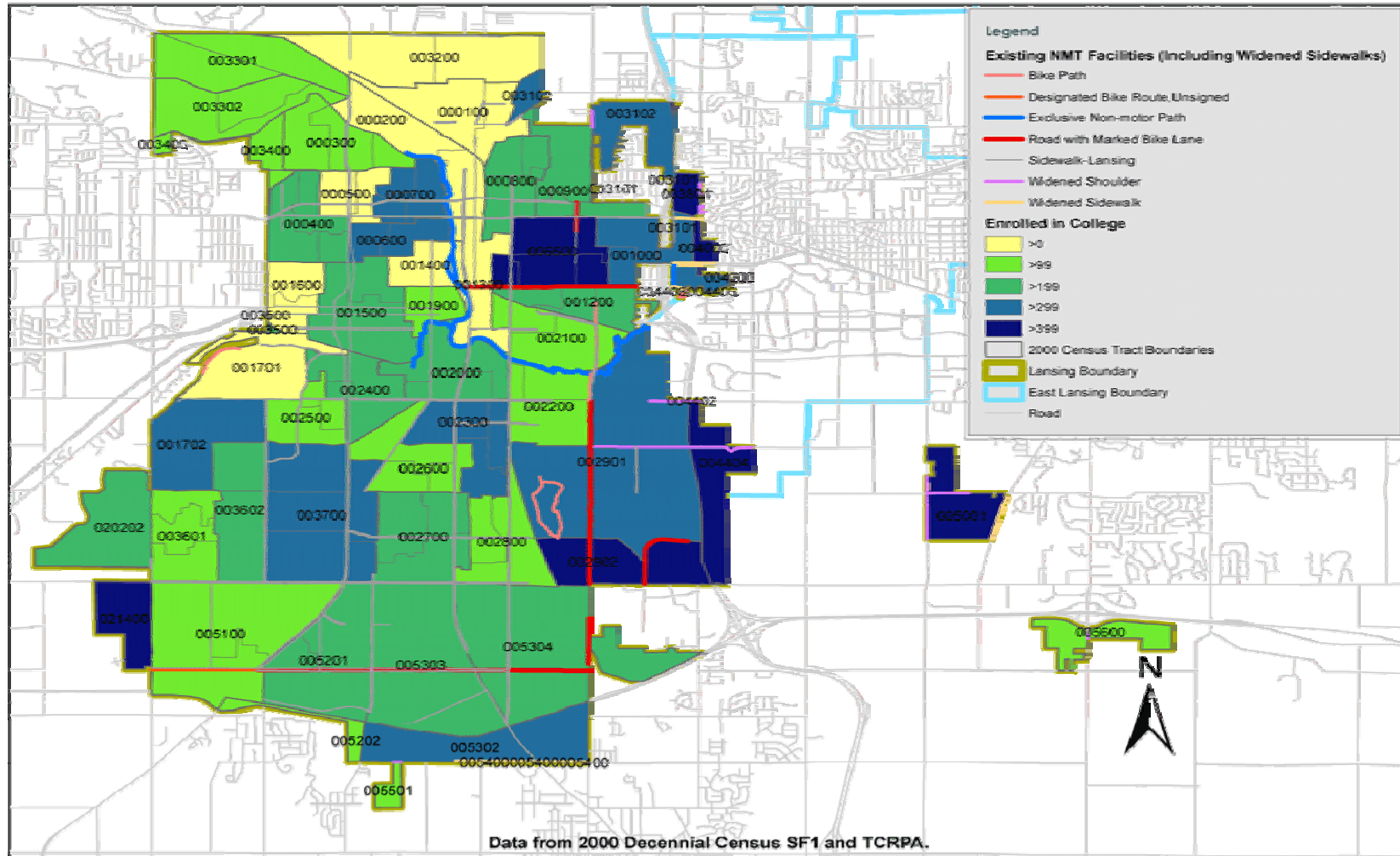


Existing Conditions: Number of Children





Existing Conditions: Enrolled in College





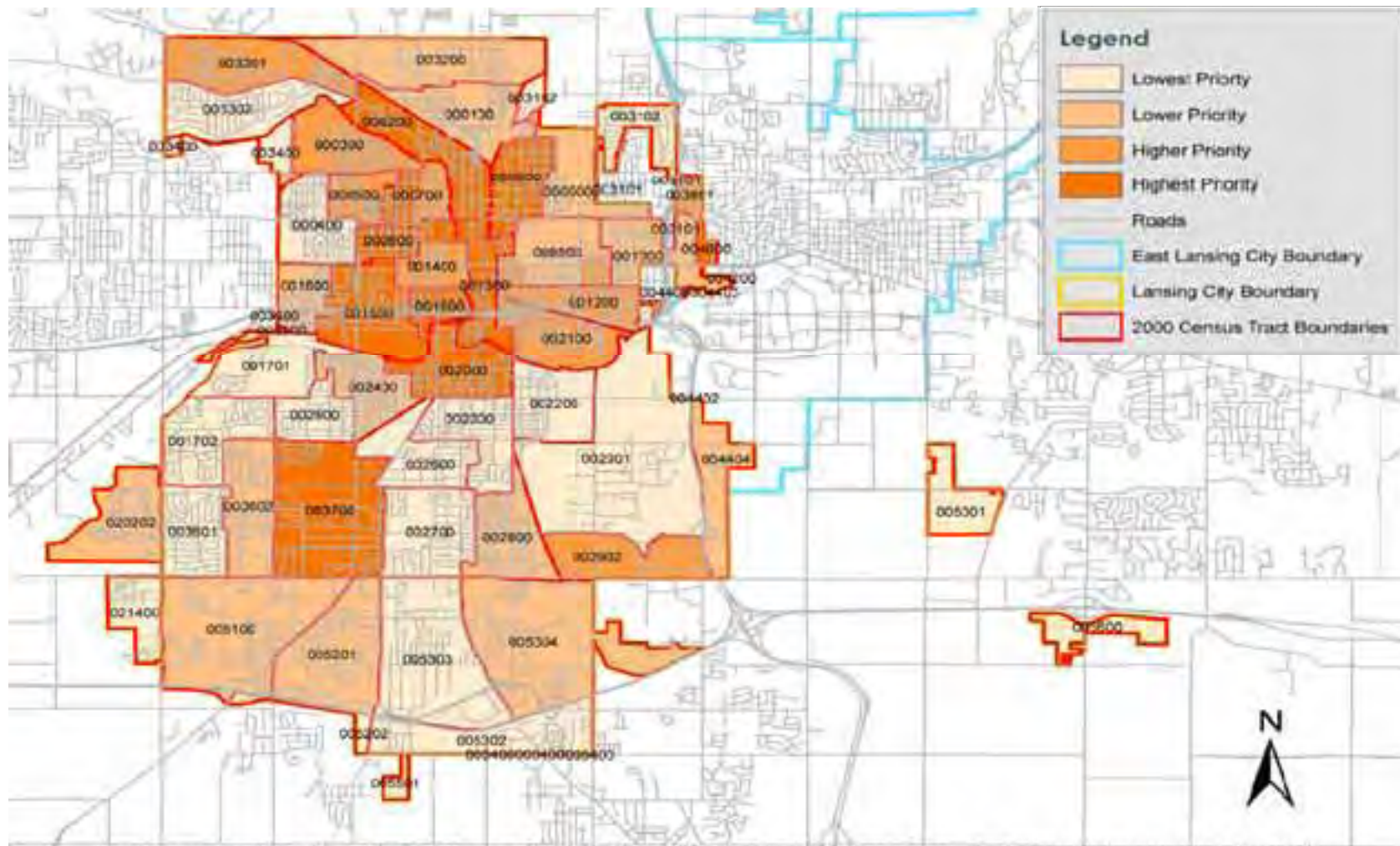
Conclusions. While some non-motorized transportation plans dismiss or overlook high poverty areas and populations with unique NMT needs, a good comprehensive non-motorized transportation plan will embrace these communities and neighborhoods as places that can benefit from walking/biking facilities—and for good reasons. In this case, a side-by-side comparison of Households below Poverty Level map and the Walking to Work maps shows some correspondence between higher poverty census tracts and census tracts with higher levels of pedestrian commuting. Although lacking strong statistical correlation, these maps suggest at least some connection between places where people have fewer resources, whether money or a privately owned vehicle.

This relationship is further examined in the Social Equity: Who Needs NMT Alternatives map. Using GIS, several individual maps were overlaid, one on the another, to create 4 categories of social equity priority: highest priority was given to census tracts with higher than average levels of poverty, lower than average levels of vehicle ownership (discussed in greater detail below), and a higher than average number of college students living in the census tract; higher priority was assigned to census tracts scoring above average in two of these categories (or below average as the case was with vehicle access); lower priority was assigned to census tracts scoring below average in two of the three categories (above average vehicle access); lowest priority was assigned to census tracts scoring below average in all three indicator areas (above average in vehicle access). This map shows areas where NMT is more or less likely (based on the issues discussed above) to be a matter of equity. Nine of 56 census tracts reviewed fell into the highest priority category, and ten more fell into the higher priority category. Nearly half of the 56 census tracts evaluated were found to have characteristics indicating higher levels of potential need for NMT alternatives.





Social Equity: Who Needs NMT Alternatives?



Based on combined data from "Poverty", "Access to Privately Owned Vehicle", "College Students" maps. Analysis and calculations by Author, 2007.



Student Practicum Team Project
Department of Urban & Regional Planning
Michigan State University

MICHIGAN STATE
UNIVERSITY

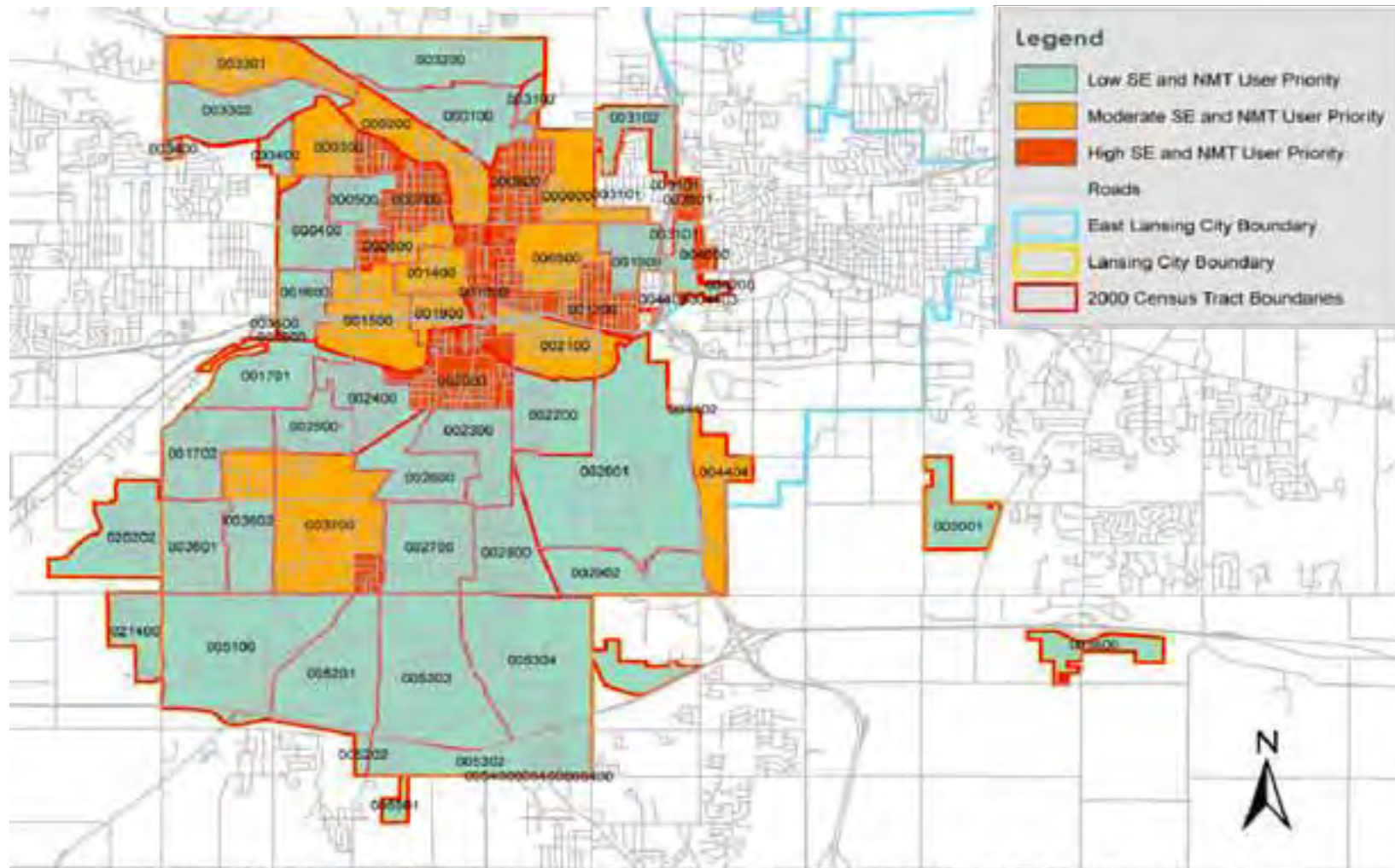


This composite of was then overlaid with a map (See above *Existing Conditions: Percentage Commuting to Work by Bicycle*, *Existing Conditions: Commuters Walking to Work*, indicating levels of bicycle and pedestrian commuting. The final result, Map *Social Equity: Who Needs NMT Alternatives*, clearly shows the significant overlap of census tracts where potential need for NMT alternatives corresponds with high levels of NMT commuting. In fact, the first 19 census tracts in the first Social Equity map scored moderate to high rates of overall social equity need and moderate to high levels of pedestrian and bicycle commuting. The same census tracts where people walk and bicycle to work are, in more instances than not, the same census tracts where people have less access to vehicles and are more likely to be poor.





Social Equity: NMT Usage and Need



Based on combined data from "NMT User Composite" and "Social Equity" maps. Analysis and calculations by Author, 2007.

Student Practicum Team Project

Department of Urban & Regional Planning
Michigan State University



MICHIGAN STATE
UNIVERSITY