



## (2.0) Methods

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

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

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





## **(2.1) NMT Variables**

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

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





Figure 15

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





## **(2.2) Investigation**

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

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

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





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

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

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

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



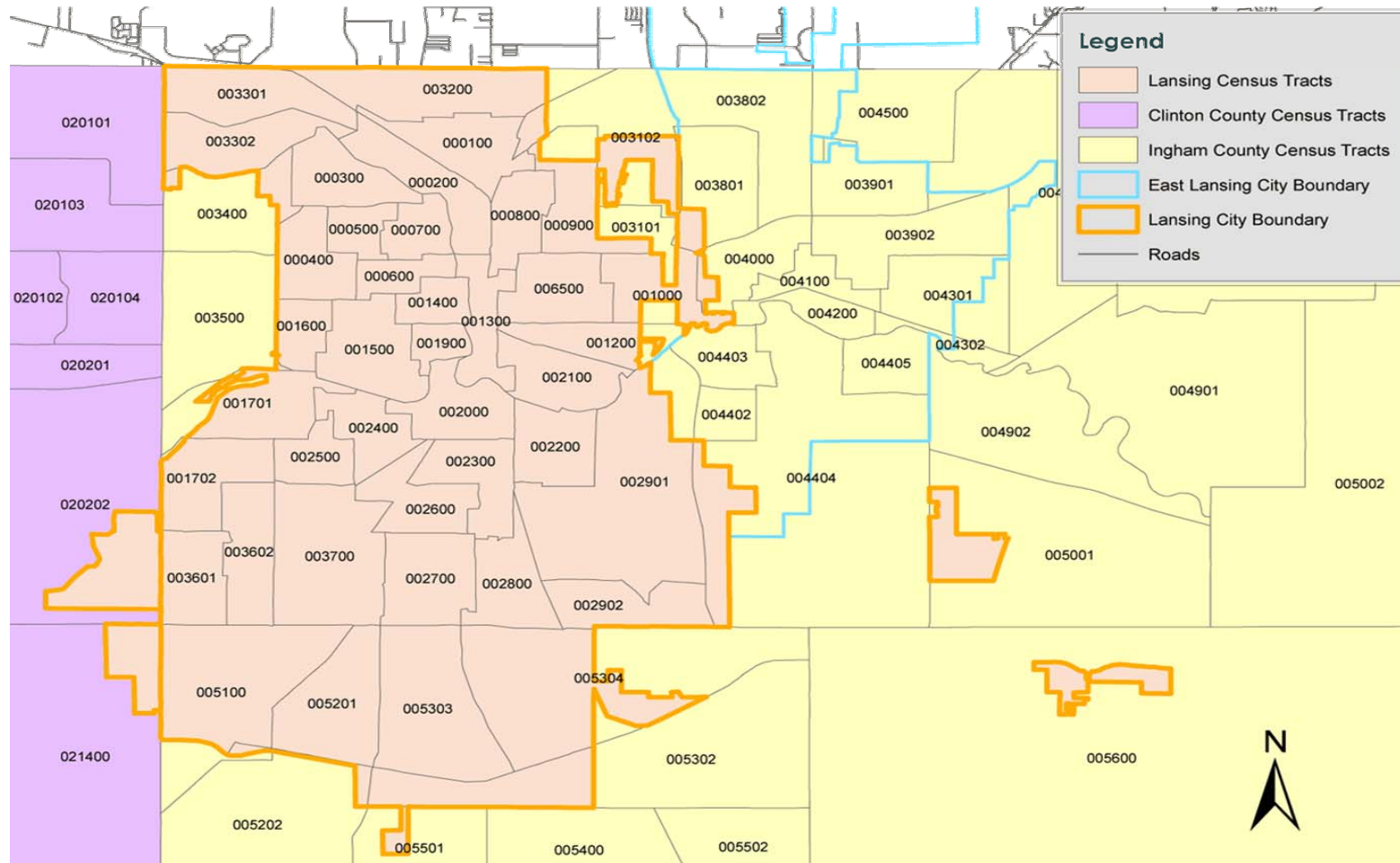


The practicum team's third and final researchable question was "What is the state of existing non-motorized transportation systems and infrastructure in the city?" The investigation consisted of a GIS-based analysis of existing conditions and assets in the City of Lansing, GIS-based suitability maps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





## 2000 Census Tract Boundaries





## Figure 16

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<sup>44</sup> Bureau of Transportation Statistics. Omnibus Survey: Household Survey Bicycle Travel During 2002 (Nov 2001 – Oct 2002). p. 1, Online: [http://www.bts.gov/publications/omnistats/volume\\_02\\_issue\\_06/html/entire.html](http://www.bts.gov/publications/omnistats/volume_02_issue_06/html/entire.html). Retrieved February 4, 2007





**Non Motorized Transportation Planning Documents - Content Analysis**

	1. CLEAR POLICY OBJECTIVES	2. RELATIONSHIPS	3. DESIGN	4. TRANSIT-ORIENTED DEVELOPMENT	5. LEGAL & POLICY	6. DESIGN/STREET	7. SOCIOECONOMIC ANALYSIS	8. EDUCATION/ENCOURAGEMENT	9. IMPLEMENTATION	10. CITIZEN INVOLVEMENT	TOTAL
		Neighborhoods Surrounding Communities County MPO's State	Neighborhood Components Institutional Facilities Employment Facilities		Zoning Site Plan Review Form-Based Coding Local Ordinances Complete Street Resolution			Transit/Encouragement Schools Employee Partners/Con Events Marketing	Regional City-wide Neighborhood Center Political Will	Visiting Data Collection/Surveying Development Public Access to Plan	
<b>Neighbors</b>											
1	Delhi Twp, MI	5 0		0	0		0 0		1		7
2	Delta Twp, MI	5 5	1 1 1 1 1	5	2 2 1	1 1 1	5 0 0	1 1	1 1 1	5 1 2 1 1	33
3	DeWitt, MI	5 1	1	5		1	0 0 0	2	1 1 1	1 1 1 1	11
4	East Lansing, MI	0 4	1 1 1	1 1	1		5 5 3	1 1 1	1 1 1 1	5 1 2 1 1	27
5	Lansing Twp, MI	5 1	1	2	2		0 0 1	1	1 1 1	1 1 1 1	13
<b>Regional</b>											
6	Ann Arbor, MI	5 1	1 0 0 0 1	3	2 0 1	1 1 0 1 0	5 0 4	1 1 0 1 1	4 0 1 1 1 1	4 1 2 0 1	34
7	Bay City, MI	0 0		0			5 0 0	0		0 1 2 0 1	5
8	Jackson, MI	5 3	1 1 1	3	2 1	1 1 1	0 0 0	1 1 1 1 0	2 1 1	4 2 1 1	20
9	Marquette, MI	5 4	1 1 1 1	5	2 2 1	1 1 1	5 5 0	1 1 1	5 1 1 1 1 1	5 1 2 1 1	42
10	Traverse City, MI	5 4	1 1 1 1	3	2 1		0 0 2	1 1	4 1 1 1 1	0 1 2 1 1	23
<b>Comparables</b>											
11	Champaign, IL	5 2	1 1	2	2		5 0 1	1	4 1 1 1 1	4 1 2 1 1	23
12	Des Moines, IO	0 1	1	0			0 0 1	1	1 1 1	2 1 1 1	6
13	Madison, WI	5 5	1 1 1 1 1	4	2 2 0	0 1 0 1 0	5 2 5	1 1 1 1 1	5 1 1 1 1 1	4 1 2 0 1	40
14	Springfield, IL	0 1	1	0			0 0 1	1	1 1	0 1 2 0 1	3
15	Urbana, IL	5 1		0			5 0 1	1	1	3 1 1 1	15
<b>National Leaders</b>											
16	Boulder, CO	5 1		5	2 2 1	1 1 1 1	5 0 3	1 1 1 1	5 1 1 1 1 1	3 1 1 1 1	36
17	Chicago, IL	5 3	1 1 1	5	2 2 1	1 1 1	0 0 5	1 1 1 1 1	2 1 1	1 1 1 1	24
18	New Haven, CT	5 1	1	5	2 2 1		0 5 4	1 1 1 1 1	4 1 1 1 1 1	5 1 2 1 1	34
19	Portland, OR	5 5	1 1 1 1 1	5	2 2 1	1 1 1 1 1	5 5 3	1 1 1	4 1 1 1 1	4 1 2 1	46
20	Seattle, WA	5 5	1 1 1 1 1	5	2 2 1	1	0 0 4	1 1 1 1	5 1 1 1 1 1	3 1 1 0 1	33
<b>Extras</b>											
	Mich State University	5 0		4	2 2		0 0 0		0 1 1 1 1	3 1 1 1 1	17
	Tri-County Master Plan	5 4	1 1 1 1	0			5 5 0		3 1 1 1	3 1 1 1 1	25





## **(2.3) Limitations**

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

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

