

IMPROVED METHODS FOR ASSESSING SOCIAL, CULTURAL, AND ECONOMIC EFFECTS OF TRANSPORTATION PROJECTS

FINAL REPORT

Requested by:

American Association of State Highway and
Transportation Officials (AASHTO)

Standing Committee on Planning

Performed by:

Center for Transportation and the Environment
North Carolina State University
Raleigh, North Carolina

Under Subcontract to:
Cambridge Systematics, Inc.

April 2008

<p>The information contained in this report was prepared as part of NCHRP Project 08-36, Task 66, National Cooperative Highway Research Program, Transportation Research Board.</p>

Acknowledgements

This study was requested by the American Association of State Highway and Transportation Officials (AASHTO), and conducted as part of National Cooperative Highway Research Program (NCHRP) Project 08-36. The NCHRP is supported by annual voluntary contributions from the state Departments of Transportation. Project 08-36 is intended to fund quick response studies on behalf of the AASHTO Standing Committee on Planning.

The study was conducted by Leigh Lane (Principal Investigator) and Ann Hartell, MRP, at the Center for Transportation and the Environment, North Carolina State University. Additional contributors include Teresa Townsend, AICP, of Planning Communities, Inc.; and Jeremy Scott and Greg Ferrara at the Institute for Transportation Research and Education at North Carolina State University. John Suhrbier of Cambridge Systematics, Inc. provided oversight of the work throughout the project as well as contributed to specific technical elements of the project and assistance in structuring and preparing the final reporting.

The authors express their thanks to Lydia McIntyre and Craig McKinney at the Greensboro Department of Transportation, Ted Partrick at the Greensboro Building Inspections Division, and Philice Foddrell at the Greensboro Police Department for their generous assistance. The authors acknowledge the assistance of Eva Reid, Chris Porter, and Nanda Srinivasan of Cambridge Systematics, Inc. Eugene Murray at the Center for Transportation and the Environment ably assisted with the editing and compilation of the report.

The work was guided by a task group chaired by Timothy Hill which included Bill Hauser, Anne Morris, Katiann Wong-Murillo, Kim Majerus, K. Lynn Berry, Ronald Pugh, Susan Haupf, and Scott Duncanson. The project was managed by Ronald D. McCready, Kimberly Fisher, and Lori Sundstrom at the NCHRP Program Office.

Disclaimer

The opinions and conclusions expressed or implied are those of the research agency that performed the research and are not necessarily those of the Transportation Research Board or its sponsors. The information contained in this document was taken directly from the submission of the author(s). This document is not a report of the Transportation Board or of the National Research Council.

Management Summary

Investments in our transportation systems have the potential to benefit as well as harm communities. These impacts on community quality of life always have been an important consideration in transportation decision making, but beginning with the passage of the National Environmental Policy Act (NEPA) in 1969, the emphasis given to social, economic, and related impacts on the human environment has steadily increased. A number of important initiatives have been undertaken by transportation agencies since the mid-1990s aimed at better understanding how transportation affects community quality of life, including social wellbeing. These initiatives include: Context Sensitive Solutions (CSS), Transportation Design of Livable Communities, Integrated Design, Community Impact Assessment (CIA), Community Sensitive Design, Common Sense Solutions, Placemaking, and most recently Sustainable Transportation Strategies. In their *Transportation Vision and Strategy for the 21st. Century*, the American Association of State Highway and Transportation Officials (AASHTO) recommends use of a “triple bottom line” as both a policy and a performance indicator in which transportation decisions are made so as to simultaneously achieve transportation, social, and economic objectives.

The objective of this project is to identify existing and emerging community and social impact assessment practices that can be used as indicators of the quality of a community’s life. Transportation professionals are experts at developing performance measures to evaluate mobility/accessibility, structural functionality, and safety. In addition, advancements in environmental assessment (primarily related to biological resources), economic analysis and cultural assessment practices (i.e. historical significance studies) have improved in recent years. Unfortunately, less progress has been made in characterizing and measuring social and community considerations. Any seasoned transportation professional can tell you that communities care deeply about their social wellbeing and always are looking for ways to improve quality of life. But what constitutes social wellbeing, how can it be measured, and can it be integrated more fully into decision-making processes?

An examination of community indicators, however, is not sufficient by itself; a systematic program of community outreach also is necessary. Most transportation agencies continue to rely on public comments as the primary means to understand and assess community interests and needs. While public involvement is critical to the success of any plan or project, it also is not sufficient. Many transportation agencies rely heavily on outreach techniques that require individuals be mobile, literate, and have the time necessary to attend public meetings. Consequently, public input used alone with no other analysis technique can skew community data and information, and therefore present an incomplete picture of a particular community. The work undertaken for this project confirms the hypothesis that the use of quantifiable indicators can serve as a valuable supplement to the results of public involvement and CIA.

While direct effects that transportation may have upon communities are well understood, including displacements, noise, aesthetics and property impacts, potential indirect and cumulative effects are less understood. Most community effects are in fact indirect and cumulative because they are part of a web of interactions that do not neatly fit into “stovepipe” assessments of individual impacts. However, we can begin to disaggregate parts of the whole to begin the quest for a deeper understanding of social wellbeing. This report leverages lessons learned from current CIA practice along with a rich, in-depth literature review and interviews with scholars both outside and within the transportation profession. The report combines information from other disciplines related to public health and safety, housing, neighborhood quality, and social capital to present a framework for understanding social wellbeing which includes measures that can be applied systematically to understand how well a community is functioning.

The proposed framework recognizes that community/social wellbeing is multifaceted and has many overlapping and interacting components. It reflects three major domains of community/social wellbeing:

- Interactions with the environment through measures related to *physical health* such as:
 - Walkability
 - Land use patterns
 - Overall happiness
 - Crime
- Interactions of an *economic* nature through measures of neighborhood quality, job opportunities, and investment value such as:
 - Building permits
 - Home mortgage data
 - Foreclosures
 - Long-term unemployment
- Interactions with other people through measures of *social capital* such as:
 - Social trust
 - Time spent commuting
 - Civic participation
 - Migration

Three categories of methodological improvement are described:

- Analyzing traditional data sources in new ways (i.e. segregation index and air quality),

- Adopting data used by other disciplines (i.e. data on business loans and home mortgages) , and
- Utilizing new data sources available from non-traditional sources (i.e. social capital and walkability).

The suggested measures were tested through an application to the Urban Loop highway in Greensboro, NC, to evaluate their validity, reliability, and utility. The case study exercise reveals how the suggested measures of community quality of life can be collected, analyzed, and evaluated as part of a scoping process for environmental studies. The results also indicate how the suggested measures can be used to help design a program of public involvement and community impact assessment activities, evaluate transportation project impacts, identify unique community needs as part of the transportation planning process, and assist where necessary in generating mitigation strategies.

Practitioners

The report is primarily targeted towards the transportation practitioner charged with understanding and assessing community effects. This report lays the foundation for understanding measures of community wellbeing and conveys them through a framework of physical health, economic, and social capital domains. More than simply a laundry list of data sources, the report suggests ways to strategically approach the design of assessments of community wellbeing using a conceptual framework based on the latest research on community function and factors. Practical information on the specific measures and their interpretation are also provided through the case study, supported by complete data documentation resources in the appendices. This information provides the practitioner with an understanding of how much effort is required to collect and utilize these measures as part of an analysis.

Managers

The information in this report also can help transportation managers understand social wellbeing as it relates to community quality life. In addition, the report helps identify data and information that can be included as part of the scoping process or needs assessment phase of the transportation planning process. It also helps identify roles and responsibilities of a community analyst and can be used to lay the foundation for procedural changes related to incorporating social wellbeing as part of decision-making processes. The information in this report is also valuable for considering as important data for screening tools or to include as part of GIS data layers to support decision support systems. The report also can guide the development of work programs. Finally, the report helps managers understand where the state of the practice needs to move for social wellbeing considerations to be integrated through a systematic and objective process.

The 21st century has brought challenges for transportation professionals trying to meet the transportation needs of our nation's communities. While it is an exciting time, it is also a difficult time because many of the supporting procedures, processes, and decision support systems need to be improved so that they remain aligned with the changing expectations of customers as well as the demands imposed by dynamic economic, demographic, and environmental conditions. While an intuitive understanding exists of how transportation policies, programs, and activities affect many aspects of a community's quality of life, we continue to learn how to systematically and effectively integrate these considerations into planning and project development.

Contents

1.0	Considering Transportation Influences on Community Quality of Life	7
1.1	Project Background and Objective	7
1.2	Transportation Decision Making and Social, Economic, and Cultural Effects	8
1.3	Results	10
1.4	Benefits to Transportation Practitioners	11
1.5	Outline of the Report	12
2.0	Overview of the Practice of Assessing Community/Social Wellbeing in the Transportation Industry	14
2.1	Legislative and Regulatory Guidelines	14
2.2	Transportation Industry Policy	15
2.3	Summary	19
3.0	Literature Review	21
3.1	The Connection Between Transportation and Community/Social Wellbeing	23
3.2	Looking Beyond Transportation: Additional Research on Community/Social Wellbeing	25
4.0	Improved Approaches to Indicators and Measures	30
4.1	Methodology: Measures and Indicators	30
4.2	Conceptual Framework	32
4.3	Potential Measures of Community/Social Wellbeing	34
5.0	Implementing the Framework: Application to a Case Study	40
5.1	Case Study: Urban Loop, Greensboro, North Carolina	40
5.2	Overview of Methodology	42
5.3	Case Study Analysis	48
5.4	Cross-Domain Investigation of Two Study Area Tracts	69
5.5	Conclusions	80
6.0	Immediate Improvements to Practice	82
6.1	Analyzing Traditional Data Sources in New Ways	85
6.2	Adopting Data Used by Other Disciplines	87
6.3	Utilizing New, Non-Traditional Data Sources	88
6.4	Summary	93
7.0	Long-Term Improvements to Practice	94
	References	98
	Appendices:	
	Appendix A: Annotated Bibliography	
	Appendix B: Data Documentation	
	Appendix C: Additional Case Study Maps and Materials	
	Appendix D: Social Capital Short Form Survey	

Tables and Figures

Table 3.1: Practitioners and Researchers Interviewed	22
Figure 4.1: Conceptual Framework for Community/Social Wellbeing Indicator	33
Table 4.1: Potential Measures	35
Figure 5.1 Greensboro, NC, Locator Map	41
Figure 5.2 Data Documentation Outline	43
Table 5.1 Measures Used in Greensboro Urban Loop Case Study	47
Table 5.2 Basic Demographics: Measures	48
Figure 5.3 Urban Loop Study Area African-American Population, Percent and Distribution within Census Tracts, 2000	50
Table 5.3: Economic Domain: Measures	51
Figure 5.4 Urban Loop Study Area Home Mortgage Loan Values, by Census Tract, 2000	53
Figure 5.5 Urban Loop Study Area Loan Denial Rates, by Census Tract, 2000	54
Figure 5.6 Building Permits Issued (per thousand DUs), 2000	56
Figure 5.7 Urban Loop Study Area Property Crime, 2000	57
Table 5.4 Physical Health Domain: Measures	58
Figure 5.8 Guilford County Walkability, by Census Block, 2000	59
Figure 5.9 Urban Loop Study Area Violent Crime, 2000	61
Table 5.5 Social Capital Domain: Measures	63
Figure 5.10 Urban Loop Study Area, Social Trust, 2000	64
Figure 5.11 Urban Loop Tracts, Social and Community Activity, 2000	66
Figure 5.12 Urban Loop Tracts, Length of Residence and Intent to Stay, 2000	68
Figure 5.13 Tracts 12803 and 17100, Urban Loop Study Area	70
Table 5.6 Measures for Tracts 12803 and 17100	71
Figure 5.14 Urban Loop Study Area Violent Crime, 2000 and 2005	76
Figure 5.15 Urban Loop Study Area Property Crime, 2000 and 2005	77
Figure 5.16 Urban Loop Study Area Loan Denial Rates, by Census Tract, 2005	79
Figure 6.1: Conceptual Framework for Community/Social Wellbeing Indicator	83
Table 6.1: Communities Participating in Social Capital Surveys	92
Table 6.2: Improved Methods and Data Sources	93

1.0 Considering Transportation Influences on Community Quality of Life

1.1 Project Background and Objective

Transportation policy, programs, and projects strongly shape many aspects of our communities including patterns of land development, economic activity, residential and employment location choices, human behavior, and how people allocate activities across time and space. Transportation agencies and practitioners recognize the importance of understanding and anticipating the type and degree of community effects when planning and developing their projects and programs. Consequently, the transportation industry has long been concerned with developing an improved understanding of how transportation investments and policies influence community quality of life. Still, while transportation professionals have become experts on measures related to transportation outcomes (i.e., motorized vehicle level of service, vehicle miles traveled, costs of travel delay), the understanding and measurement of community quality of life outcomes is far less developed. The objective of this project is to advance this understanding through an investigation of potential quantitative measures of community quality of life that could be used in conjunction with other measures in evaluating alternative transportation investments and choices.

Although quality of life may seem a difficult-to-define concept, there are some common elements identified as important. Most people value safe neighborhoods, good health, loving relationships, time with family and friends, clean air and water, good schools, and a sense of belonging. These components make up a complex system of interrelated characteristics and functions that together constitute the community's experience. This interconnectedness means that a transportation project can generate effects on community quality of life that are direct, indirect, and/or cumulative. For example, a transportation capacity project in a residential neighborhood could increase traffic volumes, creating a danger for children playing nearby, which can lead parents to curtail children's outdoor activity, which in turn can increase social isolation and decrease physical activity. Transportation projects that improve reliability of travel times between residential areas

and employment centers can encourage new residential and commercial development, increasing the local tax base, which can increase investment in local schools, thereby improving children's quality of life.

Given the potential for transportation projects and programs to affect community quality of life, transportation professionals continually seek to improve methods of assessing effects on communities. Recent industry focus on sustainable transportation strategies is yet another compelling reason to pursue a deeper understanding of the variables that define quality of life. For example AASHTO's Transportation Vision and Strategies for the 21st Century encourages transportation decision makers of the future to adopt the triple bottom line as an evaluation tool for policies and system performance.¹ The triple bottom line refers to outcomes that lead to:

- Robust economic growth;
- Better-than-before health of the environment; and
- Improved quality of life for all citizens.

If one of the goals of sustainable transportation is to improve quality of life then efforts to understand the variables of a good quality of life and how those variables can be accounted for is critical. It is with these ideas in mind that this study focuses on developing a deeper understanding of tangible measures of quality of life. In addition, this study introduces improvements to current practice by identifying data sources and measures that capture a range of components of community quality of life, and describes how these measures can begin to enrich our scoping processes and improve our understanding of community context. Furthermore, this study begins to lay the foundation for advancing performance measures that lead to sustainable transportation projects.

1.2 Transportation Decision Making and Social, Economic, and Cultural Effects

Nearly 40 years ago, the National Environmental Policy Act (NEPA) mandated a formal process for evaluating the anticipated effects of transportation projects and programs, and specifically stated that human environmental factors should be considered. NEPA acknowledges that transportation projects can have substantial effects on communities, and that those effects can alter social, economic, and cultural systems and processes. Concern about communities' wellbeing was set forth as part of serving the overall public good with which transportation agencies and professionals were charged.

This central principle is also expressed in the motto of the United States Department of Transportation (USDOT):

“Serve the United States by ensuring a fast, safe, efficient, accessible and convenient transportation system that meets our vital national interests and enhances the quality of life of the American people, today and into the future.”²

The Federal Highway Administration (FHWA) holds a similar position in their strategic goal for the environment:

“Protect and enhance the natural environment and communities affected by highway transportation.”³

Clearly, these statements recognize that having a transportation system with the size, scope, and complexity to serve the nation’s mobility needs should be balanced with the need to improve quality of life.

Beyond the legal requirements, federal and state transportation agencies are increasingly developing guidance and policies that emphasize the importance of incorporating community values and quality of life considerations through all phases of project delivery. *Context Sensitive Solutions* (CSS) describes an approach to planning and project development that strives to meet transportation needs in a way that is compatible with the human and natural environment as well as improving community quality of life. The intent of CSS is not new; many of its principles can be found in numerous statutes, regulations and policy statements over the course of nearly a half century. CSS does add, however, a push toward the consistent application of these principles through all phases of project delivery from long-range planning through construction and maintenance. Yet to begin a CSS process one must first understand the community context. This requires the identification and evaluation of a wide range of community factors, characteristics, and functions in order to plan, design, build, and maintain a transportation system that complements community quality of life.

Transportation agencies have promoted other policy initiatives concerned with addressing community quality of life. *Community Impact Assessment* (CIA) focuses on understanding the human context including key issues areas related to socio-cultural, economic, land use, aesthetic/sensory, mobility and accessibility as well as health and safety. These key issues areas comprise many of the variables of quality of life. Although the CIA process was endorsed by the FHWA in the mid-1990s to provide guidelines for evaluating the effects of a transportation project on community quality of life, it is not yet consistently used by transportation professionals. In addition, the analysis techniques presented as part of these guidelines do not provide specific quantitative methods or measures for assessing community wellbeing.

Environmental stewardship and streamlining policies have also brought a greater focus on community quality of life issues. These policies promote close consultation with other agencies and organizations to better integrate their needs into the transportation decision-making process. Additionally, across the industry, there has been a rising interest in developing *benchmarks* and *performance measures*, which require a search for new and innovative types of data that have not traditionally been measured by transportation agencies. Although the sustainable transportation agenda is somewhat new to the

industry it is endorsed by AASHTO and encourages decision makers to include improved quality of life for citizens as one of the key evaluation outcomes of the triple bottom line.

Turning from these general directions of current practice, additional concerns arise when typical current methods used to assess community quality of life are critically evaluated. Current methods rely on a combination of both quantitative and qualitative approaches to work with communities to meet their needs during planning and project development. Quantitative analyses currently rely primarily on demographic data collected by the U.S. Census Bureau, and tend to focus on meeting Environmental Justice guidelines.⁴ Economic data are generally limited to income, employment and the geographic distribution of jobs. Evaluating health effects is usually limited to assessing regional air quality or potential for crash-related injuries. In some cases, providing access for pedestrians or bicyclists is considered. Community cohesion is addressed through mapping community "focal points" in relation to residential areas and the potential for barriers to access. Practitioners generally recognize that these measures provide only preliminary and sketchy details about a community.

Qualitative methods, typically including a series of public meetings, are used to flesh out more details on a community's wellbeing. Yet public meetings are widely reported to be poorly attended and therefore are extremely unlikely to provide transportation decision makers with the full range of community perspectives. As a result, practitioners find that they often rely on anecdotal information on many aspects of community wellbeing such as the quality and frequency of social interactions, the degree to which an area supports or erodes the health of local residents, and the economic health of households.

While many agencies have adopted policies and approaches and have made considerable progress in reaching the goals of giving increasing attention to community effects, practitioners face a gap when they seek to fulfill the charge to protect and enhance community quality of life using existing practice. This report identifies data sources and methods that will allow practitioners to begin closing that gap, and provides information on promising new directions that will assist the industry in its search for improved methods for assessing social, cultural, and economic effects of transportation projects.

1.3 Results

This research builds on current practices by identifying improvements that expand on current approaches and by investigating new directions for understanding how to measure community wellbeing. The results point to ways to improve current practice through an interdisciplinary and cross-cutting approach to understanding communities, and provide guidance on how to better incorporate quantitative measures of community factors into transportation decision making.

A framework for understanding interrelated community factors was developed following an interdisciplinary review of existing practices and current research on community

function and interactions. The framework is based on three broad domains of community wellbeing:

- Physical health,
- Economic wellbeing, and
- Social capital, defined as the social networks through which norms of reciprocity and trustworthiness develop.

Promising performance measures were drawn from the framework. These measures represent a range of data sources that can provide a clearer picture of the characteristics of the local community. These measures were then applied in a practical way, using a case study of a highway project located in Greensboro, NC. The exercise of collecting, compiling, and working with real world data provided the opportunity to assess the practicality of the various measures and data sources. The report describes three categories of improvements to current practice:

- Analyzing traditional data sources in new ways,
- Adopting data used by other disciplines, and
- Identifying new data sources to develop for future adoption.

These improvements were applied to a case study in order to evaluate their applicability, practicality, and feasibility. The case study is presented in Chapter 5 of this report. The exercise of compiling the data and conducting and interpreting the results of the analysis yielded valuable information on the suggested improvements, including the associated level of effort and technical skills required, technical aspects of the data, and potential contribution to improving current practice. Overall, the case study demonstrated that the methods and approaches require careful attention to questions related to the design of the analysis, including definition of the study area and a thorough understanding of the specific measures and their meaning in the context of understanding community effects. From a technical standpoint, intermediate skills in Geographic Information Systems (GIS) and basic skills in spreadsheet applications are required to replicate the methods evaluated in this report. More detailed discussion of the improved methods is presented in Chapter 6 and in Appendix B.

1.4 Benefits to Transportation Practitioners

The improved methods discussed in this report augment, rather than replace, public outreach efforts and provide the following benefits:

- *Improved Community Data:* New measures focus on quality of life issues in a format appropriate for use in quantitative analyses. Quantitative measures and data sources broaden citizen input to include a more representative cross-section of the community than is available from anecdotal data collected at public meetings.

- *Improved Decision Making:* The measures are appropriate for time series/trend analysis to better describe changes over time, and can support the development of benchmarks.
- *Effective Public Involvement:* The outputs of the analysis, especially the maps, are appropriate for communicating with the public. The measures also provide useful information for developing effective public outreach strategies.
- *Flexible Design:* Evaluation of the measures can identify vulnerable areas in which design choices can minimize and/or mitigate continued declines. In the reverse, vulnerable areas that would benefit from improved mobility and access can be identified.
- *Streamlining:* The measures provide a robust screening tool to streamline field work efforts including selection of interviewees and development of questionnaires.
- *Avoidance of Impacts:* The measures can identify strong vibrant communities that could be severely affected by transportation actions and ensure that projects do not create barriers to continued community health and wellbeing.
- *Partnerships:* The measures can help identify other agencies and organizations that would be interested in partnering to help improve the community wellbeing, as well as common interests that could lead to shared data collection and analysis efforts.
- *Visualization:* Data and information can be presented and spatially displayed to help a community assessment practitioner explain to decision -makers and the public how well a community is functioning and identify hot spots or areas of concern.
- *Performance Measures:* The study provides insight into measures that could be used by transportation agencies to meet the triple bottom line criteria associated with sustainable transportation strategies.

1.5 Outline of the Report

The next chapter provides an overview of current practice and outlines guidance from within the transportation industry on assessing community wellbeing. Chapter 3 reviews relevant literature from other disciplines on community quality of life and social wellbeing. Building on Chapters 2 and 3, Chapter 4 presents a conceptual framework and identifies a range of potential measures. Chapter 5 evaluates the framework and measures using a case study of an urban bypass project in Greensboro, North Carolina. This chapter focuses on methodological issues of implementing the framework along with the specific measures used in the case study. These data sources and methods are fully documented in the Appendices; information on the validity, reliability and the relationship of measures to transportation infrastructure is provided, along with practical information related to data acquisition, processing, or interpretation in a complete, convenient, and accessible form for practitioners. Chapter 6 identifies opportunities for improvements to practice, and includes discussion of the challenges of implementing some of those improved methods. The final chapter, Chapter 7, outlines research needs in the area of community effects,

including ways that the data sources used in this study can be used to investigate causal relationships between changes in community quality of life and transportation systems.

2.0 Overview of the Practice of Assessing Community/Social Wellbeing in the Transportation Industry

In order to provide background and context to the improvements to practice, this section describes the history and current practice of impact assessment in the transportation industry. The discussion highlights areas of current practice where improvement is needed.

At this point, it is useful to clarify some of the terms and concepts used throughout this report. The term “community/social effects” is used to refer to social, cultural, economic, and community effects. The term “social” refers to the interaction and welfare of people as a part of society and of a particular group. “Social” describes interactions within the group, and between the group and other groups; it covers changes to relationships and interactions, whether those interactions involve formal monetary exchange (economic interactions) or the development and exchange of ideas, practices, norms or artifacts within a group (cultural interactions). Thus, community/social wellbeing can be defined as the level of health in a social system, which can be as small as a household or as large as a nation or even the globe. In the transportation context, the focus is generally at the neighborhood scale, where the geography of personal interactions and of the physical effects of a project are likely to be most closely aligned. The extent of effects is of course dependent on the scale of the project itself, with larger scale projects affecting an area larger than a neighborhood, e.g., a city or even a region. Community/social wellbeing requires some level of quality of life, with characteristics and conditions such as economic stability, sense of community, access to amenities, availability of clean water and air, sense of safety and security, good health, access to natural areas and open spaces, and satisfying human interactions. These factors are a combination of tangible and perceived aspects of the community.

2.1 Legislative and Regulatory Guidelines

In the mid-1900s, the U.S. launched the largest public works project in its history: the interstate system. While the interstate system enhanced economic prosperity from a national perspective, many communities were irrevocably harmed from direct impacts of

the highway footprint and/or from indirect impacts related to changes in travel and/or land use patterns. These community effects, along with negative consequences suffered by the natural environment, played a role in raising environmental consciousness among U.S. citizens. They demanded Congress promulgate numerous environmental statutes which required full consideration of human and natural environmental impacts before investing federal monies in programs, policies or activities. In 1969, Congress enacted the most notable environmental protection legislation, the National Environmental Policy Act (NEPA), which encouraged “productive and enjoyable harmony between man and his environment.”⁵ Other legislation followed that sought to protect a wide range of natural, socio-cultural and historic resources including individuals’ civil rights. By the early 1970s, the Federal Aid Highway Act, 23 USC 109(h) required final decisions on projects take into consideration “aesthetic values, community cohesion . . . availability of public facilities and services, injurious displacement. . . disruption of desirable community and regional growth.”⁶

Another regulatory milestone for addressing community effects was President William Clinton’s signing of the Executive Order on Environmental Justice (EO 12898) in 1994.⁷ This EO directs that programs, policies and activities not have a disproportionately high and adverse human health or environmental effect on minority and/or low-income populations. The current federal transportation legislation, Safe, Accountable, Flexible Transportation Equity Act: A Legacy for Users (SAFETEA-LU), includes requirements related to community involvement and public outreach, along with more inclusive early involvement of planning and environmental agencies.⁸ Clearly, the transportation industry has faced increasing requirements related to community/social factors, and can reasonably expect this pattern to continue.

2.2 Transportation Industry Policy

Context Sensitive Solutions

Aside from general federal requirements, the transportation industry has also increasingly moved to address issues of quality of life and community wellbeing. In 1990 and 1994, the Federal Highway Administration (FHWA) issued Environmental Policy Statements which stated, “Quality of life is enhanced not only by economic security and ample natural resources but by enduring community values and thriving neighborhoods where all citizens have access to safe, comfortable, and efficient transportation.”⁹

One of the more recent articulations of this policy direction is the Context Sensitive Solutions (CSS, also referred to as Context Sensitive Design or CSD) approach. This approach, based on a set of principles developed during the 1998 AASHTO/FHWA “Thinking Beyond the Pavement” workshop emphasizes that projects should be in harmony with the community and the natural environment and should become an asset to

the community, as well as meet the transportation purpose and need. The CSS approach relies heavily on public participation and outreach to identify the community vision and values with which the project should harmonize. In order to do so, the community's definition of quality of life and how it weights various elements of quality of life need to be known. Further, any project-related changes that would affect those factors should be understood. Thus, understanding community quality of life becomes an important part of the entire project, from initial scoping through design, construction, and maintenance. Different terminology has been used among state departments of transportation (DOTs) and other transportation groups to reflect CSS principles including transportation design for livable communities, building projects that build communities, community sensitive design, common sense solutions, etc.

CSS is being advocated by the United States Department of Transportation (USDOT) and other national entities as the emerging business model for transportation in the U.S. State DOTs across the country are working to adopt CSS policies and practices, investing considerable effort and resources to do so.¹⁰ Thus far, 41 state DOTs and the District of Columbia have moved to incorporate CSS into their planning and project development processes.¹¹ Still, the degree to which transportation agencies apply the principles of CSS varies widely among states and across projects. In order to better evaluate the degree to which CSS has been implemented across the country, the FHWA is developing an assessment tool for use by DOTs and Federal Lands Highway Divisions. Release is anticipated in 2008.

Although CSS has traditionally been considered applicable to project development, it also has value for long-range transportation planning. Current practice at Metropolitan Planning Organizations (MPOs) draws community values into the visioning process in order to develop a plan in keeping with local values related to quality of life, connecting the economic and environmental (chiefly air quality) health of their regions with the efficiency and soundness of the transportation system. The FHWA recently sponsored a project to expand on these practices by promoting CSS as a useful approach to transportation planning.¹² That project identified a number of MPOs and DOTs which are increasingly considering community/social factors in their long-range transportation planning work. These factors include aesthetics, viewsheds, safety and health of users and of the surrounding community, and even the opportunity costs of transportation investment when facing many other public needs.

Although many agencies are starting to incorporate community factors into their decisions, a recent survey of MPOs across the country found that project prioritization still is largely driven by mobility and economic development factors, which can be measured in highly technical ways.¹³ This raises a concern that the factors on which transportation agencies make decisions are somewhat removed from factors set forth as important by communities in the goals and vision statements of transportation plans. This disconnect between community goals for quality of life and transportation goals quite naturally can lead to outcomes at the project and system levels that are poorly matched with community values. Many agencies recognize this disconnect and are seeking improved

methods to bring community factors into their decision-making processes, with particular interest in finding ways to work with quality of life factors in a quantitative format.

Community Impact Assessment

Community/social effects have also received increased attention as a result of the expanding practice of Community Impact Assessment (CIA) in the transportation industry. In 1996, the USDOT's "Community Impact Assessment: A Quick Reference for Transportation" (also known as the "Purple Book") offered guidance and background on assessing the effects of transportation projects on communities' quality of life.¹⁴ In the years since, the industry has gained experience with CIA through a series national and regional workshops that helped disseminate lessons learned from community analysts.¹⁵ More recently, FHWA sponsored the development of a national CIA course. This course was developed using current practices of state DOTs, operating with and without formal CIA guidance in place, including California, Florida, Kentucky, North Carolina, and Texas. The course presents seven key issues areas for analysis including socio-cultural, economic, land use, mobility/accessibility, safety/health, displacement, and sensory/aesthetic. Numerous case studies were compiled that revealed innovative practices primarily related to community outreach strategies associated with the CIA process.¹⁶ To date, training courses for DOTs on conducting CIAs have been held in Illinois, Maryland, Alaska, Utah, North Carolina, Washington, and Pennsylvania. Evidence from the development of the national CIA course, as well as observations of the DOT practices in states that have been trained in CIA, suggest that transportation agencies continue to seek systematic approaches that include both rigorous quantitative and qualitative methods of evaluating community/social effects. Despite this interest, according to a 2005 study, most DOTs continue to rely on public involvement to evaluate effects of transportation actions on a community.¹⁷ This is further substantiated by a recent national survey which found that 84% of the respondents (27 state DOTs) rely on public comments presented to DOT staff to ensure public interest and needs affect the decision-making process.¹⁸ Furthermore, this survey found that almost 90% of survey respondents utilize open forum meetings to solicit public comments. Statistical data from the aforementioned surveys combined with the experience of the researchers responsible for this study suggest that most state DOTs use qualitative approaches to assess community effects, approaches that rely on techniques that limit participation in the process to literate, mobile persons who have time available .

One of the most progressive state agencies in terms of advancing CIA practice is the Florida DOT (FDOT). A research report for FDOT recommended an extensive list of measures and questions for CIA.¹⁹ The recommended measures included the numbers of households, businesses, and community facilities to be affected or relocated; perceptions of safety; the level of public support for the project; as well as inventories of cultural, aesthetic, or other resources that are likely to be affected. The protocol for assessing community/social effects (referred to as socio-cultural effects or SCEs by FDOT) requires considering a long list of questions about anticipated effects, informed by a combination

of public outreach/participation and the compiled data. The evaluation of the degree of projected effects is, however, based on experience and judgment and relies largely on data available in a shared Geographic Information Systems (GIS) database.

In addition to efforts to give consideration to more community factors in transportation decision-making, Federal policy has also addressed the institutional frameworks of transportation agencies to promote greater integration of these issues into decision-making processes. The FHWA guidance on environmental streamlining and stewardship requires cooperative and timely coordination among agencies, including agencies concerned with natural, cultural, and historic resources. Various states have adopted streamlining in various forms, such as the North Carolina program to link the NEPA process with planning, thus bringing some community/social issues into the decision-making process at an earlier stage. Florida's Efficient Transportation Decision Making program (ETDM) is another example of a streamlining approach. A range of community factors are brought into the formal decision-making process early on. ETDM is based on providing common data to all agencies involved in project development, including considerable data on community characteristics, in a GIS. Each FDOT District and Florida MPO designates a Community Liaison Coordinator (CLC) to ensure that community-related data is kept up-to-date, readily available, and considered along with other factors.

Sustainable Development Practices

A recent development in the transportation policy arena is an interest in promoting sustainability of transportation systems. Ideas of sustainability include developing long-term strategies for funding, alternative fuels, as well as increasing the resilience of transportation systems confronted with economic shocks or natural disasters. Some initiatives concerned with moving transportation towards sustainability also include community/social considerations. Smart Growth (known as "wise or managed growth" in some places) seeks to link transportation with land use to minimize impacts on the natural environment, thereby improving quality of life for the long term.²⁰ Minimizing auto trips is also promoted as a way to improve quality of life by improving opportunities for social interaction and for enhanced environmental conditions. Oregon's Context Sensitive Sustainable Solutions (CS³) program links ideas of sustainability and of promoting the health of local communities' economies with CSS principles of project design.²¹

Placemaking Practices

There are a number of other practices being used in the transportation industry that target the assessment of community/social effects. One of these is the "Place Game" used by Project for Public Spaces, Inc.²² The "Place Game" highlights several key attributes of a "great place" including sociability, access and linkage, uses and activities, and comfort and image. These key attributes have associated intangibles and measures such as social quality of places, including levels of volunteerism, the condition of buildings, social networks, business conditions, and general street life characteristics. The "Place Game" is

an effective tool for bringing community/social factors into the decision-making process; however, it does not allow for determining effects of different alternatives upon these key attributes.

Scenario Planning

Scenario planning is another useful approach, and is recommended by the American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on Planning as a way to improve community participation in planning.²³

Scenario planning can use visual preference exercises, computer visualization, and simulation techniques. Scenario planning techniques can be very effective when they use a combination of qualitative and quantitative methods to inform decisions.

Performance Measures

Oregon has also developed a program to require more specific consideration of community/social effects. The Oregon Progress Board, a governor-appointed policy group, has established a set of benchmarks to measure progress toward strategic goals, one of which is “safe, caring, engaged communities.”²⁴ Oregon includes volunteerism, voting, and the percent of residents who “felt they are a part of their community” in the benchmarks for 2007-2009.²⁵ All state agencies, including the Oregon DOT, are required to link their key performance measures to the goals, and their policies and programs are to be evaluated in light of their contribution to progress on the benchmarks.

2.3 Summary

Overall, current practice for assessing community/social effects involves either documenting interesting community/social data and/or relies on qualitative data (such as public comment) to measure effects. While qualitative data is very important, the limited amount of quantitative information on community/social wellbeing typically available presents a dilemma for decision makers seeking a better balance in their analytic work between traditional quantitative performance measures, such as vehicular volumes and mean commute times, and measures of quality of life. Additionally, increased use of quantitative data will open up opportunities for investigating the direction and magnitude of community effects using time series analysis techniques of pre- and post-project conditions.

Broadening the data used in practice can strengthen community/social aspects of decision making beyond the current reliance on public comment and limited demographic measures. Therefore, the transportation industry will benefit from searching out methods and approaches used by other disciplines that similarly address community function and

wellbeing. The following chapter provides an interdisciplinary review of literature on community and social factors and summarizes research on the relationship between transportation and community wellbeing.

3.0 Literature Review

This chapter provides an overview of the literature on assessment methods and measures for community/social wellbeing. The first section briefly outlines the general themes of the connection between transportation and community/social wellbeing. The following section describes some of the approaches to understanding community wellbeing by researchers from other disciplines. This broad, interdisciplinary approach proactively sought methods and concepts outside the realm of current practice in the transportation industry in order to gain fresh perspectives. Beyond the sources discussed in the chapter, additional resources and references are provided in an annotated bibliography (see Appendix A). In a further effort to include the most current thinking, interviews were conducted with a number of academic researchers and practitioners from a range of disciplines who were recognized for using interesting approaches to understanding communities and measuring community/social values (Table 3.1).

Table 3.1: Practitioners and Researchers Interviewed

<u>Name and Affiliation</u>	<u>Topical interest and expertise</u>
Hobson Bryan, PhD, Professor Department of Geography, University of Alabama	Social impact assessment methods
Jayajit Chakraborty, PhD, Professor, Department of Geography, University of South Florida	Quantitative analysis of socio-spatial data
Lew Feldstein, Chair of the New Hampshire Community Foundation; Co-author (with Robert Putnam) of <i>Better Together</i> ; Chair of the citizen advisory committee that developed the New Hampshire DOT's Transportation Business Plan, a component of the State Long-Range Transportation Plan.	Social capital as a component of quality of life; measurement of social capital and community cohesion; connecting social capital with the NEPA process
David J. Forkenbrock, PhD, Professor of Urban and Regional Planning and Civil and Environmental Engineering, Director of Public Policy Center and the Transportation Research Center, University of Iowa	Measurement of social and cultural factors; project and policy evaluation methodology
Louise Fragala, President, Powell Fragala and Associates Planners	Experience with community values and evaluation criteria; Florida's ETDM system/process
Howard Frumkin, PhD, Director of the National Center for Environmental Health at the Centers for Disease Control and Prevention; Professor, department of Environmental and Occupational Health, Emory University; Professor of Medicine at Emory Medical School	Connections between transportation and land use patterns and physical health
Mindy Fullilove, M.D., Professor of Clinical Sociomedical Services and Psychiatry, Columbia University	Connection between community health/social networks and the built environment
John Galster, PhD, Professor of Urban Affairs, Wayne State University	Measures of neighborhood condition and dynamics, especially in connection with housing and urban form
Richard E. Killingsworth, MPH, Program Director for Health Programs, Roth Mott Foundation, Flint, Michigan	Connection between transportation/urban form/built environment and physical health
Todd Litman, MSc, Founder and Executive Director of the Victoria Transport Policy Institute	Connection between transportation and social factors; true-cost accounting and equity

3.1 The Connection Between Transportation and Community/Social Wellbeing

The literature documenting the community/social effects of transportation infrastructure has long informed assessments of the effects of noise, vibration, and displacement on people and on cultural resources, such as historic properties. Improved safety through reducing crash incidents and severity has also been closely tied to improving community/social wellbeing. Generally, the transportation industry has given these factors considerable attention when assessing community/social effects.

In addition to these factors, “community cohesion” was included in regulatory requirements very early on as one of the aspects to be considered. Yet, according to NCHRP #532, “Effective Methods for Environmental Justice Assessment,” it is perhaps the most difficult category of effects to understand.²⁶ That report states that estimating changes in community cohesion is largely based on experience and judgment, as well as the quality of public involvement. Although specific to assessing effects for populations protected under Environmental Justice guidelines, the report includes some factors related to cohesion that are applicable to any community:

- *Physical barriers*: Dividing a community can make trips longer, more stressful or impractical, and can discourage interaction, especially for the elderly and the disabled.
- *Travel time*: Improving travel time for some trips may increase it for others.
- *Access to neighborhood facilities*: Changes in accessibility to sites, where interaction occurs that both builds and allows people to access social capital, can lead to changes in social cohesion.
- *Access to child care facilities*: Many communities have internal networks for organizing child care, sometimes through extended families. Child care is an important component of maintaining economic and social stability of families, as it enables regular work and school attendance.
- *Risk of physical injury*: If a project increases the perceived risk of injury, residents may forgo activities or trips and thus decrease their interaction with others.
- *Access to gathering places*: Community cohesion will likely suffer if a gathering place becomes, or is perceived to become, more difficult to reach.
- *Noise*: If increased noise levels require more effort to communicate (e.g., speaking louder, higher radio/TV volumes), they can discourage interaction.

NCHRP Report # 456, “Guidebook for Assessing the Social and Economic Effects of Transportation Projects,” lists similar measures for considering effects on community cohesion, as well as highlighting how transportation affects land values through the level of accessibility it provides.²⁷

The importance of access to the sites and events that promote interaction is emphasized in NCHRP Report #466, “Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects.”²⁸ This report notes that population increase brought by an influx of new residents, or a “decline in the density of acquaintanceship” can erode organizational and community networks (*ibid*, see Figure 7-3, p 58). Local culture can be lost when unique skills, knowledge, and perspectives are no longer used in activities that sustain cultural continuity. The report specifically mentions that gradual loss of social capital can be a response to a project as a result of transportation-related effects.

This idea is supported by a study of Boston neighborhoods conducted by Burrington and Bennet who describe a tendency for people to withdraw into their homes when traffic is

The built environment can change social wellbeing for the better “by improving access between neighborhoods, fixing the connections. And by creating space for bikes and pedestrians to share the road.”

--Mindy Fullilove

fast, heavy, or includes high truck volumes.²⁹ This can lead to increased isolation as it reduces the amount of social interaction on sidewalks, porches and even in the street itself. This idea is supported by Litman, who proposes that community cohesion can be improved or sustained through urban design that is more human-oriented with maximized walkability, traffic calming measures, increased mode choice options, and attractive streetscaping.³⁰

In recent years, an expanding literature has developed describing the connections between community/social wellbeing and transportation infrastructure from the public health perspective. The basic approach of the public health discipline is described by Hoehner et al as holding the assumption that environments influence community norms and individuals’ behaviors.³¹ Further, individuals’ behaviors and community norms are closely connected; healthy communities mean healthy individuals and vice-versa. The public health discipline has sought to understand and influence social networks, organizational networks, sense of community, community leadership configurations and civic engagement in order to design interventions that will improve health outcomes and health behaviors.

“From the public health perspective, community wellbeing is not just people, it’s also infrastructure and the environment. It’s how humans and the environment live together. We need to enhance *both* systems.”

--Richard Killingsworth

A number of empirical studies have examined the connections between physical activity, health, and transportation infrastructure. Ewing et al compared the degree of urban sprawl at the county level, including combined measures of the land use characteristics and street patterns, with body mass index (BMI) and found a statistical relationship between sprawl and obesity.³² A large study in Australia similarly found that after controlling for demographic and other factors, living on a highway or in an area without sidewalks (or sidewalks on only one side of the street) was associated with being overweight.³³ In a study of six North Carolina counties, Huston et al found a positive relationship between neighborhood trails and physical activity.³⁴ This study also found

that “streets and roads” were the most commonly reported location for physical activity, thus emphasizing the importance of transportation infrastructure that accommodates non-motorized users. A study in Pittsburgh, Pennsylvania, found that living within a 20-minute walk of a park, trail, or department, discount, or hardware store increased the amount of walking for older women.³⁵ This study demonstrated that even in neighborhoods with positive walking environments (neighborhoods perceived as good or excellent for walking, overall), having utilitarian destinations (retail) was an important determinant of increasing physical activity. Walking to school has a similar health value for children. One study found air quality inside vehicles, including school buses, was several times worse than air quality outside.³⁶ That study concluded that walking to school, even in a built-up environment, brings health benefits beyond even those realized from the additional physical exercise. These studies support the idea that land use change resulting from transportation system changes can have important effects on physical activity.

Other studies, however, have not found a relationship between overall physical activity and urban form. A rigorous, matched pairs study comparing a New Urbanist style neighborhood with a typical suburban neighborhood found no difference in the overall amount of physical activities, but did find that the residents of the New Urbanist neighborhood engaged in more activity in the neighborhood, that is, outside their homes, although whether that activity led to increase social interaction was not evaluated.³⁷

3.2 Looking Beyond Transportation: Additional Research on Community/Social Wellbeing

There is growing interest in community/social wellbeing among non-transportation researchers. Much of this work is motivated by the interest in understanding the factors involved in wellbeing. Many studies also investigate the overlapping and interactive nature of these three areas. This section presents an overview of their work, which falls in three general areas where the outcomes related to wellbeing can be observed: physical health, economic status/security, and feelings of cohesion, connectedness, and belonging.

Again, the connection between physical health and community/social wellbeing is currently receiving greater attention by researchers. This relationship is seen to operate in two directions: the health of individuals affects the general wellbeing while, at the same time, the general wellbeing affects individuals’ health. The first idea is supported by a better understanding of the costs to society of physical and mental illness. The second idea has developed from studies that have shown associations between certain environmental characteristics and healthy populations.

Following a summary of a number of studies from across the country, Putnam concludes there is a clear relationship between improved physical health and being socially connected.³⁸ The strength of this relationship is substantial. After reviewing dozens of

epidemiological studies, House et al concluded that the positive influence of social connections was close in magnitude to the negative influence of smoking, physical inactivity, obesity, and high blood pressure.³⁹ In his metastudy, *Bowling Alone*, Putnam theorizes that there may be several reasons for this effect. First, having a social network means that one has access to tangible support in a crisis: someone to turn to for a loan, for assistance in the home, or for a ride to a health care provider. Second, groups with strong social networks are better able to organize and lobby for good public services that can improve health services and outcomes. And third, a strong social network may serve to reinforce positive behaviors and discourage damaging ones such as smoking, drinking, or overeating. Rattle and Kwiatkowski confirm the connection between health and community/social effects while noting that the integrated analysis of these factors is poorly understood in part because of complex cause and effect relationships.⁴⁰

Social connectedness is related to other positive outcomes as well. In a widely cited study, Granovetter demonstrated the value of social connections for finding employment: social connections, more often acquaintances rather than close friends or family, are an important source of information about available jobs.⁴¹ This is evidence that social cohesion, even when comprised of so-called “weak ties,” has tangible and practical value. This finding supports the idea that social connections have value, which has led to the use of the term “social capital.” Light emphasizes that social networks, built by establishing trust through repeated contact, are indeed a form of capital, a “store of value that facilitates action” (p 143).⁴² The action can take several forms, one being political action. de Souza Briggs describes the political value of social capital, that it can be a resource for forwarding the interests of a group or individual.⁴³ This can, of course, have a negative

Social capital is “vital to social wellbeing. It’s a key indicator for a community to sustain itself and the ability of people to contribute to their communities.”

--Richard Killingsworth

side; “NIMBYism” is an expression of social capital. Yet it can be positive as well, by bringing together a community to solve problems collectively. Beyond such dimensions of value, social connections are thought to improve “quality of life” in less utilitarian ways as well, contributing to general feelings of optimism, satisfaction, and security.

Despite this strong research interest, a coherent, rigorous theory on social capital has yet to develop which, in turn, means that the practice of using it as a framework for assessing community/social factors is in its infancy. There are a number of critics of the idea, many of whom cite the lack of a coherent and consistent definition of social capital, which leads to inconsistent measurement and interpretation of empirical findings. Putnam recently commented, however, that he is very much encouraged that researchers and practitioners are converging on a definition of social capital, offering hope that it will become a useful theory that can frame investigations of the practical implications of social change.⁴⁴ One of the ways to inform the development of theory is by testing it in the real world. A well-tested and accepted theory, in turn, improves practice, shaping specific tools and methods and helping explain outcomes. The transportation industry can importantly contribute to this effort by investigating the social implications of changes in transportation systems which, at the same time, can contribute to expanding the current practice.

Perhaps the best-developed strand of the literature is focused on housing and community development where considerable work has been done to investigate the determinants of community/social wellbeing. For example, Rohe et al offer a summary of the research on the social impacts of homeownership for individuals and for communities.⁴⁵ There is some evidence that homeownership increases participation in volunteer activities and local politics, and some have speculated a strong connection between housing tenure and community/social cohesion. However, studies that have reported this finding have only weakly controlled for other effects, thus this relationship may be only spurious. Looking across the available studies, this same report noted that mobility, or residential instability, is positively associated with household income, change in household income, household size, change in household size, minority status, overcrowded dwelling units, dissatisfaction with the neighborhood, lack of confidence in the future of the neighborhood, and racial change in the neighborhood. The report also notes that although neighborhood stability may be generally considered desirable, it can come at the cost of individuals' mobility. In other words, residents may desire to move, but be unable to afford the transaction costs (time and money) of a move or may be unwilling to absorb the psychological costs of a major change. From this perspective, neighborhood stability may stem from obstacles to moving rather than a desire to stay. The report cites studies that have identified four groups for whom this is particularly the case: low-income households, African-American households, households headed by females (single mothers), and older households. Among all types of households, this last group is the least likely to move, even when they have the means to do so, suggesting that the choice to stay put is not economic, but perhaps psychological.

These findings have important implications for developing measures of community/social effects. First, they suggest that a simple measure of length of residence in a neighborhood may not measure satisfaction with the neighborhood. Second, recognizing that some groups tend not to move, even when they live in distressed neighborhoods and have the financial means to move, supports the idea that these households would incur substantial "costs," both social and psychological, if displaced. Finding concentrations of these populations (African-Americans, households headed by a female, elderly persons) in a project area would seem to indicate that only very well-coordinated and long-term relocation strategies could adequately mitigate displacement impacts for these groups.

Aside from the characteristics and preferences of households, housing policy research can offer insights into measuring the overall quality of neighborhoods, which translates to economic value for home-owning households and thus reflects the value of higher quality of life. Galster et al used factor analysis to compare the effectiveness of an index for neighborhood quality based on easily obtainable data compared to an index using complex and highly detailed data sets.⁴⁶ They report that home mortgage rates were a close proxy for "social disadvantage," that the median amount of mortgage loans could stand for "prestige," the numbers of loan applications represented "housing type and tenure," and the number of businesses measured employment opportunities. Galster et al note the need to use the most current measures possible, which highlights one of the weaknesses of relying solely on U.S. Census data, and the importance of exploring the possibilities for using readily available, inexpensive, secondary data sets. These authors

argue that their index measures the major factors that determine the quality of a neighborhood, especially for the purposes of tracking changes over time. Still, they note that there are other important domains including environmental quality, collective efficacy to bring about positive change and defend the neighborhood from outside threats, and social interaction among neighbors. They recommend mortgage data as a rich source of information for planners, especially in the U.S. where the housing market is quite mature and efficient.

Other housing researchers have used U.S. Census data, property transfer data and detailed, primary neighborhood data. In one such study, areas with low housing values, low family income, higher levels of migration and a higher percentage of workers in blue collar professions had weaker social networks.⁴⁷ There was also a positive relationship between strong local institutions (neighborhood organizations, a well-funded Community Development Corporation, presence of major institutions such as a hospital or museum) and social capital. These authors conclude that having a strong neighborhood identity and a social network are not enough for a community to successfully cope with change; strong institutions are also needed.

“We believe people build capital by living together . . . There is something in the exchange between people, and it’s not portable. It is of that place and people.”

--Mindy Fullilove

Other researchers have offered theories for measuring community/social wellbeing. However, the methods recommended require highly detailed, customized data collection efforts that at present make them impractical for broad adoption by practitioners. White suggests that, aside from measures of the presence or lack of social connections, the density of those connections should also be considered.⁴⁸ He recommends measures of the proportion of a person’s connections that are connected to each other (forming an inward looking network), the overall size of the network, the distance between pairs of connections (a measure of the speed of communication or assistance), and the degree to which the network is centralized rather than organized in cliques. Rohe suggests that the “content” of networks (the degree to which interactions build trust) and their “power” (a network’s ability to transmit highly valuable information and aid) are very important in understanding the importance of these networks in the function of a community.⁴⁹

The review of theory, current empirical studies, and interviews with academics and practitioners offers some direction on how to measure social wellbeing and the effects of transportation on it. From the cross-disciplinary review, two fundamental ideas emerge:

- Community/social wellbeing springs from peoples’ interaction with their physical environment, with institutions, and with each other; and
- Perceptions about these interactions and of the efficacy of them are very important components of wellbeing.

The cross-disciplinary review also reveals that there are a number of promising approaches to measuring community/social wellbeing. Clearly there is no one measure that can define community wellbeing; in fact, it is the interaction and connectivity of many

factors that influence how well a community is functioning. This is similar to understanding the functional value of an ecological community in that several variables are considered to determine if the natural resource is demonstrating good environmental quality or demonstrating evidence of degradation.

In the search for understanding how communities function, sociologists are increasingly turning to the concept of social capital as a framework for understanding the value of our interactions with each other and with institutions. Public health professionals use the concept of health behavior as a measure of our interaction with the physical environment. Housing policy experts turn to analyzing the artifacts of social wellbeing, as expressed in the housing market, to measure quality of life factors. Measures of community/social effects can triangulate from these three areas of developing research to capture the elements of wellbeing that appear to be universal: some level of physical health, a measure of personal and property security, a degree of economic security, satisfying human relationships, and a general feeling of having opportunities to work toward and accomplish personal goals. Transportation is bound up in all these elements as it provides access, to a greater or lesser degree, to the interactions and opportunities that support these basic elements.

The next chapter organizes these general areas of wellbeing within a framework of three major domains: economic wellbeing, physical health, and social capital. The chapter also outlines methodologies and measures that can move the framework toward application in transportation planning and project development.

4.0 Improved Approaches to Indicators and Measures

This chapter provides a brief discussion of methodological issues related to using measures and indicators in decision-making processes. It also presents a conceptual framework for improved methods for assessing community/social wellbeing in transportation planning and project development. This framework suggests the overall dimensions of community/social wellbeing that should be considered. Based on the framework, the third section presents a table of potential measures, along with information on potential data sources and the relationship between each measure and transportation. The final section introduces how the balance of the report moves the framework toward implementation by practitioners.

4.1 Methodology: Measures and Indicators

First, it is helpful to clarify the difference between a measure and an indicator. A measure is some valuation placed on a phenomenon. An indicator is a scale used to register a condition or trend against a reference point, predetermined target, criterion or set of criteria. For example, per capita income is a measure. If per capita income is used to designate certain census block groups as low or high poverty areas, it becomes an indicator. Per capita income could also be combined with other variables, such as race, educational attainment, and job status to develop a composite indicator (sometimes called an “index”) of socio-economic status. Composite indicators can more fully capture the nature of the thing being assessed by including additional dimensions; yet data availability can lead to problems when measures have different geographic scales, time frames, lead to “double counting”, or include unrelated concepts (spurious relationships).

Measures can be either quantitative or qualitative in nature. Quantitative measures deal with quantities or amounts. Qualitative measures are concerned with attributes, features, characteristics, and degrees of strength. Qualitative data can be secondary, but are more often primary (collected directly), involving a “commitment to field work.”⁵⁰ The decision about the type and structure of indices, indicators, and measures must balanced the pragmatic concerns about the availability of secondary data, the cost of collecting primary data, and privacy concerns for both types. Thus, constructing meaningful indicators for social phenomena is both a technical and practical challenge.

From the public health perspective, Hoehner et al recommend including a combination of perceptive/individual and empirical/generalized measures.⁵¹ Individual factors could include beliefs about crime or safety, attitudes, and barriers, while empirical measures could be density or mix of land uses, and accessibility of activities and facilities.

Perceptions of community members are “crucial for some things . . . but there is very little literature on how people form perceptions, how they revise them. It’s not an outcome indicator . . . but perceptions should be used to help us understand what is going on in a community.”

--George Galster

The Environmental Protection Agency (EPA) recommendations of indicator systems for communities interested in working towards environmental sustainability hint at an additional general issue with indicators.⁵² The EPA describes two broad types of indicators, goal-oriented and domain-oriented. Goal-oriented indicators measure progress towards a specific objective. This can make the indicator more focused and reduce the number of measures needed to assess progress. Yet it can also mean that lack of progress, or even decline in other dimensions, remains hidden. For example, if a community has the goal of reducing green house gas emission by 20% over five years, measures to track progress toward that goal could include vehicle miles traveled (VMT) and percentage of electrical power generated using clean technologies and renewable sources. If there is substantial progress in the area of electrical energy generation but VMT increases, the community still could achieve their goal. Goal-oriented indicators work well when the goal involves activities that are interchangeable in their contribution to the desired outcome. In contrast, domain-oriented indicators organize a greater number of measures by general area, and then combine them so that linkages across dimensions can be accentuated. For example, the EPA suggests an indicator for communities to track progress towards sustainability that includes economic, social, and environmental measures. A domain-oriented indicator allows for and accentuates the linkages among the domains. An example of this domain-oriented approach is described in a report on developing quality of life indicators for Canadian communities, assessing the condition of housing, health, employment/income, land use and environment, and crime and safety.⁵³ Given that community/social indicators will require such cross-linkages and involve assessing complex interrelationships, a domain-based approach will be more appropriate for use assessing community/social wellbeing in the transportation context.

“I have concerns about impacts that don’t lend themselves to monetary valuation—equity is one.” Decision makers say “‘Oh that’s an intangible’ then they can dismiss it. Monetization is useful, but we must understand exactly what the measures mean. We need to work with impacts physically, then monetarize them.”

--Todd Litman

One important dimension of measurement is the question of whether the things measured should be converted to a monetary measure of value. The traditional cost-benefit analysis approach relies on monetarization to combine market and nonmarket goods. This allows nonmarket goods (e.g., air quality, travel time) to be calibrated in dollars, a measurement unit easily understood and easily transferred. Critics of this approach take the position that this thinking is flawed

because there is often a serious mismatch between ethical values and monetary values.⁵⁴ This leads to situations where the monetarized (and monetary) gains from a project drive policy decisions that are incompatible with values and ethics. Although cost-benefit analysis can be useful for making public policy and investment decisions, it is only a tool, and many people find it unsatisfactory.

Finally, developing good methods of measuring community/social effects has value not only to communities but also to transportation agencies. If transportation agencies want to foster a positive public image, improve workforce retention and satisfaction, cultivate partnerships (including shared financial responsibilities) with communities and other agencies, expedite project delivery, and perhaps most importantly, become better known for planning, designing, and building excellent projects, methods that measure aspects valued outside the agency will be very important in evaluations of agency performance.

4.2 Conceptual Framework

A major goal of this study is to broaden the transportation decision-making process to include closer attention to factors of community. An interdisciplinary review of research and practice provides evidence that community/social wellbeing can be looked at through quantitative approaches. At the same time, data for doing so are increasingly available. While secondary data can provide a great deal of information, no index can fully substitute for rigorous public outreach work; it must be validated by direct interaction with the community. Nevertheless, a tool based on secondary data can greatly enrich the decision-making process, particularly as the current practice relies heavily on public comments submitted during formal review periods which, experience has shown, often leaves many community voices outside the process. The proposed framework recognizes that community/social wellbeing is complex, multifaceted and has many overlapping and interacting components. It reflects the three types of interactions related to community/social wellbeing:

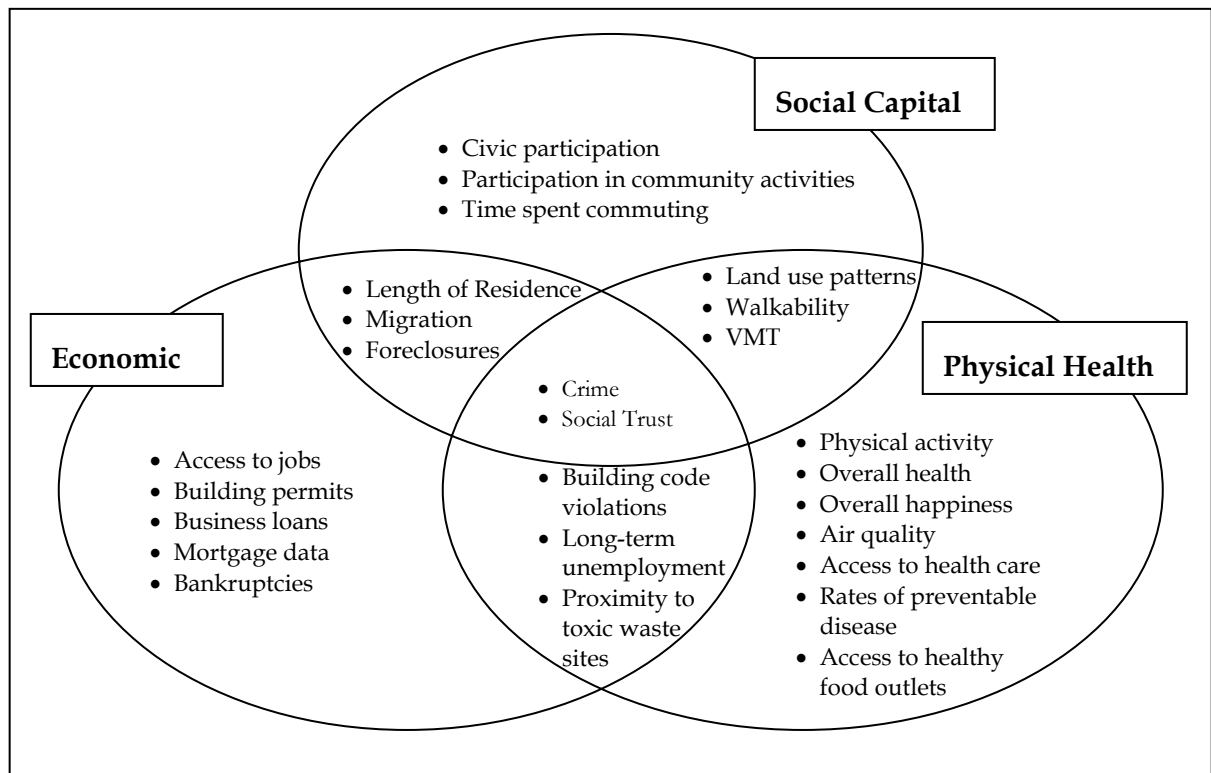
- Interactions with the physical environment through measures of elements of the environment that are related to health outcomes,
- Interactions with institutions through measures of neighborhood quality and investment, and
- Interactions with other people through measures of social capital.

In abbreviated form, these three areas of interaction define three domains of community/social wellbeing:

- Physical health,
- Economic, and
- Social capital.

A conceptual diagram of the domains and some general categories of measures that fall into one or more of the domains is provided in Figure 4.1. The diagram illustrates a suggested framework that should underlie the choice of measures used to assess community/social wellbeing in connection with transportation projects. The diagram portrays the three domains of analysis with sample measures that fit within each domain. (A more complete list of measures is presented in Section 4.3) Measures that fall within multiple domains are placed in the areas where domains overlap. This reflects the interactive nature of the domains as well as the multiple social dimensions of some of the measures. For example, the level of violent crime in a neighborhood has an effect on the health of community members, both through physical injuries inflicted and through the heightened level of stress that results from fear of violent crime. High crime levels also have a negative effect on community economic wellbeing by reducing residential property values and discouraging businesses from locating in the area.

Figure 4.1: Conceptual Framework for Community/Social Wellbeing Indicator



A multiple-domain approach allows such multidimensional effects to be recognized, while minimizing the problem of “double counting” because it measures phenomena that can have influence over several components of wellbeing. An additional advantage to using multiple domains is that it reduces the masking of effects that can occur when many measures are combined into a single index or model. For example, a transportation project that significantly increases vehicular access and traffic volumes can trigger land use change that increases the number of jobs in a community, bringing a positive effect on the economic wellbeing of that community. At the same time, that increased traffic and

vehicular access can discourage pedestrians (thus adversely affecting the community's opportunity to engage in daily physical exercise) and increase localized air pollution, bringing a negative effect on the physical wellbeing of the community. If such effects are considered all together, negative effects can be masked by positive effects, similar to the effects that are often seen when data are aggregated. Disaggregating the major categories of effects helps balance the various factors under consideration in transportation decisions. It can also help identify differential degrees of effect among different groups, given their particular sensitivities and characteristics. Because the framework diagrams areas of overlap between domains where measures represent the interconnected nature of community factors, it helps to identify areas where indirect and cumulative effects may be an issue.

4.3 Potential Measures of Community/Social Wellbeing

Table 4.1 presents an expanded list of potential measures to be used as a basis for selecting measures for application to a particular community or transportation project or plan. The table includes the data source, the geographic level at which each measure is available that is expected to be most appropriate for the transportation assessment work, the geographic coverage available for each measure, advantages to using the measure, data constraints, and the relationship between each measure and transportation facilities and systems. The list of measures focuses on measures and data sources that provide improvements to practice, drawing from data sources not traditionally used in the transportation industry and emerging, new data on community/social wellbeing. The list was developed based on the interdisciplinary literature review (see Chapter 3).

It is important to note that this list of measures may not be practical for all projects and project locations. For example, in the short term, transportation agencies may find that some of the measures, or the resources to initiate collecting them, are not available in their jurisdictions. Still, the framework and list of potential measures can guide the selection of measures to be used in any given analysis, and point up areas where targeted investment in data collection would be most effective.

In order to provide guidance on how research on community/social wellbeing can inform practice, the framework and a set of measures were applied to a case study, which is presented in the next chapter. The case study provides an opportunity to apply the framework and measures to an actual project in order to demonstrate how they can enrich and improve on current methods. It also allows for an evaluation of their value and practicality. Working with real-world data highlights the opportunities and challenges that the measures and methods are likely to present to practitioners. It also points up promising areas for data-gathering and data-sharing partnerships.

Table 4.1: Potential Measures

Measure	Data Source	Geography	Geographic Coverage	Connection to Transportation	Advantages	Constraints
Attended public meeting (several similar questions)	Social Capital Surveys	Community and/or tract	various	indirect; demonstrates collective action as evidence of cohesion and embeddedness in community	unique data source for this measure	self-reported; attendance may not be a good measure of level of actual engagement
Length of time in current address	US Census/ American Community Survey	Tract	US	changes to transportation system can lead to demographic change driven by changes in economy, VMT, access, etc	annual; current	assumes move was from outside the current tract
Friends to home	Social Capital Surveys	Community and/or tract	various	transportation facilities provide access for social purposes	unique data source for this measure	self-reported; connections reported may not be within the neighborhood
Number and type of organizations in an area	National Center for Charitable Statistics	City, but can find addresses	US	indirect: transportation provides a signal for investment or disinvestment	provides evidence of types institutions in community and level of support for them; current data	weak connection to transportation; geography of organizations' work may not match actual location
Number of times worked on a community project	Social Capital Surveys	Community and/or tract	various	transportation provides a signal to encourage/discourage investment in a community	unique data source for this measure	self-reported
VMT (or commute times)	MPO	TAZ (or Census tract)	Urbanized areas	long commutes associated with lower levels of social capital	accepted measure in industry	historic data may be difficult to obtain; may not be temporally congruent
Block or street segment length	Census TIGER files	n/a	US	shorter blocks more practical for walking	simple measure, available across country.	only a proxy, does not measure whether origin/destination mix promotes walking or cycling.

Table 4.1: Potential Measures (continued)

Measure	Data Source	Geography	Geographic Coverage	Connection to Transportation	Advantages	Constraints
Minutes/day of mod/vigorous activity	State public health monitoring system	County	various	transportation can promote or discourage walking or cycling	direct relationship to health and wellbeing	incongruent geography- -too large a scale; self-reported; as an isolated measure, does not relay where activity occurs so any change might have no connection to transportation
Overall happiness	Social Capital Surveys	Community and/or tract	various	weak: general well-being	direct relationship to health and wellbeing; unique source for this measure	self reported
Overall health	Social Capital Surveys	Community and/or tract	various	supports walking/cycling; AQ	direct relationship to health and wellbeing; unique source for this measure	self reported
Traffic data	MPO	TAZ, perhaps tracts	urbanized areas	particulate pollution important for asthma and overall health, especially for children; directly related to truck traffic volumes (diesel)	known connection to respiratory health, esp for children	actual exposure difficult to assess; historical data may be difficult to obtain
Types of crimes by category of location	Department of Justice, Uniform Crime Statistics/ National Incident Based Reporting System	City	US	land use change and investment lead to demographic change; changes in accessibility	basic and important stress factor	may only be available at large-scale geographies which may not reflect lived-in geographies; variation in reporting protocols by law enforcement agencies

Table 4.1: Potential Measures (continued)

Measure	Data Source	Geography	Geographic Coverage	Connection to Transportation	Advantages	Constraints
Violent and property crime by tract	Local municipality	Crime reporting tracts	varies; local municipalities often compile these figures	land use change and investment lead to demographic change; changes in accessibility	basic and important stress factor; at finer geography than detailed statistics	broader categories of types of crime; difficult to determine whether incidents are within the neighborhood vs. crime occurring in the neighborhood but involving outsiders; crime reporting geography usually not congruent with Census geography.
Building code violations	Local municipality	Parcel	will vary	signals investment decisions; land value changes	direct measure of poor condition of neighborhood	may be difficult to get historical data; in some jurisdictions violations may be formalized only after long time lag or political pressure to issue a violation.
Building permits issued	Local municipality	Parcel	likely all	supports land use change/investment	strong and current signal for investment decisions by landowners; high level of detail, can assess additions to existing structures as well as new construction; small scale, individual investments reveal confidence level about future of neighborhood	may be difficult to get historical data for small scale projects

Table 4.1: Potential Measures (continued)

Measure	Data Source	Geography	Geographic Coverage	Connection to Transportation	Advantages	Constraints
Business loans	Community Reinvestment Act	MSA (or county)	US	supports access which leads to local investment	measures amount of investment that will generate public and private benefits (taxes and jobs/income)	geography may be too large
Business loans made locally by institutions	Community Reinvestment Act	MSA (or county)	US	supports access which leads to local investment	measures amount of investment that will generate public and private benefits (taxes and jobs/income); measures embeddedness of lending institution in the local community	geography may be too large
Disposition of loan applications: by location of property & type of loan	Home Mortgage Disclosure Act	Tract	US	supports or erodes land investment	measures ability to leverage internal resources to secure outside funding; current; historical data available	somewhat cumbersome dataset to use
Disposition of loans sold by location & type of loan	Home Mortgage Disclosure Act	Tract	US	supports or erodes land investment	measures ability to leverage internal resources to secure outside funding; current; historical data available	somewhat cumbersome dataset to use
Jobs within specified distance	US Census/ American Community Survey or MPO	Census or TAZ	US	access to jobs and businesses	important component of benefits of a project for a community.	requires extracting information from regional modeling work; using straightline distance somewhat simplistic

Table 4.1: Potential Measures (continued)

Measure	Data Source	Geography	Geographic Coverage	Connection to Transportation	Advantages	Constraints
Long-term unemployment rate	Bureau of Labor Statistics	County	US	access to employment opportunities, support for local economy, resilient to support change in economy (local/regional)	evidence of a serious negative factor in community wellbeing	incongruent geography; may be defined differently by jurisdiction
Pricing information by borrower or tract; characteristics of loans sold by location & type of loan	Home Mortgage Disclosure Act	Tract	US	land value and investment	number of dimensions to use these data; current; historical data available	requires close attention to definitions of variables; somewhat cumbersome dataset to use
Reason for mortgage denial	Home Mortgage Disclosure Act	MSA	US	land use change and investment	evidence of otherwise unavailable information about households' financial situation (well beyond reported income); current; historical data available	large-scale geography; somewhat cumbersome dataset to use

5.0 Implementing the Framework: Application to a Case Study

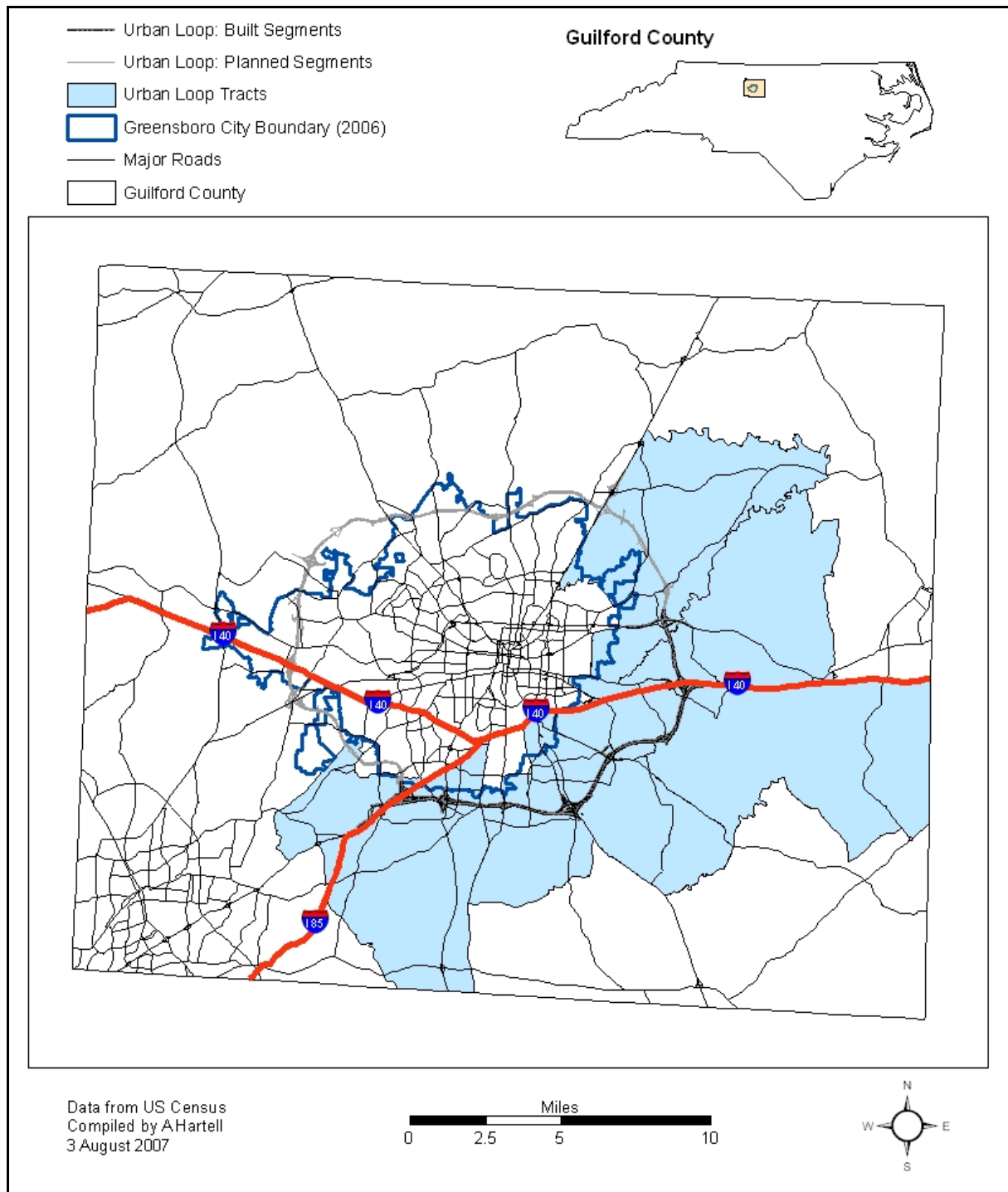
This chapter presents the case study of a major urban bypass project in Greensboro, North Carolina, as an opportunity to evaluate the practicality and usefulness of the framework and measures of community/social wellbeing described in Chapter 4. This chapter is organized as follows. The first section gives a brief overview of the case study location and the Greensboro, North Carolina, Urban Loop project. The second section outlines the methodology and measures used for the case study, organized by domain. The third section focuses on two specific locations within the study area, taking a cross-cutting look across the domains, drawing attention to areas where indirect and cumulative effects (ICEs) may be an issue.

5.1 Case Study: Urban Loop, Greensboro, North Carolina

Greensboro is located in Guilford County, in north-central North Carolina. It lies about 60 miles west of Raleigh and 90 miles northeast of Charlotte. In 2000, Greensboro had a population of approximately 224,000, representing substantial growth over the preceding years from new residents and annexations by the city (Figure 5.1).

Greensboro's Urban Loop is planned to be a circumferential loop around the city, connecting with two Interstate routes, I-85 and I-40, both of which were being widened in the early 1990s. The case study is limited to the portions of the loop opened to traffic in 2001 and late 2003. These segments total just over 15 miles in length and are located on the southern and eastern sides of the city. The project was planned and built as a grade-separated freeway facility in a 350' right of way (typical) with 6 to 8 lanes.

Figure 5.1 Greensboro, NC, Locator Map



The Urban Loop project appeared in planning documents at least as early as 1967, and the final Environmental Impact Study (EIS) for the case study segments was signed in 1994. The project purpose and need cites the need for improved system linkages, increasing capacity to cope with projected declines in levels of service, and accident rates at or above

state averages on related portions of the system.⁵⁵ Aside from transportation system issues, the purpose and need identifies the need for improved access and travel times to major employment centers and the airport. When the EIS was prepared, there was rapid development in southeast Greensboro and the city was expanding water and sewer service in that area in anticipation of additional growth.

5.2 Overview of Methodology

The case study is structured as a cross-sectional study of community/social wellbeing in the pre-project year of 2000. While this simplifies the analysis somewhat, it does not capture some potential effects of major roadway projects that may occur well before construction, especially for effects that are transmitted through land use change which can begin during the very early stages of planning when developers and municipalities act on long-range transportation plans and projects. In short, data from a year just prior to the opening of the road may already include some community and land use responses to the project, and may not strictly represent pre-project conditions. The advantage, however, to choosing 2000 as a baseline year is to allow continuity with the decennial Census and the use of some other datasets that are only available for limited years. This allows for the use and demonstration of a full set of measures, which is the central purpose of this study.

The study area for the case study was defined as the Census tracts that were intersected by any portion of the Urban Loop, including interchanges. This is clearly a rough estimate of the area of effects, and may not fully reflect the lived geography of the communities. While a census tract is a rather large geographic unit to work with when considering community issues, it does allow for initial screening work, which can identify areas that need closer scrutiny and on-the-ground verification of findings. This approach produced a study area larger than the affected environment defined in the environmental documentation for the Urban Loop.

Data

Datasets were acquired from a number of sources and cleaned and configured for compatibility with Geographic Information System (GIS) software (ArcView 9.2, ESRI). This subsection provides an overview of the data sources and methods that are likely to be unfamiliar to transportation agencies and practitioners, organized by the type of improvement to practice they represent.

Further details on the data sources for each measure are included in Appendix B. The documentation is provided not only as background for this case study and this report, but also to provide full documentation in a complete, convenient, and accessible form for practitioners. For each variable, information on validity, reliability, and the connections to transportation infrastructure are provided, along with practical information related to data acquisition, processing, or interpretation. In the appendix, the variables are organized

alphabetically under their respective domains. Figure 5.2 shows the format and types of information included in the documentation.

Figure 5.2 Data Documentation Outline

Domain	
○ Variable (name of measure)	
▪ General description	
• Type of variable (nominal, ordinal, interval, ratio)	
• Validity (how well the variable measures what we are studying)	
• Reliability (how stable the measure is when there is no actual change)	
• Reference area (geography available for comparison)	
▪ Value and importance of the data	
▪ How it relates to community wellbeing	
▪ How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects)	
▪ How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice	
• Actual data source (agency)	
• How to retrieve data (URL, contact person phone/email, etc.)	
• Cost (if applicable)	
▪ Any issues <u>specific</u> to Greensboro case study	
• Applicability	
• Drawbacks	

Traditional Data Sources

Census data are used for basic demographic information including age, income, and race. These data are often used by community analysts as they are recognized to be of high quality, are readily available for the entire US, and are available at fine geographies.

Aside from providing a general overview of the residents of the study area, Census data are typically used to determine whether a project can be expected to have disproportionate negative effects on populations protected under Executive Order 12898 (EO 12898) on Environmental Justice.⁵⁶ The traditional approach to doing this has been to calculate the percentage of the county population that falls into any of the protected categories as a reference value and then comparing that value with the percentages for each group inside the study area to determine if the proportions in the study area are 'disproportionately higher' than the values in the reference area. Conceptually simple, this approach requires some assumptions that can have substantial implications for the findings of the analysis.⁵⁷ One of the criticisms of this approach is that it can lead to

situations where a project is located such that it brings negative effects to an area with a low proportion of population in a protected group, but a high actual number of persons of a protected group in order to avoid an area with a high proportion but low number of persons of a protected group. Such a decision would negatively affect more individuals who are to be protected under EO 12898. Whether this adheres to the principles that underlie EO 12898, or would be politically acceptable is an open question. Therefore it is helpful for practitioners to consider both percentages and actual numbers of persons, as well as to identify pockets of protected populations at a small geographic scale.

A *segregation index* augments the traditional approach and provides more information to help identify areas of concern. This method is based on dissimilarity indices that have been used to study locations of toxic waste sites and school districting policies.⁵⁸ It represents a ratio where the numerator is the minimum number of people who would have to move from one Census block to another block within a tract to achieve a distribution equivalent to the distribution in the county; the denominator is the number of people who would have to move to attain that distribution, beginning from the point of maximum segregation. In other words, it is the number of people who would need to move within a tract, musical-chairs style, divided by the number of people who would need to move if the tract were completely segregated. The segregation index has a value from 0 to 1.0, with 0 representing a state of complete integration and 1.0 a state of absolute segregation. Both measures, percentages and the segregation index, can be simultaneously displayed on a map, allowing the analyst to identify areas where further investigation is needed into the distribution of protected groups. (Additional details and equations available in Appendix B.)

Data Used by Other Disciplines

Several data sources and methods used that are often used by analysts in other disciplines but are not used in transportation practice. These are data from the Federal Financial Institutions Examination Council (FFIEC) on home mortgages and business loans, a walkability index, and crime data.

Researchers and practitioners in the field of community development consider *home mortgage* data useful for determining measures of various factors of community/social wellbeing. The value of home mortgages is a good proxy for neighborhood quality, as perceived both by those borrowing funds to move to a neighborhood and by lending institutions which to some extent take the value of the neighborhood as collateral. The ability of a household to secure a loan is a measure of household-level economic health. It measures borrowers' interest in moving to or remaining in a neighborhood and measures the perceived value of the neighborhood to outsiders (lenders). Using home mortgage data helps flesh out the economic picture at the household level; considering income alone only provides a rough proxy for the economic condition of households and does not capture conditions of economic stress within households except for those considered to be low income.

FFEIC home mortgage data is collected and reported in compliance with the federal Home Mortgage Disclosure Act (HMDA).⁵⁹ Under HMDA, banks, savings and loan associations, and other financial institutions are required to file annual reports that detail their home lending activity. Lenders report the number of loan applications by Census tract; the income level, race, and gender of the borrower; and the total dollar value of the loans made in a tract. Data are available for conventional and federally subsidized (FHA, FMA, VA) loans as well as for loans to refinance an existing mortgage or to make home improvements. These data are publicly available at no charge, at the Census tract level.

The FFEIC has similar reporting requirements for *business loans* under the federal Community Reinvestment Act (CRA).⁶⁰ Lending institutions are required to report the number of small business and farm loans by the size of the loan and by Census tract. Information on the race or gender of the borrow is not reported. The reporting requirements also do not allow for the differentiation between loans made to locally owned business or franchises controlled by businesses located elsewhere. Still, CRA data allow analysts to track the flows of investment into neighborhoods. The case study also includes *building permit* data as a parallel measure of investment flows; building permit data are available from local building inspection offices.

Crime data are another publicly available data source, with important implications to understanding community context and wellbeing. Crime incidents are categorized into property and violent crime categories, usually at the level of police reporting tracts which may or may not coincide with Census tract geography. For this study, incidents were mapped to Census geography, allowing for a consistent display of data for all measures. Further details on crime measures and indices are available in Appendix B.

A number of researchers have constructed complex indices of *walkability* and/or *bikeability* that capture a range of safety, comfort, and aesthetic factors. Measures used have included roadway width, traffic volumes and speeds, length of blocks, presence and condition of sidewalks and/or bike lanes, adjacent land uses, mix of land uses, site design adjacent to the roadways, and architectural characteristics.⁶¹ While studies using complex measures provide important clues to the environmental characteristics that make a community “walkable” or “bikeable”, at this point they remain more in the research arena because they require measures that are not generally collected and maintained. For example, only in recent years has it become common for municipalities to maintain basic sidewalk inventories.

Rather than suggest that the only useful approach for practitioners is extensive, customized data collection, this portion of the case study focused on constructing an index that is immediately practical in most locations. Active Living Research suggests a focus on two major components of walkability: proximity and connectivity.⁶² For policy purposes, they define proximity as the mix of land uses and density of origins and destinations. Connectivity is the degree to which the street network provides direct routes and safe connections for pedestrians and bicyclists. The measure for walkability used in this case study focuses on connectivity, the factor most directly under control of transportation agencies, although long-range planning activities could also work to address proximity.

The walkability measure used is designed to provide a simplified proxy for the complex concept of “walkability” to use in considering the affects of a project.

Measuring walkability at the fine, Census-block level introduces the idea that walkability must be measured at a human scale. This is also reflected in the choice of a ½ mile buffer area, a distance widely accepted as a “walkable” distance. Using a buffer approach allows intersections to be counted toward the walkability of multiple block groups, especially in the downtown area, where Census blocks are very small. This also avoids the technical problem of where to allocate intersections that fall on the boundary between Census blocks because they are captured within the buffer area. This approach does not constitute double counting, as the walkability value accrues to each block and a given intersection can be credited towards the walkability for multiple blocks. One advantage of this approach is that it can be applied to any alternatives that might be under consideration because basic roadway characteristics will be available for any proposed project. Full details of the methodology for constructing the index are provided in Appendix B.

New Data Sources

This case study uses an emerging data source for assessing community/social wellbeing: the Social Capital Benchmark Survey. The Benchmark Survey was conducted in 2000 and included a stratified sample to collect statistically valid samples from some 30 cities, including Greensboro, as well as a nationwide random sample.⁶³ In order to develop time series data, a follow-up survey was carried out in 2006, using a shorter set of survey questions. Although methods of measuring social capital are in their early stages of development, the Social Capital Benchmark Survey and subsequent follow-up surveys provide a promising opportunity for the transportation industry. Developed and managed by the Saguaro Seminar, a policy research initiative at Harvard University’s Kennedy School of Government, these surveys are consistent, professionally-administered approaches to collecting time series data on social capital that can be used to inform public policy.

The organizations that sponsor these surveys are chiefly community development corporations interested in developing and evaluating their community programs. However, the survey instrument is publicly available and could be adopted by any transportation agency for use in long-range planning or project-specific analysis. Portions of the survey could be integrated into travel diaries as well. The Benchmark Survey data are publicly available for download, although the geo-coded dataset is available only under a data confidentiality agreement; 2006 data had not yet been released at the time this research was performed. The short-form survey is provided in Appendix D.

Measures Used in Case Study

Several factors played into the choices of measures used in the case study. Table 5.1 presents the measures included in the case study, organized by domain. In making these

choices, maintaining the highest possible degree of temporal and spatial consistency was an important consideration. Including measures from all domains, and adequately capturing the dimensions and interactive nature of the domains were also important.

Table 5.1 Measures Used in Greensboro Urban Loop Case Study

Basic Demographics		
Measure	Source	Geographic scale
Household income	US Census	Census Tract
Racial composition	US Census	Census Tract
Racial segregation index	US Census	Census Tract & Block
Age	US Census	Census Tract
Economic		
Proximity to jobs	Greensboro Urban Area MPO (InfoUSA & Woods-Pool)	Traffic Analysis Zone
Number of home mortgages originated	HMDA	Census Tract
Value of home mortgages	HMDA	Census Tract
Home mortgage denial rate	HMDA	Census Tract
Number of business loans	CRA	Census Tract
Value of business loans	CRA	Census Tract
Residential building permits	City of Greensboro	Census Tract
Property crime	City of Greensboro	Census Tract
Physical Health		
Walkability by density of intersections	City of Greensboro	Census Block
Violent crime	City of Greensboro	Census Tract
Overall health	Social Capital Benchmark Survey	Census Tract
Overall happiness	Social Capital Benchmark Survey	Census Tract
Air quality	Environmental Protection Agency	Urbanized area
Social Capital		
Number of times had friends to home in previous year	Social Capital Benchmark Survey	Census Tract
Number of times attended public meeting in previous year	Social Capital Benchmark Survey	Census Tract
Worked on community project	Social Capital Benchmark Survey	Census Tract
Served as officer of a community group	Social Capital Benchmark Survey	Census Tract
Length of commute	US Census	Census Tract
Length of residence in community	Social Capital Benchmark Survey	Census Tract
Intent to stay in current community	Social Capital Benchmark Survey	Census Tract
Level of social trust	Social Capital Benchmark Survey	Census Tract

5.3 Case Study Analysis

This section provides the complete results of the case study. The information is organized by the three domains of community/social wellbeing: economic, physical health, and social capital, plus basic demographics.

Basic Demographics

Current practice typically summarizes the characteristics of a community using a set of basic demographic measures: income, race, and age. Usually these measures are drawn from US Census data. For the Urban Loop project, these measures were also considered, to provide some basic information about the residential population within the study area. Table 5.2 lists the measures in this domain along with their connection to transportation. The variable name listed with each measure matches the respective data outline in Appendix B.

Table 5.2 Basic Demographics: Measures

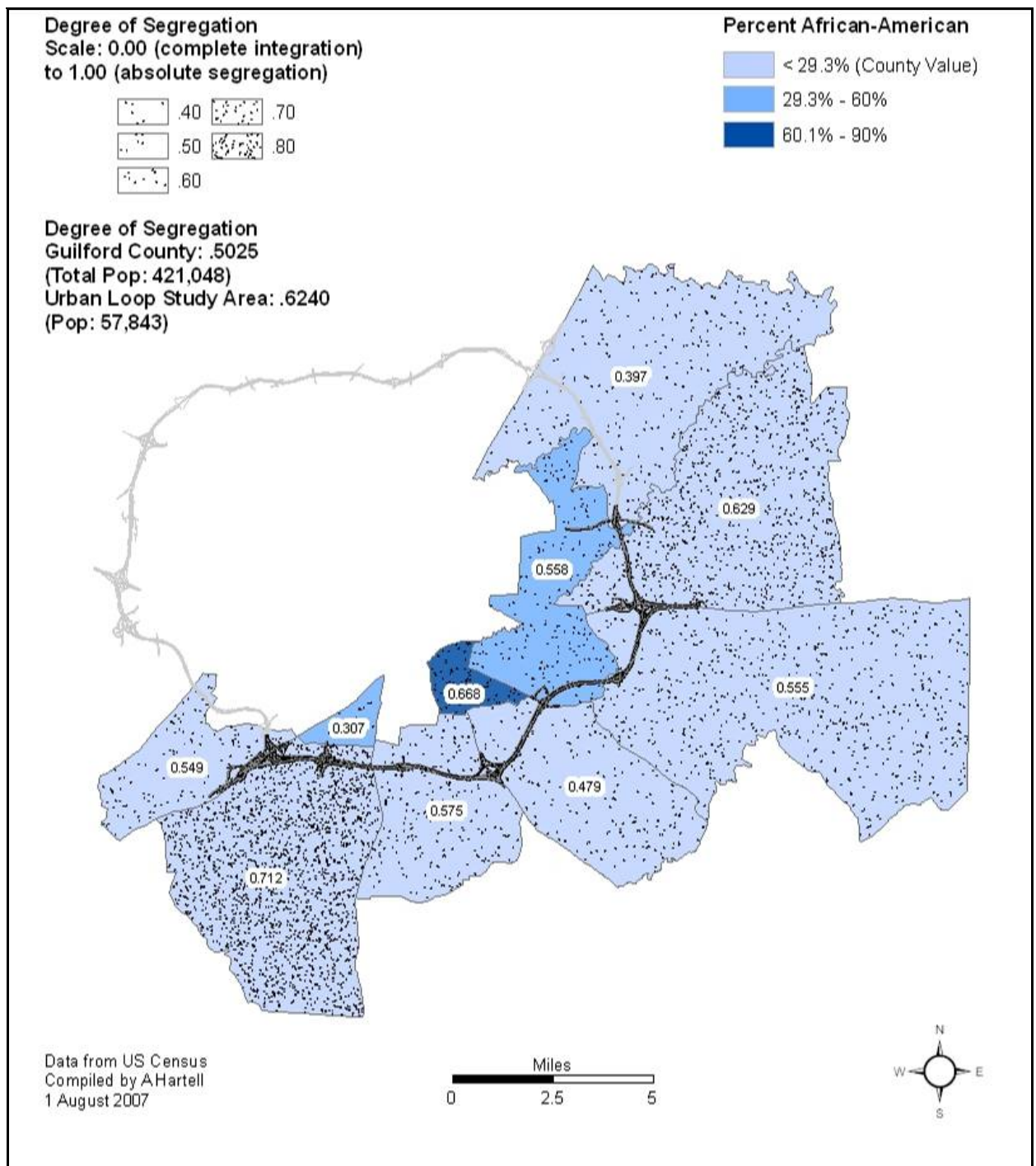
Measure	Variable Name	Data Source	Relationship to Transportation
Income	INCOME	US Census	General measure of wellbeing, household status, and economic activity of area; screening variable for environmental justice.
Race	RACE	US Census	Screening variable for environmental justice; may be a proxy for socio-economic status.
Segregation Index	RACE	US Census	Measure of the degree of racial segregation within tracts.
Age	AGE	US Census	Children and some elderly persons are more susceptible to pollutants from vehicle emissions; elderly and young may be less likely to travel by auto and more likely to walk or cycle.

The income and age profile of the study area is very similar to that of Guilford County. Within the study area, median household income for the tracts inside the urban loop, closer to the central city are somewhat lower than the rest of the study area, although never fall below 75% of the county median household income level (see Figure C-1, Appendix C). There do not appear to be any concentrated residential populations of children or elderly persons; the population is largely of working age (18 to 61 years) (see Figures C-2A and C-2B, Appendix C).

The racial composition of the study area shows a higher percentage of African-Americans in the tracts inside the Urban Loop than in Guilford County. Only very small numbers of persons of other racial or ethnic groups included in the 2000 US Census are reported in the study area, so the analysis for determining disproportionate effects to minority or low-income populations focuses on effects to the African-American population.⁶⁴ Figure 5.3 shows the Study Area tracts by percent African-American population compared to the percentage for Guilford County, the typical reference population for such analyses. This approach does point out that several interchanges as well as one segment of the Urban Loop were planned within tracts that are disproportionately African-American. Generally, the tracts closer to the central city have higher proportions of African-American residents.

In addition to showing the proportions of African-Americans in each tract, the map also displays the segregation index. The segregation index reveals tracts where the proportion of African-Americans is equal to or below the county average, yet they are highly segregated (lighter blue but with the higher dot-density symbolization). Tracts with this pattern should be more closely examined for pockets of protected populations. Traditional analyses solely based on proportions can mask the existence of concentrations of certain groups within larger geographies. Tracts with high percentages of African-Americans but low values on the segregation index reflect areas where the small proportion of other races and ethnicities are spread more or less evenly through the Census tract. Although concentrations of minority groups can also be identified by mapping proportions at the block level, it is helpful to display the proportion data and count data in a single map at a single and consistent geographic scale as a screening tool.

**Figure 5.3 Urban Loop Study Area African-American Population,
Percent and Distribution within Census Tracts, 2000**



Economic Domain

Income, perhaps combined with employment, is the measure typically used in the transportation industry to evaluate economic wellbeing. There are, however, far richer data sources available that allow for the evaluation of economic wellbeing at the household level and that can include some useful proxies for neighborhood quality, an important component of quality of life. Table 5.3 presents the set of measures used in this study for the economic domain of community/social wellbeing.

Table 5.3: Economic Domain: Measures

Measure	Variable Name	Data Source	Relationship to Transportation
Proximity to jobs	JOBS	MPO modeling bureau; from proprietary sources	Access to jobs and businesses
Number and value of home purchase loans	MORTGAGE	HMDA	Supports or erodes land values; attractiveness of neighborhood to in-moving residents; perceived value by lenders
Number and value of refinancing and home improvement loans	MORTGAGE	HMDA	Supports or erodes land values; attractiveness of neighborhood to existing residents, willingness to invest; perceived value by lenders
Loan denial rate	MORTGAGE	HMDA	Support or erodes land values; perceived quality of neighborhood; household-level economic condition
Number and value of business loans	BUSINESS	CRA	Supports or erodes access
Residential building permits	PERMIT	City of Greensboro	Changes in accessibility to land; signals investment in new structures or upgrades to existing housing stock
Property Crime	CRIME	City of Greensboro	Increased access and new development may provide increased opportunity for property crime

The value of loans in the study area are somewhat higher compared with the values for the Metropolitan Statistical Area (MSA), for both home-purchase loans (\$115,100 vs. \$98,800) and for refinance and home improvement loans (\$82,500 vs. 73,700; see Figure

5.4). This is in keeping with the somewhat higher income levels in the study area; income and housing value are typically closely associated. There is some variation within the study area tracts, however, with average value of home-purchase loans ranging from \$77,500 to \$169,100.

In addition to mortgage value, the numbers of loan applications that are denied are reported by lending institutions. This reporting requirement was instituted to allow regulators to examine lending patterns for evidence of “redlining” of minority neighborhoods. A straightforward calculation allows the analyst to map the rate of denial of mortgages by Census tract (see Appendix B for details of this calculation). Because mortgage lenders are privy to considerable detail on the financial condition of households, the rate of mortgage denials provides a richer picture of the economic health of households than does income alone. Comparing the denial rates for the two categories of loans allows for the comparisons of incoming households with existing households’ economic situations and the ability to capture outside investment to improve their situation.

Figure 5.5 presents the denial rate for home mortgages and for loans to refinance or make home improvements. The denial rates in the study area are lower compared with the rates for the MSA as whole. There are, however, some interesting differences. For the MSA, the difference in the denial rate for the two categories of loans is 10% (44% compared to 54%). The denial rate is higher for refinancing loans and for home improvement loans, which is expected given the somewhat riskier nature of such loans. Within the study area, however, most tracts show a much higher difference in denial rates for the two categories of loans, as high as 33% in one case; only two tracts have a difference less than the difference for the MSA. This suggests that existing households are experiencing more economic stress than incoming households, which may indicate a process of economic displacement at work in some of the study area tracts.

Because of the way the data are reported, it is impossible to tell at the tract level the reasons the mortgages were denied, but reasons for denial are published at the MSA level, by income level and percent minority household. Therefore we do know that for tracts of the income and racial/ethnic composition in the study area, the greatest proportion of denials for all types of loans was because of credit history, not employment history or debt-to-income ratio. For refinancing loans, lack of sufficient collateral closely followed credit history as the reason for denial. The reasons for denial could reflect the condition and value of the housing stock or the economic condition of the households, although given that the home is the primary investment for many households, these two factors are not easily teased apart. Macro-economic forces also affect the calculations made by lending institutions and influence their willingness to extend mortgage credit. Overall, the maps suggest a level of economic stress in existing households.

Figure 5.4 Urban Loop Study Area Home Mortgage Loan Values, by Census Tract, 2000

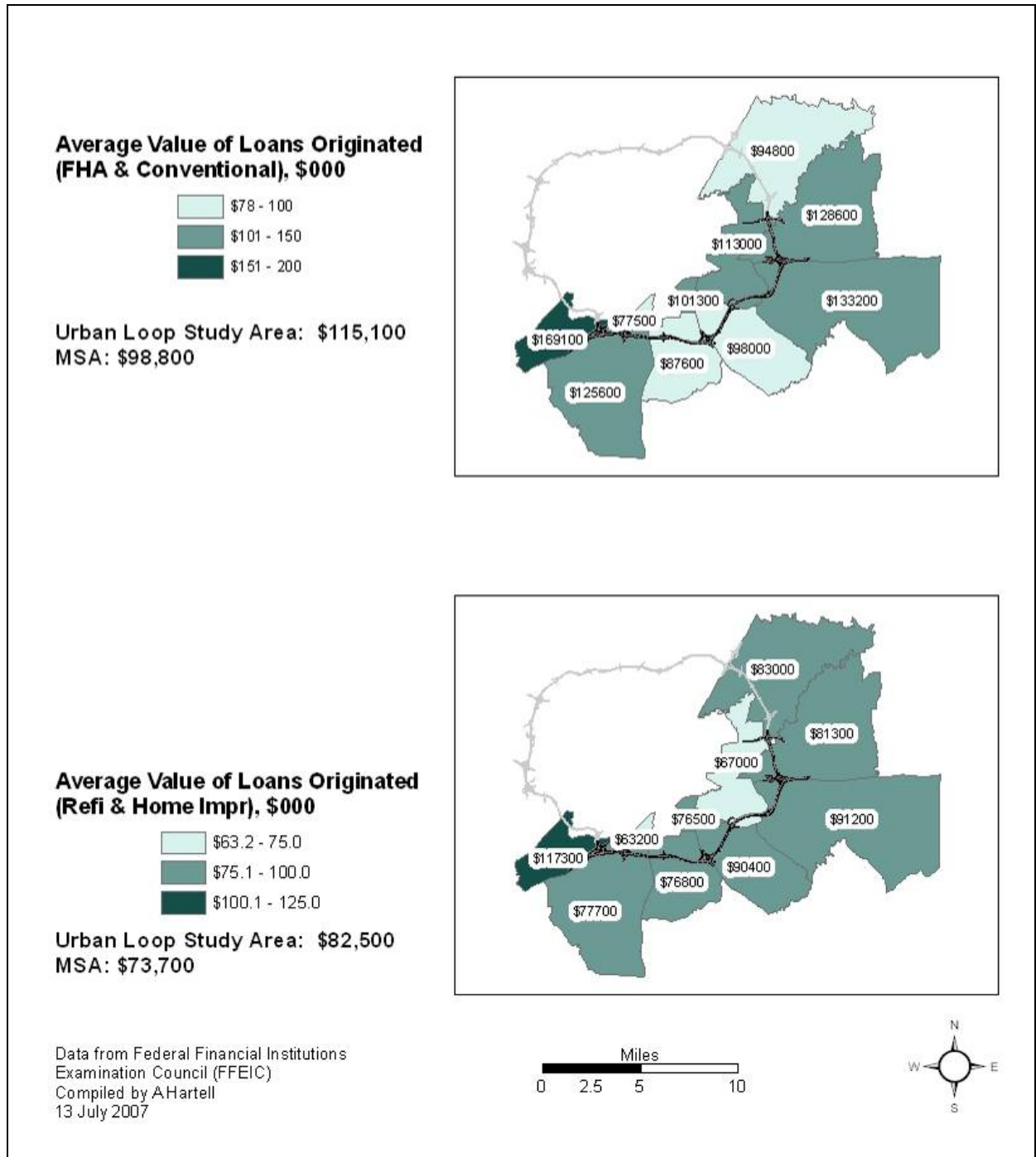
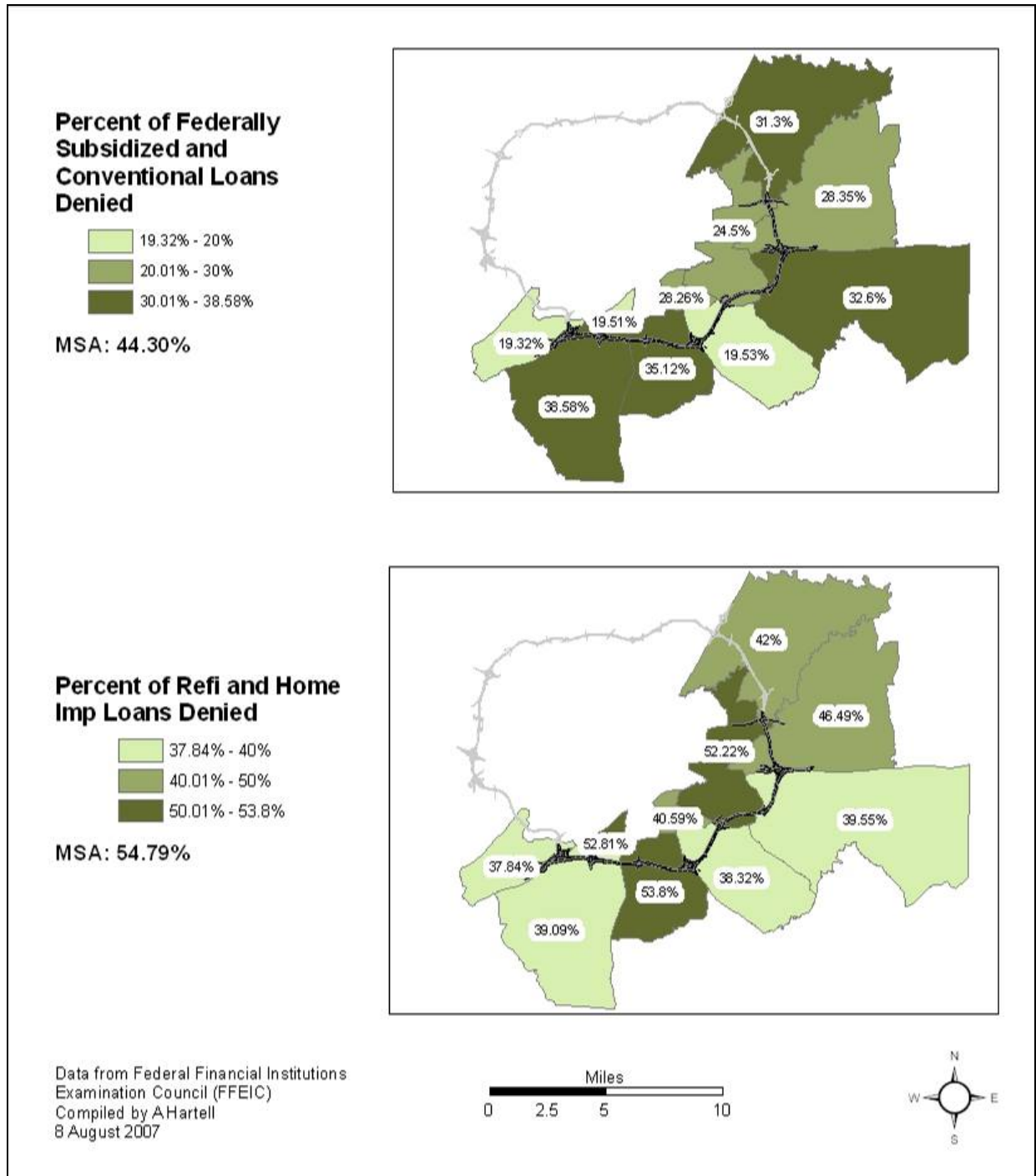


Figure 5.5 Urban Loop Study Area Loan Denial Rates, by Census Tract, 2000



In the context of the Urban Loop project, this pattern suggests that there are households in the study area that may be experiencing some volatility in their expenses or perhaps their incomes are not keeping up with the cost of living. As noted above, this may also be evidence of economic displacement, perhaps related to recent redevelopment or gentrification. Therefore substantial changes in land values could mean that the stressed households will be displaced, not directly by right-of-way acquisition, but indirectly by

the land use changes induced by the project which would be transmitted to the housing market.

Viewed from this perspective, increased housing values must be recognized as a double-edged sword with benefits for those able to capitalize on the gains, but costs for those who cannot. On the positive side, the Urban Loop project could improve access to jobs, serving as a trigger to economic development that brings more jobs or higher wages, although the study area appears to have a healthy number of jobs nearby (see Figure C-3, Appendix C). Those forces could help economically distressed households if it brought economic stability allowing consistent credit repayment. A practitioner working with maps that reveal this pattern would want to further investigate the condition of the housing stock and housing values in the study area to better understand the factors at play. Examining trend data of these measures could provide further insight into these issues.

Residential building permit data are included to capture investment activity within the study area. Building permits are issued for several categories of construction projects, including construction of new single family homes, additions to existing homes, and construction of accessory buildings (e.g. garages). Because building permits are usually issued with an expiration date, most property owners secure a permit when all financial and regulatory (e.g. zoning) hurdles have been cleared and the property owner is ready to begin construction. Building permits for alterations to existing structures are a measure of a property owners' plans to leave or stay, revealing their level of confidence in the future value of the neighborhood. Permits issued for new structures show the distribution of new residential development. Permits issued for demolition may indicate very poor housing stock that has deteriorated beyond the point at which it can be rehabbed and still provide an adequate rate of return, or housing stock that is outdated in some other way (usually size), but the neighborhood is desirable enough to warrant replacing the structure and staying in the neighborhood. In absence of further detail on pre-demolition condition, this measure is difficult to interpret but field surveys and interviews with local government officials and/or local developers could provide useful insight into understanding the developing situation.

Figure 5.6 displays building permit data, normalized to the number of dwelling units in the tract. Two inner tracts had relatively high numbers of permits issued for existing structures and low number of permits issued for new structures. New structures were permitted in larger numbers in the outer tracts. This fits with the general pattern of suburban expansion outward from the city center. Trend data for building permits, when available, could clarify patterns of development and investment.

Figure 5.6 Building Permits Issued (per thousand DUs), 2000

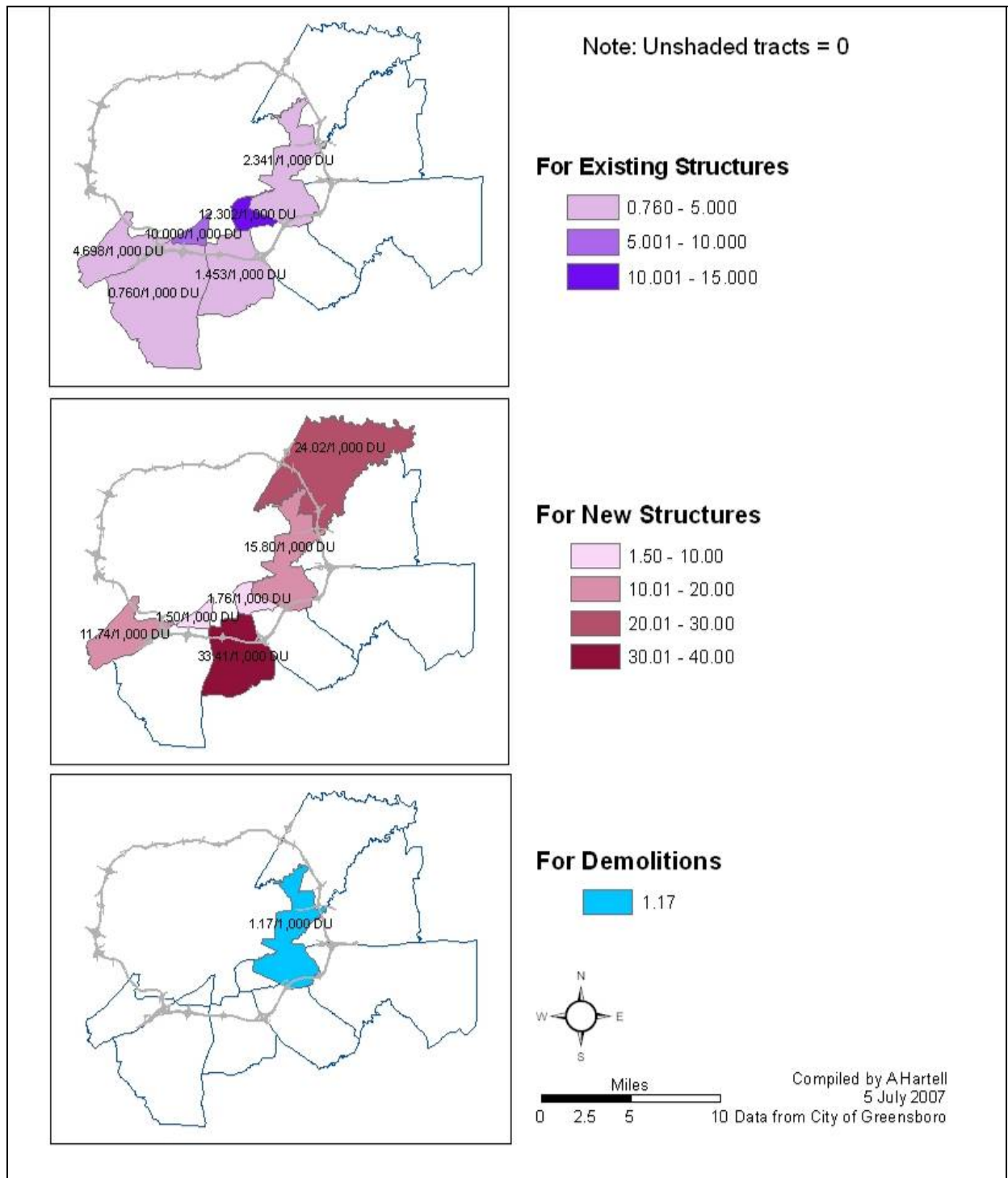
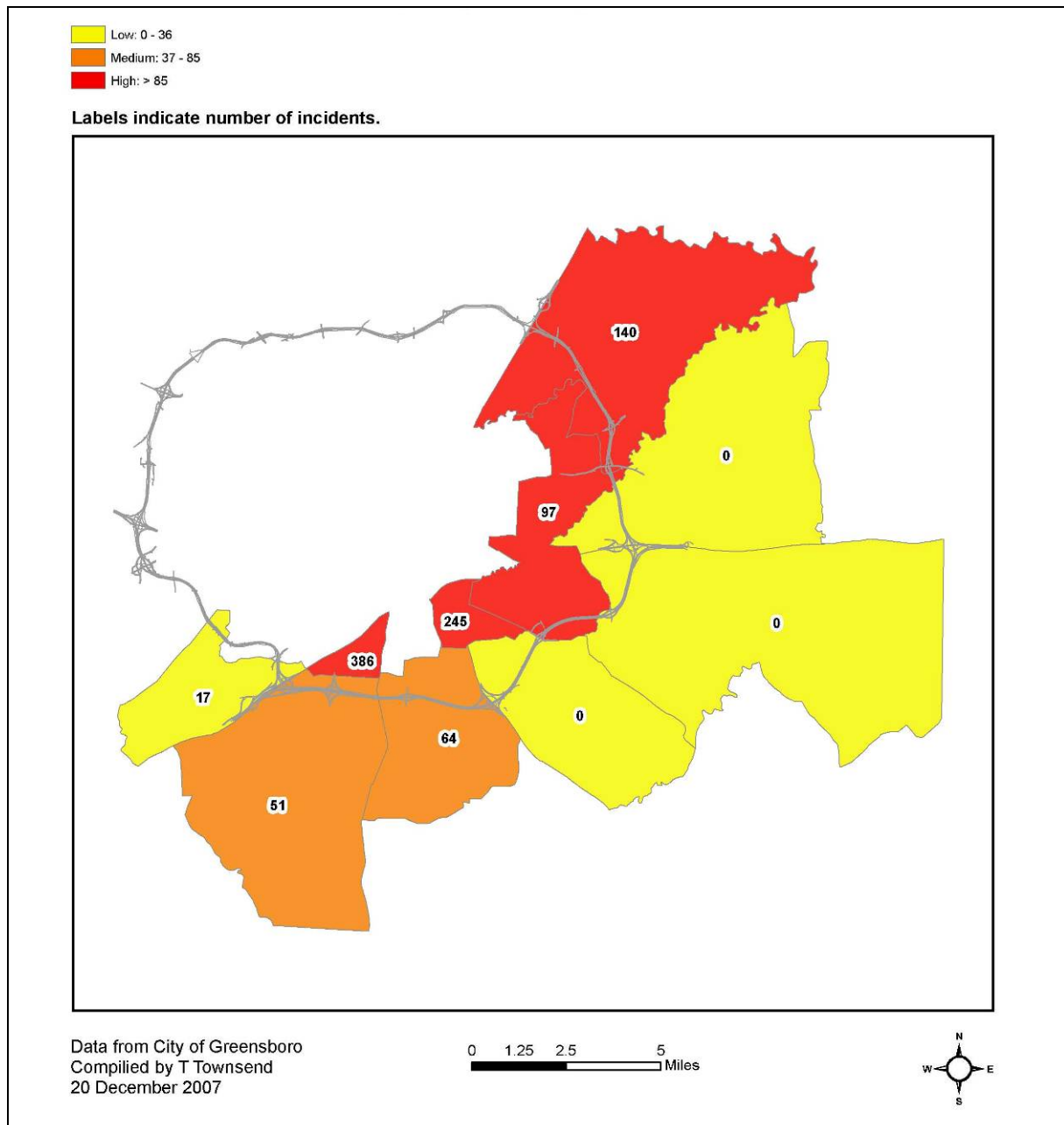


Figure 5.7 Urban Loop Study Area Property Crime, 2000



Property crime is included in this domain because it is expected to have a powerful effect on the land market. High levels of property crime are expected to put downward pressure on housing prices and discourage business location. They can also be expected to increase costs to the public sector through the need for increased surveillance and response to calls and complaints. Figure 5.7 illustrates property crime levels in the study area tracts, using a classification scheme developed by the city of Greensboro. Higher numbers of incidents are seen in the tracts closer to the central city, which likely reflects increased opportunities

for criminal behavior as much as any difference in human factors because these tracts are likely more densely developed than suburban areas.

Physical Health Domain

Physical health is an important component of overall quality of life, so is included in this study on equal footing with other aspects of social/community wellbeing. While there is a growing body of literature, as discussed in Chapter 3, related to understanding the effects of transportation infrastructure on physical health, traditional transportation industry approaches have included consideration of air quality impacts, noise, and roadway safety (largely based on crash rates for auto users) in assessing effects of projects on physical wellbeing. This study expands on the scope of physical health-related factors to consider additional connections between transportation infrastructure and physical health (see Table 5.4).

Table 5.4 Physical Health Domain: Measures

Measure	Variable Name	Data Source	Relationship to Transportation
Walkability by density of intersections and roadway speed	WALKABILITY	City of Greensboro	Shorter blocks and lower traffic speed increase the attractiveness to pedestrians
Violent Crime	CRIME	City of Greensboro	Land use change and investment related to demographic change; changes in accessibility and opportunity; stress factor for residents as well as direct hazard
Overall happiness	HAPPY	Social Capital Benchmark Survey	Measure of general well-being
Overall health	HEALTHY	Social Capital Benchmark Survey	General measure of health; indirectly may also capture access to health care services
Air quality	AIR QUALITY	EPA	Type and amount of emissions; location of monitors compared with location of vulnerable populations

Figure 5.8 Guilford County Walkability, by Census Block, 2000

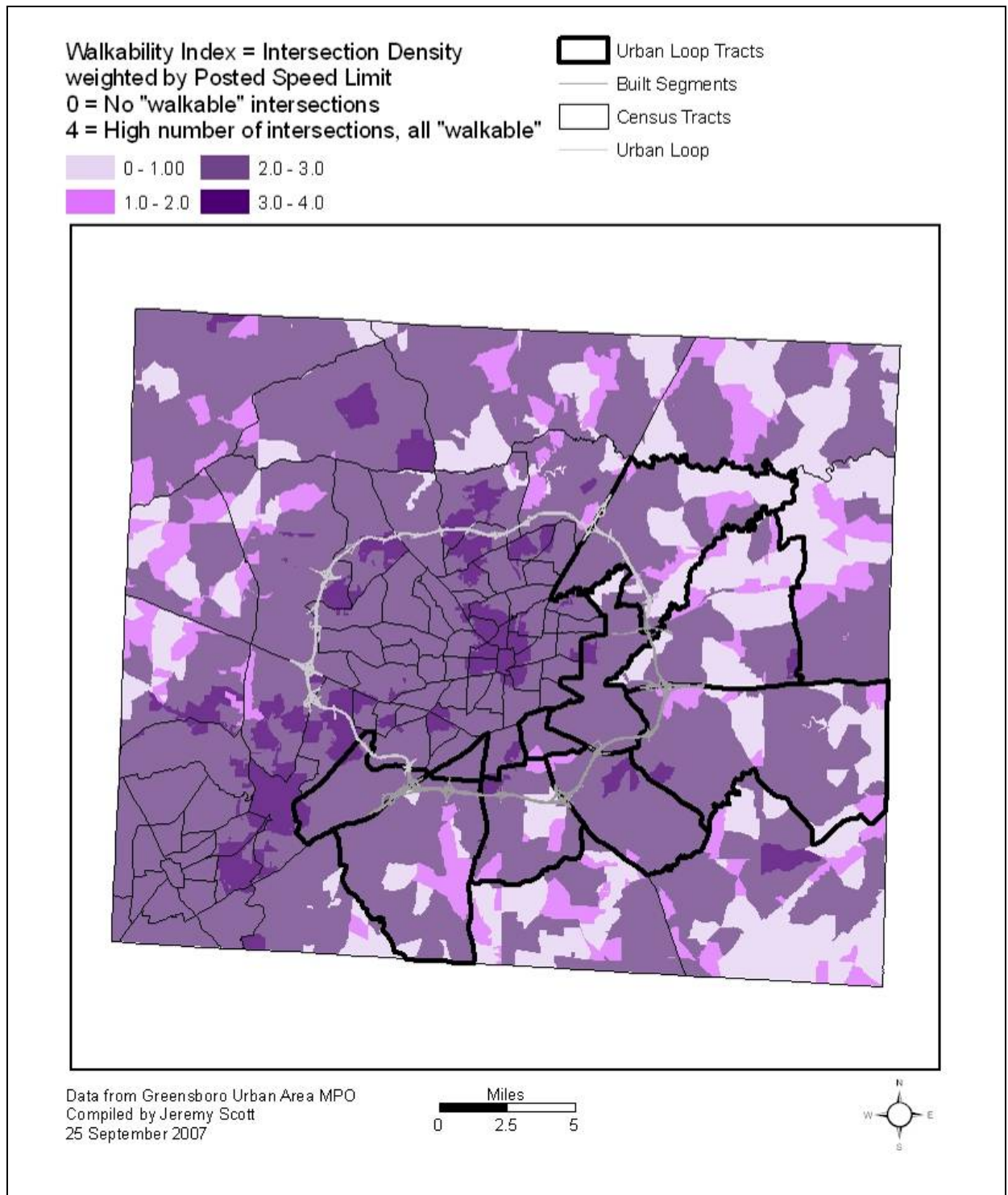


Figure 5.8 presents the pattern of walkability in Guilford County and the Urban Loop study area. As expected, the central downtown areas of Greensboro and High Point

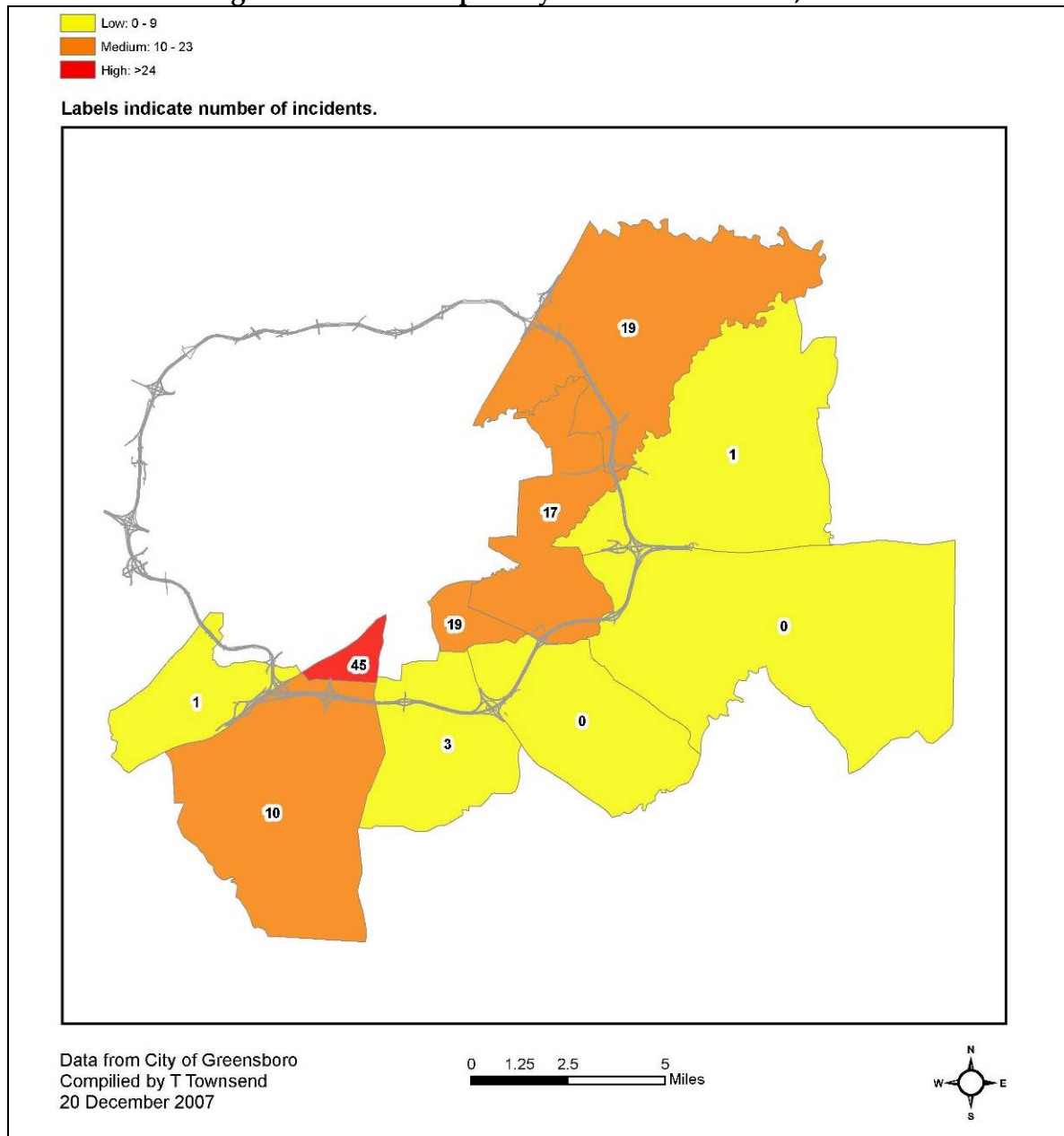
(southwest corner) have a higher walkability index; the suburban and rural areas in the outlying areas have a lower score. In the Urban Loop study area, blocks on the outer edges tend to have lower walkability index values, a few blocks containing residential developments have very high scores. Most of the balance of the study area scored in the middle of the range. Although the walkability index proposed here is only a proxy for the actual conditions experienced by pedestrians, it has the advantage of having minimal data requirements. It could also be easily altered if additional data were available to include traffic volumes, the presence of sidewalks, alternative pedestrian facilities such as greenways, or other measures that can capture additional factors.

In the case of the Greensboro Urban Loop, the freeway project will introduce *unwalkable* infrastructure into a community, and may have spillover effects on the existing street network if streets are reconfigured, stubbed out, or adjacent streets are widened to accommodate more and faster traffic. Increasing traffic speeds and decreasing the number of intersections would likely decrease the propensity of residents to walk either for exercise or for utilitarian trips, decreasing the opportunity for increasing levels of physical activity on the transportation network.

Crime and perception of crime are important factors in community/social wellbeing. Figure 5.9 presents violent crime levels, by Census tract, according to a classification scheme used by the city of Greensboro that is based on the number of incidents in a tract. Generally high-crime tracts are closer to the central city and inside the Urban Loop. An examination of point data for violent crime incidents found that most incidents were close to the inner boundaries of the tracts, except for the triangular-shaped tract in the south (shaded red), where incidents were spread more evenly across the tract.

The complex social factors involved in violent crime make it difficult to isolate connections between transportation infrastructure and criminal activity. However, an area with higher violent crime may be difficult to engage in a public outreach process and may benefit from extra attention to environmental design to discourage criminal activity. If practitioners can locate areas with higher crime, they have additional information to use in developing public outreach strategies and can perhaps point up areas where designers can carefully consider lighting and changes to levels of access or isolation of neighborhoods that may be associated with opportunity for crime. Additionally, this variable is probably best analyzed using time series approach to identify trends.

Figure 5.9 Urban Loop Study Area Violent Crime, 2000



Air quality is an important component of physical wellbeing, with children (especially those with asthma), infants, and elderly persons (who are more likely to have heart, lung or other diseases) particularly vulnerable to negative health effects of the monitored pollutants, especially particulate pollutants PM_{2.5} and PM₁₀ (particulate pollutants of ≤ 2.5 and ≥ 10 micrometers in diameter, respectively).⁶⁵ The study area population is predominantly of working age (see Figure C-2A, Appendix C), however, the preferred alignment passed within 3,000 feet of an elementary school that had two other major highways, I-85 and US 220, very close by (less than 2,000 feet and immediately adjacent,

respectively). Therefore the localized air quality effects of the Urban Loop project could add cumulative negative air quality effects.

Ambient air quality in the Greensboro Urbanized Area has generally met federal air quality standards. The EIS reports that Guilford County had been designated a maintenance area for ozone in 1993, with an attainment date set of 1996. The monitoring stations for these pollutants are located in central Greensboro (see Figure C-4, Appendix C), and therefore may not reflect conditions close to the project area. The environmental documentation for the Urban Loop project included the results of modeling air quality for portions of the project anticipated to have the greatest negative effect on ambient air quality. Levels of pollutants were found not to exceed federal standards, although it should be noted that at the time, PM_{2.5} was not monitored or modeled. Although current regulations and guidelines do not require micro-level modeling of PM_{2.5}, an analysis of community health impacts would give consideration to the likely effects of a project on the community. Satisfying the federal requirements for projects like the Urban Loop, a major freeway that will carry considerable truck traffic, thus substantially increasing PM_{2.5} and PM₁₀ emissions, may leave air quality effects underestimated.

Physical health and general feelings of wellbeing are interrelated phenomena. The Social Capital Benchmark Survey provides an opportunity to evaluate this interrelationship as it includes some overall measures of residents' health and happiness (see Figure C-5, Appendix C). For the study area, respondents reported overall health levels between good and very good. This is slightly lower than the value reported for all Greensboro area respondents. Only two Study Area tracts fell below that level, reporting good to fair health. The somewhat poorer reported health cannot be explained strictly by age; the study area tracts do not have a disproportionate population of elderly persons.

Respondents in the Study Area rated their overall happiness between happy and not very happy. Again, this is slightly worse than the overall Greensboro sample. There is no clear geographic pattern in these data, although it should be noted that at the tract level, the number of respondents is too small to draw any firm conclusions. These measures can be read as somewhat more subjective than government-tracked health outcomes (e.g. hospitalization rates), but still reflect important aspects of quality of life.

Social Capital Domain

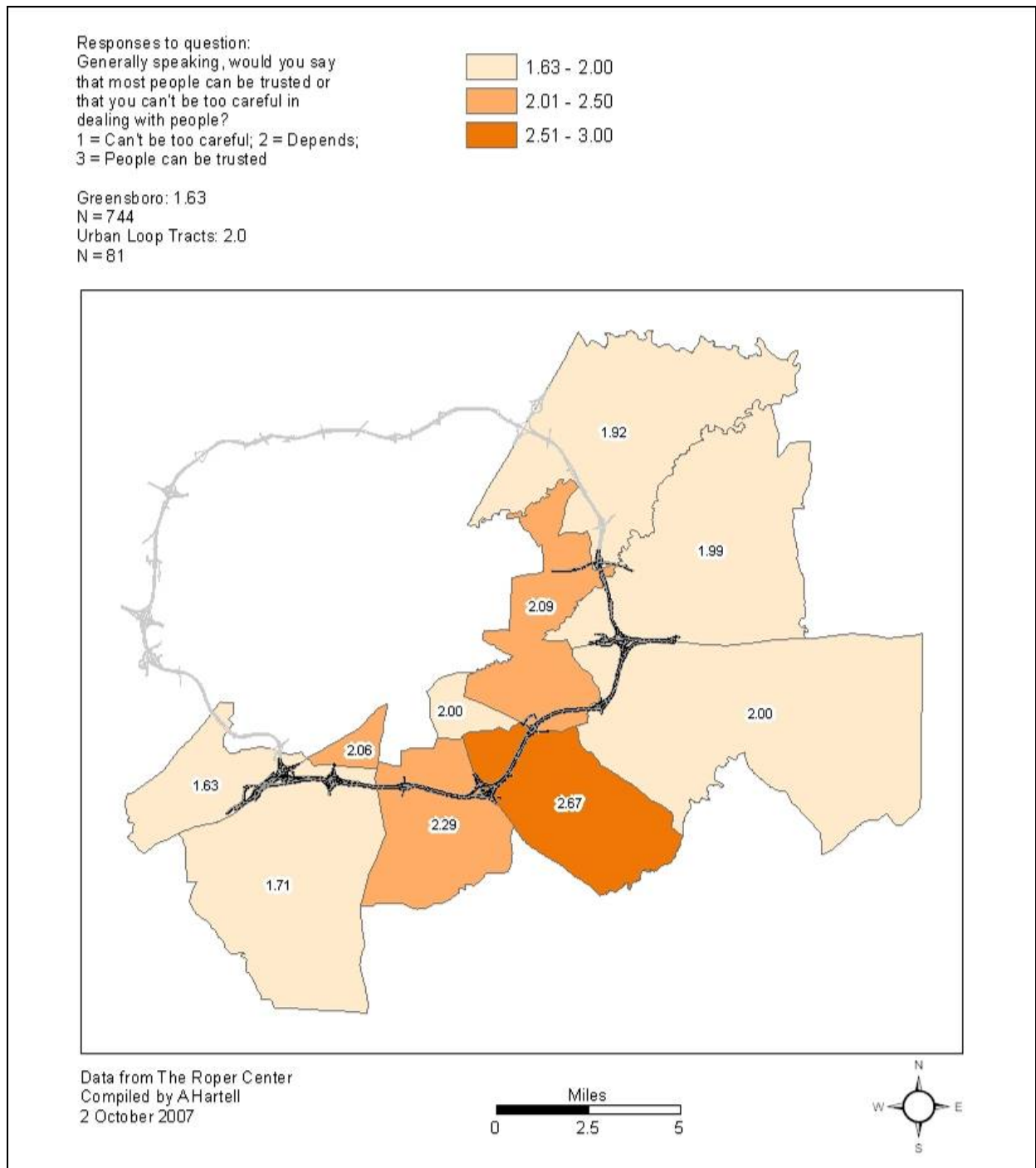
The concept of social capital is yet another important factor in the wellbeing of a community. For this study, social capital is defined as social networks that generate and support norms of reciprocity and trustworthiness.⁶⁶ These networks have value in some very material ways, such as finding a job through an acquaintance, as well as less material ways, such as feelings of belonging. Yet social capital is complex, and combines aspects of actual behavior and perceptions, both public and private activities. Therefore, this study includes more measures in this domain, in order to capture these multiple dimensions. The list of social capital measures is provided in Table 5.5.

Table 5.5 Social Capital Domain: Measures

Measure	Variable Name	Data Source	Relationship to Transportation
Social trust	TRUST	Social Capital Benchmark Survey	High and/or fast traffic and barriers to community meeting places may decrease amount of contact; demographic change brought by rapid and extensive development lowers trust.
Number of times attended public meeting	PUBMTG	Social Capital Benchmark Survey	Demonstrates collective action as evidence of cohesion and embeddedness in community; indicates propensity for attending project meetings
Length of time in current address	RESLENGTH	Social Capital Benchmark Survey	Changes to transportation system can lead to demographic change driven by changes in economy, VMT, access, etc; measure of neighborhood stability
Intent to stay in current community	STAY	Social Capital Benchmark Survey	Neighborhood stability; measure of residents' perceived value of neighborhood
Number of times had friends into home	FRIENDS	Social Capital Benchmark Survey	Transportation facilities provide access for social purposes; additional dimension of social trust
Number of times worked on community project	PROJECT	Social Capital Benchmark Survey	Transportation provides a signal to encourage/discourage investment in a community; individuals' propensity for involvement in community issues
Length of commute	COMMUTE	US Census	Can increase capacity and shorten commutes or can promote longer-distance commutes; long commutes associated with lower levels of social capital
Served as officer of community group	OFFICER	Social Capital Benchmark Survey	Individuals' level of engagement in community affairs

The cities that participated in the Benchmark Survey designed their sample size to use in city-wide analyses. Therefore at the tract level, sample sizes are too small to allow for firm conclusions. However, even this small sample size permits an exploration of how data generated from social capital surveys could be mapped and evaluated, and what it can contribute to an assessment of project effects or to improvements in the transportation decision-making process.

Figure 5.10 Urban Loop Study Area, Social Trust, 2000



The concept of trust is at the heart of social capital, defined as the social networks through which norms of reciprocity and trustworthiness develop. Social trust is a basic component of community wellbeing and cohesion. Figure 5.10 presents the responses of residents in the Urban Loop study area to a question on how much they trusted others, providing a

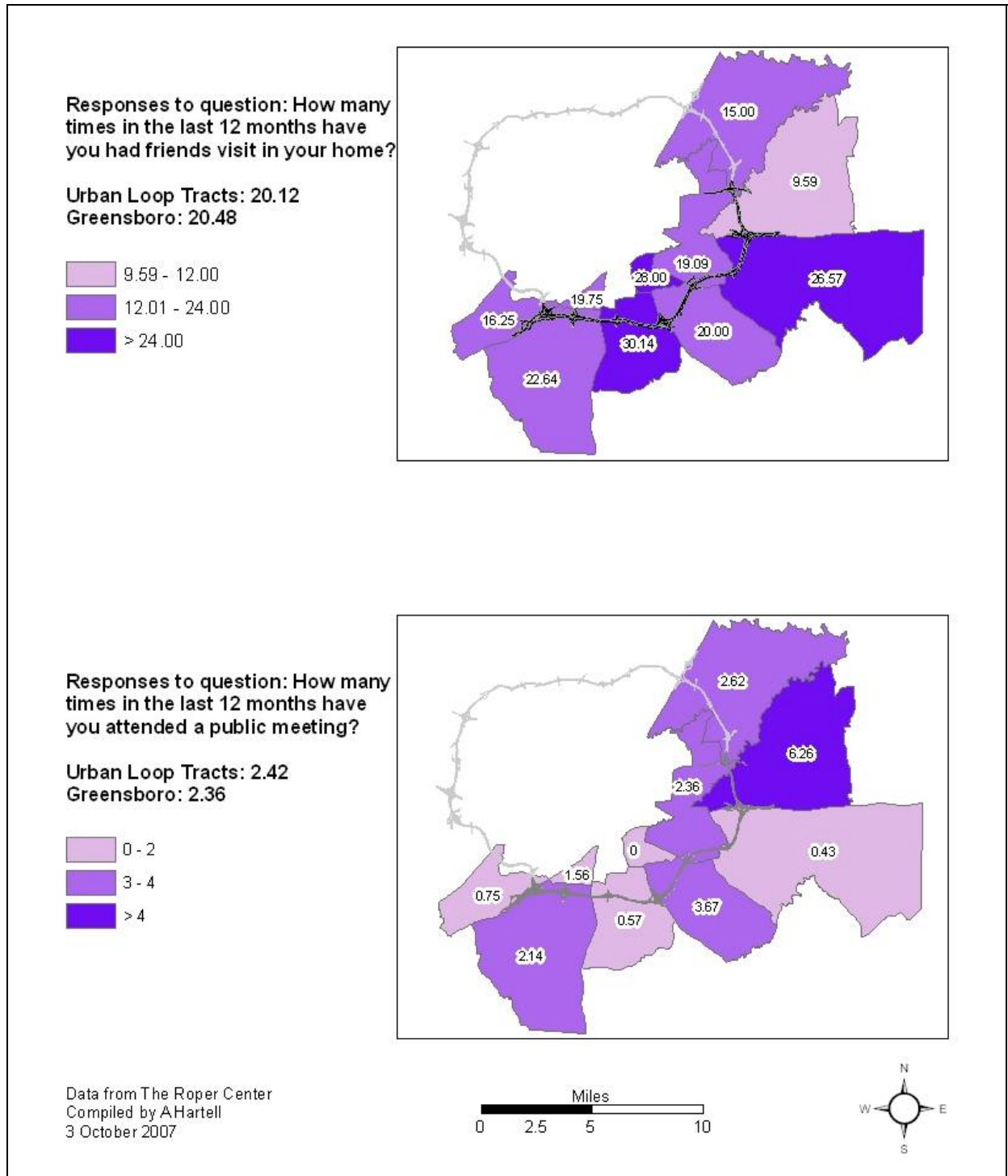
generalized measure of the level of community cohesion. This measure is reported on an ordinal scale with darker tracts reporting higher levels of trust. Most study area tracts were below the value for the greater Greensboro area.

Aside from measuring general levels of trust, the Social Capital Benchmark Survey asked about activities related to the formation and maintenance of social networks. The upper panel on Figure 5.11 presents data on the number of times in the previous year residents socialized with friends in their own homes, a measure of the level of informal, interpersonal social networking in the community. Values in the study area are very close to values for the greater Greensboro area, but there is considerable variation from tract to tract in the study area; values range from 0 to 30.14. Changes to the transportation network could increase the ease of access among residential areas, which could lead to stronger connections between people living in different neighborhoods. Alternatively within a neighborhood, an urban freeway would disrupt travel and connectivity, potentially leading to lower levels of informal socializing especially with a neighborhood.

The lower panel of Figure 5.11 presents data on how many times in the previous year residents attended a public meeting. In four of the study area tracts, the value for this measure is 0. In one tract to the west, respondents attended an average of one meeting every two months (6.26 over the year). This measure suggests that for most neighborhoods in the study area, public meetings are unlikely to be attended, and thus will not be an effective method to communicate with many residents in the study area. Knowing something about the types of community involvement activities residents already engage in can help shape a public involvement plan that will provide a broad cross-section of residents with genuine opportunity to obtaining information and provide input into the transportation decision-making process.

Additional measures consider involvement in community groups, including responses to questions on whether respondents worked on a community project or served as an officer for a community group (see Figure C-6, Appendix C). Both of these questions provide insight into respondents' level of involvement in community affairs, going beyond meeting attendance to activities that require a greater commitment of time and energy. Overall, the study area had lower values for both these measures than greater Greensboro, although several individual tracts show much higher values. Again this suggests that some areas within the study area may be more difficult to engage in transportation decision-making processes, either for project development or long-range planning.

Figure 5.11 Urban Loop Tracts, Social and Community Activity, 2000

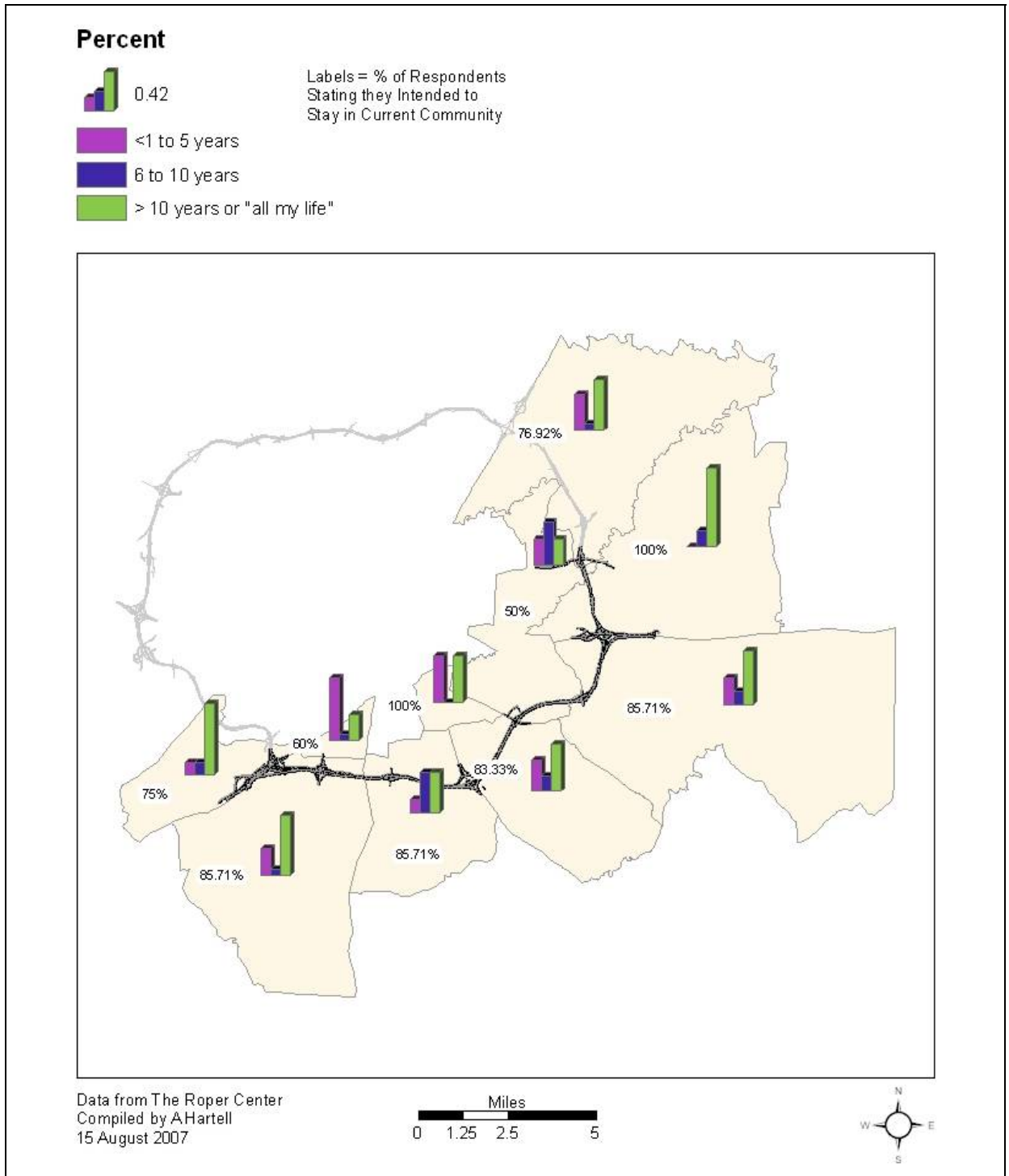


The relationship between jobs and residential locations also has important implications for commute time, which has a relationship to levels of social capital.⁶⁷ The general pattern is that a greater proportion of residents inside the Urban Loop reported commute times of less than 15 minutes (see Figure C-7, Appendix C). For most study area tracts, the majority

of commuters traveled from 15 to 30 minutes to their work place. Generally commute times in the study area are not a concern, although the Urban Loop project might encourage residents to take on very long commutes that traverse the region.

Also included in this domain are measures from the survey on the length of time respondents had lived in their current community and whether or not they intended to stay. For most study area tracts, the majority of respondents reported their intent to stay in their current community. As for the length of time respondents had lived in the community, there is considerable variation among the study area tracts, although most tracts had a high proportion of residents reporting they had lived in their community for more than 10 years or “all my life” (Figure 5.12). It is important to note that these measures do have the weakness of leaving the concept of community undefined. Respondents, therefore, could interpret the question to ask about the city of Greensboro, the southeastern and eastern part of Greensboro, their general neighborhood or an area as small as a handful of blocks. Still, these two measures, taken together do hint at a generally high level of connection to the current community, regardless of length of time persons had lived there. This indicates a level of commitment to their community that would be expected to increase interest in a major transportation projects or long-range plans, and that displacements would be resisted.

Figure 5.12 Urban Loop Tracts, Length of Residence and Intent to Stay, 2000



5.4 Cross-Domain Investigation of Two Study Area Tracts

This section provides two, tract-level examples of a cross-cutting approach to interpreting the measures. It points out areas of interaction among the measures and is especially useful in identifying areas where indirect and cumulative effects may be an issue. The two tracts selected for discussion in this section are shown in Figure 5.13. Tract 12803 is closer to downtown Greensboro and falls largely inside the Urban Loop. Tract 17100 is further from downtown and lies largely outside the Urban Loop. Table 5.6 presents the values for the full set of measures for these two tracts. (See Appendix C for map and table of measures for all Census tracts included in the case study.)

Figure 5.13 Tracts 12803 and 17100, Urban Loop Study Area

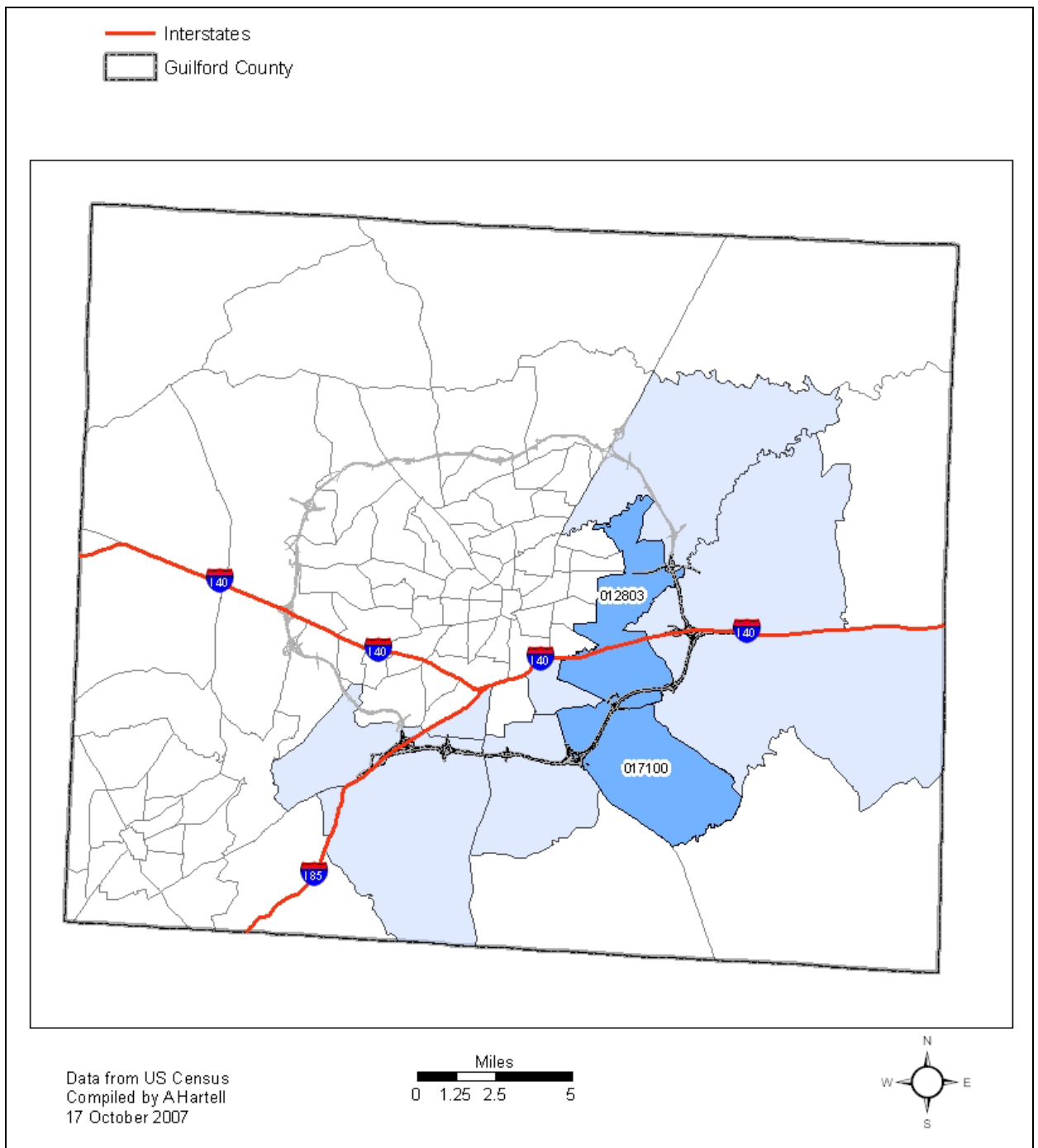


Table 5.6 Measures for Tracts 12803 and 17100

Measure	Tract 17100	Tract 12803
Demographics		
Age	18-61 (60%) >61 (18%)	18-61 (59%) >61 (14%)
Median Income (% of County Medium Income)	125-150%	75-100%
% African American Population	Less Than County Average	2 x County Average
Racial Segregation Index	0.5	0.6
Economic		
Jobs within 1 mile, per working-age person	4.5	7.9
Number of Business Loans	181	135
Value of Business Loans (per capita)	.9K	1.2K
Value of Business Loans/Capita (Excluding loans to firms with >\$1mil in annual receipts)	.5K	1K
Building Permits (Existing Structures)/1000 DU	No permits	2.3
Building Permits (New Structures)/1000 DU	No new structures	15.8
Demolitions	None	1.17
Median Housing Value	114,300	70,600
Home Purchase Loans (Average Value)	98K	113K
Refi & Home Impr. Loans (Average Value)	90K	67K
Home Purchase Loan Denial Rates (%)	20%	25%
Refi & Home Impr. Loan Denial Rates (%)	38%	52%
Property Crime Index	Low	High
Health		
Violent Crime Index	Low	High
Walkability Index	Medium High	Medium High
Levels of Happiness	Happy	Not very happy
Levels of Health	Good	Good
Air Quality Monitors		
Social Capital		
Length of Residence	Majority >10 years, large minority < 5 years	Majority 6 to 10 years
Percent that Plan to Stay	83%	50%
Length of Commute	Majority <29 minutes	Majority <29 minutes
Socialize with Friends	Medium (20)	Medium (19)
Attend Public Meeting	High (4)	Low (2)
Worked on Community Project	High (.8)	Medium (.4)
Served as Officer of Community Group	High (.8)	Medium (.3)
Social Trust	Medium to High	Medium

Tract 12803

This tract is located on the western side of downtown Greensboro and for the most part falls inside the Urban Loop. Taken altogether, the economic data suggest a healthy influx of money and investment, both in the residential and business sectors. Evidence of positive wellbeing includes:

- High ratio of jobs to working-age residents,
- Healthy business loan activity, measured by number of loans and by per capita loan value,
- Low denial rate for home purchase loans, and
- Substantial investment in the residential housing market, measured by building permits for new units and additions/improvements to existing structures.

The measures in the economic domain show some healthy investment levels in businesses in Tract 12803, with substantial values for both the number of loans and the value of loans (see Figure C-8, Appendix C). Loan values are calculated on a per capita basis, for two categories of loans reported by under CRA requirements: all business loans and business loans for firms with less than \$1 million in annual receipts. The amount of difference between these two measures helps control for the effect of a few very large loans that would likely be made to large firms, thus providing an indirect measure of the level of investment and growth in small and medium-sized businesses. The overall picture economically is of an expanding business community, which in the context of the urban loop may, in fact, be driven by the anticipation of the new roadway.

Despite these positive measures, there are some areas of concern in the measures including:

- Lowest median household income among the study area tracts,
- High violent and property crime,
- Low attendance at public meetings,
- Low percentage of residents planning to stay in their community, and
- Low levels of general happiness.

The median household income in Tract 12803 is \$40,100, the lowest among the study area tracts and below the county-wide median of \$42,600. The income level may be related to low job skills or educational attainment among the residents of this tract. Although there are many jobs available in close proximity, these jobs may be low-paying positions, or, if they are high-paying jobs, there may be a mismatch between the skills of residents and the type of jobs near by. If such a “spatial mismatch” exists, workers are unable to capitalize on the benefit from proximity to employment opportunities, including shorter commute times, lower expenditures for fuel, and more time of other activities.

The median housing value for Tract 12803 is relatively low, as expected for a lower-income tract (\$70,800), and is similar to values for other tracts of the same income class.

However, the average loan value is substantially higher than the housing value, a pattern seen in all the study area tracts except one. It is likely that many of the home purchase loans are for new structures, which have higher prices than existing housing stock. It is also possible that the average loan value is skewed by a small number of loans for properties that are priced well above the median housing value for the tract; unfortunately HMDA data do not include median loan values that would remedy this effect. A third explanation may be that new construction has somewhat outstripped demand, leaving existing housing prices, and by extension homeowner equity, stagnant. If this latter explanation is in fact the situation, the high number of building permits for new construction can be read as a negative factor for economic wellbeing for existing residents. Although these data do not offer a conclusive answer to what is exactly happening within a community they do provide information that can help a community analyst ask focused questions to local government officials/staff, community leaders and/or local developers to fully understand the community context.

Rising housing costs can put substantial economic pressure on lower-income households, and in tract 12803, there is some evidence that this is the case. Turning to the measures related to the denial rates for loans, there is considerable difference between the percent of loans denied for home purchases, and the percent denied for refinancing and home improvement loans (25% compared to 53%). While denial rates for refinancing and home improvement loans would be expected to be higher because of the greater risk associated with such loans, the difference is striking in Tract 12803. Home purchase loans appear to be originated at an acceptable rate for housing units in a rising housing market, suggesting healthy investment opportunities for incoming households and perhaps a rise in overall neighborhood quality. However, the high denial rate for refinancing and home improvement loans suggest the picture for existing residents is less rosy, and that a process of economic change and residential turnover may be at work in this tract. The relatively high level of racial segregation within the tract is a possible concern as well, although the data do not support any conclusions on whether social segregation is associated with internal economic differences.

This tract shows other areas of distress, including high property crime, high violent crime, and that only 50% of respondents to the social capital survey stated they intended to stay in their current community. The measures on overall happiness seem in line with these negative factors: residents reported that, on average, they are not very happy. Low or moderate values for the measures on community and social activity and public meetings are evidence of low levels of social capital. Overall, the measures paint a picture of low levels community cohesion, high residential instability, and general dissatisfaction.

For the practitioner, relying primarily on public meetings as a public outreach strategy is unlikely to be effective, although the other measures related to community involvement show a moderate degree of interest and experience in working on community projects and holding community leadership roles. Designing an effective public outreach plan for this Tract could include reaching out to the community organizations active at the neighborhood level and identifying the individuals, locations, and networks that the residents of this tract would recognize and be willing to work with. Special care should be

taken to consider the distribution of negative effects in the tract, given the high proportions of groups protected under Environmental Justice guidelines.

Given the evidence from the HMDA data, the project design should take care not to accelerate any processes of economic displacement that already may be underway. Designers should carefully consider the potential for land use change related to the Urban Loop. Managing and directing such changes through a robust local planning process could help ensure that changes minimize unwanted, negative effects, especially to existing residential areas. Further, given the high crime levels in this tract, designers should give consideration to physical elements to reduce the opportunity for crime, including lighting, underpasses, designs that avoid leaving small remnants of undevelopable land and promoting positive activity on nearby streets, such as attracting pedestrian traffic.

Tract 17100

Tract 17100 lies mostly outside the urban loop and covers some suburban areas to the southeast of the central city. The population of this tract is slightly older than other tracts in the study area, and a median household income of almost \$58,800, the second highest among study area tracts. This tract is very homogenous in race and ethnicity, with 91% White population. The small number of minority residents are, however, more evenly distributed through the tract; the segregation index is lower than most of the tracts in the study area at .5.

There is evidence of positive aspects of community/social wellbeing in this tract including:

- Low property and violent crime,
- Low home purchase loan denial rate and low refinance/home improvement loan denial rate,
- Substantial business loan activity, although more funds to larger firms,
- High values for community involvement,
- Highest value for social trust among study area tracts, and
- High percentage of residents intend to stay in community.

Interestingly, the average home loan value in this tract is below the median housing value. This is likely an income-related effect, with higher income households able to make a substantial down payment when purchasing a home. Adding in the measure of no building permits for new residential structures, housing prices for existing homes may be facing less competition on the housing market. There is a relatively small difference between the loan denial rates for home purchase compared with refinancing/home improvement loans, further evidence of stability on the housing market.

The lack of new structures does not seem to indicate any undesirability of Tract 17100 for residential housing; median housing value is the highest among the study area tracts at

\$114,300. Satisfaction with neighborhood quality is further evident in the measure of respondents who report they wish to stay in their community, at 80%. Certainly a factor in the positive aspects of neighborhood quality is the low crime rate, which may also play a role in the higher values for the social capital and overall health and happiness measures.

Looking across the measures for this tract, there is little that indicates negative aspects of wellbeing. Rather the overall picture is one of stability, satisfaction, cohesion, and community engagement. The Urban Loop project, however, has the potential to destabilize some aspects of community wellbeing in this tract. The project is likely to open up new areas for suburban development, with effects on the housing market, potentially bringing and influx of newcomers and associated demographic change. From a process standpoint, residents of Tract 17100 can be expected to be more easily reached through traditional public meetings, and the tract shows a history of interest in community issues and a high level of community involvement. The energy and involvement in this tract could be an asset to expanding and organizing outreach efforts, or developing working groups for project development or long-range planning issues.

In summary, the study area for the Urban Loop exhibits considerable differences among tracts. Including multiple measures broadens the context and points up some areas where more detailed analysis could be useful. Still, the measures provide valuable information about the human context of the project. The differences seen within the study supports the development of a flexible, multi-pronged public outreach strategy that recognizes the differences in the way different tracts (or neighborhoods) function and interact. Further, the more detailed contextual information highlights the need for a multidisciplinary team for project design that can address the differences among the tracts and give closer analysis to effects and outcomes.

Preliminary Pre- and Post-Project Comparisons

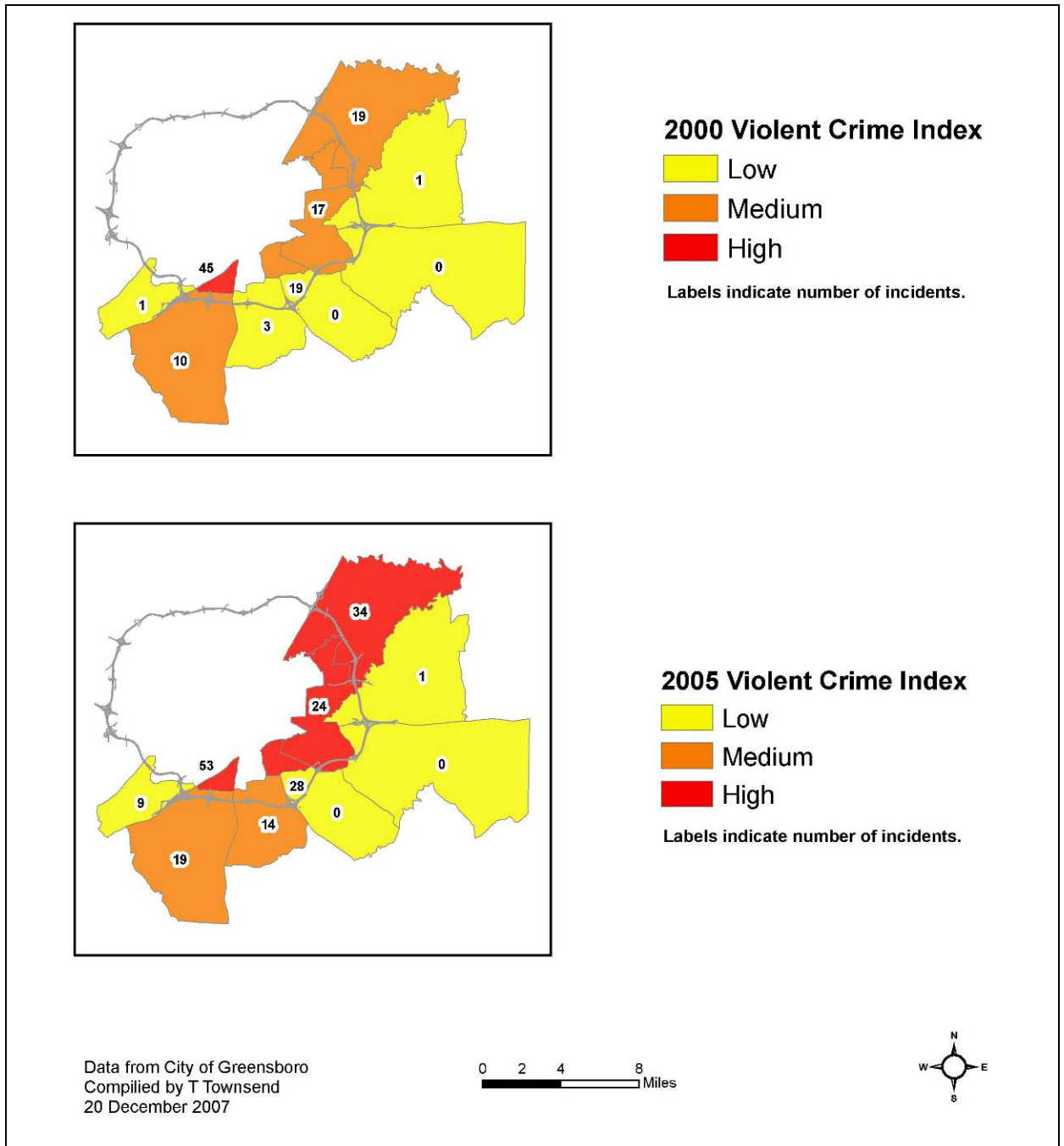
Although most of the measures used in the case study were not available for post-project years, this section describes some of the changes in the study area tracts using variables that were available for years 2000 and 2005. Time series data are presented for:

- Violent and property crime,
- Home mortgage loan denials, and
- Air quality.

Violent crime in the study area tracts increased by 61% from 2000 to 2005, an addition of 70 incidents. Figure 5.14 compares the violent crime levels for 2000 and 2005.

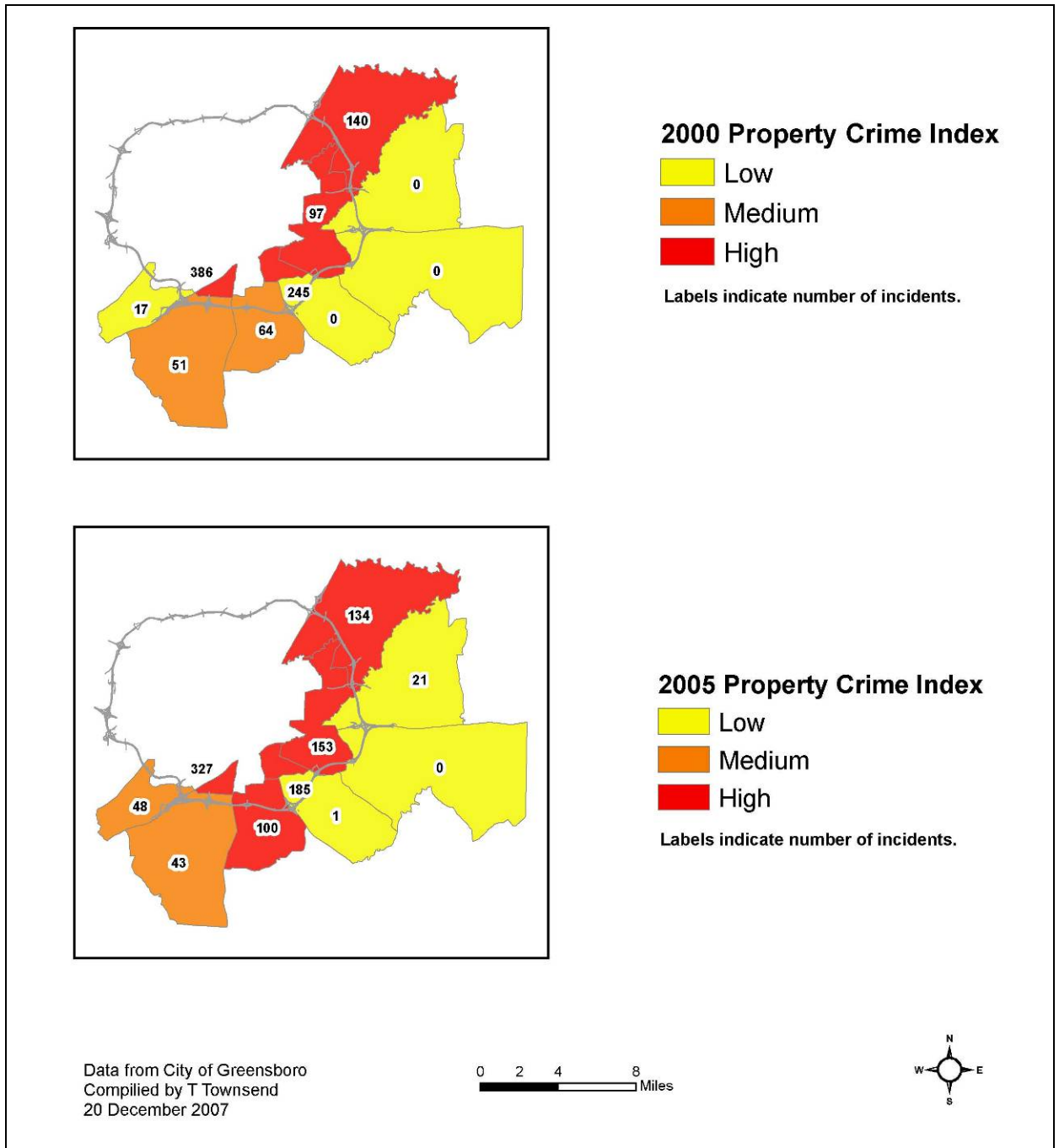
Three tracts moved from a classification as medium-crime tracts to high-crime tracts; two tracts moved from a classification as low-crime tracts to medium-crime tracts. These increases cannot, of course, be attributed solely to the Urban Loop project. Increases in the number of incidents of violent crime are related to general increases in population, and a host of social and environmental factors. However, there is some indication that for some study area tracts, a basic quality of life factor has deteriorated.

Figure 5.14 Urban Loop Study Area Violent Crime, 2000 and 2005



An examination of the point data for violent crime shows that most incidents in the study area are inside the Urban Loop, close to the Central City. No discernible change in this pattern is seen for the years 2000 through 2005. Based on this information, it is unlikely that the Urban Loop has a causal connection to the increase in violent crime. There could, however be a connection to increased population and development related to the Urban Loop that provides additional opportunities for criminal behavior. It is not possible to determine if this is the case from the data available.

Figure 5.15 Urban Loop Study Area Property Crime, 2000 and 2005

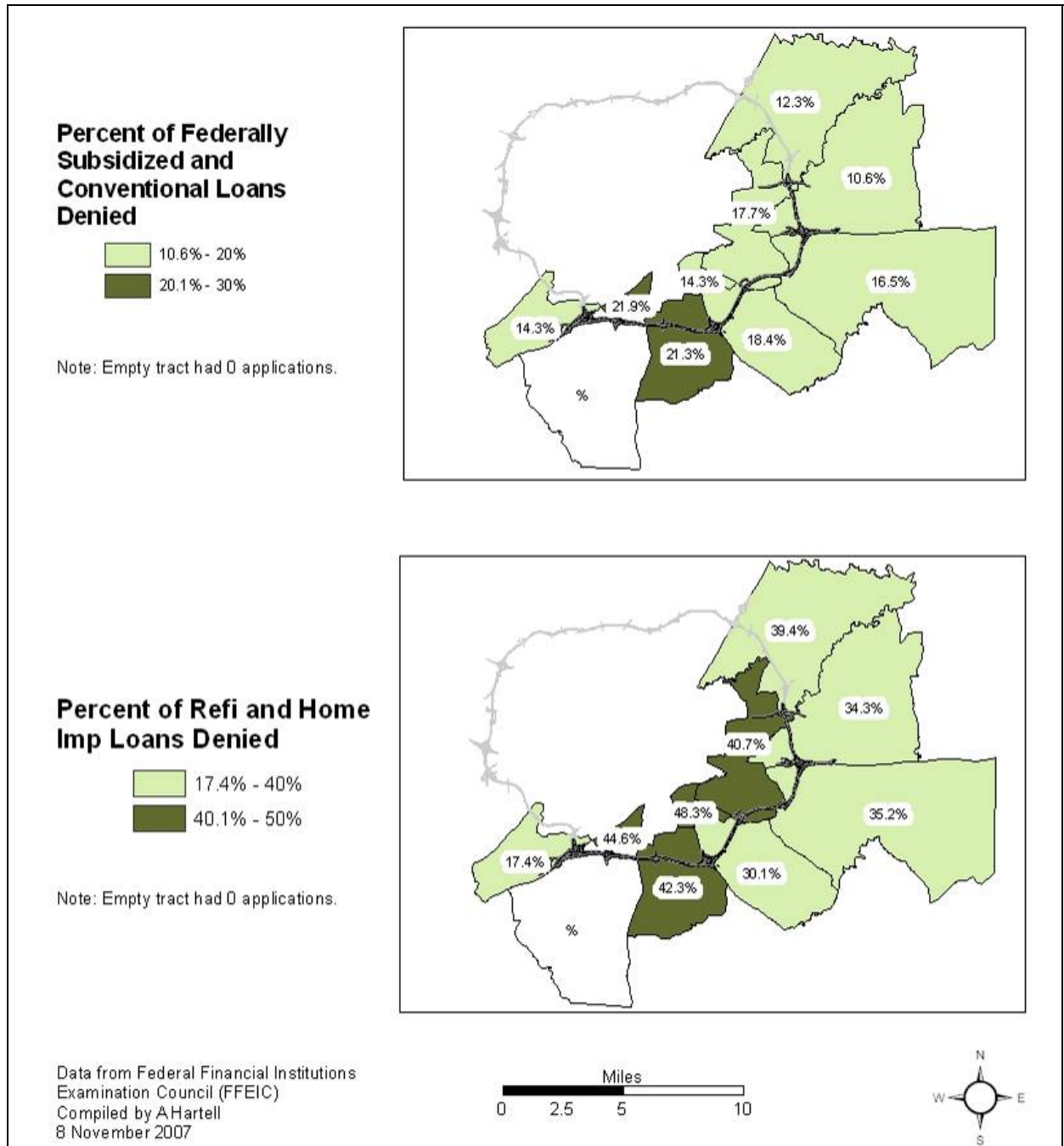


Compared with violent crime, there was a much smaller increase in property crime incidents of only 1.2%, an additional 12 incidents across the study area tracts. Figure 5.15 presents the property crime levels for 2000 and 2005. One tract moved from low-crime to medium-crime classification; one tract moved from medium- to high-crime classification.

Home Mortgage Denials

The loan denial rate for home purchase loans declined in every Census tract except one in the study area (see Figure 5.16). This may reflect stabilization in the housing market and households' economic situations. Denial rates for refinancing loans and home improvement loans, however, remained high in most tracts, especially in tracts inside the Urban Loop. This evidence of household economic stress remained in 2005; the housing finance situation did not appear to change for existing residents (compare Figure 5.5 for 2000 values).

Figure 5.16 Urban Loop Study Area Loan Denial Rates, by Census Tract, 2005



Air Quality

As mentioned in Section 5.2, there were no requirements to monitor particulate pollutants when the EIS for the Urban Loop project was developed. Although Greensboro was generally in compliance with federal air quality standards, levels of PM_{2.5} have been very close to the national standard for the years for which data are available (2002 through

2005).⁶⁸ These pollutants are considered to be particularly hazardous for children. Given that the Urban Loop project places another major roadway close to an elementary school, an analysis of pre-project conditions, evaluating localized air quality conditions near the school would help evaluate the physical health effects of the project on a near by, vulnerable population.

In order to investigate whether the Urban Loop project had negative health effects, countywide health outcome data were examined. These data show no evidence that the Urban Loop project led to an increase in the hospitalization rate for children (or adults) with asthma. Asthma hospitalization rates for children aged 0 to 14 years of age in Guilford County were below the statewide rate both pre- and post-project, although data at the localized scale might show a different pattern.⁶⁹ North Carolina also has an overall pattern of lower asthma hospitalization rates in urban areas than in rural areas, and Guilford County's higher median income may also have an effect on this rate; higher income households may receive more consistent health care that better manages chronic disease such as asthma.⁷⁰ Hospitalization rates can also be influenced by other air quality measures such as vehicle inspection programs, natural environmental factors such as wind patterns or topography, or public health programs.

While the analysis done for the Urban Loop project could not take advantage of today's knowledge of the connections between air quality and physical health, going forward greater attention to localized air quality effects by considering their impact on specific populations could result in better assessment of this major quality of life factor, and can take into account cumulative effects of additional roadways. From the planning perspective, this topic highlights the potential to better coordinate school planning with roadway planning.

5.5 Conclusions

The application of the full set of measures to the Urban Loop study area revealed considerable detail about community/social wellbeing. The social capital dataset in particular brought new elements into the analysis which have application to both transportation process and outcomes. This dataset constitutes a unique source of information on community function and how practitioners can increase the effectiveness of their public outreach work as well as address issues of community cohesion through quantitative approaches. The economic data used allow for a more detailed analysis of household-level economic wellbeing as well as investment flows by construction and business loans, into the study area. The data on physical health bring consideration of the connections between the physical environment and physical health into the analysis and also provide additional information on other factors related to health. Taken together, the breadth and depth of the data greatly expand and enrich an analysis based only on basic demographic data. Of course, causality cannot be determined between these measures and the Urban Loop project, but the measures allow for some comparison of factors of

quality of life that can continue to be tracked over time to investigate whether these factors decline or improve.

The preliminary examination of some pre- and post-project data provides clues into some aspects of community/social wellbeing in the Urban Loop study area. The increase in violent crime and the continuing differential in mortgage denials for incoming versus existing residents suggest that the Urban Loop area continues to have quality of life issues.

The changes in crime levels from 2000 to 2005 hint at some potentially worrisome patterns that merit closer investigation. A time series analysis of crime data is the best approach to further investigation. As crime is a very complex phenomenon, subject to influence from many factors, the number of incidents can oscillate from year to year. Therefore trend line analysis would be an appropriate method of analysis.

Other measures are also well suited to time-series analysis. For example, trend analysis of home mortgage data and business loan data can better show long-term patterns of investment flows and perhaps reveal patterns related to other measures to explain the differential in loan denial rates for current and incoming residents.

The Greensboro Urban Loop provided the opportunity to apply the framework to an actual project and to work with real world data. The case study was an exercise in testing the feasibility and utility of using a broader range of data sources drawn from a theoretical framework of community/social wellbeing. It also allows for identification of specific improvements to practice. Drawing on the lessons learned from the case study exercise, the next chapter describes suggested improvements to current methods for assessing social, cultural, and economic effects of transportation projects.

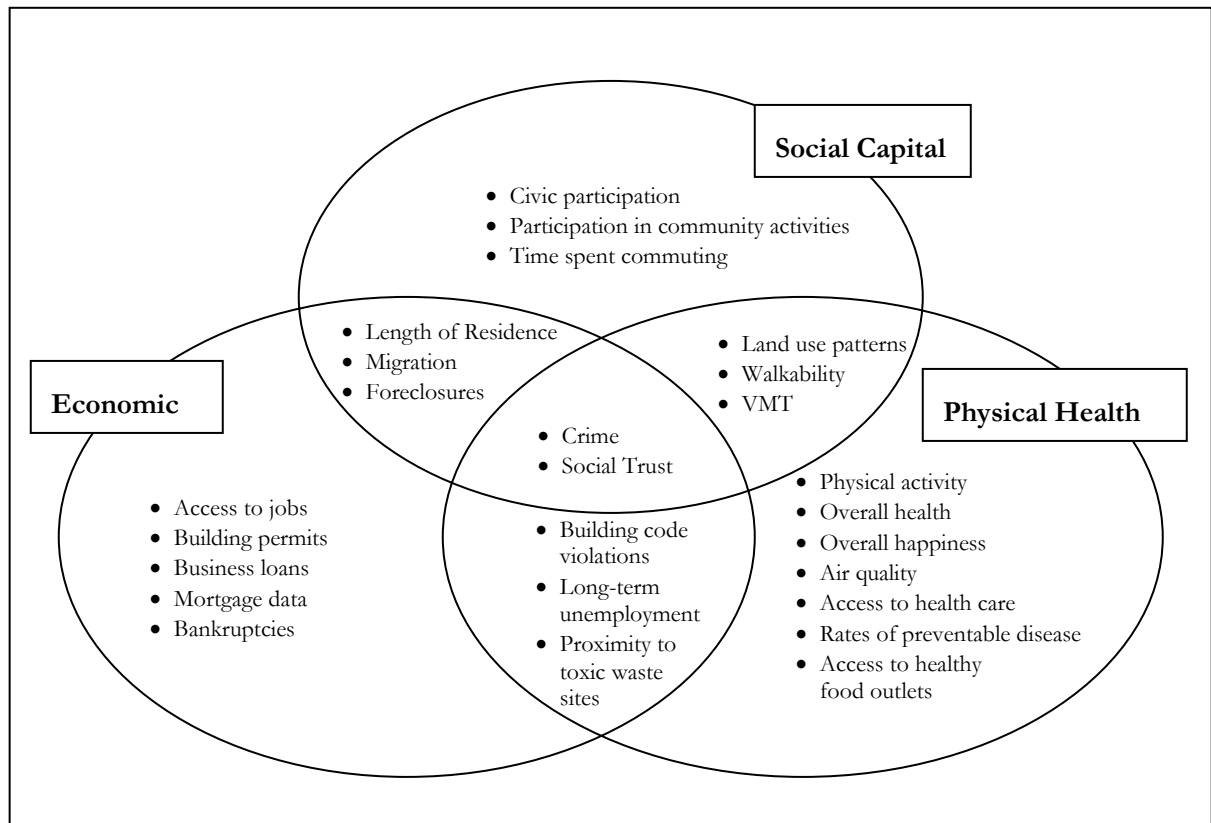
6.0 Immediate Improvements to Practice

Within the transportation profession, evaluating and assessing the effects of transportation projects on a community and its quality of life is known by different terms but the Community Impact Assessment (CIA) process is most commonly used by state departments of transportation (DOTs). While there is guidance and a national course available that describes both qualitative and quantitative analysis techniques for evaluating community effects, most state DOTs rely on public comments collected via public meetings to identify community interests and needs. As described in Chapter 2, most measures of wellbeing currently are derived from public input and often are not systematically integrated into the decision-making process.

Advancements in assessment methods have been made in evaluating economic, land use, sensory, and aesthetic issues, but socio-cultural and health considerations have seen the least improvement in methods for predicting actual effects. Health research is making great strides in understanding the links between physical health outcomes and transportation infrastructure; however, there is still a lack of rigorous research that provides robust correlations between transportation policy/projects and health outcomes. While even less rigorous research is available regarding the effects of transportation projects on a community's social wellbeing, the results of this research project still can be used to identify key variables of social wellbeing and provide an overall framework that can be utilized by practitioners as part of transportation planning and project development.

The first step in evaluating effects of transportation projects on social wellbeing is to understand what variables combine to create a strong, vibrant, functioning community. Based on an extensive literature review of current transportation practice, combined with an interdisciplinary review of approaches to social/community wellbeing, a framework of measures is proposed to help an analyst design an analysis to assess the wellbeing of a community (Figure 6.1).

Figure 6.1: Conceptual Framework for Community/Social Wellbeing Indicator



Current transportation practice has relied heavily on anecdotal information collected through public meetings to understand community/social wellbeing and subsequent community issues and needs. Census data on race, income, educational attainment, homeownership rates and length of residency are all traditional data sources that have been used to understand community characteristics, but simple tabulations from these data sources leave practitioners with little insight into the actual wellbeing of a community. This research project sought to identify new measures and new data sources to help practitioners identify areas of concern such that transportation projects do not impose additional stressors. These measures were applied to a case study using real-world data to evaluate the practicality and value of the framework, and bring to light the opportunities and challenges that the measures and methods are likely to present to practitioners. These proposed measures provide a quantitative source of information that practitioners can use to supplement more qualitative assessment approaches. An assessment of community impacts always will depend on meaningful outreach and engagement strategies to fully understand community interests and needs; however, relying exclusively on qualitative methods can lead to information that is driven by a vocal minority or is dependent on budgets that may not provide adequate funding for appropriate levels of public outreach. As such, implementing methods of assessment that partially rely on quantitative measures to augment public involvement represents a feasible step that easily can be taken by transportation agencies.

The improvements to practice illustrated in Chapter 5 and summarized in the remainder of this chapter focus on the process of evaluating community/social wellbeing. This report suggests improvements that will help practitioners improve their processes for understanding community/social wellbeing, including how to focus their qualitative efforts to develop meaningful and effective recommendations as part of planning and project development.

Three categories of methodological improvement are recommended for immediate implementation:

- Analyzing traditional data sources in new ways,
- Adopting data used by other disciplines, and
- Utilizing new data sources available from non-traditional sources.

The benefits from implementing these additional quantitative assessments include the following:

- *Improved Community Data:* New measures focus on quality of life issues in a format appropriate for use in quantitative analyses. Quantitative measures and data sources broaden the citizen input to include a more representative cross-section of the community than is available from anecdotal data collected at public meetings.
- *Improved Decision-Making:* The measures are appropriate for time-series/trend analysis to better describe changes over time, which supports the development of benchmarks.
- *Effective Public Involvement:* The measures provide useful information for design of public outreach efforts.
- *Flexible Design:* Evaluation of the measures can identify vulnerable areas in which design choices can minimize and/or mitigate continued declines. In the reverse, vulnerable areas that would benefit from improved mobility and access can be identified for consideration.
- *Streamlining:* The measures provide a robust screening tool to streamline field work efforts including selection of interviewees and development of questionnaires.
- *Avoidance of Impacts:* The measures can identify strong vibrant communities that could be severely affected by transportation actions and ensure that projects do not create barriers to continued community health and wellbeing.
- *Partnerships:* The measures can help identify other agencies and organizations that would be interested in partnering to help improve community wellbeing.
- *Visualization:* Data and information can be presented and spatially displayed to help a community assessment practitioner explain to other decision-makers how well a community is functioning and identify hot spots or areas of concern.
- *Performance Measures:* The study provides insight into measures that could be utilized by transportation agencies desiring to develop quality of life benchmarks and performance measures for advancing sustainable transportation strategies.

This research effort represents only an incremental step in improving methods to assess community effects and quality of life considerations as part of the transportation planning and project development process. It does not take the additional steps of providing conclusive evidence of causal relationships between projects and particular effects. At this time, there is only limited research available that directly links social effects to transportation infrastructure. This is a complex and costly undertaking due to the interconnectivity of many variables. However, this research effort does provide insight into measures that are likely to provide an improved understanding of potential community impacts, if applied in pre- and post-project studies.

“The federal government’s perspective is increasing interest in performance measures. Practitioners need off-the-shelf data, robust measures, and real-time indicators to use as evaluation tools for policy and to track trends.”

--George Galster

The information presented in this report can be used to assist the practitioner with a better understanding of the variables that define social wellbeing. This information is particularly useful to the National Environmental Policy Act (NEPA) practitioner as part of the scoping process and can be useful for identifying mitigation strategies. Planners can benefit from this information as part of understanding community characteristics and identifying transportation needs.

Although we cannot yet accurately predict exact outcomes associated with a specific transportation project, we do have enough history to know that projects can influence changes within communities. As such, transportation practitioners should do their best to identify vulnerable communities such that transportation actions do not become the “straw that breaks the camel’s back”. This is similar to the charge of analyzing indirect and cumulative effects (ICEs) in that the transportation project may not in and of itself cause the effect but, when combined with other forces and variables, nevertheless creates an effect. Communities are and will always be more than the sum of their parts; therefore, transportation practitioners should strive to understand community characteristics and educate others to the possible consequences of community effects, even if those actions are beyond the full control of the sponsoring (transportation) agency.

6.1 Analyzing Traditional Data Sources in New Ways

One improvement is to conduct additional analyses using data sources that already are available. Two examples are described: the use of indices of racial segregation using standard demographic analysis techniques, and conducting localized or small area air quality assessments.

Racial Segregation Index

Under Executive Order 12898, transportation agencies are required to consider whether the costs or negative effects of any project/program that receives federal funding are borne disproportionately by minority or low-income persons.⁷¹ The traditional approach to doing this has been to calculate the percentage of the county population that falls into any of the protected categories as a reference value, and then compare that value with the percentages for each group in the study area to determine if the proportions in the study area are “disproportionately higher” than the values in the reference area. Conceptually simple, this approach requires some assumptions that can have substantial implications for the findings of the analysis. One of the criticisms of this approach is that it can lead to situations where a project is located such that it brings negative effects to an area with a lower proportion of population in a protected group, but a higher actual number of persons of a protected group in order to avoid an area with a high proportion but lower actual number of persons of a protected group. Therefore it is helpful for practitioners to consider both percentages and actual numbers of persons, as well as to identify pockets of protected populations at a small geographic scale.

One approach is to use a segregation index that evaluates the degree to which Census tracts are internally segregated by race and ethnicity. The segregation index provides a balance to proportional indices as it is based on number of persons, not percentages of the population.

Segregation is a factor in considering a project’s effects on community cohesion. However desirable racial integration may be for a host of social, economic, and ethical reasons, ethnic and racial homogeneity in a neighborhood has been shown to be associated with higher levels of cohesion. An analysis using the 2000 Social Capital Benchmark Survey data showed that the degree of racial and ethnic homogeneity in a city is associated with higher levels of social trust while locations more heterogeneous populations reported lower levels of social trust.⁷² The reasons underlying this relationship are unclear, perhaps because the factors that lead to high levels of social trust are not clearly understood. The results of that study do suggest, however, that higher community cohesion would be expected in areas with high segregation indices; that is, areas where a greater number of residents’ immediate neighbors are of the same ethnicity or race. Therefore, careful consideration should be given to disrupting such communities. It is interesting to note that the pattern of greater racial/ethnic homogeneity and higher social trust does not seem to hold for the case study tracts where tracts with high levels of social trust are not necessarily racially homogenous or highly segregated. This may be explained by the very small sample size at the tract level, or may be evidence of other factors at work in this particular community.

For the case study, the information derived from combining the percentage African-American population with the segregation index allows for the identification of tracts that have an internal concentration of this population group. Using this approach early on can help highlight areas where particular attention to negative effects will be needed, including possible mitigation strategies in order to avoid Environmental Justice

complaints. Public outreach plans for highly segregated areas should include approaches and locations that will be accessible and comfortable for groups that may be quite distinct, and may function as separate communities although they live in close proximity.

Air Quality

Air quality is an important component of physical wellbeing, with children (especially those with asthma), infants, and elderly persons (who are more likely to have heart, lung or other diseases) particularly vulnerable to negative health effects of the monitored pollutants.⁷³ For transportation agencies, the requirements related to air quality standards require highly technical analyses and modeling, and compliance with complex and stringent regulatory requirements. At its heart, concern about air quality is concern about effects on physical health, an important aspect of quality of life. Therefore practitioners evaluating effects on communities of projects or programs should consider whether the approach to satisfying legal requirements for air quality evaluation will fully address potential health effects. One area of consideration can be the locations of air quality monitors and whether they accurately capture potential effects, especially for vulnerable populations. Greater attention to localized air quality effects that is focused on considering impacts on specific, vulnerable populations could result in better assessment of this major quality of life factor, and can take into account cumulative effects of additional projects. From the planning perspective, this topic highlights the potential to better coordinate planning of facilities that will be frequented by vulnerable populations (e.g., schools, hospitals, and housing for the elderly) with transportation planning.

6.2 Adopting Data Used by Other Disciplines

A second easy implementation step is to utilize data already being collected from other sources, even though these data sources have not traditionally been used in transportation impact assessments. Three sources of data, including home mortgage data, business loan data, and crime statistics, are described below.

Home Mortgage Data and Business Loan Data

Transportation practitioners have long considered the rate of home ownership to be an indicator of community cohesion. Compared to renters, those who own their homes are considered to be more likely to remain in the neighborhood and work collectively to defend the neighborhood from exterior threats, motivated by the desire to protect their investment as well as maintain quality of life. Yet there are additional and far richer data available which can be used to capture economic wellbeing at the household level.

The federal government has extensive reporting requirements for lending institutions, yielding data that are updated annually, publicly available, and at relatively fine

geography (Census tract). Similar reporting requirements exist for business loans, allowing analysts to consider levels of investment in new and existing businesses along with investment in the housing market.

The value of home mortgages is a good proxy for neighborhood quality, as perceived both by those borrowing funds to move to a neighborhood and by those lending funds who to some extent take the value of the neighborhood as collateral. Considering the loan denial rate and reasons for loan denial helps to develop a more complete economic picture at the household level; considering income alone only provides a rough proxy for the economic condition of households and does not capture conditions of economic stress within households except for those considered to be low income. These measures are particularly useful as time series data. Tracked over time, mortgage and business loan data can inform the long-range planning process about neighborhood progress or deterioration, pointing up areas in need of support through coordinated land use, economic development, and transportation planning. These data can also provide information on whether neighborhood value and business investment respond to transportation investments and, with further research, may help define the temporal limits of such responses.

Crime

Crime and perception of crime are important factors in community/social wellbeing. Whether actual or perceived, high crime negatively affects all domains of wellbeing. It affects economic wellbeing through effects on property values and attractiveness to businesses and customers, and physical wellbeing through actual physical harm or stress related to fear of harm for self or family members. It also is likely to affect social capital by leading to decreased social trust and possibly discouraging interpersonal interactions by limiting willingness to venture out of the home.

The complex social factors involved in violent crime make it difficult to isolate connections between transportation infrastructure and criminal activity. However, an area with higher violent crime may be difficult to engage in a public outreach process and may benefit from extra attention to environmental design to discourage criminal activity. If practitioners can locate areas with higher crime, they have additional information to use in developing public outreach strategies and can perhaps point up areas where designers can carefully consider lighting and changes to levels of access or isolation of neighborhoods or uninhabitable remnants of land that may be associated with opportunity for crime. This variable is best analyzed using a time series approach to identify trends.

6.3 Utilizing New, Non-Traditional Data Sources

A third potential improvement is to utilize newly collected data, typically available from non-traditional transportation sources. These new data sources include measures of walkability and data from on-going surveys of Social Capital. Each is described below.

Walkability

In recent years, transportation agencies and practitioners have given greater attention to pedestrian issues, supported by local demand for pedestrian facilities and federal “enhancement” funds that can be used for pedestrian and bicycle facilities. With the rising interest in connecting physical activity with the built environment as a way to address obesity, promote active living, reduce emissions, and provide alternatives to auto travel for our aging population, considering how a project will affect the extent to which the built environment serves and even promotes travel by nonmotorized modes should be a priority for practitioners.

A number of researchers have constructed complex indices of walkability and/or bikeability that capture a range of safety, comfort, and aesthetic factors. Measures used have included roadway width, traffic volumes and speeds, length of blocks, presence and condition of sidewalks and/or bike lanes, adjacent land uses, mix of land uses, site design adjacent to the roadways, and architectural characteristics. While studies using complex measures provide important clues to the environmental characteristics that make a community “walkable” or “bikeable,” at this point they remain primarily in the research arena because they require measures that are not generally collected and maintained. For example, only in recent years has it become common for municipalities to maintain basic sidewalk inventories. Therefore this report describes a simple walkability measure that can be derived from a typical Geographic Information Systems (GIS) coverage of a street network.

Beyond this, long-range planning agencies can develop comprehensive sidewalk inventories that also include data on other pedestrian infrastructure elements such as signals, sidewalk condition, and lighting fixtures. Such inventories should include data fields on the installation year for each element. Complete inventories will allow for better tracking of lifecycle costs, maintenance needs, and greater pedestrian system connectivity. Tracking such data will also expand the opportunities for careful, empirical evaluation of the effects of pedestrian infrastructure on physical wellbeing, which will continue to improve methods of assessing the effects of transportation project on physical wellbeing.

Social Capital

In the area of emerging new data sources for assessing community/social wellbeing, the *Social Capital Benchmark Survey* and subsequent follow-up surveys provide a promising opportunity for transportation impact assessments. Developed and managed by the Saguaro Seminar, a policy research initiative at Harvard University’s Kennedy School of Government, these surveys are consistent, professionally-administered approaches to collecting time series data on social capital that can be used to inform public policy by expanding the use of quantitative analyses of social wellbeing. The Benchmark Survey was conducted in 2000 and included a stratified sample to collect statistically valid samples from some 30 cities as well as a nationwide random sample. A number of cities administered a shorter, follow-up survey in 2006 and plan to continue these surveys on a

periodic basis to track conditions over time. Table 4.1 shows the communities that participated in the 2000 and 2006 social capital surveys. The 2006 survey included some of the 2000 participants along with some new communities. The 2006 survey ran in two waves. Wave 1 ran from mid-January to late April, 2006 and covered 14 communities. Wave 2 ran from May to August, 2006 and covered 8 communities. The 2000 data are available to the public domain for evaluation and analysis (although the publicly available dataset is not geocoded below the county or metro level) the 2006 data are also slated for release to the public domain.

For development of transportation projects, the instrument could be used to assess community cohesion within a project study area for direct use in a project-specific analysis. Given the level of interest in social capital among researchers and community organizations, there is a real potential for partnering with other entities to share the cost of data collection and analysis. Such partnerships could benefit the transportation industry in the short term by providing consistent and comparable quantitative data to use in long-range planning and National Environmental Policy Act (NEPA) processes. Social capital data can also provide clues as to how to design an effective and inclusive public outreach process, whether for a specific project or for a long-range planning effort. Long-term benefits include the potential to analyze the direction and magnitude of social effects from transportation projects through the use of benchmarking and subsequent time series surveys to evaluate post-project changes. Such studies can lead to better understanding of the kinds of benefits and costs related to transportation projects and programs, which should inform project and program design. Over time, communities will benefit as well: projects and programs will better fit their complex, interactive community contexts.

“Social aspects tend to get ignored, so people find another way to stop projects, another legal mechanism.”

--*Louise Fragala*

Community analysts can take immediate advantage of available data from the Social Capital Community Benchmark Survey on the civic engagement of Americans in 2000 and 2006, although partnership with the sponsoring agency and/or data agreements are required for use of the geocoded dataset.⁷⁴ While data from social capital surveys are currently available only for a limited number of communities, the survey instrument and guidelines for administering it are available to any transportation agency or practitioner. The Saguaro Seminar has distilled the 25-minute Social Capital Community Benchmark Survey into a Short Form that has 5-10 minutes of questions (see Appendix D for survey instrument). Thus, Metropolitan Planning Organizations (MPOs) and state departments of transportation (DOTs) have a ready tool that could be easily folded into other data collection efforts that underpin long-range planning including travel diaries, transit user surveys, or other surveys conducted for program development or marketing. For locations that participated in the 2000 and 2006 survey efforts, existing data could be synchronized with long-range transportation planning updates for many DOTs and MPOs, with the 5 to 6 year time series pattern extended into the future for subsequent planning updates. The common interests of Community Development Corporations (CDCs), which seek regular evaluation of their community programs, and long-range transportation planning agencies, which routinely engage in community visioning and must coordinate

transportation plans with other planning and visioning efforts, point towards a natural partnership for collecting, maintaining, and analyzing social capital data.

The long-term collection of social capital data by transportation agencies can assist with identifying communities that may be vulnerable to actions that could compromise their community/social wellbeing. These data can be used for transportation policy decisions at the long-range planning phase and during project development when an analyst must evaluate the effects of a transportation action as part of a NEPA analysis. In addition, time series data can provide a rich resource to researchers attempting to more fully understand the causal relationships between transportation investment and community/social wellbeing. Consequently, the practice of community impact assessment can be further improved to assist transportation agencies with their efforts to plan, design, build, operate, and maintain transportation infrastructure.

Table 6.1: Communities Participating in Social Capital Surveys

Participating Communities	Participated in 2000	Participated in 2006
Phoenix: Arizona Community Foundation	Yes	No
Atlanta: Community Foundation for Greater Atlanta	Yes	No
Baton Rouge: Forum 35/Baton Rouge Area Foundation	Yes	Wave 1
Birmingham : Community Foundation of Greater Birmingham	Yes	No
Boston Foundation	Yes	No
Community Foundation Serving Boulder County	Yes	No
Los Angeles: California Community Foundation	Yes	No
Charlotte: Foundation for the Carolinas	Yes	No
Syracuse: Central New York Community Foundation	Yes	No
Chicago Community Trust	Yes	No
Greater Cincinnati Foundation	Yes	No
Cleveland Foundation	Yes	No
Delaware Division of State Service Centers/ Delaware Community Foundation	Yes	No
Denver Foundation/Rose Community Foundation/Piton Foundation	Yes	No
East Tennessee Foundation	Yes	No
Fremont Area Community Foundation (Michigan)	Yes	No
Grand Rapids Community Foundation, Michigan	Yes	No
Community Foundation of Greater Greensboro , North Carolina	Yes	Wave 1
Greater Houston Community Foundation, Texas	Yes	Wave 1
Indiana Donors Alliance	Yes	No
Greater Kanawha Valley Foundation, West Virginia	Yes	No
Kalamazoo Community Foundation	Yes	Wave 1
Lewiston-Auburn: Maine Community Foundation	Yes	Wave 1
Montana Community Foundation	Yes	No
New Hampshire Charitable Foundation (Statewide)	Yes	Wave 2
Peninsula Community Foundation / Community Foundation Silicon Valley	Yes	No
Rochester Area Community Foundation	Yes	Wave 1
St. Paul Foundation	Yes	No
San Francisco: San Diego Foundation; Walter & Elise Haas Fund	Yes	No
Detroit: Community Foundation for Southeastern Michigan	Yes	No
Winston-Salem Foundation	Yes	Wave 1
Pennsylvania: York Foundation	Yes	No
Northwest Area Foundation Bismarck, central Oregon, Minneapolis, North Minneapolis, rural South Dakota, Seattle, and Yakima	Yes	Wave 1
San Diego , California	No	Wave 1
Duluth , Minnesota	No	Wave 1
Superior , Wisconsin	No	Wave 1
Siloam Springs, Pine Bluff, Van Buren and Little Rock , Arkansas	No	Wave 1
Kansas (Statewide)	No	Wave 2
Sarasota , Florida	No	Wave 2

6.4 Summary

The suggested improvements focus on community quality of life factors, giving attention to community level measures of economic, physical and social wellbeing. The recommendations will improve practitioners' understanding of community conditions and functions, and help with the design of more inclusive and effective public outreach plans. Additionally, the measures are quantitative in form and are well-suited to GIS applications that can be effectively used in public outreach work and for decision makers as a simple visualization technique to display patterns of quality of life factors in the community. The recommended improvements suggested in this chapter are summarized in Table 6.2.

Table 6.2: Improved Methods and Data Sources

<u>Category of Improvement</u>	<u>Measure or Data Source</u>	<u>Anticipated Benefits</u>
Traditional Data in New Ways	Segregation Index	Balance proportional analyses of protected populations under environmental justice
	Air Quality	More closely address community effects
Adopting Data from Other Disciplines	HMDA	Richer analysis of household economic condition
	CRA	Richer analysis of economic development condition
New Data Sources	Social Capital	Understanding of community cohesion and community interaction; Partnerships with CDCs and other community organizations
	Walkability	Understanding of physical health context and effects; Partnerships with public health agencies

Although we have learned much about community quality of life considerations, there continues to be a need to further examine causal relationships between transportation systems and the many aspects of quality of life. The closing chapter provides ideas and suggestions for long-term improvements to practice which include future research needs.

7.0 Long-Term Improvements to Practice

Improvements to current practice that can immediately be implemented for assessing the affects of transportation projects on community/social wellbeing are described in Chapter 6. Although this report describes methods and measures that can be used right away to improve current practice in community impact assessment, community effects research is important to promote continued improvement in assessment methods.

In order to fully understand how a transportation project will affect community/social wellbeing, one must first understand what variables constitute community/social wellbeing. This report provides information on three domains (economics, physical health, and social capital) and associated measures that can be used to assess the health of a community. These measures can be immediately used as described in this report to identify areas of concern, focus field efforts on important considerations, develop effective outreach strategies and identify design choices that may mitigate some negative aspects of a community's quality of life. Yet still, there is uncertainty as to understanding both the direction and magnitude of effects borne by a community as a result of a transportation project. Consequently, the next logical step is to use these measures as the basis for research to improve the understanding of the direction and magnitude of effects.

Additional investigation would be especially helpful in understanding potential *indirect and cumulative community effects (ICEs)*. The ICE methodologies currently employed by transportation agencies are process-oriented with a focus on understanding resultant land use changes from transportation projects. Different approaches, ranging from scenario constructs to regression analysis produced from time series land development patterns, have been used to evaluate ICEs. In addition, quantitative models have been developed to assess changes in permeable surfaces and subsequent effects to water quality as part of ICEs, but little has been done to understand ICEs on the elements of community quality of life. Unraveling the complex system of variables that combine to create the synergistic outcome called quality of life is no simple task. Disaggregating these web-like interactions and causal chains into understandable units that can be successfully isolated and measured is a current concern within the transportation profession. A further important consideration is that many of the community effects we seek to understand in fact stem from actions by other agencies, government entities, and the private sector.

Much of current practice is limited to speculating about possible effects that rely on anecdotal, qualitative data. As a result, project outcomes, evaluation criteria, and mitigation strategies lack influence compared with quantitatively-based projections. In order to bring greater focus and strength to recommendations and projections for quality-of-life considerations, the understanding of effects ultimately should be grounded in

rigorous, pre- and post-project analyses of community/social factors. This will require analysis of multiple projects as well as a range of project types and scales. The consideration of community/social wellbeing is inherently complex, the composite of many interactions among factors. Teasing apart these interwoven

“One of the big challenges in decision making in the modern world is the bias between things easy to measure versus things difficult to measure.”

--Todd Litman

factors is difficult and any credible effort to do so will involve advanced statistical techniques and an acceptance that the relationships between social phenomena may not be linear or have clearly defined causal relationships. To provide a basis for continued improvement to current practices, it is recommended that on-going research:

- Examine the effects of projects by conducting pre- and post-project studies of community/social wellbeing using rigorous, quantitative approaches;
- Address data needs by designing data collection and maintenance protocols for community/social measures that are practical and consistent across the country; and
- Focus on cross-disciplinary studies of community/social wellbeing to take advantage of current and future work in disciplines that may have traditionally not been connected with transportation.

A good starting point is to conduct comparative analyses using the social capital data collected in the years 2000 and 2006 (see Table 6.1 for a list of participating communities). As the 2006 data are released, studies of changes related to projects that were opened in the intervening years, one of which was the Greensboro Urban Loop, can be conducted. Looking ahead, there are communities that started collecting social capital data in 2006 and intend to carry out additional surveys in future years, which will create opportunities to add communities and projects to the study pool.

Conducting quantitative analyses of community effects depends on the availability of good data. Thus, it is important to develop a protocol for data collection and maintenance that focuses on community/social wellbeing. The social capital surveys offer the potential to collect data on community function and perceptions in a statistically valid fashion over time, thus eliminating the self-selection bias of public meetings and allowing for spatial analysis. These data include information about how communities function and the level of cohesion and interaction among residents. Comparing the changes in social capital measures with other changes in communities, including changes to the transportation system, can reveal the associated direction and magnitude of changes to social networks and relationships. A data collection protocol for social capital has been developed and a national baseline established through the 2000 survey. A shorter survey instrument is now publicly available (see Appendix D for instrument and information for organizations interested in using it). Among the researchers and community organizations already working with the social capital survey data, there is keen interest in bringing social capital into the analysis of public policy decisions, thus providing a natural opening for partnerships for transportation practitioners and researchers. Many of the participating communities are seeking to understand how social capital is developed and sustained and how public policy could play a role in strengthening social networks.

“The messages buried within transportation and land use” planning and policy “do not resonate with the public at large. They are too complex and too abstract. But the public health perspective can bring the issues into focus and help people think about how something affects their wellbeing, how they make choices. It allows for moving an agenda forward without politicizing it.”

--Richard Killingsworth

Given the high level of interest in the public health discipline regarding relationships between physical activity and the built environment, the time seems particularly ripe to partner with public health researchers and practitioners to collect more and better data that can be used to investigate the connections between physical health and transportation systems. A widespread, consistent data protocol that would support time series studies would ensure consistency of high quality information. Improved data on all components of our transportation infrastructure would also support asset management activities, an increasingly important activity in Metropolitan Planning Organizations (MPOs) and departments of transportation (DOTs).

Even in the domain of economic wellbeing, there is room for improvement. By refocusing the analysis of effects to consider localized investment and borrowing activity by businesses and households, the effects of a project on a neighborhood can be better understood. Home mortgage and business loan data can greatly enrich current analyses of land use change and economic effects, and are already available to both practitioners and researchers. Current efforts to understand ICEs also could be improved by utilizing these data sources.

A program of continued research should be carried out on an interdisciplinary basis and engage non-traditional as well as traditional partners. There are developments in the research and practitioner communities of several disciplines that offer an important potential for partnering in investigations into basic questions about social/community wellbeing and transportation facilities. For example, the Centers for Disease Control (CDC) and the Environmental Protection Agency (EPA) are conducting research on physical health outcomes of residents of different types of built environments. These research projects use surveys that easily can be augmented to include questions designed to measure social networks.

“We need to start approaching things in a more multidisciplinary way. We need insights on how to do it better.”

--Richard Killingsworth

The payoffs from such studies will provide an improved understanding of how transportation infrastructure can be designed in a way that improves community quality of life. Such research also will help improve the efficiency of project delivery by streamlining the analysis process to focus on the variables that affect quality of life and lead to effective solutions that reflect the values of communities. Finally, balancing transportation decisions by paying greater attention to community/social factors will lead to greater understanding of the costs and benefits of transportation projects and programs.

In summary, additional research that contributes to implementing and developing cross-cutting measures that promote a greater focus on community/social wellbeing can lead to new partnerships, an improved transportation decision-making process, and improved project and program outcomes.

References

-
- ¹ AASHTO. "Transportation. Invest in Our Future. Transportation Vision and Strategies for the 21st Century. Global Climate Change Strategies." July 2007.
http://www.transportation1.org/tif5report/vision_strategies_cont.html. Accessed 20 March 2008.
 - ² USDOT. "Mission and History." June 27, 2007. <http://www.dot.gov/mission.htm>. Accessed 11 September 2007.
 - ³ FHWA. "Who We Are." August 11, 2007. <http://www.fhwa.dot.gov/whoweare/whoweare.htm>. Accessed 9 September 2007.
 - ⁴ Executive Order 12898, 1994. "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."
 - ⁵ FHWA. Environment. The National Environmental Policy Act of 1969. November 2001.
<http://www.fhwa.dot.gov/environment/nepatxt.htm>. Accessed 16 September 2007.
 - ⁶ FHWA. 23 United States Code. Undated. http://www.fhwa.dot.gov/environment/109_h.htm. Accessed 16 September 2007.
 - ⁷ Executive Order 12898, 1994. "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."
 - ⁸ FHWA. "SAFETEA-LU." Undated. Available at: <http://www.fhwa.dot.gov/safetealu/index.htm>
[Accessed April 1, 2008.](#)
 - ⁹ FHWA. FHWA Environmental Policy Statement 1994: A Framework to Strengthen the Linkage Between Environmental and Highway Policy. Undated.
<http://www.fhwa.dot.gov/environment/epsfinal.htm>. Accessed 17 September 2007.
 - ¹⁰ AASHTO Task Force on Context Sensitive Solutions. "AASHTO Center for Environmental Excellence State DOT Context Sensitive Solutions Survey." Report to Members, April, 2006. Available at:
<http://www.transportation.org/sites/scoh/docs/National%20CSS%20Survey%20Summary.pdf>. Accessed 4 October 2006.
 - ¹¹ Context Sensitive Solutions.org "CSS Programs by State."
<http://www.contextsensitivesolutions.org/content/gen/state-profiles/sp-programs>. Accessed Nov 7, 2007.

-
- ¹² FHWA. "Integration of Context Sensitive Solutions in Transportation Planning." January 2007. <http://www.fhwa.dot.gov/planning/csstp/csstransplan.htm>. Accessed 2 September 2007.
- ¹³ Lane, Scott. June 5, 2006. Untitled report for the North Jersey Transportation Planning Authority.
- ¹⁴ USDOT, FHWA. "Community Impact Assessment. A Quick Reference for Transportation." Washington DC: FHWA Office of Environment and Planning, Publication No. FHWA-PD-96-036, 1996.
- ¹⁵ FHWA. "Community Impact Assessment." 2000. <http://www.ciatrans.net>. Accessed Sept 1, 2006.
- ¹⁶ USDOT, FHWA. "Community Impact Assessment". Class materials, national course. 2005.
- ¹⁷ Ward, Beverly. "Measuring the Effectiveness of Community Impact Assessment. Recommended Core Measures." Report for the Florida DOT #FDOT BC353-28. Tampa: University of South Florida, October 2005.
- ¹⁸ Lane, Leigh Blackmon. "NCHRP Synthesis 373: Multi-disciplinary Teams in Context-Sensitive Solutions" Washington DC: Transportation Research Board, 2007. Available online at: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_373.pdf. Accessed 20 March 2008.
- ¹⁹ Ward, Beverly. "Measuring the Effectiveness of Community Impact Assessment. Recommended Core Measures." Report for the Florida DOT #FDOT BC353-28. Tampa: University of South Florida, October 2005.
- ²⁰ Smart Growth Online. "Principles of Smart Growth." <http://www.smartgrowth.org/about/principles/default.asp>. Accessed November 7, 2007.
- ²¹ Oregon Department of Transportation. Undated. *Context Sensitive and Sustainable Solutions (CS3) Guidebook*.
- ²² Project for Public Spaces. "Place Game Workshops." <http://www.pps.org/info/services/work>. Accessed Nov 7, 2007.
- ²³ Emerson, Donald J., PB Consult, Inc. "Improved Linkage Between Transportation Systems Planning and the National Environmental Policy Act (NEPA)." Report for AASHTO Standing Committee on Planning. January 2006.
- ²⁴ Oregon Progress Board. "Oregon Benchmarks, Introduction to Benchmarks." http://www.oregon.gov/DAS/OPB/obm.shtml#Introducing_Oregon_Benchmarks. Accessed July 29, 2007.

-
- ²⁵ Oregon Progress Board. "Oregon Benchmarks, Benchmarks for 2007-2009."
http://www.oregon.gov/DAS/OPB/obm.shtml#Current_list_of_benchmarks. Accessed July 29, 2007.
- ²⁶ Forkenbrock David J. and Jason Sheeley. NCHRP Report # 532 "Effective Methods for Environmental Justice Assessment" Washington DC: Transportation Research Board, National Research Council, 2004.
- ²⁷ Forkenbrock, David J. and Glen E. Weisbrod. NCHRP Report #456 "Guidebook for Assessing the Social and Economic Effects of Transportation Projects" Washington DC: Transportation Research Board, National Research Council, 2001.
- ²⁸ Louis Berger Group, Inc. NCHRP Report #466 "Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects" Washington DC: Transportation Research Board, National Research Council, 2002.
- ²⁹ Burrington and Bennet. "City Routes, City Rights. Building Livable Neighborhoods and Environmental Justice by Fixing Transportation." Boston: Conservation Law Foundation, 1998. Available at:
http://www.clf.org/uploadedFiles/CLF/General/Publications/City_Routes_City_Rights.pdf. Accessed 21 August 2006.
- ³⁰ Litman, T. "Cities Connect. How Urbanity Helps Achieve Social Inclusion Objectives." Paper presented at the Metropolis Conference, Toronto, June 2006. Available at
<http://www.vtapi.org/citiesconnect.pdf>. Accessed 20 September 2006.
- ³¹ Hoehner, Christine M., Laura K. Brennan, Ross C. Brownson, Susan L. Handy, Richard Killingsworth. "Opportunities for Integrating Public Health and Urban Planning Approaches to Promote Active Community Environments." *American Journal of Health Promotion*, Sept/Oct 2003, Vol. 18, No. 1. pp 14-19.
- ³² Ewing, Reid, Tom Schmid, Richard Killingsworth, Amy Zlot, and Stephen Raudenbush. "Relationship Between Urban Sprawl and Physical Activity, Obesity, and Morbidity." *American Journal of Health Promotion*, Sept/Oct 2003, Vol. 18, No. 1. pp 47-57.
- ³³ Giles-Court, Billie, Sally Macintyre, Johanna P. Clarkson, Terro Pikora, and Robert J Donovan. "Environmental and Lifestyle Factors Associated With Overweight and Obesity in Perth Australia." *American Journal of Health Promotion*, Sept/Oct 2003, Vol. 18, No. 1. pp 93-102.
- ³⁴ Huston, Sara L., Kely R. Evenson, Philip Bors, and Ziya Gizlice, 2003. "Neighborhood Environment, Access to Places for Activity, and leisure-time Physical Activity in a Diverse North Carolina Population." *American Journal of Health Promotion*, Sept/Oct 2003, Vol. 18, No. 1. pp 58-69.

-
- ³⁵ King, Wendy C., Jennifer S. Brach, Steven Belle, Richard Killingsworth, Mark Fenton, Andrea M. Kriska. "The Relationship Between Convenience of Destination and Walking Levels in Older Women." *American Journal of Health Promotion*, Sept/Oct 2003, Vol. 18, No. 1. pp 74-82.
- ³⁶ Gilbert, Richard and Catherine O'Brien. "Child- and Youth-Friendly Land-Use and Transport Planning Guidelines." The Centre for Sustainable Transportation, March 28, 2005.
- ³⁷ Rodríguez, D., Khattak, A.J., and Evenson, K.R. 2006. "Can New Urbanism encourage physical activity? Comparing a New Urbanist Neighborhood with Conventional Suburbs." *Journal of the American Planning Association*, 72:1, pp 43-56.
- ³⁸ Putnam, Robert D. *Bowling Alone. The Collapse and Revival of American Community*. New York: Simon and Schuster, 2000.
- ³⁹ House, James S., Karl R. Landis, and Debra Umberson. "Social Relationships and Health." *Science*, 1988, No. 241, pp 540-545.
- ⁴⁰ Rattle, Robert and Roy E. Kwiatkowski. "Integrating health and Social Impact Assessment" in *The International Handbook of Impact Assessment*, Henk A. Becker and Frank Vanclay, eds. Cornwall, UK: Edward Elgar, 2003, pp 92-107.
- ⁴¹ Granovetter, Mark. "The Strength of Weak Ties: A Network Theory Revisited." *Sociological Theory*, Vol. 1 (1983), pp 201-233.
- ⁴² Light, Ivan. "Using Social Capital to Help Integrate Planning Theory, Research, and Practice." Judy Hutchinson and Avis C. Vidal, eds. *Journal of the American Planning Association*, Vol. 70, No. 2, Spring 2004, pp 142-192.
- ⁴³ de Souza Briggs, Xavier. "Using Social Capital to Help Integrate Planning Theory, Research, and Practice." Judy Hutchinson and Avis C. Vidal, eds. *Journal of the American Planning Association*, Vol. 70, No. 2, Spring 2004, pp 142-192.
- ⁴⁴ Putnam, Robert. "Using Social Capital to Help Integrate Planning Theory, Research, and Practice." Judy Hutchinson and Avis C. Vidal, eds. *Journal of the American Planning Association*, Vol. 70, No. 2, Spring 2004, pp 142-192.
- ⁴⁵ Rohe, William M., George McCarthy and Shannon VanZandt, 2002. "The Social Benefits and Costs of Homeownership. A Critical Assessment of the Research." Working Paper No. 00-01. Research Institute for Housing America.
- ⁴⁶ Galster, George, Chris Hayes, and Jennifer Johnson. "Robust and Parsimonious Neighborhood Indicators." *Journal of Planning Education and Research*, Vol. 24 (2005), No. 3, pp 265-280.
- ⁴⁷ Temkin, K. and William M. Rohe. "Social Capital and Neighborhood Stability: An Empirical Investigation." *Housing Policy Debate* Vol. 9 (1998) issue 1, pp 61-88.

⁴⁸ White, Leroy. "Connection Matters: Exploring the Implications of Social Capital and Social Networks for Social Policy." *Systems Research and Behavioral Science* Systems Research, Vol. 19 (2002), 255-269.

⁴⁹ Rohe, William M. "Building Social Capital Through Community Development" Judy Hutchinson and Avis C. Vidal, eds. *Journal of the American Planning Association*, Vol. 70, No. 2, Spring 2004, pp 142-192.

⁵⁰ Fitzgerald, Gerard. "Computer-based qualitative data methods" in *The International Handbook of Impact Assessment*, Henk A. Becker and Frank Vanclay, eds. Cornwall, UK: Edward Elgar, 2003, pp 143-160.

⁵¹ Hoehner, Christine M., Laura K. Brennan, Ross C. Brownson, Susan L. Handy, Richard Killingsworth. "Opportunities for Integrating Public Health and Urban Planning Approaches to Promote Active Community Environments." *American Journal of Health Promotion*, Sept/Oct 2003, Vol. 18, No. 1. pp 14-19.

⁵² EPA "Green Communities: Indicators." 16 August 2006.
<http://www.epa.gov/greenkit/indicator.htm#real>. Accessed 26 September 2006.

⁵³ Sun, Yinshe. "Development of Neighbourhood Quality of Life Indicators." Saskatoon: University of Saskatchewan, 2005. Available at: http://www.usask.ca/cuisr/docs/pub_doc/quality/sun.pdf. Accessed 20 September 2006.

⁵⁴ Heinzerling, Lisa and Frank Ackerman. *Priceless: On Knowing the Price of Everything and the Value of Nothing*. New York: New Press, 2004.

⁵⁵ USDOT, FHWA, and NCDOT. "Final Environmental Impact Statement." FHWA-NC-EIS-92-01-F, State Project No 6.498002T, Guilford County TIP No. I-2402.

⁵⁶ Executive Order 12898, 1994. "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."

⁵⁷ Hartell, A. "Methodological Challenges of Environmental Justice Assessments for Transportation Projects." *Transportation Research Record* No. 2011, 2007.

⁵⁸ Morello-Frosch, R. and B.M. Jesdale. "Separate and unequal: residential segregation and estimated cancer risks associated with ambient air toxics in US metropolitan areas." *Environmental Health Perspectives*, March 2006, 114(3): A 176-177.

⁵⁹ National Community Reinvestment Coalition. "HMDA." Available at:
<http://www.ncrc.org/policy/cra/hmda.php>. Accessed May 18, 2007.

⁶⁰ National Community Reinvestment Coalition. "Small Business Data." Available at: <http://www.ncrc.org/policy/cra/smallbiz.php>. Accessed May 18, 2007.

⁶¹ See, e.g.: Song, Y. 2005 "Smart Growth and Urban Development Pattern: A Comparative Study." International Regional Science Review, Vol 28, No. 2, April 2005, pp 239-265. Available at: <http://irx.sagepub.com/cgi/content/abstract/28/2/239>. Accessed November 16, 2007.

Frank, L. D., T.L. Schmid, J. F. Sallis, J. Chapman and B.E. Saelens, 2005. "Linking objectively measured physical activity with objectively measured urban form: Findings from SMARTRAQ." American Journal of Preventive Medicine, Vol. 28, Issue 2, Supplement 2, Active Living Research, February 2005, Pages 117-125. Available at: <http://www.sciencedirect.com/science/article/B6VHT-4FDF6R9-4/2/d98f78d5cedac29d2ffd12e4f3b696bd>. Accessed November 17, 2007.

⁶² Active Living Research, February 2005. "Designing for Active Transportation." Available at: <http://www.activelivingresearch.org>.

⁶³ The Roper Center, June 2003. "Social Capital Benchmark Survey: Methodology and Documentation." Provided on CD with restricted use dataset.

⁶⁴ Executive Order 12898, 1994. "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."

⁶⁵ US EPA, August 2003. "Air Quality Index: A Guide to Air Quality and Your Health." Available at: <http://www.epa.gov>.

⁶⁶ Putnam, Robert, 2000. *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon And Schuster.

⁶⁷ Putnam, R., 2000. *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon and Schuster, see page 213 and footnote.

⁶⁸ US EPA. "Air Trends." October 1, 2007. Available at: <http://www.epa.gov/airtrends/index.html>. Accessed Oct 3, 2007.

⁶⁹ North Carolina State Center for Health Statistics. "County Level Data Available from SCHS." Available at: <http://www.schs.state.nc.us/SCHS/data/county.cfm>. Accessed 2 October 2007.

⁷⁰ Buescher, P and Kathleen Jones-Vessey. March 1999. "Childhood Asthma in North Carolina." Special Report Series No. 113. North Carolina Public Health, SCHS Studies, NC Department of Health and Human Services. Available at: <http://www.schs.state.nc.us/SCHS/pdf/schs113.pdf>. Accessed September 25, 2007.

⁷¹ Executive Order 12898, 1994. "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."

⁷² Putnam, Robert. 2007. "E Pluribus Unum: Diversity and Community in the Twenty-first Century. The 2006 John Skytte Prize Lecture" *Scandinavian Political Studies*, Vol. 30, No. 2, pp 137-173.

⁷³ US EPA. "Air Trends." October 1, 2007. Available at: <http://www.epa.gov/airtrends/index.html>. Accessed Oct 3, 2007.

⁷⁴ The Social Capital Community Benchmark Survey. Available at: <http://ksgwww.harvard.edu/saguaro/communitysurvey/index.html>.

Contents of Appendices

Appendix A: Annotated Bibliography	1
Appendix B: Data Documentation	13
Basic Demographic Domain	14
Economic Domain	18
Physical Health Domain	30
Social Capital Domain	36
Appendix C: Additional Case Study Maps and Materials	44
Table C-1: Measures for Tracts in Case Study	55
Appendix D: Social Capital Short Form Survey	58

Appendix A: Annotated Bibliography

- Baines, James, Wayne McClintock, Nick Taylor and Brigid Buckenham, 2003. "Using Local Knowledge" in *The International Handbook of Impact Assessment*, Henk A. Becker and Frank Vanclay, eds. Cornwall, UK: Edward Elgar, 2003, pp 26-41. Outlines methods for including local knowledge, perspectives and experience in Social Impact Analysis (SIA). Notes that any ex-post analysis must use the experience of locals to understand how the community was and is affected; likely the only way to truly confirm whether or not ex-ante projections were accurate.
- Burdge, Rabel J., editor. *The Concepts, Process and Methods of Social Impact Assessment: Rabel J. Burdge and Colleagues*. Middleton, Wisconsin: Social Ecology Press. General guidebook on SIA.
- Canadian Handbook on Health Impact Assessment*, 2004. Social support networks considered a part of health as these networks can help people cope with daily stresses and solve their problems. This is particularly important for women, who generally experience increased stresses related to family and work: lower income/social status; and increasing life spans all of which translate into higher disability levels and illnesses. Notes that there is a relationship between better economic situation and better health. Asserts that socio-cultural impacts including changes in "social patterns, stress, crime, drug abuse" can have negative health effects, but offers no real guidance on measures for these factors.
- Cassel, Andrew. "Impact Studies: A Guess at Best." *Philadelphia Inquirer*, August 2006. Economist critiquing economic impact studies and the use of multipliers; argues no one really knows the "correct" multiplier for various activities in part because there is an opportunity cost to engaging in a certain activity.
- Centre for Sustainable Transportation. "Child-Friendly Transport Planning." February 29, 2004. Available online at: http://cst.uwinnipeg.ca/documents/Child_friendly.pdf. Discussion of child-friendly approach to transportation planning. Identifies a set of guidelines to shape child friendly policies. For example, comprehensive planning should consider a broader range of impacts, costs, benefits to move toward more efficiency and system diversity. States that more transportation options can promote greater inclusivity of transport systems. One way to accomplish this is to promote Transportation Demand Management (TDM) policies.
- Committee on Identifying Data Needs for Place-Based Decision Making. *Community and Quality of Life. Data Needs for Informed Decision Making*. Washington: National Academy Press, 2002. Guidelines for developing quality of life measures and indices.
- Community Families and Work Program, Research Group at Brandies University. Current research projects include investigations of families' time management, elder care, child care issues, and working women's issues. <http://www.bcfwp.org/Research.html>.
- Delaware Valley Regional Planning Commission. "Environmental Justice". Available at: <http://www.dvrpc.org/planning/regional/ej.htm>. Accessed 2 October 2006. The Delaware Valley Regional Planning Commission, an MPO, combines a "degree of disadvantage" index that measures minority concentrations, income, numbers of elderly,

and of handicapped residents. This is combined with “quality of life factors” including transit service, hospitals, job access and reverse commute transportation services, and arterial highways. This expanded environmental justice method seeks to combine the negative and positive effects of the transportation system and assess whether services are equitably provided for vulnerable populations.

Department of Housing and Urban Development (HUD), Division of Community Planning and Development. “Conplan Improvement Initiative Library.” Offers a number of “quality of life” studies online aimed mostly at informing community development work by Community Development Corporations (CDCs). Includes performance and outcome measures for programs. Information available at:

<http://www.hud.gov/offices/cpd/about/conplan/improvement/library/index.cfm>

DeTome, D. “Handling Complex Societal Problems” in *The International Handbook of Impact Assessment*, Henk A. Becker and Frank Vanclay, eds. Cornwall, UK: Edward Elgar, 2003, pp 278-295. Complex society problems involve many disciplines that rely on three important perceptive viewpoints to consider including knowledge, power and emotion. Describes the COMPRAM (Complex Problem Handling method) method currently being used by some SIA practitioners:

1. Analysis and description of the problem by a team of neutral content experts.
2. Analysis and description of the problem by different teams of actors
3. Identification of interventions by experts and actors
4. Anticipation of the societal reactions
5. Implementation of the interventions
6. Evaluation of the changes.

DeSouza, Alice, William H. Dunlap, Martin L. Gross, Dennis Meadows, Paul D Spiess, Felix M Torres, and Abby Williamson. “Social Capital Impacts of the I-93 Expansion Project.” 12 December 2002. Available at: <http://www.ksg.harvard.edu/saguaro/pdfs/scimpactanalysisi93widening.pdf#search=%22saguaro%20desouza%20new%20hampshire%22>. Accessed 20 September 2006. Memorandum submitted in response to the draft EIS of a proposed expansion of an Interstate in New Hampshire. The authors cited studies noting the positive connections between social capital and child development, public health, safety, property/home values, and happiness. They asserted that a major expansion of an Interstate route would change commuter and demographic patterns which, in turn, will “weaken the social bonds of the communities that house and support the workforce” and damage the social structure that supports “public education, voluntary social services . . . a safe environment and high quality of life (p 1).

Fitzgerald, Gerard. “Computer-Based Qualitative Data Methods” in *The International Handbook of Impact Assessment*, Henk A. Becker and Frank Vanclay, eds. Cornwall, UK: Edward Elgar, 2003, pp 143-160. Detailed discussion of data types of data used for SIA, and data management issues. Includes a case study demonstrating how qualitative data and field notes can be managed using AskSam Software.

Frank, Lawrence D. and Peter Engelke. “How Land Use and Transportation Systems Impact Public Health: A Literature Review of the Relationship Between Physical Activity and

Built Form.” Active Community Environments (ACES) Initiative Working Paper #1, Centers for Disease Control and Prevention, December 2006. Available online at: <http://www.cdc.gov/nccdphp/dnpa/pdf/aces-workingpaper1.pdf>. Review of the public health literature. Notes current thinking among public health professionals that there are significant health benefits through moderate physical activity, and the increasing focus on interventions designed to change lifestyles to include such activity in daily activities. Description of important barriers to walking and bicycling; can be environmental (lack of sidewalks, bike lanes, proximity to parks and trails) or internal (perceptions of safety in one’s neighborhood). Points up lack of understanding of ped/bike travel as being under-researched because of auto-centric focus on data collection and difficulty in disentangling factors of density, street patterns, and the propensity of people to walk/bike (self-selection). Authors support developing a Level of Service index based on bike/ped facilities, amenities (trees, benches, buffers), and presence of Travel Demand Management (TDM) programs.

Frumkin, Howard, Lawrence Frank, and Richard Jackson. *Urban Sprawl and Public Health. Designing, Planning, and Building for Health Communities*. Washington: Island Press, 2004. Strong argument for the compact, mixed use land use and multi-modal transportation to improve overall health outcomes.

Fullilove, M. T. Root Shock. *How Tearing Up City Neighborhoods Hurts America and What We Can Do About It*. New York: Ballantine, 2004. Proposes a Community Burn Index for use in a community development project; likens the loss of housing to burn damage to a human body. Loss or deterioration of housing stock compared to entire housing stock of a neighborhood. Connects housing loss to loss of businesses/services and increase in “noxious” land uses.

Galster, George, Jackie Cutsinger and Up Lim. “Are Neighborhoods Self-stabilizing? Exploring Endogenous Dynamics.” *Urban Studies*, vol. 44, No. 1, pp 167-185. January 2007. Study used variables on housing market conditions, vital statistics, and crime rates to investigate how neighborhoods respond to exogenous shocks. The study finds neighborhoods to generally be quite resilient and able to return to pre-shock equilibrium. The study found no evidence of thresholds beyond which a neighborhood could not stabilize, although neighborhoods with poverty rates over 20% do not adjust as quickly, especially to crime rate shocks.

General Accounting Office. “Highlights of an Expert Panel. The Benefits and Costs of Highway and Transit Investments.” Report no: GAO-05-423SP. Washington DC: USGAO, May 2005. Series of interviews with authorities on cost benefit analysis. Consensus that cost benefit analysis is a tool to inform the decision-making process, not a ‘checklist’. David Forkenbrock noted that much effort has gone into improving transportation modeling, but little improvement in the data used in the models.

Georgia Tech Research Institute and the Bombardier Active Transport Research Lab, University of British Columbia. “SMARTAQ.” Available at: <http://www.act-trans.ubc.ca/smartraq/pages/>. Accessed 20 September 2007. Innovative project with extensive data collection work on physical activity and built environment, along with traditional travel

diary data; goal is to develop a framework for assessing land use and transportation policies related to auto travel and emissions in the Atlanta, GA, region. Includes a walkability index that combines street connectivity, land use mix, and net residential density.

GPI Atlantic. "The Genuine Progress Index (GPI)". 14 September 2007 Available at: <http://www.gpiatlantic.org/gpi.htm>. Accessed 20 September 2007. Used in various places, including Atlantic Canada. An index that measures prosperity as a combination of economic gains, environmental quality, and social progress. Involves full cost accounting for resource use; seeks to measure progress towards sustainability. The GPI assigns explicit value to environmental quality, population health, livelihood security, equity, free time, and educational attainment.

Health Canada. Environmental and Workplace Health. "The Canadian Handbook on Health Impact Assessment" Volumes 2 and 3. Available at: http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/index_e.html. Accessed 30 June 2005. Guidance on assessing health impacts of projects, programs, and investments. Highlights importance of including perceptions. Suggests community/social indicators be categorized as "evaluative" and "descriptive", rather than "subjective" and "objective", to better convey how the two types of information function in the social context.

Helmer, Olaf. *Social Technology*. New York: Basic Books, 1966. Operations analysts are interested in effective control and only secondarily in understanding all the underlying phenomena. Yet the theory is: Understanding → Prediction → Ability to Control → Control. Therefore even if we really have no theory, we must construct a model, but be pragmatic and adjust the model as we go along. We must "press ahead because the dangers are too great" if we do not do so. A model can be conceptual, a flow chart, or mathematical. A classic in the field of systems/modeling theory.

Hipp, John R. and Andrew Perrin. "Nested Loyalties: Local Networks' Effects on Neighborhood and Community Cohesion." *Urban Studies*, vol. 43, No. 13, pp 2503-2523, December 2006. Study of connections within neighborhoods and to the larger city. Found that strong ties are important to neighborhood ties and cohesion, but weaker ties are important to both neighborhood and community-wide cohesion. There is a positive relationship between

Hirschhorn, Larry. "Scenario Writing: A Developmental Approach." *Journal of the American Planning Association*, Vol 46, No 2, April 1980, pp 172-182. Theoretical outline of scenario planning. Described as consideration of the outcomes of different options. It relies on a known set of chains of cause and effect. Scenario planning allows for the analysis of the changes that can be expected from given set of events/choices. The chain of effect can change with the insertion of feedback loops or when a new chain stems from a particular choice. Scenario planning allows for experimentation with alternative choice sets and can help articulate goals and values when a set of outcomes is presented and evaluated for their desirability.

Houston, Douglas, Jun Wu, Paul Ong and Arthur Winer. "Down to the Meter: Localized Vehicle Pollution Matters." *Access* Fall 2006, No. 9, pp 22-27. University of California

Transportation Center. Describes uneven distribution characteristics of near-roadway vehicle-related pollutants; possible implications for environmental justice. Suggests greater attention to health risks for urban roadway projects, and potential conflicts with land uses such as child care facilities, playgrounds, schools, medical care facilities, and residential areas.

Interorganizational Committee on Principles and Guidelines for Social Impact Assessment. "US principles and guidelines for social impact assessment in the USA." *Impact Assessment and Project Appraisal*, Vol 21, No 3, September 2003, pp 231-250. Revised a set of guidelines and principles previously been set forth by the US Department of Commerce and the National Oceanic and Atmospheric Association (NOAA; see following entry). Variables recommended include community and institutional structures, community and family changes, and community political and social resources.

Interorganizational Committee on Principles and Guidelines for Social Impact Assessment. "Guidelines and Principles for Social Impact Assessment" Prepared for the US Department of Commerce, NOAA, and the National Marine Fisheries Service, 1994. Early guidance on impact assessment for infrastructure projects. Includes a number of social and community cohesion aspects that were to be considered.

Jensen, Ryan, Jay Gatrell, Jim Boulton, and Bruce Harper. "Using Remote Sensing and Geographic Information Systems to Study Urban Quality of Life and Urban Forest Amenities." *Ecology and Society* Vol 9 (2004) no 5, p 5. This study examines urban quality of life by assessing the relationship between observed socioeconomic conditions and urban forest amenities in Terre Haute, Indiana. Using remote-sensing and statistical methods, found a positive correlations between urban leaf area, population density, and their interaction with median income and median housing value. Furthermore, leaf area, density, and their interaction statistically account for observed variance in median income and median housing value, indicating that these variables may be used to study observed quality-of-life metrics. A potential measure of neighborhood quality.

Kingsley, G. Thomas, ed. "Building and Operating Neighborhood Indicator Systems: A Guidebook." Washington: The Urban Institute, 1999. Good information on how to select measures and construct indicators; stresses taking an asset-based approach. An accompanying document "Catalog of Administrative Data Sources" offers specific information on various measures available at the neighborhood level.

La Gory, Mark and Kevin Fitzpatrick. "The Effects of Environmental Context on Elderly Depression." *Journal of Aging and Health*, Vol 4, No. 4, November 1992, pp 459-479. Study of over 1,000 elderly Alabama residents found that symptoms of depression were associated with being environmentally dissatisfied, having limited social support, or living in a neighborhood with limited transportation (measured by availability of automobile transportation). The residential and social environment shown to be important factors for mental health and happiness of elderly persons.

Lancaster County (PA) Planning Commission. "Measure Up Lancaster." 1 March 2007 Available at: <http://www.co.lancaster.pa.us/planning/cwp/view.asp?a=2&q=387005>.

- Accessed 20 September 2007. Measure Up Lancaster. (Lancaster, PA) A "quality of life" indicator project to inform comprehensive planning. Includes land use, tax capacity, housing code violation data, as well as perceptive data on environmental quality and personal safety.
- Litman, Todd. "Evaluating Transportation Equity. Guidance for Incorporating Distributional Impacts in Transportation Planning." Victoria Transport Policy Institute. 24 May 2005. Available at: <http://www.vtpi.org/>. Discussion of various dimensions of equity. Includes a table of indicators to assess degree of equity between and within groups.
- Litman, Todd, 2003. "Integrating Public Health Objectives in Transportation Decision-Making." American Journal of Health Promotion, Sept/Oct 2003, vol 18, no. 1, pp 103-108. Overview of practitioner experience and empirical evidence; argues that "all else being equal, increased motor vehicle travel and reduced nonmotorized travel tends to harm public health" even when mitigation efforts are used to reduce harmful effects (p 107).
- Lucas, Karen and Michael Brooks. "Appraisal of Sustainability for Transport" Social Indicators Report 26-07-05. Westminster: University of Westminster, 2005. Report suggests social sustainability is an important component of sustainable development, including transportation systems. Working in the international context, they suggested that the relationship between many social measures and transportation infrastructure was untenable and instead recommend using more direct measures of household transportation expenditures, e.g. accessibility in terms of time, distance, and cost; accessibility to pedestrian/bicycling facilities; and air and noise pollution. Highlight importance of pedestrian safety and walkability to wellbeing.
- Marsden, Greg. "Defining and Measuring Progress toward a Sustainable Transport System." Discussion Paper, TRB Sustainable Transportation Indicators Discussion Group. 1 August 2007. A proposed set of sustainability measures and key principles that should guide the development of any sustainable indicator set. Many of the measures proposed connected with land use issues, housing, and energy and resources.
- Metropolitan Philadelphia Indicators Project. Available at: <http://www.temple.edu/mpip>. Accessed 20 September 2007. Cooperative regional effort Uses two types of indicators: social, environmental, and economic measures; and household surveys on "quality of life." Used to identify emerging problems and opportunities for regional planning and programs.
- Mid-America Regional Commission (MARC) "Metro Outlook." August 2001. Available at: <http://www.marc.org/Metro%20Outlook.pdf>. Accessed 6 October 2006. Report by an MPO on their efforts to integrate community/social considerations into decision making. Eight factors (social investment, healthy institutions, capable people, economic participation, productive economy, economic wealth and investment, innovation, resource efficiency and natural wealth) form the building blocks of the MARC "quality of life" framework. Measures such as home ownership, job growth, charitable giving, education, social connection, poverty rate, home loans, etc. are used to assess the region's

progress. How transportation can contribute to each of the building blocks is considered in developing transportation policy.

Missouri Department of Transportation. "The Relationship of Environmental Justice Populations to Key Socio-economic Variables." 17 February 2003. Available at: http://oseda.missouri.edu/modot/planning/stlouis_analysis.shtml. Accessed 4 October 2006. The Missouri DOT conducts expanded environmental justice evaluations that included educational attainment, housing and employment data in their environmental justice assessments.

Morrison Institute for Public Policy, Arizona State University. "What Matters in Greater Phoenix: Indicators of our Quality of Life." 1999. Available at: <http://www.asu.edu/copp/morrison/public/qofl99.htm>. Accessed 20 September 2007. Wide ranging study on quality of life factors including measures of degree of "community" using in-and out-migration figures, what factors are important to people when selecting a neighborhood. Includes interesting measure of how important commute time is in determining whether people would consider relocating, and if so, how much of an increase would be required to trigger a move.

Oliver, Naomi, Kyle Campbell, and Kevin Archer. "Florida Community Indicator Index Grant." Final summary report. Tampa: Florida Center For Community Design and Research, University of South Florida, 2003. Available at: <http://www.fccdr.usf.edu/projects2.asp?projid=17>. Accessed 20 June 2005. A University of South Florida study used a modified Delphi approach to develop a community indicator index for use across the state. Selection of measures based on the combined input from citizens and academics (experts). The study concluded that using several measures for specific issues or general areas was a better approach; allowed more accurate portrayal of the conditions in a particular community and prevent a negative effect from the ranking itself by labeling a particular area as having poor "quality of life."

Palinkas, Lawrence A., Bruce Murray Harris, And John S. Petterson. *A Systems Approach to SIA: Two Alaskan Case Studies*. Boulder: Westview Press, Social Impact Assessment Series, 1985. Suggest a systems approach to SIA, in which the functions and outputs of a system can be correlated with inputs. The structures through which inputs flow (organizations, value hierarchies, or processes), are the "rules of transformation". Deciphering those rules will allow the outputs (direct effects) and feedback loops that develop (indirect effects) to be predicted.

Putnam, Robert D and Lewis M Feldstein. *Better Together. Restoring the American Community*. New York: Simon and Schuster, 2003. Case studies on several institutions and community groups that are building social capital and sustaining social networks.

Raine, J.W. "On Measuring Patterns of Neighbourly Relationships." *Socioeconomic Planning Sciences*, Vol 13 (1979), no 1, pp 27-33. Small UK study of the activity patterns of housewives found mixed empirical evidence that major roadways offer obstacles to social interaction. The social domain for each respondent was mapped. For some respondents, the boundary of the social domain coincided with a major roadway; for others it crossed

them. The study did find that residents who lived at the center of a neighborhood had larger circulation patterns and generally better access to social interactions.

Rohe, William M. In "Using Social Capital to Help Integrate Planning Theory, Research, and Practice." Judy Hutchinson and Avis C. Vidal, eds. Journal of the American Planning Association, Vol 70, no 2, Spring 2004, pp 142-192. Outlines the need to understand not only the presence of social networks, but also their dimensions of power and content. Proposes series of measures that would require highly detailed data collection at the local level. Brief case study that illustrates the value of social capital to a community and to a transportation project development team in Durham, North Carolina.

Sabatini, Fabio. "Social Capital as Social Networks. A New Framework for Measurement." Unpublished paper, June 2005. Study using trust data for Italian regions. Identified a social capital configuration that was associated with desirable economic development: low levels of bonding social capital, good quality of family relationships, high levels of bridging social capital shaped by weak ties among friends, high levels of bridging social capital shaped by ties connecting members of voluntary associations, high levels of civic awareness. Higher levels of religious participation correlated with bonding social capital and with little interesting politics and social affairs; bridging correlated with lower religious participation.

Sander, Thomas. "Environmental Impact Assessment and their Lessons for Social Capital." Seminar paper for the Saguaro Seminar, Harvard University, 1999. Available at: <http://www.ksg.harvard.edu/saguaro/pdfs/sandereisandsklessons.pdf>. Accessed 20 September 2006. Suggests social capital be explicitly included in Environmental Impact Statements (EISs). Notes that social capital factors are already alluded to in the NEPA requirements, specifically in the requirement that social cohesion be considered.

San Mateo County, CA. "Sustainable San Mateo County." March 1997 with subsequent updates. Available at: <http://www.plsinfo.org/healthysmc/5/>. Accessed 20 September 2007. Broad range of measures to assess quality of life and plan for improved sustainability. Includes measures of voter participation, volunteerism, crime including domestic violence. Vehicle miles traveled (VMT), number of commuter trips, and congestion levels included as components of quality of life.

Sénécal, Gilles. "Urban Spaces and Quality of Life: Moving Beyond Normative Approaches." Policy Research Initiative, Vol 5, no 1, 7 September 2002. http://policyresearch.gc.ca/page.asp?pagenm=v5nl_art_06. Accessed August 19, 2004. Describes a follow up study of an application of the pilot application COMLE Canadian quality of life index; practitioners stated that the measures used were not output measures. For example, using the number of meetings a citizen attends was shown to be only a proxy for measuring their level of genuine civic participation.

Simon, Herbert A. *The Sciences of the Artificial*, 3rd edition. Cambridge: MIT Press, 1996. Design is part of psychology, which includes the relationship to the complex outer world in which humans seek to survive and achieve. Should seek to understand relationship to inner and outer environments that defines the space in which people choose to live can provide

insight into the inner human core: “the complexity of his behavior may be drawn from man’s environment, from man’s search for good designs. . . .the proper study of mankind is the science of design”.

Slootweg, Roel, Frank Vanclay, and Marlies van Schooten “Integrating Environmental and Social Impact Assessment” in *The International Handbook of Impact Assessment*, Henk A. Becker and Frank Vanclay, eds. Cornwall, UK: Edward Elgar, 2003, pp 56-73.

Smith-Lovin, L., Miller McPherson, and Matthew Brashears. “Social isolation in America: Changes in Core Discussion Networks over Two Decades.” *American Sociological Review* Vol 71 no 3, June/July 2006, pp 353-375. Survey-based study that found increasing numbers of Americans have only one person they view as a close confidant, and that person is more often a spouse/partner than in previous decades. Taken as evidence that peoples’ social networks are becoming smaller and as a result are likely less resilient than they once were.

Steg, Linda and Robert Gifford. “Sustainable Transportation and Quality of Life.” Paper presented at the STELLA Focus Group 4 Meeting, 26-27 May 2003, Québec City, Canada. Study in The Netherlands. Citizens in The Netherlands reported being in good health and having access to adequate health care as important to having good quality of life. Rather rigorous study design.

Stolp Annelies, Wim Groen, Jacqueline van Vliet, and Frank Vanclay. “Citizen Values Assessment: Incorporating Citizens’ Value Judgments in Environmental Impact Assessment.” *Impact Assessment and Project Appraisal*, Vol 20, no 1, March 2002, pp 11-23. Case study of a modified Delphi technique used in The Netherlands called the Citizen Values Assessment (CVA). This approach uses interviews with key community members to discover stakeholder values and their perceptions about changes that would stem from a highway project. A sample of area residents then rank the values in order of importance and score current conditions using the ranked values as evaluation criteria. The outcomes are translated into a ranking of the projected impacts, in order of their importance to the community.

Taylor, Nick, Colin Goodrich, Gerard Fitzgerald and Wayne McClintock, 2003. “Undertaking Longitudinal Research” in *The International Handbook of Impact Assessment*, Henk A. Becker and Frank Vanclay, eds. Cornwall, UK: Edward Elgar, 2003, pp 13-25. Suggestions for developing a more solid theory to underlie SIA work, including using comparative case studies and analyses of likely webs and chains of effects to develop conceptual models.

Tolbert, Charles M, II. “Sustainable Community in Oil and Gas Country.” Draft report. May 2005. Study to investigate the economic resiliency of a small town in Louisiana where a major plant closing did not cause serious decline in community/social wellbeing. Found that industrial and economic diversity into the service and business sectors. Also kinship networks and longstanding relationships leant stability. The authors caution against making cross-sectional comparisons with other communities.

Transportation Alternatives. "Traffic's Human Toll. A Study of the Impacts of Vehicular Traffic on New York City Residents." October 2006. Available at: www.transalt.org. Accessed 20 September 2007. Four neighborhoods surveyed comparing perceptions of neighborhood quality and activity patterns. Residents on medium- and heavy-traffic streets reported having fewer friends and acquaintances on their blocks, residents on heavy-traffic streets were more active in working for improvements in the community, and traffic was bothersome to residents in their homes, yards, and when walking in their neighborhoods. Several policy recommendations related to reducing overall traffic and neighborhood traffic calming projects.

Transportation Research Board. "Information Assets to Support Transportation Decision Making. Report of a Peer Exchange of State Transportation Organizations." 17-18 April 2007, Kansas City, MO. Circular number E-C121. Report summarizing the discussions at a peer exchange; for the most part focused on roadway condition inventory, but the participants also identified a set of recommendations for all types of transportation data including: collection of before-and-after data to evaluate effectiveness of changes to the transportation system, fusing a range of data sources into a commonly accessible platform such as a GIS, and mapping and documenting data and data needs.

University of Michigan, Taubman College of Architecture and Urban Planning. "Detroit Area Study 2001." Available at: <http://www.tcaup.umich.edu/workfolio/DAS2001/stdescript.html>. Accessed 20 September 2007. Long term survey project with expansion of "quality of life" questions in 2001. Attitudes and behaviors related to neighborhoods and neighboring, civic engagement, and environmental and community conditions. Study objectives include producing accurate and credible information on the quality of life for decision-makers, measuring and documenting public perceptions about community life in the region, establishing a benchmark for perceived quality of life, and determining how closely public perceptions correspond to community and environmental conditions.

Vanclay, Frank. "Conceptual and methodological advances in social impact assessment" in *The International Handbook of Social Impact Assessment*, Henk Becker and Frank Vanclay, eds. Cornwall: Edward Elgar, 2003. Basic outline of SIA practice. Identifies a set of key principles for SIA practice and content.

Wilson, William Julius. *When Work Disappears. The World of the New Urban Poor*. New York: Alfred Knopf, 1996. This noted scholar discusses how local institutions (e.g. the YMCA) decline when 'old heads' move away. Old heads are the mentors and parents of young people in African-American communities. This increases the developmental hazards for youth, leaving them with fewer support mechanisms. In many cases, the traditional old heads have been replaced by 'new old heads', often gang leaders with connections to violence, drug culture, etc.

Wolf, Kathleen L. "Transportation, Large Infrastructure, and Context in Urban Areas: A Review of Human Scale Perception and Response." Paper presented at the Transportation Research Board 2007 Annual Meeting, January 2007, Washington DC. Comprehensive literature review of perception studies related to transportation. Suggests looking at sound and noise, light and shadow, on-the-ground spatial configuration, crime

prevention through environmental design, the experience of nature in the city, and driver response to natural elements on roadsides in developing design that fits with human context.

Wooldcock, Michael and Deepa Marayan. "Social Capital: Implications for Development theory, Research, and Policy." *The World Bank Research Observer*, Vol. 15, No. 2, August 2002, pp 225-249. Overview of the evolution of social capital theory and research. Notes that social capital as a concept has value for public policy as it promotes cross-disciplinary discourse. Recommends that practitioners and policymakers work with social capital concepts rather than waiting for the research to fully explain all of its dimensions.

The World Bank, 2004. "Community Driven Development in Urban Upgrading." *Social Development Notes, Community Driven Development and Urban Services for the Poor*, Number 85, July 2004. CDD emphasizes treating the poor and their institutions as initiators, collaborators and resources for development initiatives. The goal is to link communities to both the private sector and to local government. Describes a project in Bombay that had important spin-off effects: local economic development, a paradigm shift towards empowerment rather than paternalism, improved cohesion among slum dwellers, and better integration with the wider social fabric of the city. The political sustainability and momentum towards improvement are key in the view of the Bank's overall mission.

Appendix B: Data Documentation

Domain: Basic Demographics

- **Variable: AGE**
- **General description:** Basic age profile of the study area and of Guilford County. The percentage of persons in four age groups was calculated using 2000 US Census data (from the SF-1, 100% sample):
 - Percent under 5 years of age;
 - Percent 5 to 17 years;
 - Percent 18 to 61 years;
 - Percent 62 years and older.
 - **Type of variable:** Interval.
 - **Validity:** High.
 - **Reliability:** High.
 - **Reference area:** County.
- **Value and importance of the data:** A basic demographic measure, common in current practice. Age categories were developed to reflect differences in how people interact with, and would be expected to use, an auto-based transportation facility. Age is generally a good proxy for lifecycle. The categories were selected to reflect broadly-defined life stages: young children, school-age children, working-age persons, and retired/elderly persons.
- **How it relates to community wellbeing:** Activities, community needs, and susceptibility to certain impacts vary by age. Looking at the composition of a community provides information on expected types of activities residents engage in, services likely to be needed, and the types of facilities they can be reasonably expected to want and need.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Activity patterns and lifecycle characteristics are related to travel patterns. For example, locating a large, limited access facility in an area with high numbers of elderly persons may mean that preferred low-traffic, low-speed routes are eliminated, especially for destinations reached by foot. Children are more susceptible to particulate pollutants, therefore a facility designed to carry heavy diesel truck traffic could bring disproportionately negative effects for a community.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** Identify special needs populations; generally accepted in current practice.
 - **Actual data source (agency):** US Census. Since 1996, the American Community Survey has collected data annually between the decennial Census.
 - **How to retrieve data:** <http://www.census.gov>
 - **Cost:** None for downloadable datasets.
- **Issues specific to Greensboro case study:**
 - **Applicability:** None specific.
 - **Drawbacks:** None specific.
- **Variable: INCOME**
- **General description:** Basic income profile of the study area and of Guilford County. Using 2000 US Census data (from the SF-3, sample of 1 in 6 households, nationwide), the median household income for each tract in the County and the study area were compared with the County-wide median income (CMI, \$42,618).

Tracts were classified as:

<25% of CMI = <\$10,655

50% CMI = \$10,655 – 21308

75% CMI = \$21,309 – 31,963
75 – 100% CMI = \$31,964 – 42,617
100 – 125% CMI = \$42,618 – 53,272
125 – 150% CMI = \$53,273 – 62,926
>150% CMI = >\$62,926

- **Type of variable:** Ordinal.
 - **Validity:** Moderate. While using the median value does somewhat minimize the related error, it does not account for wide ranges in values and thus can mask considerable difference within tracts. Using the median assumes a degree of internal similarity in Census tracts.
 - **Reliability:** Moderate to High. Potential for error related to self-reporting and sampling error.
 - **Reference area:** County.
- **Value and importance of the data:** A basic demographic measure, common in current practice. Income is a useful metric for assessing general well-being of households. As income rises, people generally have greater choices and opportunities; income is considered by some to be a proxy for quality of life.
- **How it relates to community wellbeing:** Higher incomes associated with improved physical health and life expectancy. Higher incomes also provide access to opportunity (education), capital (home and business loans), and political influence (ability to press for public investment in infrastructure, environmental quality, etc.). Low incomes can be a signal for systematic problems with a local economy, including jobs mismatched to the skills of workers (thus providing fewer and lower-paying opportunities) or a general economic downturn.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Transportation projects are an important component of a regional and local economy. The efficient movement of goods and workers supports business investment and activity, and can support the expansion of a regional economy by opening land to residential development (drawing more population) and/or to business development (attracting new firms). Changes in the transportation system usually involve shifts in the degree of access among firms, and a given transportation facility can provide greater support to certain types of businesses while diminishing access to others. Incomes will be affected by these infrastructure changes as businesses are the providers of jobs to residents. Conversely, major, intrusive facilities can devalue residential areas, leading higher income residents to move elsewhere and allowing the nearby housing stock to be devalued, thus opening it to lower-income strata. The direction of these effects is highly dependent on the specific project, the adjacent development, and the role it plays in the region's transportation system. If an overarching goal of transportation projects is to improve quality of life, incomes should be expected to rise following the construction of a project.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:**
 - **Actual data source (agency):** US Census. Since 1996, the American Community Survey has collected data annually between the decennial Census.
 - **How to retrieve data:** <http://www.census.gov>
 - **Cost:** None for downloadable datasets.
- **Issues specific to Greensboro case study:**
 - **Applicability:** None specific.
 - **Drawbacks:** None specific.
- **References:**

Sen, Amartya, 1999. *Development as Freedom*. New York: Anchor Books, Random House.

US Census Bureau. *Summary File 3. 2000 Census of Population and Housing. Technical Documentation*. US Census Bureau: Washington DC, July 2007. Available online at: <http://www.census.gov/prod/cen2000/doc/sf3.pdf>

- **Variable: RACE**
- **General description:** Basic racial profile of the study area and of Guilford County. Using 2000 US Census data (from the SF-1, 100% sample file), six race categories were compiled:

White: Non Hispanic white;
Black: Non-Hispanic black;
Hispanic: All Hispanics;
AIAN: Non-Hispanic American Indian, Alaskan Native;
Asian: Non-Hispanic Asian;
Other: All other Non-Hispanics, including those reporting two or more races.

The percentage of each of these categories was mapped for the county and for the study-area Census tracts. These categories are non-overlapping to allow for their use in calculating a dissimilarity index.

A measure of the level of racial segregation was calculated for the study area and for Guilford County:

$$D_m = \sum (t_i \sum_i | p_{im} - P_m |) / [2 T \sum P_m (1 - P_m)]$$

where t_i is the number of residents in tract i
 p_{im} is the proportion of people in subgroup m in tract i
 T is the total number of residents in the county and
 P_m is the proportion of people in subgroup m in the county.

The numerator is the minimum number of people who would have to move from one tract to another to achieve a distribution equivalent to the county. The denominator is the number of people who would have to move to attain a distribution equivalent to the county, beginning from a state of maximum segregation. The result, D_m , can range from 0 (indicating no segregation exists) to 1.0 (a situation of absolute segregation). Note that this formula is not affected by the relative proportions of the various racial groups; it measures their spatial distribution, not their relative proportions.

In a study comparing segregation in metropolitan areas nationwide, Morello-Frosch and Jesdale applied the following scale for interpreting D_m :

0.16 to 0.39 = low to moderately segregated
0.40 to 0.60 = highly segregated
0.60 = extremely segregated

For Guilford County, $D_m = 0.5025$
For the Urban Loop Study Area Census Tracts, $D_m = 0.4442$
For the urban Loop Study Area Blocks, $D_m = 0.6677$

A higher value for D_m for the smaller, Block geography shows that Census Blocks within the Tracts in the study area have greater racial segregation than the Tracts. This result is to be expected as finer geographies should show more concentration/segregation than larger geographies. The slightly lower value for the study area Tracts compared to all Tracts in Guilford County is a result of very low numbers (or zero) for some racial groups, therefore the number of persons who must move to reach lowest segregation (the numerator) is smaller.

- **Type of variable:** Nominal.
 - **Validity:** High.
 - **Reliability:** Moderate to High. Changes in race self-identification may change somewhat, although are expected to be rather stable.
 - **Reference area:** County.
- **Value and importance of the data:** A basic demographic measure, common in current practice. Race is often found to be associated with income and educational levels, and with certain cultural and social norms, therefore it is a useful screening tool for framing public outreach. Some evidence that social networks within racially homogenous neighborhoods have more and stronger connections.
- **How it relates to community wellbeing:** N/A, except in how it is associated with other factors.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Racial composition of the project study area must be analyzed under Executive Order 12898 (Environmental Justice), although a thorough EJ analysis requires that multi-racial persons be counted in each of the race categories that they report, with each category calculated separately.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice**
 - **Actual data source (agency):** US Census. Since 1996, the American Community Survey has collected data annually between the decennial Census. For 2005, ACS data are available for geographic areas with a population of 65,000 or more, including 761 counties, 436 congressional districts, 602 metro- and micropolitan statistical areas, and all 50 States plus the District of Columbia. See http://factfinder.census.gov/jsp/saff/SAFFInfo.jsp?_pageId=sp1_acs&_submenuId=
 - **How to retrieve data:** www.census.gov.
 - **Cost (if applicable):** None for downloadable datasets.
- **Issues specific to Greensboro case study:**
 - **Applicability:** The combined categories may result in the loss of some detail, however a tract by tract check of the Guilford County data revealed that the number of respondents who reported two or more races was small. Other communities may have large numbers of multi-race persons so the categories compiled for the Greensboro case study may not be appropriate other locations.
 - **Drawbacks:** None specific.
- **References:**

R Morello-Frosch and BM Jesdale. "Separate and unequal: residential segregation and estimated cancer risks associated with ambient air toxics in US metropolitan areas." *Environmental Health Perspectives*, March 2006, 114(3): A 176-177.

Putnam, R., 2007. "E Pluribus Unum: Diversity and Community in the Twenty-first Century. The 2006 Johan Skytte Prize Lecture." *Scandinavian Political Studies*, Vol. 30, no. 2.

Domain: Economic

- **Variable: BUSINESS**
- **General description:** This variable measures the number and value of business loans, a measure of economic development. These data are based on the federal requirements for lending institutions to report their small business and farm loan activity, and are commonly referred to as Community Reinvestment Act (CRA) data. The reporting requirements provide information for community revitalization initiatives that focus on increasing small business activity and economic development. The total value of loans and number of loans are reported by the tract in which the loan was made in three loan-size categories:

≤ \$100,000;
>\$100,000 to \$250,000; and
>\$250,000.

Alternatively, these data can also be investigated by lending institution, allowing for analysis of lending patterns by bank office. For rural areas, farm loan data are available in the same basic format.

- **Type of variable:** Interval.
- **Validity:** Moderate to high. Some small businesses, especially start-up operations, may secure loans from private sources (friends or family) rather than formal banking channels.
- **Reliability:** Moderate to high. Federal reporting requirements change from time to time, which can affect reliability for time series analyses.
- **Reference Area:** Guilford County.
- **Value and importance of the data:** Provides a measure of investment flows that reveal the value of a neighborhood as a business and investment location. Also reveals the ability of local businesses to secure loans, an important part of growing their businesses.
- **How it relates to community wellbeing:** Healthy levels of business investment for small businesses and farms are needed to maintain a healthy local economy. Neighborhood businesses can provide local jobs and needed services to nearby neighborhoods. CRA data do not allow the analyst to determine if loans are received by small locally-owned businesses or franchises of corporate chains. Therefore, care should be taken in the interpretation of JOBS as an indicator of the local economy.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Transportation projects can enhance or increase access to existing businesses, promoting expansion of their operations; or they can open new land up for development, promoting the development of new businesses. This effect would be expected to increase BUSINESS. Projects that create substantial negative effects, including displacement of residents and businesses, or changing land use patterns so that small businesses have greater difficulty finding affordable and feasible locations, would be expected to decrease BUSINESS.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** Transportation projects are to give consideration to the degree to which a project or program could disrupt desirable community growth, which includes community economic development patterns. BUSINESS provides a measure of investment flows that indicate levels of local economic development. Looking at these investment flows, in combination with jobs data and income provides a much more complete picture of the local economic wellbeing in the community.

- **Actual data source (agency):** Federal Financial Institutions Examination Council (FFIEC).
 - **How to retrieve data:** Can be downloaded from:
<http://www.ffiec.gov/cra/default.htm>
 - **Cost:** None.
- **Issues specific to Greensboro case study:**
 - **Applicability:** Greensboro's Urban Loop was constructed during a period of growth in the region and would be expected to support a rising trend of business investment. Data on both the number of loans and loan values are mapped in the case study.
 - **Drawbacks:** None known.
- **Variables: DEMO_THOU, PERM_NEW**
- **General description:** This variable is the number of building permits issued for demolitions of residential structures. The raw count data is converted to a ratio of number of permits issued per 1000 dwelling units (from US Census data) for maps.
- **Type of variable:** Interval.
 - **Validity:** High. Demolitions, especially in urban areas, are unlikely to occur without a permit as these tend to be very noticeable events. Analysts should recognize that while the issuance of a demolition permit is a strong indicator that a project will be started, it does not measure whether a project is actually completed. There may also be a time lag between the date of issuance and the date of demolition (although in most cases municipalities do require demolition to begin within a specified time frame, typically 12 months).
 - **Reliability:** Moderate. Reliability is somewhat dependent on the changes to city ordinances (or variation from place to place) with respect to what kinds of projects require permits and how projects are defined under local ordinance. It is also dependent on changes to jurisdictional boundaries (city limits) over time and the extent to which those boundaries coincide with Census geography. This may be more common in rapidly growing areas where annexation is common; changing boundaries will mean that permit requirements may vary within the study area.
 - **Reference area:** City.
- **Value and importance of the data:** Demolitions of residential structures typically occur for one of two reasons: (1) a structure has become obsolete because dramatic changes in the housing stock around it have made the lot more valuable than the existing structure, or (2) the structure has been allowed to physically deteriorate to the point where it is economically unfeasible to repair it. Property owners choose to invest or not to invest in their structures based on the actual or perceived value of the neighborhood, both present and future. Therefore the number of demolitions in a neighborhood is a measure of change not only of the physical housing stock, but also of the perceived and actual economic viability of that housing stock.

A high number of demolitions paired with a high number of building permits for new residential structures (PERM_NEW) indicate substantial neighborhood change, most likely an influx of residents with much higher incomes than existing residents. Replacement with commercial structures indicates that there has been a substantial change in the value of the land and the zoned use. A high number of demolitions with no apparent replacement of the housing stock indicates that there has been an extended period during which property owners did not maintain their structures, thus is a strong indicator of decline (it is unlikely that a sound, vacant unit would be demolished).

- **How it relates to community wellbeing:** Demolition without replacement is an indicator of poor quality housing stock, residential turnover, or change to different land uses. All of these scenarios will tend to stress existing social networks, existing household finances (through increases in land values and rents), or poor quality, unhealthy physical environments.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Effects will be dependent on the specifics of a transportation project. Projects that support increased land values and trigger a *change in land use* are expected to have a positive effect on DEMO_THOU.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:**
 - **Actual data source (agency):** Local municipality or county (City of Greensboro).
 - **How to retrieve data:** Local building inspection office. Many jurisdictions, especially smaller towns and rural areas, are unlikely to maintain extensive building permit databases thus requiring extensive work with files. However, with the trend to maintain increasing types of information in GIS, permit data may become more accessible for practitioners, with requests customizable to the project study area.
 - **Cost:** Some jurisdictions might levy a small fee to provide data.
- **Issues specific to Greensboro case study:**
 - **Applicability:** Greensboro's Urban Loop is a major transportation project that can be expected to change land values. Greensboro has also seen rapid growth in recent decades which could trigger demolition and replacement of housing.
 - **Drawbacks:** Portions of some project-area Census tracts are (or were in 2000) outside the city boundary, so city permit data may be incomplete.
- **Variable: JOBS**
- **General description:** This variable measures the number and proximity of jobs to the study area Census tracts, providing a measure of economic opportunities available to residents in the study area. Jobs numbers are compiled by a number of firms; the data for Greensboro were collected by Info USA and Dunn & Bradstreet. In order to develop socio-economic forecasts that become important inputs to regional travel models, most Metropolitan Planning Organizations (MPOs) purchase such data, often augmenting and correcting it with their own local efforts. Jobs are classified into broad industry categories:

Highway Retail, Industrial, Retail, Service, Office, and School.

These data are available at the Traffic Analysis Zone (TAZ) level, which is finer than the Census tract level, although TAZs do not generally cross tract boundaries so they can be grouped to provide a Census-tract level analysis.

- **Type of variable:** Interval.
- **Validity:** Moderate. Jobs data collected will tend to miss jobs at very small establishments, or jobs outside the formal economy ("under the table" jobs). A more important issue is that proximity to jobs does not mean that the residents' skill set matches with the requirements of jobs. Therefore, a neighborhood can have a large number of jobs in close proximity, but these may be jobs for which the residents are not trained and consequently do not represent actual opportunities for employment. Additionally, these data are subject to the so-called "headquarters effect" in which a firm's headquarters may report the number of jobs for its entire operation, though many of which may not be located at the headquarters site.

- **Reliability:** Moderate. Data are gathered based on employers' reporting of numbers of employees to data collection firms and are likely subject to some reliability issues depending on the timing of the contact to the firm, and variation in data calculation by the data providers attributable to differences in their proprietary methods.
 - **Reference Area:** The MPO's modeling area.
- **Value and importance of the data:** Provides a measure of economic opportunity for workers. Using data provided to the MPO regional modeling service is at the TAZ level, allowing a much finer-grained analysis of jobs patterns than county or state level jobs data, and will support a range of GIS analysis techniques.
- **How it relates to community wellbeing:** Access to employment opportunities is a key aspect of reaching a level of economic wellbeing. A healthy jobs market provides jobs for a range of skills and educational attainment levels; it supports household and neighborhood stability. It also supports a viable tax base that allows for the provision of public services, thus indirectly benefiting even those not in the work force or unemployed/underemployed persons.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Transportation projects can enhance or increase access to existing businesses, promoting expansion of their operations; or they can open new land up for development, promoting the development of new businesses. Generally business expansions and new businesses will also provide additional jobs. This effect would be expected to increase JOBS. Projects that create substantial negative effects, including displacement of residents and businesses would be expected to decrease JOBS. Transportation projects can also improve access to jobs for workers, although determining this effect would require a network-based analysis rather than a geographic buffer-based analysis.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** Transportation projects are to give consideration to the degree to which a project or program could disrupt desirable community growth, which includes community economic development patterns. JOBS provides a measure of the opportunity residents have to access the positive aspects of community development. Very high levels of JOBS, beyond the local residential population base, may signal a situation in which workers are commuting in from elsewhere, a circumstance associated with lower levels of community cohesion.
 - **Actual data source (agency):** Greensboro Urban Area MPO (GUAMPO).
 - **How to retrieve data:** Provided by the MPO under agreement. Proprietary data.
 - **Cost:** None, although without a data-sharing agreement with a local MPO, data must be purchased.
- **Issues specific to Greensboro case study:**
 - **Applicability:** Greensboro's Urban Loop was constructed during a period of growth in the region and would be expected to support a rising levels of JOBS.
 - **Drawbacks:** Data were collected to support the GUAMPO Long-Range Transportation Plan update cycle and therefore were available for 2002. In order to adjust the jobs numbers to the case study, pre-project year of 2000, the 2002 figures were corrected based on changes in Guilford County Business Pattern data for the two years. Calculating the factor of increase or decrease for each industry classification in the Greensboro data required a reclassification of the industry classifications used for the county data. The categories of Highway Retail and Retail in the Greensboro data were combined into a single Retail classification for the calculation of the change factor. The table on the following page presents the reclassification scheme and factors of change. The sum of jobs in each

reclassification category for the year 2000 was compared with the 2002 Greensboro figures and the percentage change from 2002 to 2000 was calculated. If the difference indicated that the number of jobs increased from 2000 to 2002, the figure for 2000 was calculated:

$$2002 \text{ figure} * (\text{percentage change} + 1.0)$$

If there was a decrease in jobs for a particular classification, the 2000 figure was calculated:

$$2002 \text{ figure} * (1.0 - \text{percentage change})$$

In most cases, the changes were very small. A major drawback to this approach is that the adjustment corrects for the overall number of jobs, but cannot account for changes in the locations of jobs. Therefore, the calculated 2000 figures may include job locations that were not yet in existence in 2000. This approach also assigns county-wide shifts in jobs patterns to the study area, assuming such changes are evenly distributed over the entire county, and may mask localized effects including anticipation of the Urban Loop. Generally these effects are expected to be small, however, given the very short time interval (2 years) involved. Table B-1 presents the reclassifications and factors used in the Greensboro case study.

Table B-1: Job Classifications and Factors

County Level Business Pattern Major Industry Code Classifications	Reclassification for Calculation of Factor of Increase or Decrease	Factor for change from 2002 to 2000
Forestry, fishing, hunting and agricultural support	Industrial	1.0760 (increase of 7.6%)
Mining	Industrial	1.0760 (increase of 7.6%)
Utilities	Industrial	1.0760 (increase of 7.6%)
Construction	Services	.966 (decrease of 2.34%)
Manufacturing	Industrial	1.0760 (increase of 7.6%)
Wholesale Trade	Industrial	1.0760 (increase of 7.6%)
Retail trade	Retail	1.0319 (increase of 3.19%)
Transportation and warehousing	Services	.966 (decrease of 2.34%)
Information	Services	.966 (decrease of 2.34%)
Finance and insurance	Office	.9385 (decrease of 6.02%)
Real estate and rental and leasing	Office	.9385 (decrease of 6.02%)
Professional, scientific and technical services	Services	.966 (decrease of 2.34%)
Management of companies and enterprises	Office	.9385 (decrease of 6.02%)
Administration, support, waste management, remediation services	Industrial	1.0760 (increase of 7.6%)
Educational services	School	.9494 (decrease of 5.06%)
Health care and social assistance	Services	.966 (decrease of 2.34%)
Arts, entertainment and recreation	Services	.966 (decrease of 2.34%)
Accommodation and food services	Services	.966 (decrease of 2.34%)
Other services	Services	.966 (decrease of 2.34%)
Unclassified establishments	Services	.966 (decrease of 2.34%)

- **Variable: MORTGAGE**
- **General description:** Under the Home Mortgage Disclosure Act (HMDA) of 1975, banks, savings and loans, and other financial institutions are required to report detail information on their home mortgage lending activity each year. These data are often used by community organizations and researchers to investigate lending patterns and credit needs, especially in low-income and minority neighborhoods. Institutions report the number of loan applications by census tract, and income, race, and gender of the borrower. The disposition of loans not originated is also reported. They also report the number and value of loans made. HMDA data are available at the census tract level, with some details reported at the MSA level, primarily to protect proprietary algorithms used by lenders during the loan application process. The location of the loan is the tract in which the real estate is located; HMDA data can be analyzed for individual financial institutions allowing for investigation of lending patterns of particular banks. For this study, several measures were derived from HMDA data:

Number of loans, by Census tract,
Value of loans, by Census tract, and
Mortgage denial rate, by Census tract.

All loans included are for 1-to-4 family and manufactured home dwellings and do not include non-occupant loans. These measures were calculated for two categories of loans:

Home purchase loans: This category includes federally subsidized loans (e.g., FHA-Federal Home Administration, FSA/RHS-Farm Service Agency/Rural Housing Service, and VA-Veterans' Administration loans) as well as conventional mortgages.

Home improvement and refinancing loans.

The number of loans is simply the sum of loans in the two categories made in each Census tract. The value of loans is the total value of loans in the tract divided by the number of loans. The denial rate is calculated by first computing the number of Total Applications, less applications withdrawn or closed for incompleteness:

$$\text{Total Applications} = \text{Loans Originated} + \text{Loans Approved but Not Accepted by Applicant} + \text{Applications Denied}$$

The denial rate is then calculated:

$$\frac{\text{Applications Denied}}{\text{Total Applications}}$$

- **Type of variable:** Interval.
 - **Validity:** Moderate to high. There may be some under-reporting of loans denied as there are reports of lenders encouraging borrowers to withdraw applications voluntarily if the lender perceives them to be poor prospects for a profitable loan. Home equity loans taken out for consolidation of credit-card debt or payment of medical bills are not reported under HMDA unless such loans are also intended for home improvement or purchase. Reporting of home equity lines of credit is optional, so data for these loans are incomplete. Only lenders with offices located in MSAs are required to report under HMDA, therefore home loan data for rural areas will likely be incomplete. Smaller institutions (measured by value of assets) are not

required to report HMDA data. Mortgage loans are also affected by macroeconomic conditions that may not reflect household-level economics; this will somewhat influence the validity of the measure as a proxy for household economic health. Similarly, different lending institutions use different algorithms in evaluating loan applications, therefore there may be some small differences in the denial rate among institutions that are not attributable to data on the application.

- **Reliability:** High.
- **Reference Area:** MSA.
- **Value and importance of the data:** Home mortgage loans are robust indicators of neighborhood quality, both as perceived by lending institutions who seek loans backed by healthy values of collateral, and by borrowers who are making a substantial financial commitment to invest in a neighborhood as well as an individual property. Further, in making a decision on a loan application, lenders have access to considerable information about the economic health of individuals and households at the time of the application and over time. Loans are denied for a variety of reasons including debt-to-income ratio, employment history, credit history, insufficient collateral or insufficient cash. Therefore it provides additional insight into households' economic health beyond simple measures of income. Economic health at the household level can be evaluated indirectly by determining the rate at which lending institutions deny or approve loans. The U.S. housing market is considered highly efficient; therefore economic measures using housing market-based data can be expected to be good measures of underlying economic forces, especially over time. HMDA data is updated annually, reported at the Census tract level, and is available at no cost.
- **How it relates to community wellbeing:** Neighborhood quality is closely related to factors of quality of life and community/social wellbeing. Neighborhood quality includes the quality of the housing stock (including condition, which reflects the long-term investment in maintenance), quality of public services (e.g., schools, streets), proximity to desirable land uses and distance from undesirable ones, and intangible elements that include feelings of security, comfort and belonging. The ability to secure a home mortgage is related to several factors of wellbeing at the neighborhood and household level. MORTGAGE measures the economic wellbeing of households, residents' interest in moving to or remaining in a neighborhood (which is an indication of their perception of neighborhood quality), and outsiders' perceptions of neighborhood quality. The economic stress that underlies a high mortgage denial rate would also be expected to generate other kinds of stress, including physical stress or stress related to holding multiple jobs.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** The mortgage market is at least as complex as the relationship between land use and transportation. Briefly, if a transportation project will introduce heavy, fast traffic into a neighborhood, it would be generally expected to reduce neighborhood quality as perceived by residents and outsiders, thereby increasing the mortgage denial rate and decreasing the number and average value of loans. Similar effects would be expected if the existing housing stock were rendered out-of-date or unattractive by the combined effects of the transportation project and nearby land use change. If a transportation project triggers land use change or redevelopment that includes housing attractive to outsiders, the reverse of these effects would be expected. If a transportation project improves access to desirable locations without simultaneously bringing substantial negative effects (e.g., noise), it would be expected to lead to an increase in the number and value of mortgages as well as a decrease in the mortgage denial rate. Such improvements would also be expected to decrease the denial rate for home improvement loans, especially for reasons of insufficient equity, if housing values in general rose. Differences in the mortgage denial rate for home purchase loans compared with denial rates for home

- improvement and refinancing loans may indicate a difference in the economic wellbeing of incoming households compared with existing households. If redevelopment plays a role in substantially changing the income profile of a neighborhood, existing residents in existing dwellings may find they lack the income or equity to cope with rising housing and other costs when they seek to upgrade or refinance their homes.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** No examples of using HMDA data for evaluating community/social wellbeing are known. Neighborhood condition and quality are assessed through homeownership rates and household income. HMDA offers additional measures that can improve and enrich the consideration of economic effects of transportation projects, and better evaluate economic wellbeing at the household level.
 - **Actual data source (agency):** Federal Financial Institutions Examination Council (FFIEC).
 - **How to retrieve data:** <http://www.ffiec.gov/hmda/default.htm>.
 - **Cost:** None for data tables in .PDF format for years 1999 through 2006. CDs with data in more easily accessible format available for purchase (\$10 per reporting year).
 - **Issues specific to Greensboro case study:**
 - **Applicability:** The assessment of effects from the Greensboro Urban Loop project was conducted during a time of substantial growth and anticipated additional growth in the project area and the region.
 - **Drawbacks:** The reference area is the MSA, which in 2000 included Greensboro, High Point and Winston-Salem. Winston-Salem subsequently became a separate MSA, so cross-sectional comparisons will be limited for variables reported at the MSA level (e.g., reason for loan denial).
 - **References:**

Office of Thrift Supervision, US Department of the Treasury. "Frequently Asked Questions About the New HMDA Data." April 3, 2006. Available at <http://www.ots.treas.gov/docs/4/48799.pdf>. Accessed October 2, 2007.

National Community Reinvestment Coalition. "HMDA" Available at <http://www.ncrc.org/policy/cra/hmda.php>. Accessed May 18, 2007.
 - **Variable: PERMEXST**
 - **General description:** This variable is the number of building permits issued for permits related work to existing structures. In this study, PERMEXST is the sum of permits issued for additions to existing residential structures (including attached carports and garages), accessory buildings (e.g. detached garages, storage units), interior and exterior alterations (e.g. adding a bath without increasing building footprint, roofing over patio area), and repairs and rehabilitation involving structural components. The raw, count data is converted to a ratio of number of permits issued per 1000 dwelling units (from US Census data) for maps.
 - **Type of variable:** Interval.
 - **Validity:** Moderate. Permits may not be required for all types of alterations and additions to existing structures so this measure may not capture small, incremental investments property owners might make. Further, property owners might not apply for a permit, either in avoidance of the permitting cost and process or out of ignorance of the local ordinances. This is more likely to be an issue in rural areas or in cities where enforcement is lax (or perceived to be lax).
 - **Reliability:** Moderate to high. Reliability is somewhat dependent on the changes to city ordinances (or variation from place to place) with respect to what kinds of projects require permits and how projects are defined under local ordinance. It is

also dependent on changes to jurisdictional boundaries (city limits) over time and the extent to which those boundaries coincide with Census geography. This may be more common in rapidly growing areas where annexation is frequent; changing boundaries will mean that permit requirements may vary within the study area.

- **Reference area:** City.
- **Value and importance of the data:** Provides a quantitative measure of the degree to which residents are willing to invest in their existing dwelling and, by extension, their perceptions about current and future neighborhood value. Securing a building permit is usually not done until a property owner has finalized their project plans and secured any necessary loans (or has enough cash on hand). Therefore it is an indirect measure of the ability of property owners to marshal financial resources, whether within their own households or by securing a loan.
- **How it relates to community wellbeing:** Greater willingness to invest is an indicator of higher satisfaction with the neighborhood. It also reflects an expectation of future economic returns and current economic health.

Residents can be expected to invest in modifications to their homes if they are satisfied with their neighborhood, optimistic about the future conditions in the neighborhood, and anticipate remaining in their current dwelling for some time in the future. Permits issued for additions could also indicate that changes are underway in a neighborhood. For example, property owners may make additions to a dwelling that they rent out and are seeking to raise their overall return on the property. In such cases, high numbers of permits issued for additions could precede substantial demographic shifts (e.g. an influx of university students). While such demographic change would generally be expected to have a negative impact on existing social networks, it does provide the potential for the generation of new networks.

Analysts should recognize that while the issuance of a building permit is a strong indicator that a building project will be started, it does not measure whether a project is actually completed. There may also be a time lag between the date of issuance and the date of construction (although in most cases municipalities do require construction to begin within a specified time frame, typically 12 months).

- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Effects will be dependent on the specifics of a transportation project. Projects that support increased land values *in their current use* are expected to have a positive effect on PERMEXST. Projects that bring negative effects such as increased local traffic, noise, and pollution would have a negative effect on PERMEXST.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice**
 - **Actual data source (agency):** Local municipality or county (City of Greensboro).
 - **How to retrieve data:** Local building inspection office. Many jurisdictions, especially smaller towns and rural areas, are unlikely to maintain extensive building permit databases thus requiring extensive work with files. However, with the trend to maintain increasing types of information in GIS, permit data may become more accessible for practitioners with requests customizable to the project study area.
 - **Cost:** Some jurisdictions might levy a small fee to provide data.
- **Issues specific to Greensboro case study:**
 - **Applicability:** Greensboro has experienced considerable growth in recent decades which can be expected to also increase the value of existing residential structures, thus PERMEXST would be expected to trend upward across the region as well as in

the project area. The City of Greensboro also includes considerable detail about building permits which allows for constructing variables.

- **Drawbacks:** Portions of some project-area Census tracts are (or were in 2000) outside the city boundary, so city permit data may be incomplete.

- **Variable: PERMNEW**
- **General description:** This variable is the number of building permits issued for new residential dwellings. In this study, PERMNEW is the total of permits for construction of new single family residences, townhouse units and placements of mobile homes in the year 2000. The raw, count data is converted to a ratio of number of permits issued per 1000 dwelling units (from US Census data) for maps.
 - **Type of variable:** Interval.
 - **Validity:** High. New housing starts are recognized as an effective measure of the local job market; this variable builds on that idea by allowing analysis of new units at a finer scale when data on individual parcels is not available.
 - **Reliability:** High. Changes in permit requirements or definitions are unlikely to vary substantially over time or from place to place.
 - **Reference area:** City.
- **Value and importance of the data:** New construction signifies an area is growing in population or anticipated to do so in the near future. In the absence of historical parcel data, building permit data can pinpoint where new housing has been built. Building permit data is more complete than subdivision plats as it includes permits for one-parcel projects as well as multiple-unit subdivisions. PERMNEW is also a measure of the confidence investors (developers) and residents (individuals who may secure a permit for a single-unit project) have in the future of the neighborhood, and of their perceptions about current and future neighborhood quality.

This variable can also be used for time series analysis of investment decisions. Securing a building permit is usually not done until a property owner has finalized their project plans and secured any necessary loans (or has enough cash on hand); therefore it is a relatively concrete measure of investment activity.

- **How it relates to community wellbeing:** High numbers of permits issued for new dwelling units indicate substantial demographic change and in-migration are likely occurring. Such change can positively affect the economic wellbeing of current residents as it demonstrates market demand for property in their neighborhood, which supports steady or increasing property values. A rising tax base can also lead to more diffuse wellbeing effects provided through expanded public services. Residential development is, however, typically a poor contributor to the overall budget as it requires extensive and costly public services.

New construction is likely to upgrade the overall quality of the neighborhood's housing stock, further improving economic and perhaps even physical wellbeing. In-migration either can stress existing social networks or can improve them by providing more connections within the neighborhood along with more connections to resources outside the neighborhood.

- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Effects will be dependent on the specifics of a transportation project. Because they open up land for development, projects that provide or improve access should have a positive effect on PERMNEW, while increased through-traffic and noise would be expected to have a negative effect. Induced commercial development

could have either a negative or positive effect. For example, townhouse dwellings might be built nearby shopping areas while construction of single-family residences and mobile home placements might decline in proximity to extensive commercial development. The direction of effects might also depend on the year for which data is analyzed, compared to the year the transportation project is completed; that is, there may be a time lag in responding to changing development patterns or changes in the transportation network/infrastructure.

- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice**
 - **Actual data source (agency):** Local municipality or county (City of Greensboro).
 - **How to retrieve data:** Local building inspection office. Many jurisdictions, especially smaller towns and rural areas, are unlikely to maintain extensive building permit databases thus requiring extensive work with files. However, with the trend to maintain increasing types of information in GIS, permit data may become more accessible for practitioners, with requests customizable to the project study area.
 - **Cost:** Some jurisdictions might levy a small fee to provide data.
- **Issues specific to Greensboro case study:**
 - **Applicability:** Greensboro has experienced considerable growth in recent decades so PERMNEW would be expected to trend upward across the region as well as in the project area.
 - **Drawbacks:** Portions of some project-area Census tracts are (or were in 2000) outside the city boundary so city permit data may be incomplete.

Domain: Physical Health

- **Variable: AIRQUALITY**
- **General description:** This measure is a simple map of the location of air quality monitors in the metropolitan area. To consider whether there might be localized pollutant effects, especially for vulnerable populations, the proximity of the monitors to the study area is displayed.
 - **Type of variable:** Geographic.
 - **Validity:** High. Locations are provided using street addresses so point data for monitor locations can be generated.
 - **Reliability:** High. Monitor locations accurately recorded and updated.
 - **Reference Area:** Urbanized area.
- **Value and importance of the data:** Air quality monitors provide the input for air quality analyses. The data collected by these monitors is considered to be the ambient air quality conditions, representative of the conditions experienced for the entire population.
- **How it relates to community wellbeing:** Air quality is an important factor in maintaining good physical health. Certain populations (e.g., the elderly, children and persons with other cardio-pulmonary conditions) are more vulnerable to air pollutants. There is rising concern about PM_{2.5} and PM₁₀, particulate matter pollutants of ≤ 2.5 micrometers and ≤ 10 micrometers in diameter, respectively.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Vehicles emit pollutants, therefore substantial increases in the volume of traffic is expected to decrease air quality. Vehicles operating in congested conditions emit a different profile of pollutants than vehicles operating at higher speeds, so alleviating congestion is often a strategy for air quality improvement. Diesel-powered trucks emit higher levels of particulates, so projects that will move heavy truck traffic will lead to different air quality impacts than projects that will carry low or no truck traffic.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** Air quality monitoring and modeling is a highly technical area of transportation practice. It is heavily controlled by legislative requirements, and transportation agencies and practitioners may have little flexibility in evaluating or addressing air quality impacts. However, the primary purpose of conducting a community effects analysis is to evaluate the effects that will be felt and the degree to which they will affect quality of life. Therefore it is appropriate to consider air quality effects outside the strict boundaries set by legislation, framing the question as one related to community wellbeing and quality of life rather than being satisfied with compliance with legal requirements.
 - **Actual data source (agency):** EPA.
 - **How to retrieve data:** Monitor locations can be queried here: <http://www.epa.gov/aqspubl1/select.html>.
 - **Cost:** None.
- **Issues specific to Greensboro case study:**
 - **Applicability:** Air quality monitors in Greensboro are located in the central city area, some distance from the Urban Loop study area.
 - **Drawbacks:** None known.
- **Variables: HAPPY and HEALTHY**
- **General description:** These variables provide measures of overall health and happiness, as reported by respondents to the 2000 Social Capital Benchmark Survey.

HAPPY maps responses to the question, “All things considered, would you say you are very happy, happy, not very happy or not happy at all?” Responses coded: 1 = Very happy, 2 = Happy, 3 = Not very happy, 4 = Not happy at all.

HEALTHY maps responses to the next question asked in the survey, “And how would you describe your overall state of health these days? Would you say it is excellent, very good, good, fair, or poor?” Answers coded: 1 = Excellent, 2 = Very good, 3 = Good, 4 = Fair, 5 = Poor.

- **Type of variable:** Ordinal.
- **Validity:** Moderate to High. Health and happiness are intertwined; good physical health contributes to overall happiness, and happiness promotes physical health by mitigating stress and supporting a positive outlook. Subject to the error inherent in any self-reported phone survey, including sampling or coding errors.
- **Reliability:** Low to Moderate. Subject to influence by most recent experiences. Question may be understood differently by individual respondents. Measurement scale subjective.
- **Reference Area:** Guilford County.
- **Value and importance of the data:** Provides basic perceptive data on aspects central to physical wellbeing that can be handled in a quantitative analysis. Currently, no other source for a quantified measure of overall health and happiness is available. The survey instrument used to collect this variable was professionally designed and administered.
- **How it relates to community wellbeing:** Higher levels of happiness and health are expected to be associated with higher levels of social interaction, fewer social costs related to health care (for both physical and mental illnesses), and higher quality of life.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** To the extent and direction (positive or negative) that transportation infrastructure affects the built environment and other quality of life factors, it can be expected to influence HAPPY and HEALTHY. Can also provide insight into the design of effective public outreach as unhealthy persons may have difficulty attending meetings, and may be difficult to engage or to engage in a positive manner.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** Provides a quantitative measure for basic elements of physical wellbeing. Current practice generally uses public outreach/comment to assess the level of general community cohesion, but do not look at happiness and health explicitly. If a sample were collected with small-scale analysis in mind, it would provide a valid sample for spatial and statistical analysis. Could be especially useful in multivariate analysis along with other factors, such as crime, income, intent to stay in current community, and social trust.
 - **Actual data source (agency):** Data are owned by the Roper Center and collected in cooperation with the Community Foundations and academic partners in each locale. Geocoded dataset is restricted; requires a data security agreement.
 - **How to retrieve data:** Contact Roper Center at:
<http://www.ropercenter.uconn.edu/>.
 - **Cost:** ~\$250 for the 2000 geocoded dataset; High potential for partnering with other agencies to collect social capital data.
- **Issues specific to Greensboro case study:**
 - **Applicability:** This measure provides some generalized background about the perceptions of residents of two basic quality-of-life components.

- **Drawbacks:** Aside from potential reliability issues, the very small sample size in study area and at the tract level do not allow for robust analysis or reliable conclusions on effects.

- **Variable: WALKABILITY**

- **General description:** This variable is a constructed index score to measure the street network's suitability for pedestrians as a measure of the degree to which the transportation system supports or even promotes physical activity. The index is the density of intersections weighted by the posted speed limit for each leg of each intersection, normalized by the number of street segments.

WALKABILITY was calculated using a GIS:

The street segment layer file was filtered to remove any interstates and interstate on- or off-ramps.

A new layer was made using nodes to represent intersections and then spatially joined to the filtered street segment layer. Intersections with less than three legs (e.g., dog-leg configurations, cul-de-sacs) were eliminated from the analysis.

A speed score was given for each leg:

0 – 25 mph = 4
30 – 35 mph = 3
40 – 45 mph = 2
50 mph = 1
50 mph = 0

The intersection score was then calculated for each node:

$$\frac{\text{sum of the speed scores}}{\text{\# of intersection legs}}$$

For each Census block, the value for WALKABILITY was calculated:

$$\frac{\text{sum of the intersection scores within } \frac{1}{2} \text{ mile of Block centroid}}{\text{\# of intersection legs within } \frac{1}{2} \text{ mile of Block centroid}}$$

- **Type of variable:** Ordinal.
- **Validity:** Moderate. WALKABILITY focuses on the element of connectivity of the network and posted speed limits. Many additional factors make a street attractive to pedestrians, including the presence of sidewalks, low traffic speeds, the type and mix of land uses, the density of origins and destinations, lighting, the presence of other pedestrians, site characteristics, and the like. However, for many locales, such measures are not available; some of these variables are likely to have less validity as local municipalities can have substantial differences in coding (e.g., land use categories or road classification schemes). Although posted speed limit may not reflect actual traffic speeds, it is reasonable to expect that to some extent it captures roadway characteristics such as traffic volume and road width (higher speed roadways are likely to be wider and carry greater volumes).
- **Reliability:** High.
- **Reference Area:** Guilford County.

- **Value and importance of the data:** Provides a basic measure applicable to rural or urban areas, using minimal data. Could be somewhat extended to consider bikeability as well. When additional data are available, such as locations of pedestrian signals at intersections, sidewalk (or bike lane) inventories, these could be added into the weighting scheme. One advantage to WALKABILITY is that it is not based on residential locations or population figures, allowing for walkability proximal to workplaces to be included.

WALKABILITY measures only the extent to which the roadway network would support walking (or cycling); it cannot measure actual physical activity, so only indirectly measures a factor of physical wellbeing.

- **How it relates to community wellbeing:** Physical activity is an important factor of physical health. Walking provides residents of all ages with a form of exercise. When walking is done for utilitarian trips, it reduces the use of other modes, which can reduce emissions, bringing a further positive health benefit. It may be that walking also promotes community cohesion through increasing the opportunity for interpersonal interaction.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Roadways with high traffic volumes and speeds discourage pedestrians because of increased noise and (at least the perception of) reduced safety. The safety factor is particularly important for children, whose parents may not permit them to walk if traffic is heavy and/or fast. Very long blocks decrease access for pedestrians and may reflect auto-oriented land use patterns and site plans (e.g., large parking lots, poor or incomplete infrastructure for pedestrians). Projects that will require roadways to be stubbed out, legs of intersections removed, or posted for greater speeds (a function of volume and capacity) will lower WALKABILITY. The construction of cul-de-sacs will also lower WALKABILITY, even if they are posted with a low speed limit as they do not contribute to connectivity.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** Assesses the transportation network from the perspective of the pedestrian user, placing their basic requirements in the arena of physical health. Generally pedestrian needs are considered only as the presence or absence of sidewalks; should consider roadway characteristics as well.
 - **Actual data source (agency):** Greensboro Urban Area Metropolitan Planning Organization (GUAMPO); street network shapefile.
 - **How to retrieve data:** Contact MPO.
 - **Cost:** None.
- **Issues specific to Greensboro case study:**
 - **Applicability:** The Urban Loop project is expected to have major effects on the surrounding street network.
 - **Drawbacks:** Street network file required some manipulation to filter out streets constructed since 2000 using a data field that indicated when the most recent work was done on a given road segment. It is possible that streets having maintenance or database corrections in the years since 2000 were also constructed since 2000, but only the most recent changes to the file are available.

Posted speed limits may not reflect actual traffic and roadway conditions. Does not include many aspects of the built environment. Index constructed somewhat arbitrarily.

Domain: Physical Health and Economic

- **Variable: CRIME (Property, Violent)**
- **General description:** These variables are direct measures of the levels of property and violent crimes, which influence community health and wellbeing in several dimensions. The data is based on incidents of crime, classified as either violent or property crimes. For this study, the crime index used by the city of Greensboro is used to classify tracts into low, medium or high crime categories. The data used the following classifications:
 - **Violent Crime:** Measured by offenses including aggravated assault; aggravated assault domestic; aggravated assault on officers; criminal homicide/murder; rape (forcible); and shooting into occupied property.
 - **Property Crime:** Measured by offenses including auto theft; auto theft other motor vehicle; auto theft trucks; burglary non-residential and residential; unlawful entry non-residential; unlawful entry residential; larceny auto accessories; larceny from auto; larceny bicycle; larceny from buildings; larceny from coin-operating; larceny from gas; larceny other; larceny pocket-picking; larceny purse-snatching; larceny shop-lifting; robbery commercial; and robbery individual.

For this study, local crime data was provided with X,Y coordinate data by street address within police reporting tracts and zones. All crime data was extracted from the Greensboro police reporting tracts to correspond with the census tracts for the study area.

- **Type of variable(s):** Ordinal.
 - **Validity:** High. Although there may be some crimes that go unreported, generally crime reporting is expected to accurately measure the actual number of crime incidents. Local crime data was provided by street address allowing for accurate allocation to Census tracts.
 - **Reliability:** High. Changes in reporting standards unlikely to affect these measures.
 - **Reference Area:** Guilford County.
- **Value and importance of the data:** Provides a basic measure of an important aspect of community health and wellbeing. Crime rates are directly related to community health and wellbeing, and also relate to social capital (i.e., the level of trust people have in others) as well as to community economic conditions. Therefore, crime rates are an important measure of community/social wellbeing. Federally reported crime data is provided for different geographies and may not allow for Census tract level analysis.
- **How it relates to community wellbeing:** Higher levels of property and violent crimes are associated with higher levels of stress, increases in real and perceived safety concerns, and associated negative impacts to physical health and wellbeing.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Transportation facilities may affect property and violent crime rates through induced land use change, barrier/isolation effects and introduction of structures that may provide concealment of activities. Projects that trigger substantial land use change and/or development will likely impact crime rates in the vicinity of the project and in those areas experiencing secondary development. Opening up areas to development will provide new locations for the potential occurrence of property and violent crimes (i.e., shifting the possible locations for crimes to occur). Projects that divide or isolate areas, as well as projects that provide physical concealment (e.g., bridge structures, overpasses, walls) may increase the occurrence and concentration of crimes in those areas and/or specific locations.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** Provides a quantitative measure for a basic element of community well-being. Evaluating crime data would provide agency staff with

information on trends and areas of concern to consider in project planning and design to address community impacts. Over time, pre- and post-project assessment of crime data could increase an agency's ability to provide for design and/or mitigation measures to avoid or offset negative impacts to crime rates. Current practice generally does not evaluate potential impacts to crime levels. Any analysis should take into account that crime reporting districts are not congruent with Census tract geography.

- **Actual data source (agency):** Local police department (City of Greensboro Police Department Crime Analysis Unit). If local data are not available, data available from the Department of Justice, Uniform Crime Statistics/National Incident-Based Reporting System.
 - **How to retrieve data:** Contact the local police department. County level data is available through the DOJ: <http://www.ojp.usdoj.gov/bjs>
 - **Cost:** None.
- **Issues specific to Greensboro case study:**
 - **Applicability:** Greensboro's Urban Loop is the type of project that can produce substantial demographic change, land use/ development change, and potentially affect the location and levels of crime. Increasing access to previously undeveloped land, increased housing stock and new business developed contributes to the likelihood of increased levels of crime, in particular property crimes. The Urban Loop can potentially divide or isolate areas, as well as create partially concealed locations (bridges, underpasses, etc.); such unintended consequences of design may provide opportunities for increases and/or pocket concentrations of criminal activities. Therefore, concern about changes in levels of property and violent crime are applicable.
 - **Drawbacks:** Criminal activity is dependent on multiple variables and can be isolated. Trends need to be studied over multiple years, particularly when focusing on smaller areas as crime levels are easier to track at a macroscopic scale.

Domain: Social Capital

- **Variable: COMMUTE**
- **General description:** This variable represents travel time to work, as reported by the 2000 US Census, for persons who do not work at home. Census reports the number of workers in the following travel-time categories:

<5 minutes	30 to 34 min
5 to 9 min	35 to 39 min
10 to 14 min	40 to 44 min
15 to 19 min	45 to 59 min
20 to 24 min	60 to 89 min
25 to 29 min	>= 90 min

These categories were collapsed into four categories for this study:

< 15 min
15 to 29 min
30 to 59 min
>59 min

- **Type of variable:** Ordinal.
- **Validity:** High.
- **Reliability:** Moderate to High. Potential for error related to self-reporting and sampling error.
- **Reference area:** County.
- **Value and importance of the data:** This measure connects provides a major measure related to the transportation system that is also connected with social capital; higher commute times are associated with lower levels of social capital. The measure is available at fine geographies and is available for the entire US.
- **How it relates to community wellbeing:** Higher commute times are associated with lower levels of social capital; Putnam reports a 10-reduction in involvement in community affairs for every additional 10 minutes in daily commuting. The reason for this is theorized to be two-fold: (1) Long commutes take time that could otherwise be spent in community activities; and (2) Long commutes also mean that people are physically separated from their communities during the work day and may invest in social capital at the work place rather than in their residential community. While this may be advantageous to the individual, it leaves community organizations with fewer engaged participants.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Transportation projects often have a purpose and need related to reducing travel time. This purpose and need, however, is not generally tied to issues of community cohesion. In considering travel time as a factor in the social capital domain of community/social wellbeing, the importance of transportation system performance to quality of life is highlighted. A transportation project or program that improves system operations or capacity would be expected to reduce COMMUTE, although the factors involved in residential and workplace location choices are very complex, especially for two-income households. Therefore, a transportation project is unlikely to reduce COMMUTE unless it also takes into consideration land use effects. Therefore projects that open up new areas for development may, in fact, increase COMMUTE by providing more feasible long-distance connections between housing and jobs.

- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** Travel time is often considered in the analysis of the performance of the transportation system, but is not considered explicitly in the context of evaluating effects to community/social wellbeing.
 - **Actual data source (agency):** US Census, Summary File 3.
 - **How to retrieve data:** <http://www.census.gov>.
 - **Cost:** None for downloadable datasets.
- **Issues specific to Greensboro case study:**
 - **Applicability:** None specific.
 - **Drawbacks:** None specific.
- **Reference**
Putnam, R. *Bowling Alone*. New York Simon and Schuster, 2000.
- **Variable: FRIENDS**
- **General description:** This variable measures the amount of informal socializing residents engage in. A survey question included in the 2000 and 2006 social capital asks, “How many times in the last 12 months have you had friends visit in your home?”
 - **Type of variable:** Interval.
 - **Validity:** Moderate. The question is limited to socializing in the home, with the goal of capturing socializing that rises to a certain level of comfort and friendship, but eliminates other venues of socializing including commercial establishments (e.g., restaurants or bars) or public gathering places (parks, churches, etc.) where other meaningful social interaction may occur.
 - **Reliability:** Moderate. Relies on memory of respondent.
 - **Reference Area:** Greater Greensboro area.
- **Value and importance of the data:** Provides a basic measure of an important aspect of social capital. Measures activity, rather than perception or feelings. The survey instrument used to collect this variable was designed and tested for validity and reliability by experts, and collected by professional survey personnel.
- **How it relates to community wellbeing:** Higher amounts of informal socializing are a component of social capital. High levels of social capital are associated with improved physical health, longevity and general life satisfaction which are desirable outcomes not only for individuals but also at the public policy level. FRIENDS measures social interaction beyond simple greetings between passersby; it measures the amount of an activity that is important to generating and maintaining social capital and captures an aspect of the strength of ties between people. Note, however, that FRIENDS measures all socializing in the home, not only socializing with neighbors, so cannot be interpreted as directly measuring interaction among neighbors.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Research has shown a negative relationship between social capital and commute times, neighborhood turnover/migration, and low income. Some evidence that ‘bonding’ social capital is positively associated with race and class homogeneity. Projects that trigger substantial land use change and/or development which involves substantial in- or out-migration will likely be associated with a decline in FRIENDS. Opening up areas that are distant from employment or isolating a neighborhood from employment opportunities (i.e., requiring long commutes) is likely to be associated with a decline in FRIENDS. Improvements in commuting time must be balanced with the potential for triggering demographic change.

Additionally, if residents in the project area primarily socialize with one another, a transportation project that constitutes a barrier would be expected to decrease FRIENDS. Conversely, a transportation project that improves localized access to residential areas would be expected to increase FRIENDS.

- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** Provides a quantitative measure for a basic element of community wellbeing and of community cohesion. Current practice generally uses public outreach/comment to assess anecdotally the level of general community cohesion. If a sample were collected with small-scale analysis in mind, it would provide a valid sample for spatial and statistical analysis that can identify areas in need of particular attention and targeted outreach to understand how project effects could be mitigated or avoided.
 - **Actual data source (agency):** Data are owned by the Roper Center and collected in cooperation with the Community Foundations and academic partners in each locale. Geocoded dataset is restricted; requires a data security agreement.
 - **How to retrieve data:** Contact Roper Center at:
<http://www.ropercenter.uconn.edu>
 - **Cost:** ~\$250 for the 2000 geocoded dataset; no fees published for 2006 data, although there may be data prep fees assessed by the community foundations. High potential for partnering with other agencies to collect social capital data.
- **Issues specific to Greensboro case study:**
 - **Applicability:** Greensboro's Urban Loop is the type of project that can produce substantial demographic change and dramatically affect commuting and development patterns, therefore concern about changes in levels of social capital and FRIENDS are applicable.
 - **Drawbacks:** Very small sample sizes in study area and at the tract level do not allow for robust analysis or reliable conclusions on effects.
- **Variables: PROJECT and OFFICER**
- **General description:** These variables measure the amount of involvement in community affairs reported by respondents to the 2000 Social Capital Benchmark Survey.

PROJECT maps responses to the question "Have you worked on a community project in the last 12 months?" Answers coded: 0 = No, 1 = Yes.

OFFICER maps responses to the question "Have you served as an officer of a community group?" Answers coded: 0 = No, 1 = Yes.

- **Type of variable:** Nominal.
- **Validity:** Moderate. Both these measures evaluate interest in community affairs, although it may measure interest triggered by a single issue rather than ongoing commitment to the community. Serving as an officer measures a higher degree of commitment to community projects/affairs than does working on a community project. These measures may not capture informal community projects that operate outside formal organizations.
- **Reliability:** Moderate. Relies on memory of respondent.
- **Reference Area:** Greater Greensboro area.
- **Value and importance of the data:** Provides a measure of a basic aspect of community involvement which is an important way in which social capital is formed, maintained, and expanded. Measures actual activity with respect to community affairs and potential interest in

working collectively with others to solve problems. PROJECT measures the general involvement in community affairs; OFFICER measures levels of formal commitment to community affairs. These measures also indirectly capture the extent to which residents feel they can be effective in addressing community activities; high participation in community projects likely represents some optimism about the future of the community and of the potential influence residents can have on solving community problems. The survey instrument used to collect this variable was designed and tested for validity and reliability by experts, and collected by professional survey personnel.

- **How it relates to community wellbeing:** Community/social wellbeing requires a collective as well as individual level of wellbeing, as there are some aspects of quality of life that must be addressed collectively rather than individually. A willingness to work together to solve problems indicates greater interest in the collective wellbeing.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Community involvement is most directly related to processes in transportation decision-making rather than project outcomes. High levels of PROJECT and OFFICER suggest that a community will be interested in projects and programs in their community. High levels of community involvement also suggest that public outreach can be organized in partnership with community organizations; low values for these measures suggest that public outreach may need to include nontraditional approaches to draw interest and participation from the community.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** Provides a quantitative measure for an element of community cohesion. These measures can also suggest whether partnering with existing community organizations and groups, or making connections with existing community projects, could make outreach efforts more inclusive and effective. If a sample were collected with small-scale analysis in mind, it would provide a valid sample for perhaps differentiating public outreach plans across the study area to maximize effectiveness.
 - **Actual data source (agency):** Data are owned by the Roper Center and collected in cooperation with the Community Foundations and academic partners in each locale. Geocoded dataset is restricted; requires a data security agreement.
 - **How to retrieve data:** Contact Roper Center at: <http://www.ropercenter.uconn.edu/>.
 - **Cost:** ~\$250 for the 2000 geocoded dataset; no fees published for 2006 data, although there may be data prep fees assessed by the community foundations. High potential for partnering with other agencies to collect social capital data.
- **Issues specific to Greensboro case study:**
 - **Applicability:** Greensboro's Urban Loop is a major project, therefore early and complete public outreach work could help head off controversy and assist in the design of alternatives or mitigation strategies.
 - **Drawbacks:** Very small sample size in study area.

Domain: Social Capital

- **Variable: PUBLICMTG**
- **General description:** This variable measures the amount of involvement in community affairs. Survey question included in the 2000 and 2006 social capital surveys asks, "How many times in the last 12 months have you attended a public meeting in which there was discussion of town or school affairs?"
 - **Type of variable:** Interval.

- **Validity:** Low to Moderate. Attendance at a public meeting is only a proxy for actual engagement. It does, however, capture some level of interest in community. It may measure attendance triggered by a single issue rather than ongoing interest.
 - **Reliability:** Moderate. Relies on memory of respondent.
 - **Reference Area:** Greater Greensboro area.
- **Value and importance of the data:** Provides a basic measure of an aspect of social capital. Measures actual activity with respect to community affairs and potential interest in working collectively with others to solve problems. Indirectly PUBLICMTG measures the general interest in community affairs. It also indirectly captures the extent to which residents feel they can be effective in addressing community activities; high levels of meeting attendance likely represent some optimism about the future of the community and of the potential influence residents can have on solving community problems. The survey instrument used to collect this variable was designed and tested for validity and reliability by experts, and collected by professional survey personnel.
- **How it relates to community wellbeing:** Community/social wellbeing requires a collective as well as individual level of wellbeing as there are some aspects of quality of life that must be addressed collectively rather than individually. A willingness to work together to solve problems indicates greater interest in the collective wellbeing.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Community involvement is most directly related to processes in transportation decision-making rather than project outcomes. High levels of PUBLICMTG signal that a community will be more likely to attend public meetings related to a transportation project, providing broader and more inclusive input into the process. Low levels of PUBLICMTG indicate that public meetings would probably be poorly attended and alternative outreach methods should be used.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** Provides a quantitative measure for an element of community cohesion. PUBLICMTG provides information on the likelihood of engaging a community through public meetings and of the general attention to community matters. If a sample were collected with small-scale analysis in mind, it would provide a valid sample for perhaps differentiating public outreach plans across the study area to maximize effectiveness.
 - **Actual data source (agency):** Data are owned by the Roper Center and collected in cooperation with the Community Foundations and academic partners in each locale. Geocoded dataset is restricted; requires a data security agreement.
 - **How to retrieve data:** Contact Roper Center at:
<http://www.ropercenter.uconn.edu/>.
 - **Cost:** ~\$250 for the 2000 geocoded dataset; no fees published for 2006 data, although there may be data prep fees assessed by the community foundations. High potential for partnering with other agencies to collect social capital data.
- **Issues specific to Greensboro case study:**
 - **Applicability:** Greensboro's Urban Loop is a major project, therefore early and complete public outreach work could help head off controversy and assist in the design of alternatives or mitigation strategies.
 - **Drawbacks:** Very small sample size in study area.
- **Variables: STAY and RESLENGH**
- **General description:** These two variables are responses to questions from the 2000 Social Capital Benchmark Survey.

RESLENGTH maps responses to the question "How many years have you lived in your community?" Responses coded: 1 = < 1 year, 2 = 1 to 5 years, 3 = 6 to 10 years, 4 = 11 to 20 years, 5 = > 20 years, 6 = "all my life". For this study, these responses were collapsed into three categories: <=5 years, 6 to 10 years, and > 10 year or "all my life". For this study, responses are mapped as proportions of respondents in each of the three categories.

STAY represents responses to the question "Do you expect to be living in your community five years from now?" Responses coded: 1 = Yes, 2 = No. For this study, the "yes" responses were used to calculate a percentage of respondents that reported intent to stay.

- **Type of variable:** STAY is nominal; RESLENGTH is ordinal.
- **Validity:** High. Social capital is developed through repeated contacts that lead to higher levels of trust and feelings of reciprocity. Generally speaking, the longer someone has resided in a community, the more social capital one would expect that person to have. Further, someone planning to stay in a community is more likely to invest in that community, either through formal community activities, civic engagement (e.g., voting), and interpersonal network with other community residents. These variables are subject to the error inherent in any self-reported phone survey including sampling error, coding error, or response error.
- **Reliability:** Moderate. Questions may be understood differently by individual respondents, especially with regard to the definition of "community."
- **Reference Area:** Greater Greensboro Area.
- **Value and importance of the data:** Provides a basic measure of characteristics and attitudes expected to be associated with the formation and maintenance of social capital. Although data on length of residence are available from other sources, this dataset provides a unique measure of the intent to remain in a neighborhood. The survey instrument used to collect this variable was designed and tested for validity and reliability by experts, and collected by professional survey personnel. These survey questions are *not* included in the Social Capital Short Form Survey (administered in Greensboro in 2006), but could easily be added to that survey if agencies would find these measures informative for planning and policy decisions.
- **How it relates to community wellbeing:** These two measures are factors related to social capital and community cohesion, and survey both characteristics and intent of residents. Higher levels of social capital are associated with improved physical health, longevity and general life satisfaction, which are desirable outcomes not only for individuals but also at the community level.
- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Transportation projects, especially large ones like the Urban Loop can be associated with dramatic land use change. These changes can affect neighborhood satisfaction and increase development, both of which can be related to residential mobility. Large projects are expected to be associated with lower levels of RESLENGTH, although the effect on STAY is difficult to predict for most projects. Projects that introduce undesirable effects such as noise, physical barriers or heavy traffic into residential areas are expected to be associated with declining proportions of "yes" responses to STAY. Still, STAY in particular provides a measure of overall satisfaction with the community, and can be taken as a quantitative measure of community cohesion.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** Provides a quantitative measure for factors related to the formation and maintenance of social capital, a basic element of community wellbeing. Current practice generally uses public outreach/comment to assess the level of general community cohesion, normally relying on housing tenure (proportions of

- homeowners and renters). STAY and RESLENGTH correct the bias towards assuming greater level of connection to community by homeowners compared with renters. Both measures can be incorporated into the Social Capital Short Form Survey, and for project-level analysis, valid samples are needed for analysis.
- **Actual data source (agency):** Data are owned by the Roper Center and collected in cooperation with the Community Foundations and academic partners in each locale. Geocoded dataset is restricted; requires a data security agreement.
 - **How to retrieve data:** Contact Roper Center at:
<http://www.ropercenter.uconn.edu/>.
 - **Cost:** ~\$250 for the 2000 geocoded dataset. High potential for partnering with other agencies to collect social capital data.
 - **Issues specific to Greensboro case study:**
 - **Applicability:** Greensboro's Urban Loop is the type of project that can produce substantial physical and demographic change, and dramatically affect development patterns, both of which could increase residential mobility and disruption in neighborhoods.
 - **Drawbacks:** Very small sample size in study area and at the tract level do not allow for robust analysis or reliable conclusions on effects.
 - **Variable: TRUST**
 - **General description:** This variable serves as a general measure of the level of social trust a person feels towards others. Survey question included in the 2000 and 2006 social capital surveys asks, "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?" Responses coded: 1 = People can be trusted, 2 = You can't be too careful, 3 = (volunteered) Depends, 8 = Don't Know, 9 = Refused. Variable recoded to show polarity: 1 = You can't be too careful, 2 = Depends, 3 = People can be trusted (higher value = greater level of trust).
 - **Type of variable:** Ordinal.
 - **Validity:** High. By definition, social capital is the level of trust people have in others, and includes some perception about anticipated reciprocity. This measure also does not differentiate as to types of people and situations for which trust is being measured. This may effectively mask a high level of trust of neighbors if a respondent feels distrustful of outsiders. Subsequent questions ask about levels of trust of various groups of people, so TRUST might be best used in combination with other variables in the dataset. This variable is subject to the error inherent in any self-reported phone survey including sampling error, coding error, or response error.
 - **Reliability:** Moderate. Subject to influence by most recent experience. Question may be understood differently by individual respondents.
 - **Reference Area:** Greater Greensboro Area.
 - **Value and importance of the data:** Provides a basic measure of an important aspect of social capital. Currently, no other source for a quantified measure of social trust available. The survey instrument used to collect this variable was designed and tested for validity and reliability by experts, and collected by professional survey personnel.
 - **How it relates to community wellbeing:** Higher levels of social capital are associated with improved physical health, longevity and general life satisfaction, which are desirable outcomes not only for individuals but also at the public policy level. Social trust is a basic component of the amount of social capital an individual perceives s/he possesses. The degree to which someone trusts others indicates their perceptions about to what degree they can rely on other in times of difficulty or their willingness to provide help to others in needs.

- **How it relates to possible effects of transportation infrastructure (including hypothesized direction of effects):** Research has shown a negative relationship between social capital and commute times, neighborhood turnover/migration, and low income. There is some evidence that ‘bonding’ social capital is positively associated with race and class homogeneity. Projects that trigger substantial land use change and/or development which involves substantial in- or out-migration will likely be associated with a decline in TRUST. Opening up areas that are distant from employment or isolating a neighborhood from employment opportunities (i.e., requiring long commutes) likely to be associated with decline in TRUST. Improvements in commuting time must be balanced with the potential for triggering demographic change.
- **How and for what uses a transportation agency might incorporate this measure into practice; how it differs from current practice:** Provides a quantitative measure for a basic element of community wellbeing. Current practice generally uses public outreach/comment to assess the level of general community cohesion, but does not look at social trust explicitly. If a sample were collected with small-scale analysis in mind, it would provide a valid sample for spatial and statistical analysis that can identify areas that may need particular attention and targeted outreach to understand how project effects could be mitigated or avoided.
 - **Actual data source (agency):** Data are owned by the Roper Center and collected in cooperation with the Community Foundations and academic partners in each locale. Geocoded dataset is restricted; requires a data security agreement.
 - **How to retrieve data:** Contact Roper Center at:
<http://www.ropercenter.uconn.edu/>.
 - **Cost:** ~\$250 for the 2000 geocoded dataset; no fees published for 2006 data, although there may be data prep fees assessed by the community foundations. High potential for partnering with other agencies to collect social capital data.
- **Issues specific to Greensboro case study:**
 - **Applicability:** Greensboro’s Urban Loop is the type of project that can produce substantial demographic change and dramatically affect commuting and development patterns, therefore concern about changes in levels of social trust are applicable.
 - **Drawbacks:** Very small sample size in study area and at the tract level does not allow for robust analysis or reliable conclusions on effects.

Appendix C: Additional Case Study Maps and Materials

**Figure C-1: Guilford County Median Income
by Tract, % of County Median Income, 2000**

Percent of County Median Income

- > 150%
- 125 - 150%
- 100 - 125%

75 - 100%

50 - 75%

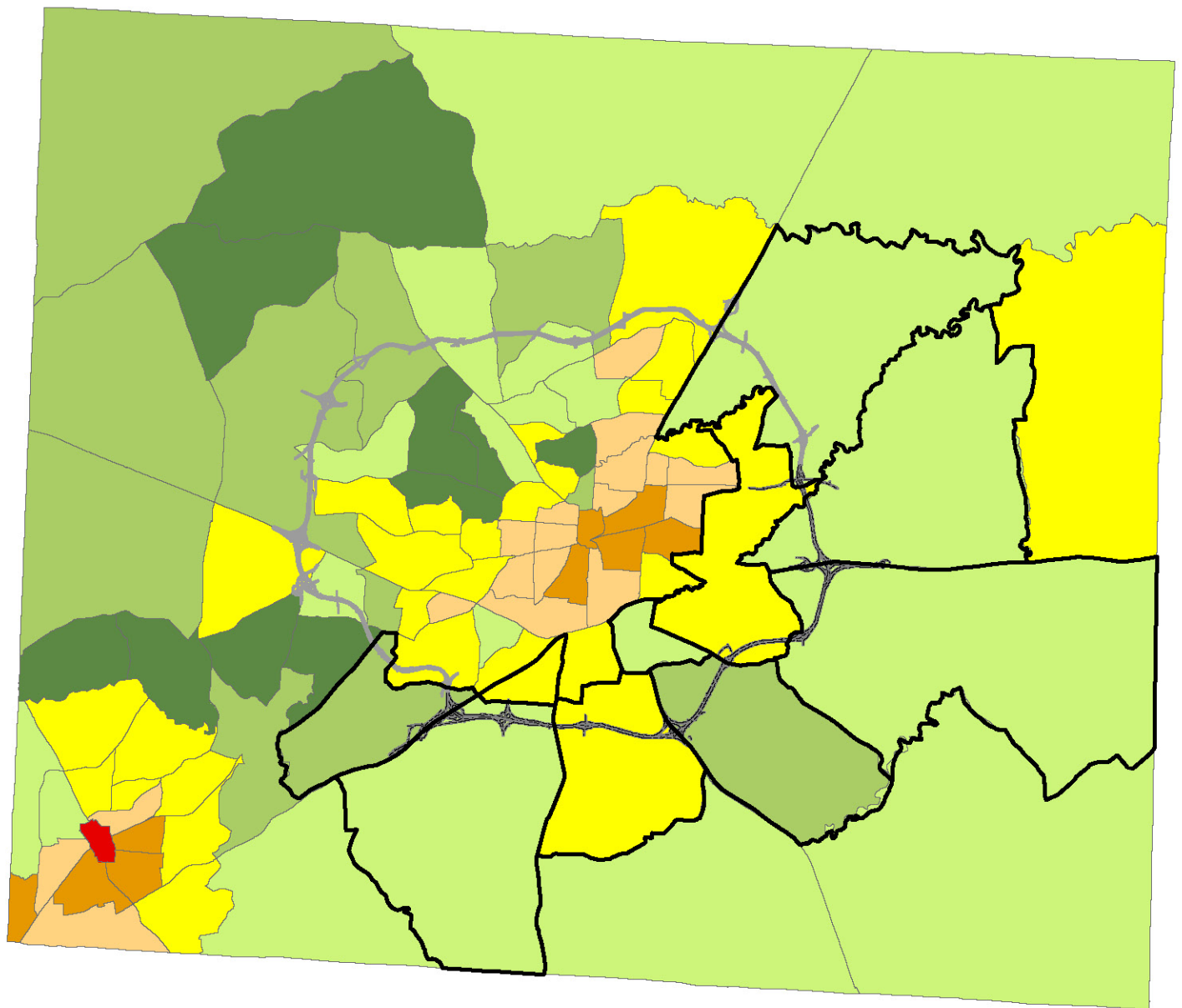
25 - 50%

<25%

Urban Loop Tracts

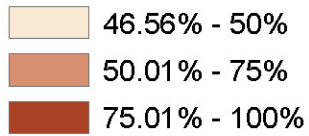
County Median HH Income: \$42,618

US Median HH Income: \$41,994

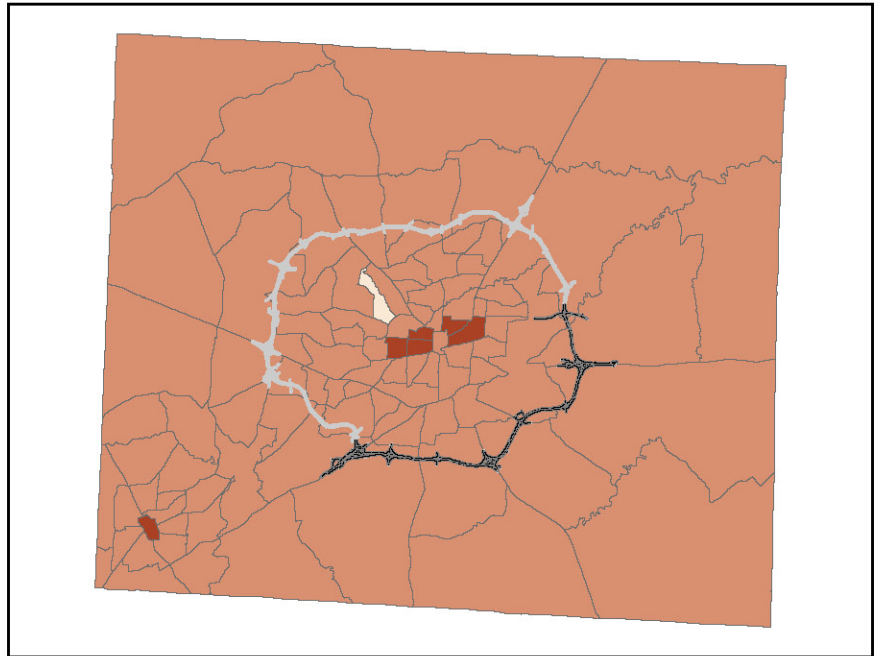


**Figure C-2A: Guilford County Age,
Adult Population by Census Tract, 2000**

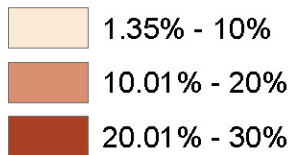
Percent 18 to 61 Years



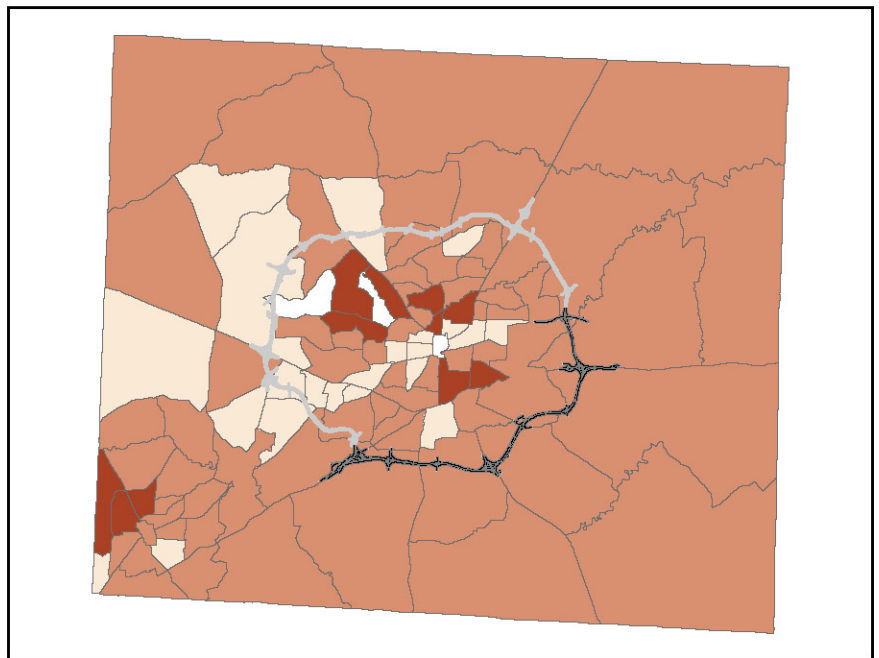
County-wide: 62.38%



Percent 62 and Up



County-wide: 13.91%

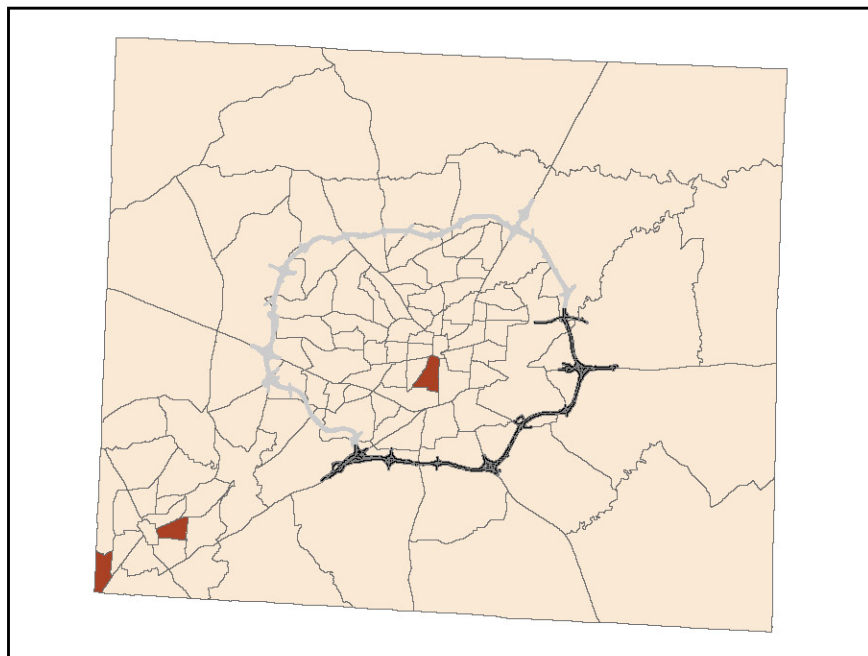


**Figure C-2B: Guilford County Age,
Youth Population by Census Tract, 2000**

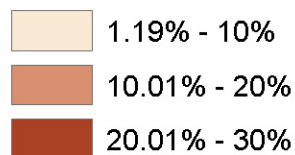
Percent Under 5 Years of Age



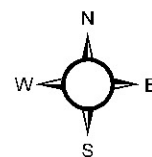
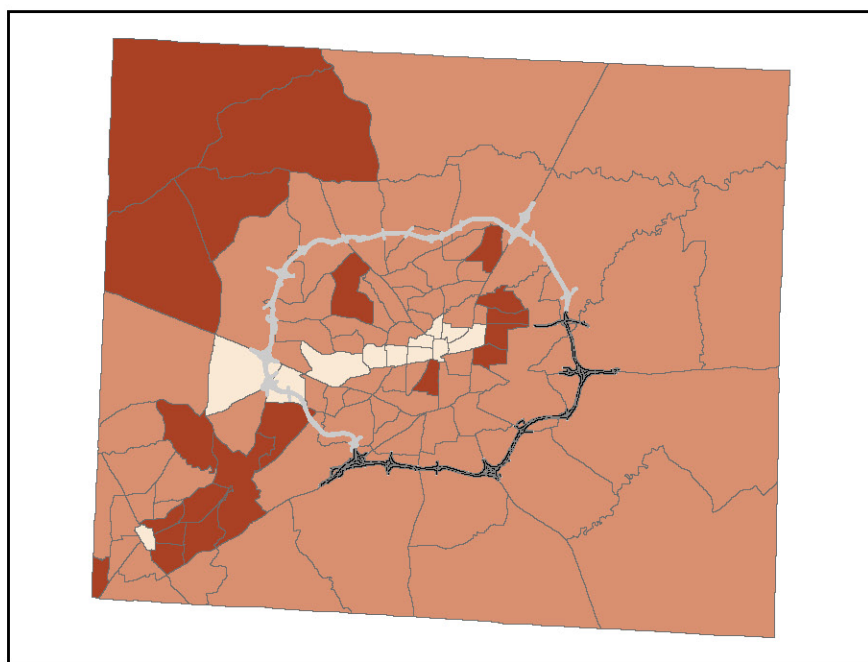
County-wide: 6.57%



Percent 5 to 17 Years



County-wide: 17.15%



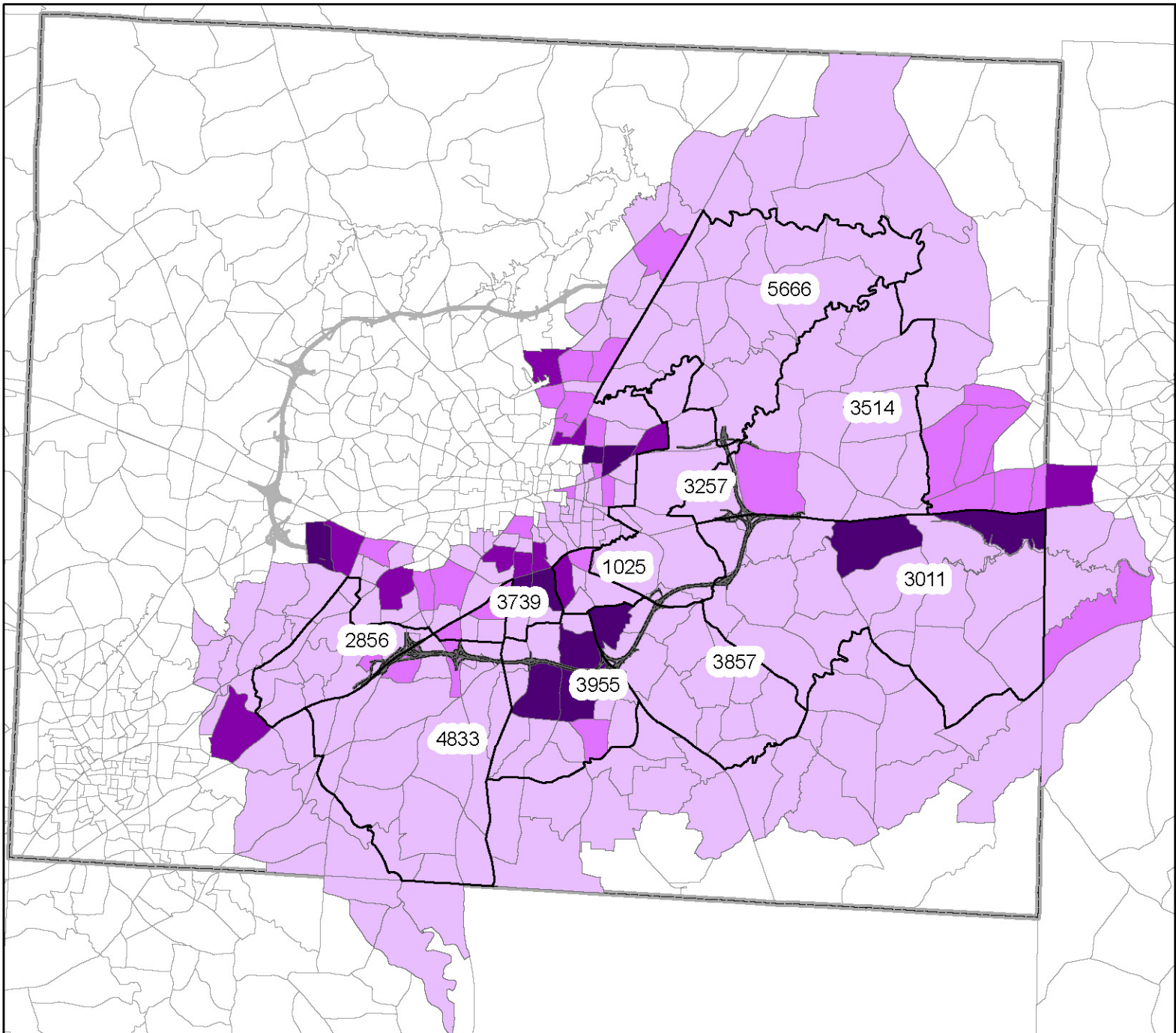
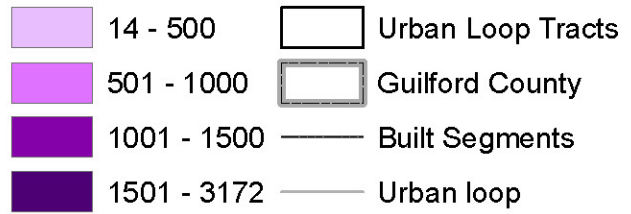
**Figure C-3: Urban Loop Study Area, Number of Jobs
in TAZs within 1 Mile of Tract Centroids, 2000**

Jobs per Capita

Urban Loop Study Area: 2.68

Guilford County: 0.88

**Labels = Population of Working Age
in Urban Loop Tracts**



**Figure C-4: Locations of Air Quality Monitors
in Vicinity of Urban Loop Study Area, 2000**



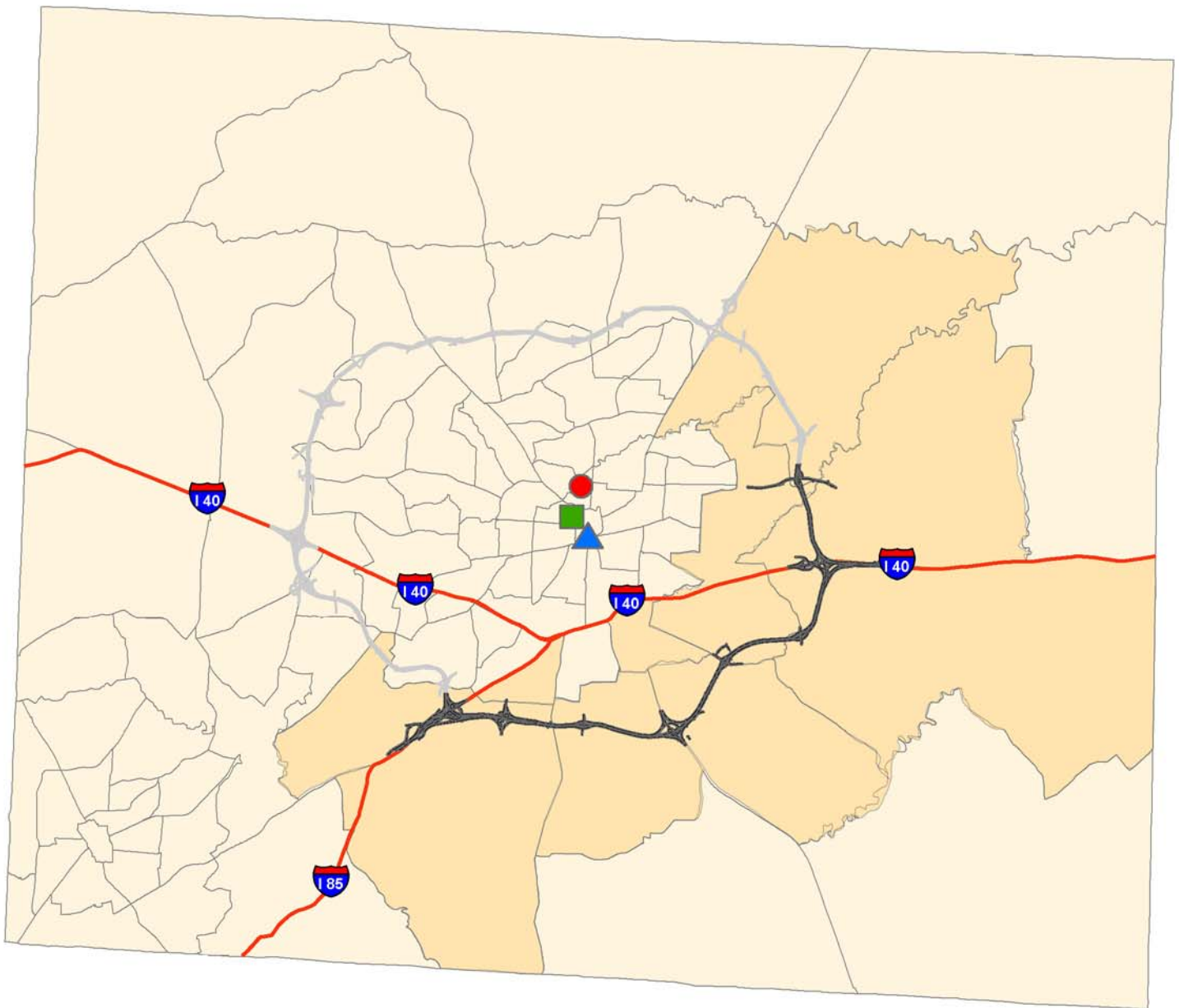
CO Monitor



PM-2.5 and PM-10 Monitor

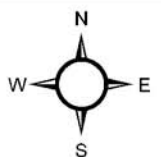


Ozone Monitor



Data from US EPA
Compiled by A Hartell
4 September 2007

Miles
0 1.25 2.5 5

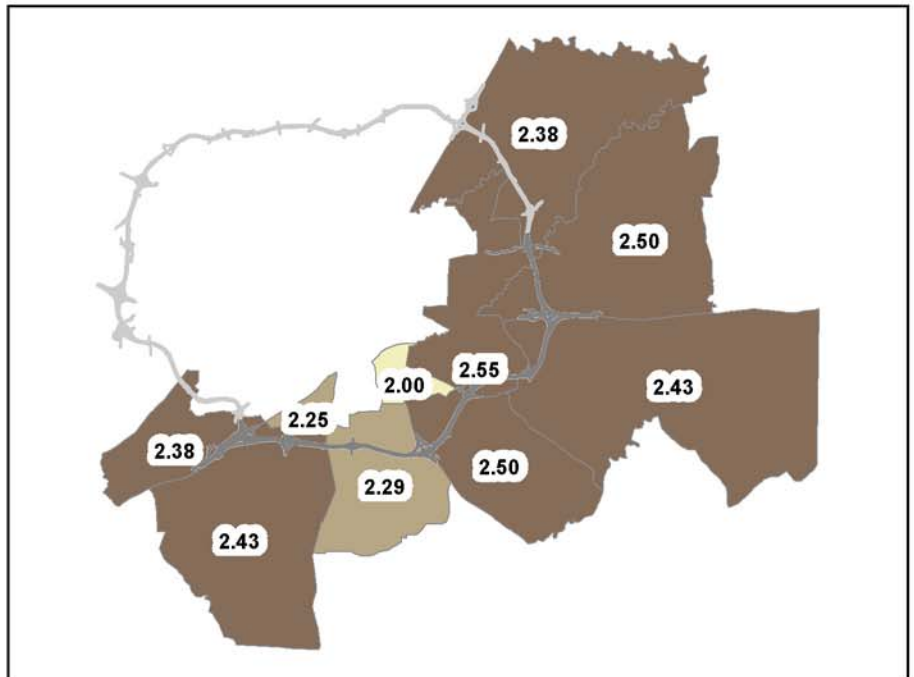
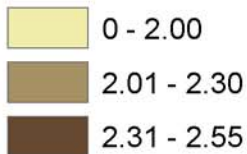


**Figure C-5: Urban Loop Study Area,
Levels of Happiness and Health, 2000**

Responses to question: All things considered, would you say you are very happy, happy, not very happy or not happy at all?

- 1 = Very happy
- 2 = Happy
- 3 = Not very happy
- 4 = Not happy at all

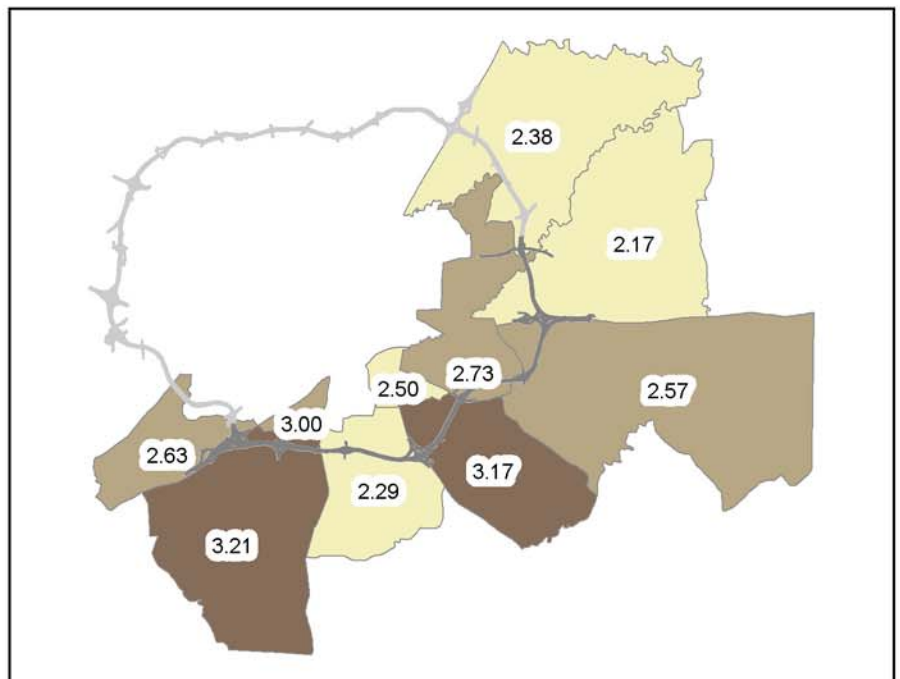
All Urban Loop Tracts: 2.39 (N = 90)
Greensboro: 2.33 (N = 753)



Responses to question: And how would you describe your overall state of health these days? Would you say it is excellent, very good, good, fair, or poor?

- 1 = Excellent
- 2 = Very good
- 3 = Good
- 4 = Fair
- 5 = Poor

All Urban Loop Tracts: 2.73 (N = 90)
Greensboro: 2.68 (N = 753)

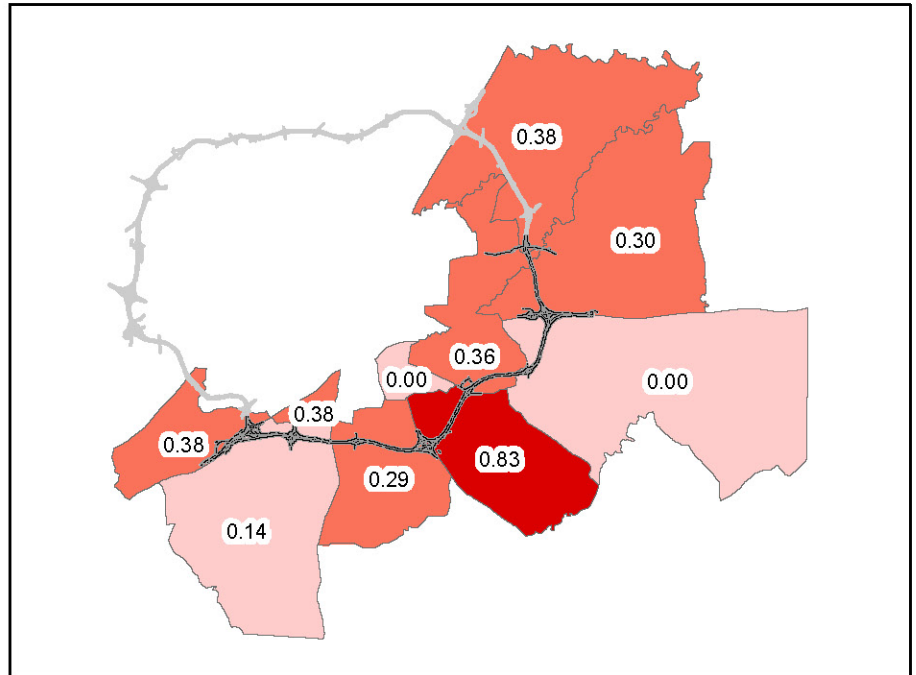
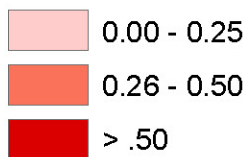


**Figure C-6: Urban Loop Study Area,
Community Participation, 2000**

**Responses to question: Have you
worked on a community project in
the last 12 months?**

**0 = No
1 = Yes**

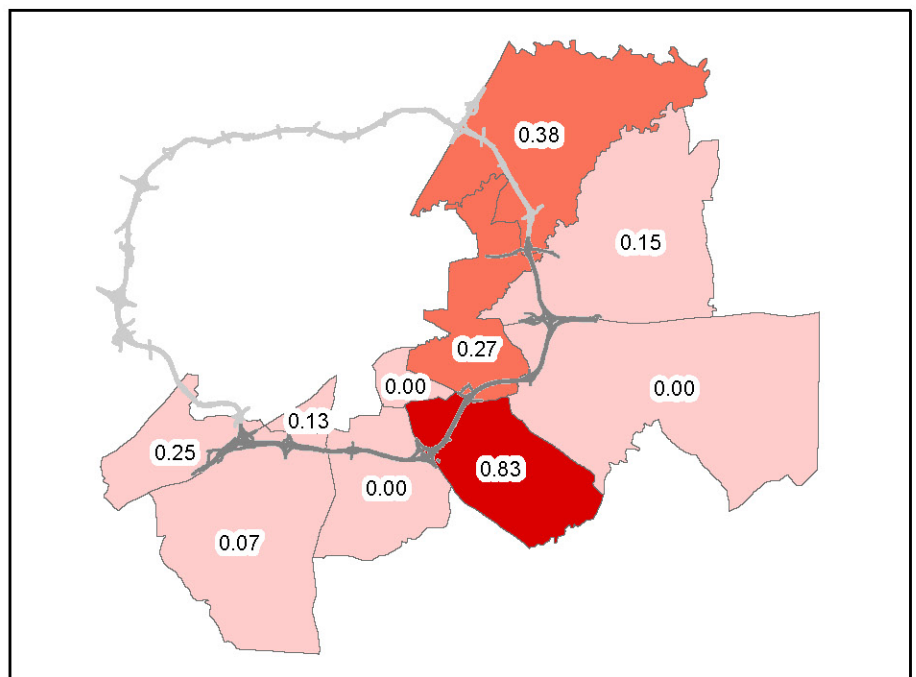
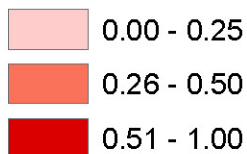
**All Urban Loop Tracts: .31
Greensboro: .42**



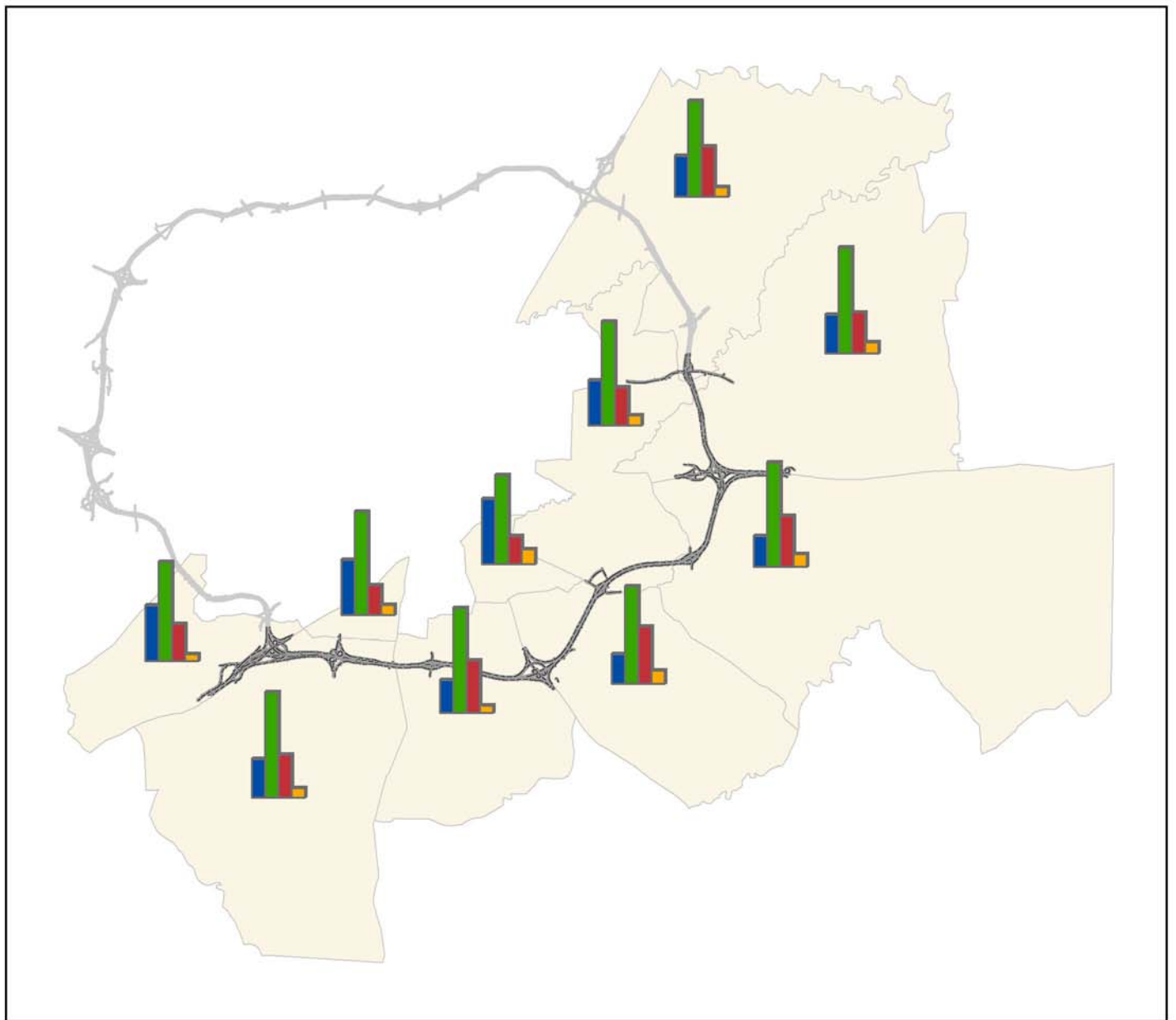
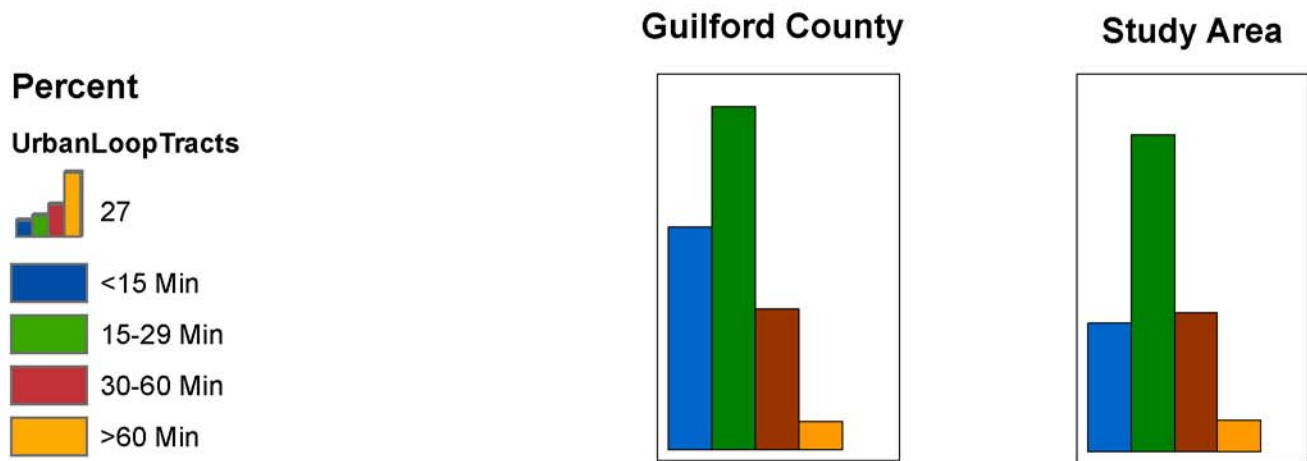
**Responses to question: Have you
served as an officer of a
community group?**

**0 = No
1 = Yes**

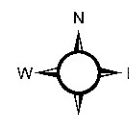
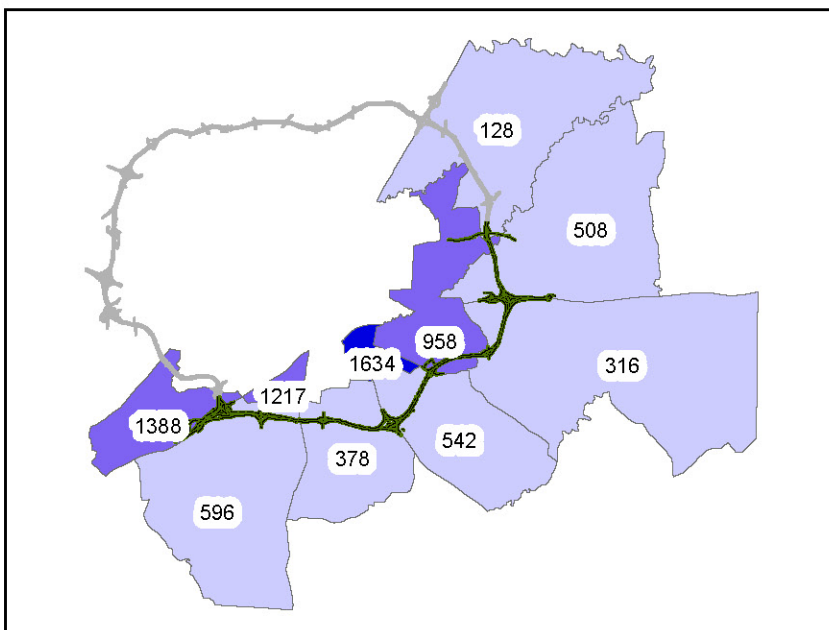
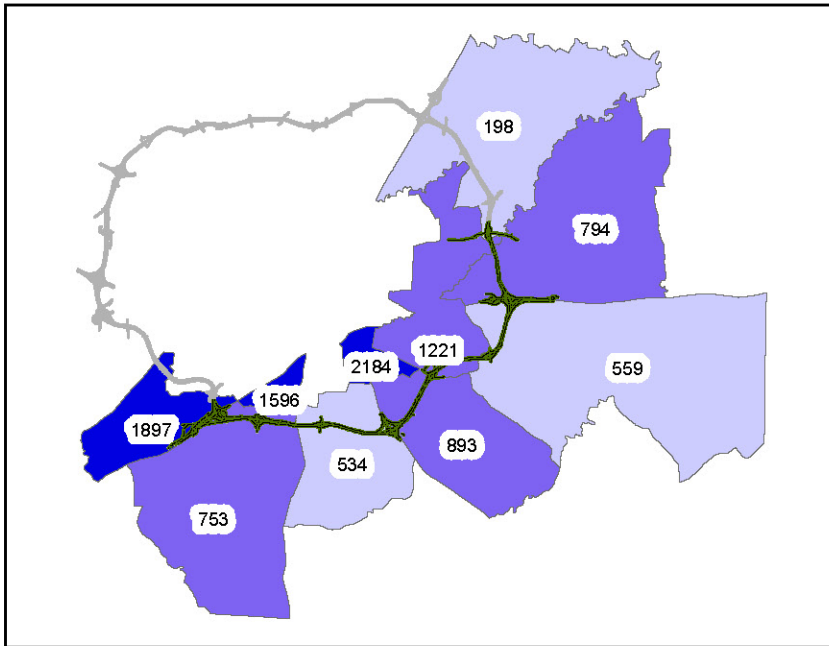
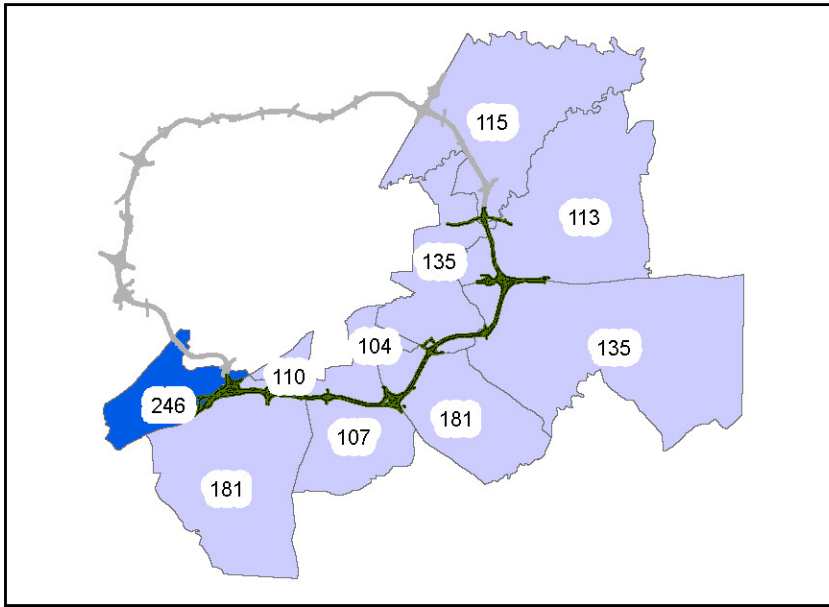
**All Urban Loop Tracts: .21
Greensboro: .23**



**Figure C-7: Urban Loop Study Area,
Length of Commute, 2000**



**Figure C-8: Urban Loop Study Area,
Business Loan Activity, 2000**



Miles
0 2.5 5 10

Data from Federal
Financial Institutions
Examination
Council (FFIEC)
Compiled by A Hartell
16 July 2007

Fig. C-9: Urban Loop Study Area Census Tracts

- Interstates
- Guilford County
- Urban Loop Tracts

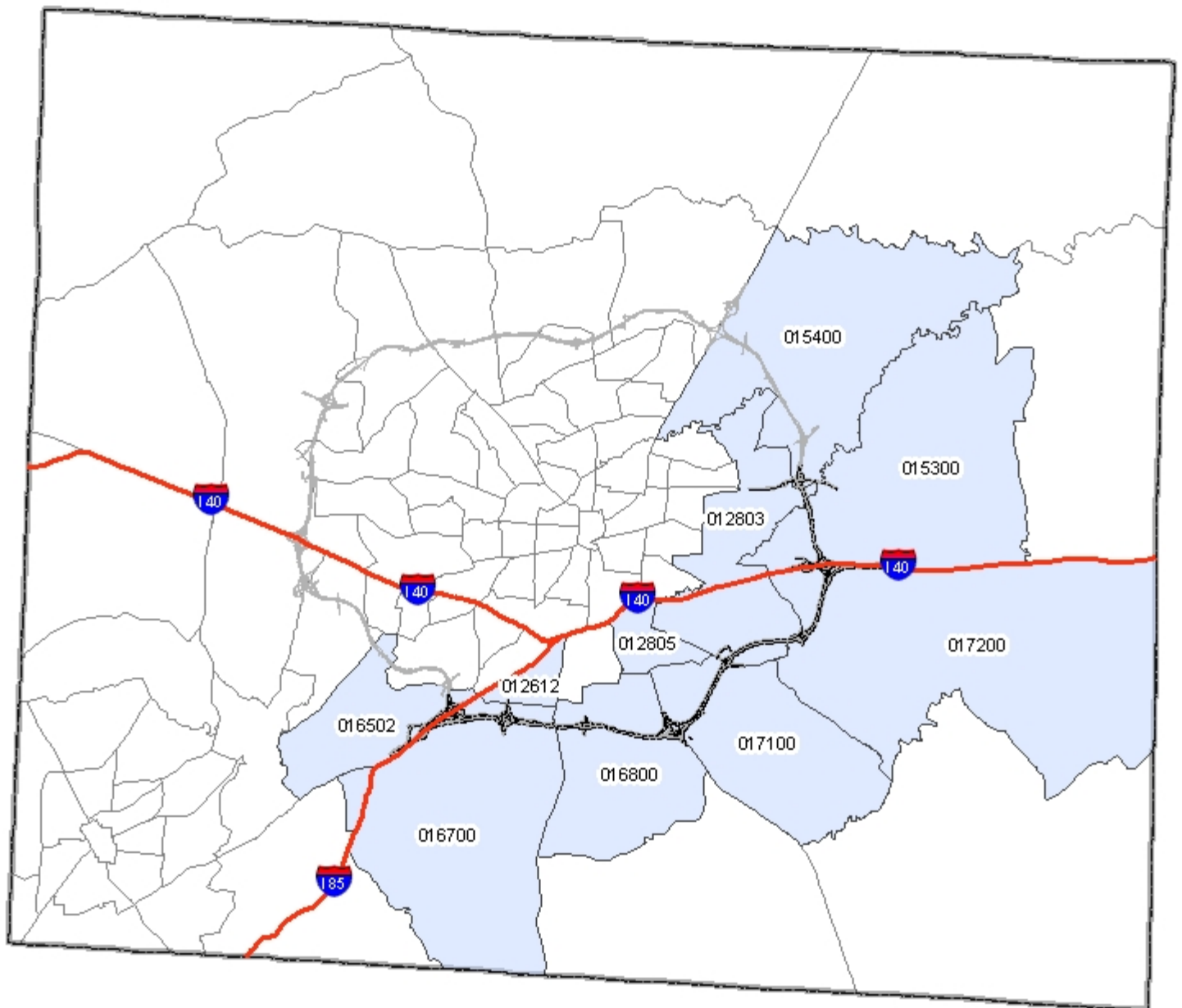


Table C-1: Measures for Tracts in Case Study

Measure	Tract 16502	Tract 16700	Tract 12612
Demographics			
Age	18-61 (61%) >61 (18%)	18-61 (62%) >61 (14%)	18-61 (65%) >61 (10%)
Median Income (% of County Medium Income)	125-150%	100-125%	75-100%
% African American Population	Less Than County Average	Less Than County Average	2 x County Average
Racial Segregation Index	0.5	0.7	0.3
Economic			
Jobs within 1 mile, per working-age person	2856	4833 (High)	3739
Number of Business Loans	246(High)	181	110
Value of Business Loans (per capita)	1.9K	.8K	1.6K
Value of Buiness Loans/Capita (Excluding loans to firms with >\$1mil in annual receipts)	1.4K	.6K	1.2K
Building Permits (Existing Structures)/1000 DU	4.7	0.8	10
Building Permits (New Structures)/1000 DU	11.7	No structures	1.5
Demolitions	None	None	None
Home Purchase Loans (Average Value)	169K	126K	78K
Refi & Home Impr. Loans (Average Value)	117K	78K	63K
Home Purchase Loan Denial Rates (%)	19%	39%	20%
Refi & Home Impr. Loan Denial Rates (%)	38%	39%	53%
Property Crime Index	Low	Medium	High
Health			
Violent Crime Index	Low	Medium	High
Walkability Index	Medium High	Medium High	Medium High
Levels of Happiness	Happy	Happy	Happy
Levels of Health	Good	Good	Good
Air Quality Monitors			
Social Capital			
Length of Residence	Majority >10 years	Majority >10 years	Majority< 5years
Percent that Plan to Stay	75%	86%	60%
Length of Commute	Majority <29 minutes	Majority <29 minutes	Majority <29 minutes
Socialize with Friends	Medium (16)	Medium (23)	Medium (20)
Attend Public Meeting	Low (.8)	Medium (2)	Medium (.2)
Worked on Community Project	Medium (.4)	Low (.1)	Medium (.4)
Served as Officer of Community Group	Medium (.3)	Low (.1)	Low (.1)
Social Trust	Low	Low	Medium

Table C-1: Measures for Tracts in Case Study

Measure	Tract 16800	Tract 17200	Tract 12805
Demographics			
Age	18-61 (62%) >61 (14%)	18-61 (62%) >61 (15%)	18-61 (62%) >61 (14%)
Median Income (% of County Medium Income)	75-100%	100-125%	100-125%
% African American Population	Less Than County Average	Less Than County Average	3 x County Average
Racial Segregation Index	0.6	0.6	0.7
Economic			
Jobs within 1 mile, per working-age person	3955	3011	1025 (Low)
Number of Business Loans	107	135	104
Value of Business Loans (per capita)	.5K	.6K	2.1K
Value of Buiness Loans/Capita (Excluding loans to firms with >\$1mil in annual receipts)	.4K	.3K	1.6K
Building Permits (Existing Structures)/1000 DU	1.5	None	12.3
Building Permits (New Structures)/1000 DU	33.4	None	1.8
Demolitions	none	None	None
Home Purchase Loans (Average Value)	88K	133K	101K
Refi & Home Impr. Loans (Average Value)	77K	91K	77K
Home Purchase Loan Denial Rates (%)	35%	33%	28%
Refi & Home Impr. Loan Denial Rates (%)	54%	40%	41%
Property Crime Index	Medium	Low	High
Health			
Violent Crime Index	Low	Low	Medium
Walkability Index	Medium High	Medium High	Medium High
Levels of Happiness	Happy	Happy	Happy
Levels of Health	very good	Good	Good
Air Quality Monitors			
Social Capital			
Length of Residence	Majority > 5 years	Majority >10 years	Half <5 years with half >10 years
Percent that Plan to Stay	82%	86%	100%
Length of Commute	Majority <29 minutes	Majority <29 minutes	Majority <29 minutes
Socialize with Friends	High (30)	High (27)	High (28)
Attend Public Meeting	Low (.6)	Low (.4)	Low (0)
Worked on Community Project	Medium (.3)	Low (0)	Low (0)
Served as Officer of Community Group	Low (0)	Low (0)	Low (0)
Social Trust	Medium	Medium	Medium

Table C-1: Measures for Tracts in Case Study

Measure	Tract 15300	Tract 15400
Demographics		
Age	18-61 (63%) >61 (14%)	18-61 (62%) >61 (11%)
Median Income (% of County Medium Income)	100-125%	100-125%
% African American Population	County Average	Less Than County Average
Racial Segregation Index	0.6	0.4
Economic		
Jobs within 1 mile, per working-age person	3514	5666 (High)
Number of Business Loans	113	115
Value of Business Loans (per capita)	.8K	.2K
Value of Buiness Loans/Capita (Excluding loans to firms with >\$1mil in annual receipts)	.5K	.1K
Building Permits (Existing Structures)/1000 DU	None	None
Building Permits (New Structures)/1000 DU	None	24
Demolitions	None	None
Home Purchase Loans (Average Value)	129K	95K
Refi & Home Impr. Loans (Average Value)	81K	83K
Home Purchase Loan Denial Rates (%)	28%	31%
Refi & Home Impr. Loan Denial Rates (%)	46%	42%
Property Crime Index	Low	High
Health		
Violent Crime Index	Low	Medium
Walkability Index	Low to Medium Low	Low to Medium
Levels of Happiness	Happy	Happy
Levels of Health	Very Good	Very Good
Air Quality Monitors		
Social Capital		
Length of Residence	Majority > 10 years	Half <5 years Half > 10 years
Percent that Plan to Stay	100%	77%
Length of Commute	Majority <29 minutes	Majority <29 minutes
Socialize with Friends	Low (10)	Medium (15)
Attend Public Meeting	High (6)	Medium (3)
Worked on Community Project	Medium (.3)	Medium (.4)
Served as Officer of Community Group	Low (.2)	Medium (.4)
Social Trust	Low	Low

Appendix D: Social Capital Short Form Survey

Social Capital Community Benchmark Survey short form

(September 2002 draft. Release 1.0)

It is possible that we will change some of these questions in the future, but this is our best effort to detail what the most important social capital questions are to ask if you have limited time and budget to field a survey.

Background

In 2000, some three-dozen community foundations partnered with the *Saguaro Seminar: Civic Engagement in America* Project at the John F. Kennedy School of Government at Harvard University on the Social Capital Community Benchmark Survey (SCCBS). The Saguaro Seminar, with the help of a top-notch Scientific Advisory Committee, put together a 25-minute phone survey on levels of social capital.¹ The survey was administered to approximately 30,000 Americans in the summer of 2000, with 27,000 respondents surveyed across 40 communities and 3,000 nationally representative respondents.² Each community foundation sponsored one or more of the local community surveys. The SCCBS represented by far the largest and most scientific investigation of social capital to-date.

The results of the survey can be found at: www.ksg.harvard.edu/saguaro/communitysurvey. This site contains the survey instrument, a discussion of the national results, a comparison of the 40 communities surveyed, and whatever community-specific results that the sponsoring local foundations wished to post. At our insistence, we made the entire dataset available for free to researchers through the Roper Center (at the Univ. of Connecticut at Storrs). The web site for accessing these data is: http://www.ropercenter.uconn.edu/scc_bench.html.

In addition, post-September 11, 2001, we have returned to some of the 3,000 respondents in the national portion of the SCCBS to repeat most of the same questions as in the 2000 SCCBS. One such survey (wave 2) was administered in October/November 2001, and wave 3 was administered in March 2002. [We did this primarily to track changes in civic behavior post-September 11, but the data gathered turn out to be very useful in the development of the short-form.]

Motivation for developing the short-form survey on social capital

There were three motivations for developing the short-form survey. First, we hope that this short form will be useful if state governments or the federal government want to start surveying on social capital. Second, many smaller communities hoped to ask about social capital, but lacked the wherewithal to conduct 25 minute phone surveys; a shorter survey enables communities to measure social capital at lower cost. Third, many communities and non-profits were already fielding other surveys and wanted to add "social capital" questions to their surveys. A short form enables them to do so.

Methodology for determining short-form questions

¹ Social capital ("community connectedness") refers to social networks and the norms of reciprocity that arise from them. A growing body of hard-nosed literature over the last several years shows that social capital, and the trust, reciprocity, information, and cooperation associated with it, enables many important individual and social goods. Communities with higher levels of social capital are likely to have higher educational achievement, better performing governmental institutions, faster economic growth, and less crime and violence. And the people living in these communities are likely to be happier, healthier, and to have a longer life expectancy. For more information, see pp. 18-25 in Robert D. Putnam's *Bowling Alone: Collapse and Revival of the American Community* (NY: Simon and Schuster, 2000).

² The national portion of the survey oversampled African-Americans and Hispanics at twice the rates that they occurred in the population.

The Social Capital Community Benchmark Survey intentionally tested out various competing questions to measure social capital, because we envisioned that from this broader array of questions, we could determine which questions were most effective at measuring key dimensions³ of social capital.

In a nutshell, we evaluated the suitability of questions for the SCCBS short form along four criteria:

1) *A question's centrality to a dimension of social capital.* [In social science lingo, we conducted “factor analysis” that figures out the underlying inter-relationships of a group of questions. We looked for questions with high loadings in the dominant factor and then looked for questions with high loadings in the second most-important factor.]⁴

³ Social capital, like intelligence, generally coheres as a core concept. Some people are smarter than others, and people adept at math are likely to be good at poetry; which is why one can speak of IQs. However, at a finer grain, there are different types of intelligence—the best mathematicians are not the best poets, and neither are they necessarily emotionally intelligent.

The same is true of social capital. Among approximately a hundred different measures of social capital in the Social Capital Community Benchmark Survey, some people (or communities) broadly are more (or less) socially connected. People with lots of friends are more likely to vote more, to attend church more often, and to bowl in leagues. This means that you can speak of a person (or a community) as being generally high (or low) in social capital. On the other hand, closer examination reveals different sub-dimensions (comparable to the difference between mathematical, verbal, emotional, and spatial intelligence). The 11 different facets of social capital found in the Social Capital Community Benchmark Survey include two dimensions of “*social trust*” (whether you trust others), two measures of *political participation* (electoral political participation and participation in protest politics), two measures of *civic leadership and associational involvement*, a measure of *giving and volunteering*, a measure of *faith-based engagement*, a measure of *informal social ties*, a measure of the *diversity of our friendships*, and a measure of the *equality of civic engagement* at a community level.

⁴ The dimensions of social capital are listed in the above footnote [and a fuller description of these dimensions can be found at <http://www.ksg.harvard.edu/saguaro/communitysurvey/results5.html>], but the question numbers on the 2000 Social Capital Community Benchmark Survey that comprised these dimensions are listed below:

Social trust: Trust others (versus can't be to careful in dealing with others) (6), Trust neighbors (7A), trust co-workers (7B), trust co-religionists (7C), trust local shop clerks (7D), trust local police (7F)

Inter-racial trust: trust whites (7G), trust blacks or African Americans (7H), Trust Asians (7I), Trust Hispanics or Latinos (7J)

Electoral political participation: Days in the past week respondent read a daily newspaper (17), Interest in politics and national affairs (21), Currently registered to vote (22), Voted in most recent presidential election (23), Knowledge of US Senators from respondent's state (28)

Protect politics participation: Signed a petition in past 12 months (26A), Attended a political meeting or rally in past 12 months (26B), Participated in demonstrations, boycotts, or marches in past 12 months (26D), Participate in labor union (33I), Participate in ethnic, nationality, or civil rights organization (33L), Participate in political group (33M), Belonged to any group that took local action for reform (34)

Civic leadership: Number of categories of formal group involvements (excludes church membership) [33B-R], Served as an officer or on a committee (35), Number of times attended club meeting past 12 months (56E), Number of times attended public meeting discussing school or town affairs in past 12 months (56L)

Associational involvement: Number of categories of formal secular group involvement [33B-R]

Giving and volunteering: money contributed to secular causes (37B), money contributed to religious causes (37A), number of times volunteered (58), volunteered for place of worship (59A), volunteered for health care or to fight disease (59B), volunteered for needy, volunteered for school or youth programs (59C), volunteered to help poor or elderly (59D), volunteered for cultural or arts organizations (59E), volunteered for neighborhood civic group (59G)

Faith based engagement: Member of church or religious organization (30), Religious attendance (31), Participate in church activities besides services (32), Participate in organization affiliated with religion (33A), Money contributed to church or religious causes (37A), Volunteered for religion (59A)

Informal social ties: Number of times in last 12 months respondent... played cards or board games with others (56C), visited with relatives (56D), had friends over to his/her home or was in theirs (56F), socialized with co-workers outside of work (56H), hung out with friends in a public place (56I)

2) *Intrinsic interest in the answer to question itself.* Given a choice between two equally good, we tended to choose the more essential one (for instance, volunteering).

3) *The stability (over time) of responses to a question.* Some questions elicit more consistent responses from the same respondent and others seem to depend metaphorically “on what they had for breakfast.” Since we conducted two additional waves of the SCCBS, we could look at the underlying consistency of responses by the same individuals to the same questions at different times. We chose more stable questions over more mercurial ones. [This measure of stability is what social scientists refer to as “test-retest reliability.”]

4) *Economy of time.* In the short form, we are trying to maximize the information that can be obtained in a short period of time and also improve the flow of the questionnaire. Thus, when faced with the choice of good questions on a topic, we chose questions that took less time to ask, or fit well in a battery of questions already being asked with a common form (for example, “how many times in the last 12 months did you do X?”)

Ownership: The short form was generated through the efforts of the *Saguaro Seminar: Civic Engagement in America*. Funds to distill Social Capital Community Benchmark Survey questions down to a short form came from a consortium of community foundations that were SCCBS participants. We want to share this short form as widely as possible; you are free to use it, but please attribute it to us if you use it: it should be cited as “Social Capital Community Benchmark Survey short form, July 2002 version, Saguaro Seminar: Civic Engagement in America project, John F. Kennedy School of Government, Harvard University.”

How we imagine that this short-form might be used

There are three possible uses we imagine for this short-form, and a few cursory comments about applying the short-form in these settings:

1) Users (surveyor s) planning to interview all in a group (an 8th grade class, neighbors on a block, an alumni group, etc.).

Here the user can interview all the people in the population he/she is concerned with and doesn't have to worry about choosing a sub-sample. A few comments are in order:

a) *Method in which the survey is conducted.* The SCCBS and the short-form are designed to be phone surveys. If you are planning the survey to be face-to-face you will have to review the questions to make sure that they work well in this context.

b) *Confidentiality.* In all cases, but especially if the survey is to be conducted face-to-face, you will need to worry about how to protect respondent confidentiality. One way to ensure confidentiality is to have this information collected by a trusted third party. If you are administering the survey yourself (as an organization), you should have the survey administered by someone who does not know the respondents (so they can be more candid). You should consider having a cover sheet that has some information about the respondent and an ID number. If the person conducting the survey writes the respondent ID number on page 2, the cover pages can be separated from the data so when the data are entered into a machine, the person doing the data entry doesn't know who the data refers to.

Diversity of our friendships: a count of the number of categories in which respondent had a personal friends. The categories asked about were: personal friend who owns a business (55A), [personal friend who] is a manual worker (55B), ... has been on welfare (55C), ...owns a vacation home (55D), ... with different religious orientation (55E), ... is white (55F), ...is Latino or Hispanic (55G), ... is Asian (55H), ... is black or African-American (55I), ...is gay or lesbian (55J), ...is a community leader (55K).

The wording of the questions in the original Social Capital Community Benchmark Survey can be found at: http://www.ksg.harvard.edu/saguaro/communitysurvey/docs/survey_instrument.pdf

c) *Response rate and selection bias*. It is critically important that whoever is administering the survey attempt to get cooperation from as many respondents as possible in the group you are aiming to survey. Otherwise, you run the serious risk that you only hear from the most willing respondents and that their responses are atypical from the group as a whole. At the minimum, you need to try administering the survey at different times of day and different days of week, you need to persistently try to convince even reluctant individuals to participate, you need to be willing to find whether there are better times to administer the survey and follow-up by setting and keeping appointments, etc.

d) *Asking all of the questions*. Whatever questions you decide to ask (some are optional in our module), you need to ensure that you attempt to ask all of these questions to every person surveyed. If you decide that you are not going to ask some of these questions, you should ask them of no one or be random in who is asked these questions.

e) *Appropriateness of Questions*. You may want to review whether all the questions work well of the group you are surveying (depending on the demographics of this group). For example, the question about whether people are registered to vote, won't work well for youth under the age of registration. In such a case you may want to ask an alternate question, like determining how many of the U.S. Senators from the respondent's state, he/she correctly knows the names of.

f) *Analysis of the data*. You should think in advance how you are going to enter the data, what software you are going to need to analyze the data, whether you need outside help in analyzing the data, etc. Administering the survey (i.e., gathering the data) may turn out to be not so difficult, but you want to make sure that you understand how you will translate these surveys into a summary of results, and how complicated the analysis is that you want to conduct.

2) Users wishing to add a social capital module to a survey that they are already administering:

In this case, the group has already figured out how who they are surveying, how to generate the sample, and who is conducting the survey. They have also, presumably, figured out who is analyzing the survey. Such a group should also review what demographic information they are already obtaining in their base survey. It may well not be necessary to ask many of the demographics questions (if these are already in their survey); conversely, the group may need to add in some of these demographic questions that are not already being gathered.

a) *Fit with survey*. You will need to fit these questions as best as possible into the flow of your survey. If the topic is rather different than what you are already asking about, you may need to alter the introduction to your survey, and you may need some transitional phrase, like "now, I'd like to ask you some questions about your community and your involvement..." You also need to think about whether the other questions on the survey are likely to influence the responses you are getting on the social capital questions. For example, if the rest of your survey is about whether the respondent thinks others are rude, this may make respondents more likely to report lower levels of trust in the social capital questions. There's not much that can be done about this, other than trying to pair the social capital questions with another set of questions that are unlikely to influence the social capital responses.

3) Users conducting a freestanding short-form survey of social capital on a sub-segment of a group too large to interview in total (e.g., a town, University students in Boston, etc.)

Those of you that have already conducted many surveys will understand that having a list of questions to ask is the beginning, not the end, of what you'll need to conduct a successful survey. We strongly recommend that you: a) find a good polling firm⁵ to conduct the survey; and b) find a strong local academic partner⁶ (with a background in statistics and quantitative methods) to

⁵ A list of survey research firms adhering to the Council of American Survey Research Organizations' standards can be found at: http://www.casro.org/casromembers_displaypage.cfm

advise you on issues like sampling and oversampling, to help conduct the analysis of the data for you, to write up the findings in a report, etc. The appended footnote lists some things to look for in such a local academic partner.

We cannot realistically educate the first-time surveyor about the surveying process, but we attach a few useful WWW links in this footnote.⁷

Cost us to administer this

A lot of the cost of surveying will depend on who will administer this and how.

We envision three ways in which this survey would be used and the price varies accordingly:

⁶ We recommend that you use an academic partner (AP) for the following tasks, although this is up to you:

- The AP interprets your local data and prepares your local “message” about the data for reports you issue or statements you make. [This is a combination of analyzing the data and providing a local context for the survey (history, demographics, regional trends, culture, and other local factors).]
- Determining geographic areas or demographic areas in which you want to oversample (i.e., sample at rates higher than they naturally occur in the population).

An academic partner should probably be someone at a university, college or research institution in your area who has:

- Training and experience in contemporary social science (as indicated, for example, by a doctorate in one of the social sciences and/or appointment as a regular member of any social science department at an accredited college or university). Graduate training in the sociology and/or political science of contemporary America is highly desirable, though not absolutely mandatory.
- Some experience in quantitative data analysis, preferably of survey data. (This need not include actually directing an original survey, but could include secondary analysis of survey archive data.) Advanced statistical skills are desirable, but not absolutely mandatory.
- Some familiarity with the history, demographics and cultures of your community. One important contribution each academic partner will make will be to help interpret the statistical results against the backdrop of the various cultures represented in your locality.
- General sympathy to the study of social capital, community, and civil society. The project has no detailed orthodoxy, and we all have an open mind about empirical findings, but we do not want to spend lots of time at our learning sessions debating the “first principles” of social capital and civil society.
- Interest in *applied* social research, not merely academic work.

Some of you will be able to find one local academic who combines all these virtues. In some cases, however, it may not be possible to find a single individual who has all the necessary skills. In such cases, you may wish to seek some institutional partner (for example, a local university center of urban studies, or a university survey research center) where multiple faculty members bring different skills to the table.

⁷ 1) The American Statistical Association has a good site at:
<http://www.amstat.org/sections/srms/brochures/survwhat.html>
and also has 3 useful brochures on the topic of surveying.

2) The Research Knowledge Data Base (gathered by a Psychology Prof. at Cornell) may be more than most users will need but it discusses everything from sampling to figuring what the question is to analysis, etc. The information can be found at: <http://trochim.human.cornell.edu/kb/>

3) There are some useful general pointers in: <http://www.surveysystem.com/sdesign.htm>

a) You are trying to survey *everyone* in a given population (e.g., an entire 8th grade class, a 4 block neighborhood, etc.). In this case, where you do not need to draw up a sample (since you are trying to interview everyone), the cheapest way to do the survey would be to train some students in how to administer this survey, and do it yourself, and then compile all the results into a spreadsheet with rows corresponding to the various respondents and columns corresponding to the various questions. If you want to do more sophisticated analyses than what percent responded “yes” or “no” to various questions, you may have to input the data into a statistical software package like SAS or SPSS. The cost of doing this could be as inexpensive as printing out copies of the survey (or adapting them for a written survey), training some students, distributing the surveys, collecting them, inputting the results and then analyzing them.

b) Adding a social Capital module to an existing survey. A second possibility is that you are already conducting a survey (for example, on public health) and want to gather social capital information as well. Since you would already, presumably, be having a firm draw up a sample for you and administer the survey, and provide you with marginal and banner results, and since you would also probably gathering much of the demographic information for this survey, you would only need to add on the social capital questions to your survey. You will need to make sure that the questions flow somewhat together (for example from your other questions to the social capital questions), but the cost of adding the 5 or so minutes of social capital questions for a survey of some 500 respondents would probably be in the range of \$5,000-10,000.

c) Free standing survey. If you want to just conduct the “Social Capital Short Form” survey and need to have a random sample drawn up for a much larger population (e.g., finding 500 respondents in the city of Grand Rapids, MI), we would recommend that you hire a polling firm to draw up a random sample (from the relevant area codes and telephone exchanges), conduct this survey, and supply you with these data. The cost for a nationally respected polling firm to conduct 500 complete interviews might be in the range of \$40-60 per completed interview or \$20,000-30,000.⁸ You can probably find more inexpensive ways to pursue this by working through a local university that does polling.⁹

How big a job/how long will it take to administer and then analyze results?

Assuming the survey is a phone survey, and you were interviewing 500 people, you probably would want to administer this for approximately 3 weeks, to leave time to try to reach respondents during the week and on the weekend, and leave time for respondents being away on business or vacation, or being busy particular days or nights. If you use an outside polling firm, given that it often takes a week or so to originally draw the sample, and some time to check the results, the process from start to finish (to obtain the data) would be able 5-6 weeks. Analysis time depending on the level of analysis that you wanted to undertake, and the skills of those undertaking the analysis might be an addition 2-6 weeks more.

Will we be able to compare ourselves to other towns, organizations, or businesses who use this form?

Unless you know of other sites undertaking the same survey and using the same methodology it will be very hard to compare the results. Since many of these surveys may be administered by different survey firms or use different methodologies (for example, the number of times they call

⁸ This assumes that you would get the marginal responses and banners (responses broken out along key demographics of the community) and a copy of the data in SPSS, but would not have any analysis performed for you by the polling firm, nor require any demographic or geographic screening. If you want to contact the firm we used for the Benchmark Survey (TNSI Intersearch in Horsham, PA), they can be reached at 215-442-9638(contact Dave Lambert). They have the advantage of already have many of these questions programmed into their computers.

⁹ For example we received one price quote for this of \$15,000 and others may be still lower.

back to reach respondents, or what hours of the day and times of the week they call), it could very well be misleading to compare results. We suggest that you use the data collected primarily as a “baseline” measurement of social capital, and then return in 2-3 years, after you have tried to build more social capital, and conduct a follow-up survey, using the same methodology.

However, there may be a way in which you can use the 2000 Social Capital Community Benchmark Survey and other prior surveys as rough interpretative benchmarks. First, before doing so you have to be aware of some potential differences that could skew comparisons: differences in results obtained when different polling firms conduct surveys (“house effects”), different results obtained when the questions asked at one time are compared with questions asked at an earlier time (“period effects”)¹⁰, and different results obtained as a result of differential response rates¹¹, and differences obtained because the demographics of the community sampled were very different from one survey to another. That said, you should know that many to most of the social capital questions in the Social Capital Community Benchmark Survey have prior pedigrees, some of them quite long: that is, they have been taken from other surveys.¹² Assuming you have an academic partner that is helping you to interpret the results of the survey, we recommend that your academic partner examine the results from your community and compare it with results to this same question over time, adjusting for demographic differences in your community. This analysis cannot tell you precisely whether you are higher or lower than in the past, but can give you a rough indication of whether your community’s responses are notably high or low. For example, even with all the qualifications about period effects, house effects, response rates, etc., we know that a figure of 60% saying most people can be trusted suggests a quite “trusting” community, whereas without those other, prior usages, we’d have no way of know if 60% should be considered high or low.

Finally, **a word to the wise.** We think the survey has the most utility as a “pre-“ and “post-“ measurement to see if more or less social capital is being built in an area. If you are doing so, it is critically important that the methodology be as similar as possible to the one employed earlier (how the sample was chosen, how the survey was conducted, how interviewers were selected and trained, etc.) And in all cases, you should use identically worded questions to the earlier survey to make comparisons meaningful.

¹⁰ You should be especially attentive to this in the aftermath of September 11, 2000, since civic spiritedness and many measures of trust showed significant rises after September 11.

¹¹ In general, respondents who are harder to reach and harder to convince to cooperate by answering the survey tend to be less civic, so polling firms and methodologies that make less of an attempt to persuade the reluctant and busy to participate (i.e., have lower response rates) tend to find more civic results, and firms that have higher response rates tend to find less civic results.

¹² We did this because it is generally inadvisable to invent new questions for two reasons. First, new questions that *sound* good often do not provide very useful data. Second, because the prior history of having had the exact same question asked provides a context to interpret whether a response of 60% is higher or lower than expected. If new questions are asked, regardless of how great they might turn out to be, there is no way of knowing whether a community’s responses are unusually civic or not.

Questions in Social Capital Community Benchmark Survey short form

Notes:

Our estimate is that this about 7.5 minutes of starred questions (including 2.5 minutes of demographics). The optional questions would add 5 minutes to the survey length.

Proposed questions:

Hello, I'm _____ calling from _____. We are conducting an important survey about life in communities across America including yours.

[GENDER: INTERVIEWER: RECORD R's GENDER
(IF NECESSARY SAY: I am recording that you are a male/female.)

<GENDER>

- 1 Male
- 2 Female

- *1 We'd like to ask you some questions about how you view other people, groups and institutions.

Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?

<TRUST>

- 1 People can be trusted
- 2 You can't be too careful
- 3 (VOLUNTEERED) Depends
- 8 Don't Know
- 9 Refused

- *2 Next, we'd like to know how much you trust different groups of people. First, think about (GROUP). Generally speaking, would you say that you can trust them a lot, some, only a little, or not at all?

*2A People in your neighborhood

(CLARIFY IF NECESSARY: How about in general?)

<TRNEI>

- 1 Trust them a lot
- 2 Trust them some
- 3 Trust them only a little
- 4 Trust them not at all
- 5 (VOLUNTEERED) Does not apply
- 8 Don't Know
- 9 Refused

2B (How about) **The police in your local community** (would you say that you can trust them a lot, some, only a little, or not at all?)

<TRCOP>

- 1 Trust them a lot
- 2 Trust them some
- 3 Trust them only a little
- 4 Trust them not at all
- 5 (VOLUNTEERED) Does not apply
- 8 Don't Know
- 9 Refused

2C **People who work in the stores where you shop**

<TRSHOP>

- 1 Trust them a lot
- 2 Trust them some
- 3 Trust them only a little
- 4 Trust them not at all
- 5 (VOLUNTEERED) Does not apply
- 8 Don't Know
- 9 Refused

*2D (How about) **White people?**

<TRWHT>

- 1 Trust them a lot
- 2 Trust them some
- 3 Trust them only a little
- 4 Trust them not at all
- 5 (VOLUNTEERED) Does not apply
- 8 Don't Know
- 9 Refused

*2E (How about) **African Americans or Blacks?**

<TRBLK>

- 1 Trust them a lot
- 2 Trust them some
- 3 Trust them only a little
- 4 Trust them not at all
- 5 (VOLUNTEERED) Does not apply
- 8 Don't Know
- 9 Refused

*2F (How about) **Hispanics or Latinos?**

<TRHISP>

- 1 Trust them a lot
- 2 Trust them some
- 3 Trust them only a little
- 4 Trust them not at all
- 5 (VOLUNTEERED) Does not apply
- 8 Don't Know
- 9 Refused

- 3 My next questions are about public affairs. How interested are you in politics and national affairs? Are you very interested, somewhat interested, only slightly interested, or not at all interested?

<POLINT>

- 1 Very interested
- 2 Somewhat interested
- 3 Only slightly interested
- 4 Not at all interested
- 8 Don't know
- 9 Refused

- *4 Are you currently registered to vote

<REGVOTE>

- 1 Yes
- 2 No
- 3 (VOLUNTEERED) Not eligible to vote
- 8 Don't know
- 9 Refused

- 5A How much of the time do you think you can trust the NATIONAL government to do what is right – just about always, most of the time, only some of the time, or hardly ever?

<TGNAT>

- 1 Just about always
- 2 Most of the time
- 3 Some of the time
- 4 Hardly ever
- 8 Don't know
- 9 Refused

- 5B How about your LOCAL government? How much of the time do you think you can trust the LOCAL government to do what is right? (Would you say just about always, most of the time, only some of the time, or hardly ever?)

<TGLOC>

- 1 Just about always
- 2 Most of the time
- 3 Some of the time
- 4 Hardly ever
- 8 Don't know
- 9 Refused

- 5C Thinking POLITICALLY AND SOCIALLY, how would you describe your own general outlook--as being very conservative, moderately conservative, middle-of-the-road, moderately liberal or very liberal?

<IDEO>

- 1 Very conservative
- 2 Moderately conservative

- 3 Middle-of-the-road
- 4 Moderately liberal
- 5 Very Liberal
- 6 (VOLUNTEERED) Something else
- 8 Don't know
- 9 Refused

- 6 Now I'm going to ask you how many times you've done certain things in the past 12 months, if at all. For all of these, I want you just to give me your best guess, and don't worry that you might be off a little. About how many times in the past 12 months have you (ACTIVITY):

RANDOMIZE A-J

Note: for all questions 6A-6J, interviewer probes for an actual number and if respondent can not provide an actual number, the interviewer follows up with:

Would you say you never did this, did it once, a few times, about once a month on average, twice a month, about once a week on average, or more often than that? (IF RESPONDENT ANSWERS "A FEW TIMES", PROBE WITH:) Would that be closer to 2-4 times or 5-9 times?

- 6A (How many times in the past twelve months have you) **Worked on a community project?**

<CPROJECT>

VALID RANGE 0 to 53

--

- 98 Don't Know
- 99 Refused

(IF RESPONDENT IS UNABLE TO ANSWER, PROBE:) Would you say you never did this, did it once, a few times, about once a month on average, twice a month, about once a week on average, or more often than that?

(IF RESPONDENT ANSWERS "A FEW TIMES", PROBE WITH:) Would that be closer to 2-4 times or 5-9 times?

< PROJECT >

- 1 never did this
- 2 once
- 3 a few times (ENTER ONLY IF FIGURE CANNOT BE CLARIFIED)
- 4 2-4 times
- 5 5-9 times
- 6 about once a month on average
- 7 twice a month
- 8 about once a week on average
- 9 more than once a week
- 98 Don't Know
- 99 Refused

6B (How many times in the past twelve months have you) **Donated blood?**

<CBLOOD>

VALID RANGE 0 to 53

--

98 Don't Know

99 Refused

(IF RESPONDENT IS UNABLE TO ANSWER, PROBE:) Would you say you never did this, did it once, a few times, about once a month on average, twice a month, about once a week on average, or more often than that?

(IF RESPONDENT ANSWERS "A FEW TIMES", PROBE WITH:) Would that be closer to 2-4 times or 5-9 times?

< BLOOD >

1 never did this

2 once

3 a few times (ENTER ONLY IF FIGURE CANNOT BE CLARIFIED)

4 2-4 times

5 5-9 times

6 about once a month on average

7 twice a month

8 about once a week on average

9 more than once a week

98 Don't Know

99 Refused

*6C (How many times in the past twelve months have you) **Attended any public meeting in which there was discussion of town or school affairs?**

<CPUBMEET>

VALID RANGE 0 to 53

--

98 Don't Know

99 Refused

(IF RESPONDENT IS UNABLE TO ANSWER, PROBE:) Would you say you never did this, did it once, a few times, about once a month on average, twice a month, about once a week on average, or more often than that?

(IF RESPONDENT ANSWERS "A FEW TIMES", PROBE WITH:) Would that be closer to 2-4 times or 5-9 times?

< PUBMEET >

1 never did this

2 once

3 a few times (ENTER ONLY IF FIGURE CANNOT BE CLARIFIED)

4 2-4 times

- 5 5-9 times
- 6 about once a month on average
- 7 twice a month
- 8 about once a week on average
- 9 more than once a week
- 98 Don't Know
- 99 Refused

6D (How many times in the past twelve months have you) **Attended a political meeting or rally?**

<CRALLY>

VALID RANGE 0 to 53

--

- 98 Don't Know
- 99 Refused

(IF RESPONDENT IS UNABLE TO ANSWER, PROBE:) Would you say you never did this, did it once, a few times, about once a month on average, twice a month, about once a week on average, or more often than that?

(IF RESPONDENT ANSWERS "A FEW TIMES", PROBE WITH:) Would that be closer to 2-4 times or 5-9 times?

< RALLY >

- 1 never did this
- 2 once
- 3 a few times (ENTER ONLY IF FIGURE CANNOT BE CLARIFIED)
- 4 2-4 times
- 5 5-9 times
- 6 about once a month on average
- 7 twice a month
- 8 about once a week on average
- 9 more than once a week
- 98 Don't Know
- 99 Refused

*6E (How many times in the past twelve months have you) **Attended any club or organizational meeting** (not including meetings for work)?

<CORGMTG>

VALID RANGE 0 to 53

--

- 98 Don't Know
- 99 Refused

(IF RESPONDENT IS UNABLE TO ANSWER, PROBE:) Would you say you never did this, did it once, a few times, about once a month on average, twice a month, about once a week on average, or more often than that?

(IF RESPONDENT ANSWERS "A FEW TIMES", PROBE WITH:) Would that be closer to 2-4 times or 5-9 times?

< ORGMTG >

- 1 never did this
- 2 once
- 3 a few times (ENTER ONLY IF FIGURE CANNOT BE CLARIFIED)
- 4 2-4 times
- 5 5-9 times
- 6 about once a month on average
- 7 twice a month
- 8 about once a week on average
- 9 more than once a week
- 98 Don't Know
- 99 Refused

*6F (How many times in the past twelve months have you) **had friends over to your home?**

<CFRDVIS>

VALID RANGE 0 to 53

--

- 98 Don't Know
- 99 Refused

(IF RESPONDENT IS UNABLE TO ANSWER, PROBE:) Would you say you never did this, did it once, a few times, about once a month on average, twice a month, about once a week on average, or more often than that?

(IF RESPONDENT ANSWERS "A FEW TIMES", PROBE WITH:) Would that be closer to 2-4 times or 5-9 times?

< FRDVIS >

- 1 never did this
- 2 once
- 3 a few times (ENTER ONLY IF FIGURE CANNOT BE CLARIFIED)
- 4 2-4 times
- 5 5-9 times
- 6 about once a month on average
- 7 twice a month
- 8 about once a week on average
- 9 more than once a week
- 98 Don't Know
- 99 Refused

*6G (How many times in the past twelve months have you) **been in the home of a friend of a different race or had them in your home?**

<CFRDRAC>

VALID RANGE 0 to 53

--

98 Don't Know

99 Refused

(IF RESPONDENT IS UNABLE TO ANSWER, PROBE:) Would you say you never did this, did it once, a few times, about once a month on average, twice a month, about once a week on average, or more often than that?

(IF RESPONDENT ANSWERS "A FEW TIMES", PROBE WITH:) Would that be closer to 2-4 times or 5-9 times?

< FRDRAC >

1 never did this

2 once

3 a few times (ENTER ONLY IF FIGURE CANNOT BE CLARIFIED)

4 2-4 times

5 5-9 times

6 about once a month on average

7 twice a month

8 about once a week on average

9 more than once a week

98 Don't Know

99 Refused

*6H (How many times in the past twelve months have you) **been in the home of someone of a different neighborhood or had them in your home?**

<CFRDXNEI>

VALID RANGE 0 to 53

--

98 Don't Know

99 Refused

(IF RESPONDENT IS UNABLE TO ANSWER, PROBE:) Would you say you never did this, did it once, a few times, about once a month on average, twice a month, about once a week on average, or more often than that?

(IF RESPONDENT ANSWERS "A FEW TIMES", PROBE WITH:) Would that be closer to 2-4 times or 5-9 times?

< FRDXNEI >

1 never did this

2 once

3 a few times (ENTER ONLY IF FIGURE CANNOT BE CLARIFIED)

4 2-4 times

5 5-9 times

6 about once a month on average

7 twice a month

8 about once a week on average
 9 more than once a week
 98 Don't Know
 99 Refused

*6I (How many times in the past twelve months have you) **been in the home of someone you consider to be a community leader or had one in your home?**

<CLDRHOM>
 VALID RANGE 0 to 53

--

98 Don't Know
 99 Refused

(IF RESPONDENT IS UNABLE TO ANSWER, PROBE:) Would you say you never did this, did it once, a few times, about once a month on average, twice a month, about once a week on average, or more often than that?

(IF RESPONDENT ANSWERS "A FEW TIMES", PROBE WITH:) Would that be closer to 2-4 times or 5-9 times?

<LDRHOM>
 1 never did this
 2 once
 3 a few times (ENTER ONLY IF FIGURE CANNOT BE CLARIFIED)
 4 2-4 times
 5 5-9 times
 6 about once a month on average
 7 twice a month
 8 about once a week on average
 9 more than once a week
 98 Don't Know
 99 Refused

*6J (How many times in the past twelve months have you) **volunteered?**

<CVOLTIM>
 VALID RANGE 0 to 53

--

98 Don't Know
 99 Refused

(IF RESPONDENT IS UNABLE TO ANSWER, PROBE:) Would you say you never did this, did it once, a few times, about once a month on average, twice a month, about once a week on average, or more often than that?

(IF RESPONDENT ANSWERS "A FEW TIMES", PROBE WITH:) Would that be closer to 2-4 times or 5-9 times?

< VOLTIM >

- 1 never did this
- 2 once
- 3 a few times (ENTER ONLY IF FIGURE CANNOT BE CLARIFIED)
- 4 2-4 times
- 5 5-9 times
- 6 about once a month on average
- 7 twice a month
- 8 about once a week on average
- 9 more than once a week
- 98 Don't Know
- 99 Refused

- 7 In the past twelve months, have you served as an officer or served on a committee of any local club or organization?

<OFFICER>

- 1 Yes
- 2 No
- 8 Don't know
- 9 Refused

- *8 Not including weddings and funerals, how often do you attend religious services? (IF NECESSARY PROBE WITH CATEGORIES) (Every week (or more often)/Almost every week/Once or twice a month/A few times per year/Less often than that/Don't know/Refused)

<RELATEND>

- 1 Every week (or more often)
- 2 Almost every week
- 3 Once or twice a month
- 4 A few times per year
- 5 Less often than that
- 6 Never
- 8 Don't know
- 9 Refused

- 9 People and families contribute money, property or other assets for a wide variety of charitable purposes. During the past 12 months, approximately how much money did you and the other family members in your household contribute to all secular causes and all religious causes, including your local religious congregation

(IF NECESSARY: By contribution, I mean a voluntary contribution with no intention of making a profit or obtaining goods or services for yourself.)

(IF NECESSARY: REPEAT ASSURANCES OF CONFIDENTIALITY)

<GIVE>

- 1 None
- 2 Less than \$100
- 3 \$100 to less than \$500

- | | |
|---|----------------------------|
| 4 | \$500 to less than \$1000 |
| 5 | \$1000 to less than \$5000 |
| 6 | More than \$5000 |
| 8 | Don't know |
| 9 | Refused |
- *10 All things considered, would you say you are very happy, happy, not very happy, or not happy at all?
- <HAPPY>
- | | |
|---|------------------|
| 1 | Very happy |
| 2 | Happy |
| 3 | Not very Happy |
| 4 | Not happy at all |
| 8 | Don't Know |
| 9 | Refused |
- *11 And how would you describe your overall state of health these days? Would you say it is excellent, very good, good, fair, or poor?
- <HEALTH>
- | | |
|---|------------|
| 1 | Excellent |
| 2 | Very Good |
| 3 | Good |
| 4 | Fair |
| 5 | Poor |
| 8 | Don't Know |
| 9 | Refused |
- 12 Please tell me for the following statement whether you agree strongly, agree somewhat, disagree somewhat, or disagree strongly. Television is my primary form of entertainment
- <TVONE>
- | | |
|---|-------------------------------|
| 1 | Agree strongly |
| 2 | Agree somewhat |
| 3 | (VOLUNTEERED) Neither/depends |
| 4 | Disagree somewhat |
| 5 | Disagree strongly |
| 8 | Don't know |
| 9 | Refused |
- *13 Our last questions are used to ensure that our sample for this survey accurately reflects the population as a whole. First, we'd like to know if you are working now, temporarily laid off, or if you are unemployed, retired, permanently disabled, a homemaker, a student, or what?
(INTERVIEWER: IF MULTIPLE RESPONSES ARE GIVEN, ENTER THE ONE WITH THE LOWEST CODE NUMBER.)
- <LABOR>
- | | |
|---|----------------------|
| 1 | Working |
| 2 | Temporarily laid off |
| 3 | Unemployed |

- 4 Retired
- 5 Permanently Disabled
- 6 Homemaker
- 7 Student
- 8 Don't Know
- 9 Refused

*14 . Next, in what year were you born?

<BYEAR>

VALID RANGE 1880-1982

*15 What is the highest grade of school or year of college you have completed?

<EDUC>

- | | | |
|---|--|------------|
| 1 | Less than high school (Grade 11 or less) | |
| 2 | High school diploma (including GED) | SKIP TO 16 |
| 3 | Some college | SKIP TO 16 |
| 4 | Assoc. degree (2 year) or specialized technical training | SKIP TO 16 |
| 5 | Bachelor's degree | SKIP TO 16 |
| 6 | Some graduate training | SKIP TO 16 |
| 7 | Graduate or professional degree | SKIP TO 16 |
| 8 | Don't know | SKIP TO 16 |
| 9 | Refused | SKIP TO 16 |

*15A Do you have a GED or high school equivalency?

<EDUC2>

- 1 Yes
- 2 No
- 8 Don't know
- 9 Refused

*16 Do you consider yourself Hispanic or Latino?

<HISPAN>

- | | | |
|---|------------|------------|
| 1 | Yes | |
| 2 | No | SKIP TO 17 |
| 8 | Don't know | SKIP TO 17 |
| 9 | Refused | SKIP TO 17 |

*16A Would you say your background is Mexican, Puerto Rican, Cuban, or something else?

<HISPNAT>

- 1 Mexican
- 2 Puerto Rican
- 3 Cuban
- 4 Other
- 8 Don't know
- 9 Refused

*16B Do you consider yourself to be White or Black?

<HISPRACE>

- 1 White
- 2 Black
- 3 Other
- 8 Don't Know
- 9 Refused

ALL SKIP TO 18

*17 Do you consider yourself to be White, Black or African American, Asian or Pacific Islander, Native American, or some other race?

<RACE>

- | | | |
|---|--------------------------------|-------------|
| 1 | White | SKIP TO 18 |
| 2 | African American or Black | SKIP TO 18 |
| 3 | Asian or Pacific Islander | SKIP TO 17B |
| 4 | Alaskan Native/Native American | SKIP TO 18 |
| 5 | Other | |
| 8 | Don't know | SKIP TO 18 |
| 9 | Refused | SKIP TO 18 |

*17A Specify:

<RACEO> [STRING]

SKIP TO 18

*17B Would you say your background is Chinese, Korean, Japanese, Filipino, or something else?

<ASNNAT>

- 1 Chinese
- 2 Korean
- 3 Japanese
- 4 Filipino
- 5 Asian Indian
- 6 Vietnamese
- 7 Cambodian
- 8 Other
- 98 Don't know
- 99 Refused

*18 Are you an American citizen?

<CITIZ>

- 1 Yes
- 2 No
- 8 Don't know
- 9 Refused

*19 How many different telephone numbers does your household have, not counting those dedicated to a fax machine or computer?

<PHONES>

VALID RANGE 1-9

*20A If you added together the yearly incomes, before taxes, of all the members of your household for last year, 2001, would the total be: (READ LIST)

<YP_1>

1 Less than \$30,000 or

2 \$30,000 or more

---DO NOT READ BELOW---

8 Don't Know

9 Refused

IF <YP_1> = 2, SKIP TO 20C.

IF <YP_1> = 8 or 9, REPEAT ASSURANCES OF CONFIDENTIALITY

*20B Would that be: (READ LIST)

<YP_2>

1 \$20,000 or less SKIP TO 21

2 Over \$20,000 but less than \$30,000 SKIP TO 21

---DO NOT READ BELOW---

8 Don't Know SKIP TO 21

9 Refused SKIP TO 21

*20C Would that be: (READ LIST)

<YP_3>

1 \$30,000 but less than \$50,000

2 \$50,000 but less than \$75,000

3 \$75,000 but less than \$100,000

4 \$100,000 or more

---DO NOT READ BELOW---

8 Don't Know

9 Refused

21 And what city or town do you live in? (RECORD VERBATIM)

<CITY_STR> [STRING]

22 Are you currently married, separated, divorced, widowed, or have you never married?

<MARITAL>

- 1 Currently married
- 2 Separated
- 3 Divorced
- 4 Widowed
- 5 Never Married
- 9 Refused

23 How many children, aged 17 or younger, live in your household?

<KIDS>

VALID RANGE 0-20

- 98 Don't know
- 99 Refused

*24 Do you or your family own the place where you are living now, or do you rent?

<OWN>

- 1 Own
- 2 Rent
- 8 Don't know
- 9 Refused