CENTER FOR
TRANSPORTATION STUDIES

UNIVERSITY OF MINNESOTA

RESEARCH REPORT

College and University Campuses in Greater Minnesota as Traffic Generators

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CTS 09-17

Technical Report Documentation Page

1. Report No.	2.	3. Recipients Accession No.
CTS 09-17		

4. Title and Subtitle	5. Report Date
College and University Campuses in Greater Minnesota as Traffic Generators	June 2009
	6.

7. Author(s)	8. Performing Organization Report No.
Barbara J. VanDrasek and John S. Adams	

9. Performing Organization Name and Address	10. Project/Task/Work Unit No.
University Metropolitan Consortium 330 Humphrey Center 301 – 19th Ave So Minneapolis, Minnesota 55455	CTS Project # 2007011
	11. Contract (C) or Grant (G) No.

12. Sponsoring Organization Name and Address	13. Type of Report and Period Covered
Center for Transportation Studies University of Minnesota 511 Washington Avenue SE, Suite 200 Minneapolis, Minnesota 55455	Final Report
	14. Sponsoring Agency Code

15. Supplementary Notes
http://www.cts.umn.edu/Publications/ResearchReports/

16. Abstract (Limit: 250 words)

This report evaluates the significance of selected Minnesota college and university campuses located in regional centers outside the Minneapolis-St. Paul metropolitan commuter field with respect to the highway traffic that they generate. It examines campuses as places that generate motor vehicle traffic each day, and analyzes the absolute and relative significance of campuses in Greater Minnesota as traffic generators within the counties and wider commuting field in which they are situated.

Expanding upon findings from two previous studies that investigated land development trends and increasing highway traffic for a sample of Minnesota's 49 regional centers and their adjacent commuting fields, the report examines the volume of personnel moving to and from campuses each day, estimates traffic generation rates for different types of schools and their varying impact on traffic generation using trip generation factors supplied by the Institute of Transportation Engineers. It provides 27 campus-based cases, and discusses societal trends likely to affect schools as traffic generators, and concludes with speculations on the implications of these trends for transportation planning in Greater Minnesota.

The geographical scale of analysis matters in assessing the relative impact of a school or campus as a traffic generator. If the impact if extremely local, it is likely to be a city responsibility. If the scale of analysis is the county, both city streets and county roads experience traffic impacts. At the scale of the entire commuting field, state highways may be affected. In this analysis, counties were used as the most appropriate spatial unit of analysis.

17. Document Analysis/Descriptors	18. Availability Statement
Rural traffic congestion; college campus traffic; university campus traffic; campus traffic congestion; college-university traffic generation; university campuses as traffic generators.	No restrictions. Document available from: National Technical Information Services, Springfield, Virginia 22161

19. Security Class (this report)	20. Security Class (this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	59	

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Final Report

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June 2009

Published by

Center for Transportation Studies
University of Minnesota
200 Transportation and Safety Building
511 Washington Avenue S.E.
Minneapolis, MN 55455-0375

Acknowledgements

The authors are grateful to personnel in the offices of presidents, registrars, deans, and offices of public information in dozens of public and private colleges, universities and private career schools in Minnesota who supplied us with recent matriculation, enrollment and employment data to supplement what we gathered from the University of Minnesota, Minnesota State Colleges and Universities, and the Minnesota Private College Council.

We also gratefully acknowledge the financial support of the Center for Transportation Studies, and helpful comments and suggestions supplied by Cecil L. Selness, director, Office of Freight and Commercial Vehicle Operations, Minnesota Department of Transportation, and by Alan Forsberg, Blue Earth County engineer.

We appreciate the guidance of workers who supplied us with data.

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Executive Summary

The goal of this report is to evaluate the current and prospective significance of selected college and university campuses located in regional centers throughout Greater Minnesota, with respect to the traffic that they generate. For highway and transit planning purposes it is useful to evaluate the current and prospective significance of these schools. The report examines these campuses as places that generate motor vehicle traffic each day moving to, from, and within the regional centers and nearby areas. It provides data and analysis of the absolute and relative significance of Minnesota's post-secondary educational institutions outside the Twin Cities area as traffic generators within the counties and wider commuting field in which they are situated.

In some cities and counties, the colleges and universities enroll large numbers of full-time and part-time students, and are major employment centers as well. In other places, the significance of the schools' impact on traffic is substantially overshadowed by other activities that generate most of the person-trips in the places where the schools are located, as well as within adjacent commuting fields. Expanding upon findings from two previous studies that investigated land development trends and increasing highway traffic in a sample of Minnesota's 49 regional centers and their adjacent commuting fields, the report examines the volume of personnel moving to and from campus each day, estimates traffic generation rates for different types of schools and their varying impact on traffic generation using trip generation factors supplied by the Institute of Transportation Engineers, provides 27 campus-based cases, and then discusses societal trends likely to affect schools as traffic generators. The report concludes with speculations on the implications of these trends for transportation planning in Greater Minnesota.

The authors found that few schools assess the motor vehicle traffic that they generate daily beyond the data needed to plan parking on their campuses. The relative importance of traffic generated by a school depends on its context—on the volume of that traffic compared with traffic volumes generated locally by other activities. The scale of analysis matters in assessing the relative impact of the school as a traffic generator. If the impact is extremely local, it is likely to be a city responsibility. If the scale of analysis is the county, both city streets and county roads experience traffic impacts. At the scale of the entire commuting field, state highways may be affected. In this analysis, the county was chosen as the most appropriate unit for analysis.

While the Minnesota State Colleges and Universities (MnSCU) and the University of Minnesota (UMN) Duluth generated significant traffic impacts on their surrounds, most others did not, assessed at the county scale. There is great diversity among schools in their traffic impacts; the top four counties had an impact ratio more than twelve times that of the ratios of the bottom four counties among those studied. The conclusion of the analysis is that the traffic generation impact of the campuses is modest and manageable compared with traffic generated from other sources.

Campus enrollment data are difficult to gather and report on a consistent basis for several reasons. Some students enroll at more than one school, while some schools operate at two or more locations. Some students are part-time and some full-time. Some enroll only for short

courses; others for full terms. Some students enroll for credit instruction while others are only auditing courses or taking non-credit courses.

Employment data are similarly difficult to assemble and summarize in ways that can be linked to traffic loads generated by campus activity. Some workers are full time and some part-time. Some part-time workers are also students and probably get counted twice. Some employees are counted once but work on more than one campus of a college or university, generating traffic at both campuses. Personnel who supplied data tried to be as clear as possible about the limitations of the data for the study's purposes. Those who helped were told that this was an exploratory study, an effort to determine what might be learned about how their schools and campuses generated motor vehicle traffic. In all cases they tried to be as helpful as they could.

Data interpretations and analysis remain the sole responsibility of the authors.

Chapter 1: Introduction

This report examines college and university campuses throughout Greater Minnesota as places that generate motor vehicle traffic each day moving to, from and within Minnesota's regional centers and nearby areas. It provides data and analysis of the absolute and relative significance of Minnesota's post-secondary educational institutions outside the Twin Cities area as traffic generators within the counties and wider commuting fields in which they are situated. In some cities and counties, the colleges and universities enroll large numbers of full-time and part-time students, and are major employment centers as well. In other places, the significance of the schools' impact on traffic is substantially overshadowed by other activities that generate most of the person-trips in the places where the schools are located, as well as within adjacent commuting fields. For highway and transit planning purposes it is useful to evaluate the current and prospective significance of these schools with respect to the traffic that they generate. That is the goal of this report.

Plan of the Report

This study was stimulated by findings from two previous studies that investigated land development trends and increasing highway traffic in a sample of Minnesota's 49 regional centers and their adjacent commuting fields. [1][2] The findings and conclusions of those studies are summarized in Chapter 2.

In Chapter 3 we discuss the mix of personnel who visit campuses each day–students, staff, visitors, delivery personnel, and so forth. We suggest how the market for post-secondary education and job training has been changing on the supply side (who is providing and producing educational services), and on the demand side, with attention to the changing mix of students, their varying levels of preparation, and their diverse objectives as they enroll. Finally, we describe the present higher-education landscape in Minnesota and discuss how campus size, location, and activity can affect traffic generation.

Chapter 4 provides estimates of traffic generation rates for different types of schools and their varying impacts on traffic generation using trip generation factors supplied by the Institute of Transportation Engineers, which relate traffic generation to the "functional size" of origins and destinations, which in this study are campuses. There are different ways to measure the size of a school or campus as it generates traffic. Regardless of the absolute size of a school or campus–despite how size is measured–it is the relative importance of a campus as a traffic generator that may matter most. For example, a large campus in a small town is likely to have a greater relative impact on traffic than a small campus in a large city. Every college and university campus in this study is located within the commuting fields of one of the regional centers in Greater Minnesota. The commuting fields are aggregates of counties. We rank the counties within which the campuses are located by the relative importance of those campuses as traffic generators.

Chapter 5 discusses societal trends that are likely to affect schools as traffic generators. They include the different sizes of the age cohorts from which the student population is drawn from

year to year, the length of time that students remain in college pursuing their certificates and degrees, the rising importance of life-long learning, and the increasing popularity of distance learning through Internet-based instruction.

Finally, Chapter 6 speculates on the implications of these trends for transportation planning in Greater Minnesota.

Chapter 2: Background of the Study

This report builds on and extends a pair of investigations that were prompted by the Transportation and Regional Growth (TRG) Study, which focused on the Minneapolis-St. Paul metropolitan area, and was completed in the late 1990s. These studies asked whether the trends of low-density land development and transportation congestion that were evident within the 24-county Twin Cities commuting field were being duplicated at reduced scale in and around Minnesota's regional centers, which are the principal nodes on the state's trunk highway system. The first study examined population growth in minor civil divisions (MCDs: cities, towns, townships), daily commuting, and vehicle traffic on trunk highways in the commuting fields around a sample of twenty (of 49) regional centers across Greater Minnesota between 1970 and 2000. Its central question was: Have the patterns of low-density development that sprawled over the 24 counties around the Twin Cities area in recent decades been duplicated near Minnesota's 50 regional trade centers? And if so, have traffic volumes on trunk highways in the vicinity of the centers risen in response to recent patterns of residential and commercial development in and around those centers?

That study explored those questions by:

(1) examining population changes during each decade after 1970 in the cities, towns and townships within the commuting ranges of a sample of 20 regional centers,

(2) investigating the relationship between (a) population change within each commuting field and (b) distance from the regional center of the field, and

(3) measuring rates of change in traffic volumes on the trunk highways serving each sample regional center and its commuting field.

Half of the sample of 20 regional centers are in northern Minnesota, and half are in the southern part of the state. Some were moderate- to fast-growing in the 1990s (3 percent population increase or more); half had slow growth or lost population during the 1990s (Figure 1). The sample regional centers included the following:

Northern Areas, with Slow Growth or Decline (< 3% growth in Study Area population in 1990s): Duluth-Superior/Hibbing (treated as one study area; commuting fields significantly overlap); Grand Forks-East Grand Forks; and International Falls;

Northern Centers, with Moderate to Fast Growth (≥ 3% growth in 1990s): Bemidji; Brainerd; Fargo-Moorhead; Little Falls; Park Rapids; and Wadena;

Southern Centers, with Slow Growth or Decline (< 3% growth in 1990s): Albert Lea; Marshall; Montevideo; New Ulm; and Worthington;

Southern Centers, with Moderate to Fast Growth (≥ 3% growth in 1990s): Alexandria; Mankato-North Mankato; Rochester; Waseca; and Willmar.

A daily commuting field surrounds each regional center, and is composed of the core county containing the regional center (the *key city*) plus any nearby counties that sent at least 5 percent

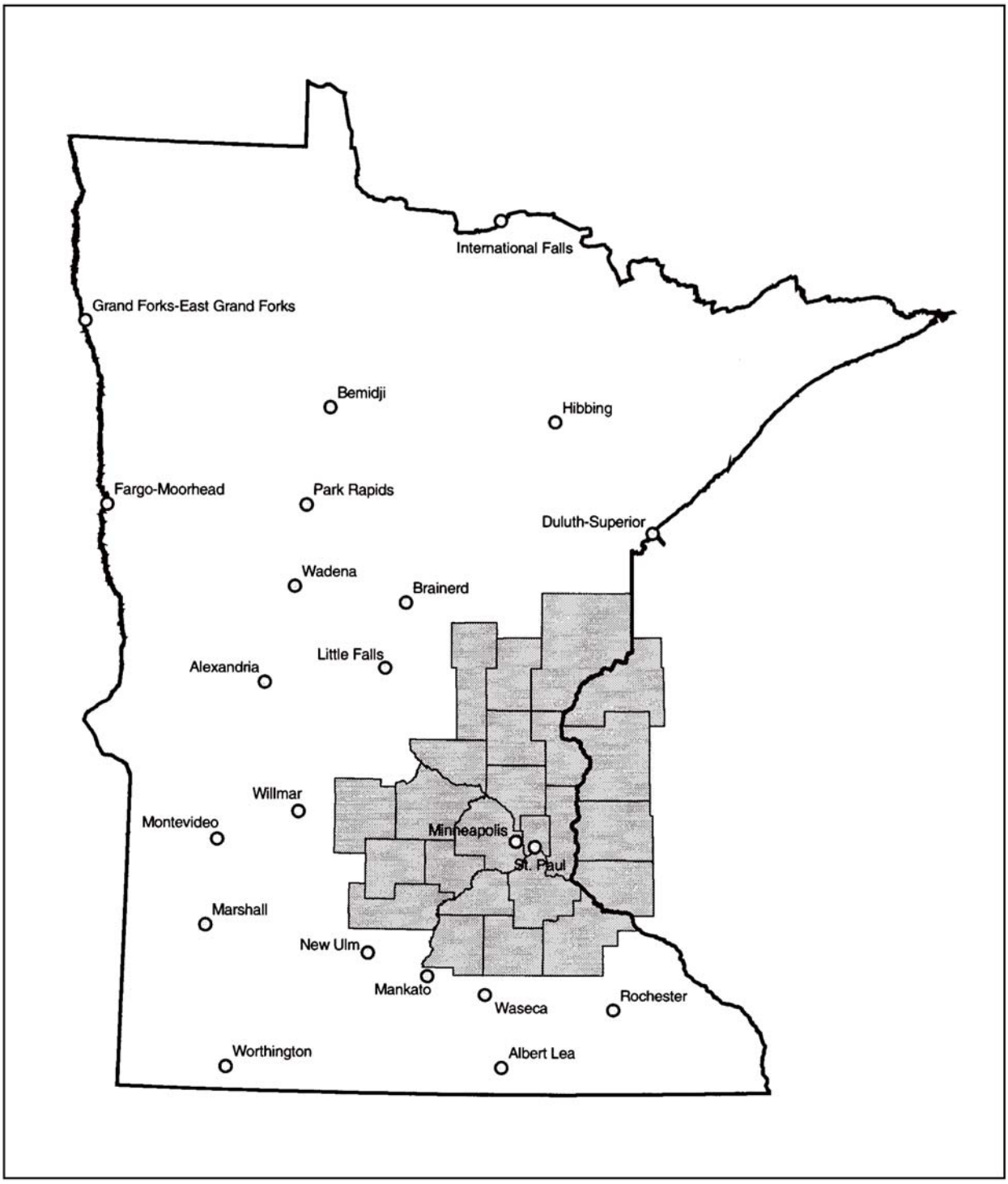

Figure 1. Regional Centers

of their workers to that core county to work in 1990. Commuting fields defined this way formed the 19 *study areas* attached to each of the sample regional centers. Centers generally had two or three counties in their commuting field in addition to the county containing the regional center. In the case of Albert Lea, only Freeborn County qualified. The largest functional region surrounded Grand Forks-East Grand Forks with seven counties, followed by Rochester and Duluth-Superior/Hibbing with six (Figure 2).

In *northern-slow-growth study areas*, there were differences between population change in the study area overall (including the key city) and population change in the key city itself. In the Duluth-Superior/Hibbing area both measures rose at modest rates; in the International Falls area they both declined at significant rates; and in the Grand Forks-East Grand Forks area the overall study area lost population while the key city of Grand Forks gained.

In *northern fast-growth study areas*, study-area populations and key-city populations rose together in every case, but the rates differed. In the Bemidji, Brainerd, and Park Rapids cases the study-area populations rose much faster in the 1990s than the key cities grew, an outcome related to expanding residential and economic activity in the lake areas that surround these regional centers.

All but one of the *southern slow-growth study areas* lost population in the 1990s, but three of their regional centers—Albert Lea, Marshall and Worthington—managed to add population while the overall study area experienced losses. New Ulm experienced slow growth all around, while Montevideo lost population along with its entire 4-county study area.

Finally, the *southern fast-growth study areas* all added population in the 1990s, as did their key cities. Like the northern study areas that gained population during the decade, these areas and their centers lie in a broad crescent-shaped belt that extends from the southeastern corner of the state, northwestward through Rochester, Waseca, Mankato and New Ulm, through the greater Twin Cities area west to Willmar, then northward through the lake district to Park Rapids and Bemidji, and west to Fargo-Moorhead. Outside this *crescent of growth* lie two large parts of Minnesota: most of the drier farming areas in the far west and southwest, and a wide arc of counties stretching from Grand Forks-East Grand Forks, north to International Falls, and then to the Iron Range and into the Arrowhead Region north of Lake Superior.

Colleges and university campuses form part of the life, economy and society within study areas and generate part of the traffic. This report builds on that study, and assesses the relative importance of the traffic patterns generated by campus life.

Dynamics of Growth and Decline

Slow-growth regions have been disadvantaged by their relative location, or lack of easy accessibility, with respect to other places–what we call their “situation”. They are remote from major population centers. [3] They were further disadvantaged by deficient “site resources” in the 1990s and early 2000s due to a languishing farm economy, weakness in forestry and mining, and limitations in the recreational opportunities they offered compared with the offerings of

other places. Despite spikes in commodity prices in 2007 and 2008, the long-term trend has not been generous to these parts of Minnesota.

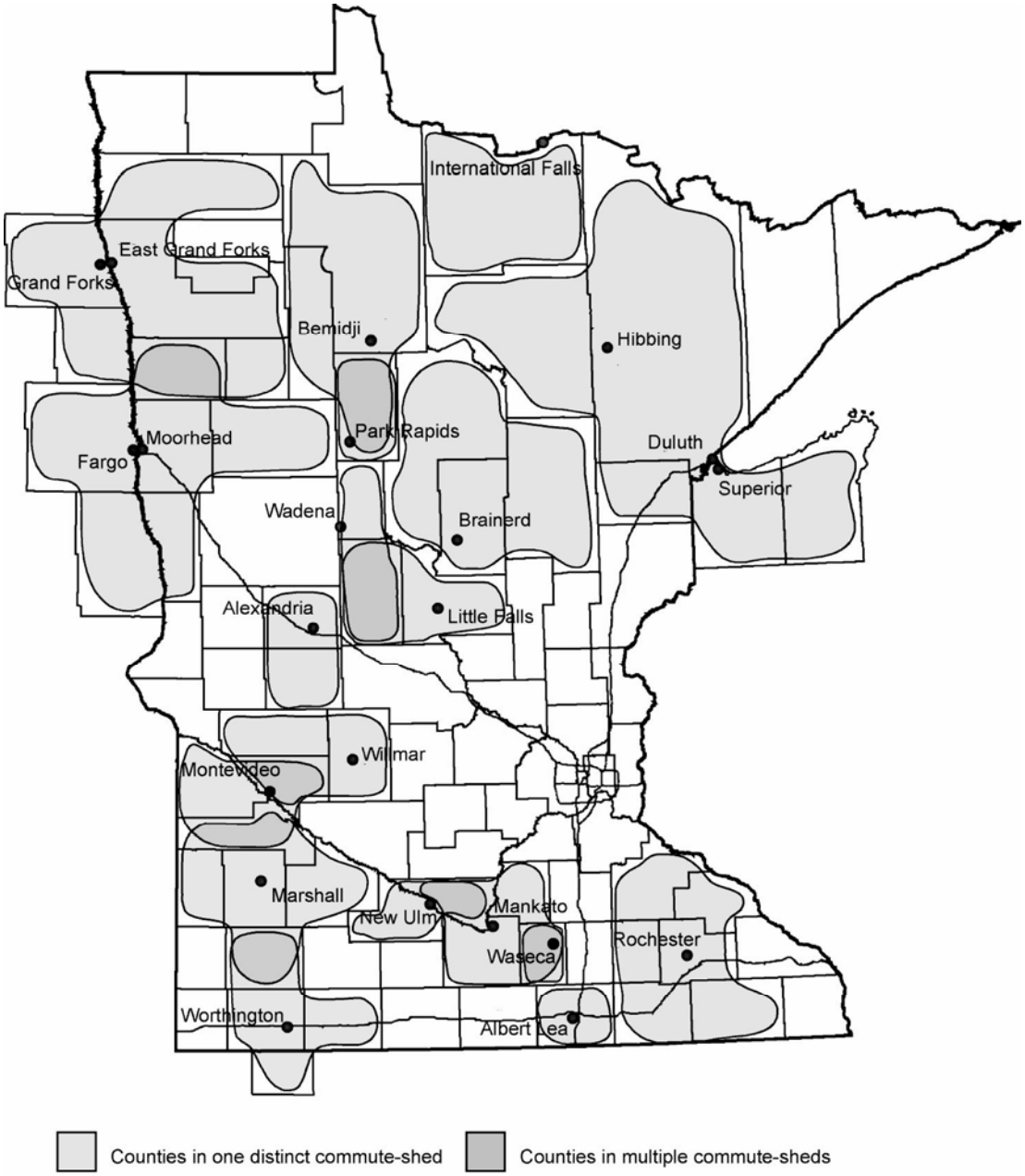

Figure 2. Study Areas

In contrast, the places that experienced moderate-to-fast growth enjoyed advantages of proximity to prosperous and growing population centers, valuable site resources, and opportunities to capitalize on scale efficiencies in production that are unavailable in smaller and declining places. Moreover, there are cumulative and circular advantages that accompany growth, and that promote further growth. Once under way, and for a variety of reasons, advantages flow to places that grow faster than nearby competitors. This process of "cumulative and circular causation" works in reverse as well, because when a place stops growing or slides into decline, the negative economic and demographic effects of stagnation feed off of one another and promote further decline.

There is some arbitrariness at the outset as to which places will eventually emerge as economic leaders. Successful entrepreneurship is one key ingredient in determining which ones succeed and which lag behind. For example, in early Minnesota history it was not at all clear which among the early major competitors—Stillwater, St. Peter, St. Paul, St. Anthony, or Minneapolis—would overtake the others. But once certain places gained an edge over their competitors they flourished, others reached a plateau and went no further, while still others literally disappeared from the map.

There are several reasons why large and fast-growing places gain advantages for businesses as well as for colleges and universities. Production costs are lower when volume buying is possible. In growing places there can be a more satisfying matching of workers with jobs. When places are growing, it is easier for an employee to leave an unsatisfactory job and find another, so all are better off—the worker, the former employer, and the new employer. Employers are better off when poor or dissatisfied employees leave, and it is easier for an employer to fire an unsatisfactory employee if it is likely that the worker will find other employment. Skills and attitudes often improve in a fast-changing local growth situation, prompting employers to try harder to keep good employees knowing that they can and will leave for better opportunities elsewhere. In growing places, new competitors arise, so all must sharpen their competitive skills and those that do will prosper. Businesses feel freer to invest in new plant and equipment when growth prospects are good, and new plant and equipment can improve productivity and profitability.

But the opposite occurs when the population and economy of a place slow or slip into reverse. The average cost of each transaction rises in the drug store, the county clerk's office, the hardware, and the doctor's office. Investments are postponed. Revenues drop faster than costs. The more talented, educated, and ambitious risk-takers leave, and those left behind face a harder time. As costs rise, ability to pay declines, as the cumulative and circular process goes negative. In such settings, colleges and universities face competitive challenges different from those faced in growth centers.

New businesses in growing areas, such as the suburbs of the Twin Cities metropolitan area and fast-growing regional centers around the state, have advantages because their revenues in the short run can rise faster than costs, in both goods-producing industries and in services. The same probably is true for campuses located in those areas. As the map of economic opportunity slowly is transformed, residents relocate, and newcomers to the state—immigrants as well as domestic migrants—settle in places that appear to offer more promise and opportunity. In the process, human capital relocates in both absolute and relative terms from places where it is less

productive to places where it will be more productive, magnifying the advantages of the growing places and making life even more challenging for places falling behind. For example, a high school math teacher may earn $40,000 and teach 100 pupils in a consolidated high school in a flourishing growth center, while another math teacher earning $30,000 in a small outlying district that is losing population may work with only 60 pupils. Thus, what looks like a more "expensive" teacher may be more cost-effective. The bottom line is that college and university campuses in Greater Minnesota are part of their local economies. The economic terms of their operations and the traffic that they generate need to be understood within their respective local contexts.

Transportation and Development

Modern economic activity, which depends on specialized producers and individualized consumers coming together and interacting, depends on *accessibility*, which is the ease in time, cost and convenience of moving people, products, capital and information among places of production, investment and consumption. Other things equal, places endowed with superior accessibility to other places enjoy economic development advantages over competitors that lack such advantages. From earliest days of Minnesota's exploration by European-Americans, there has been a close and reciprocal relationship between transportation and economic development. Early transportation routes (rivers, lakes, trails) were established and used to exploit the resources of the natural environment (furs, timber, minerals, agriculture), then to pursue other production, distribution and consumption activity. Once business activity got under way, existing transportation-communication routes and the settlements along them influenced the course of subsequent development of railroads and highways, as infrastructure already in place guided later investments in land development. Population distribution follows economic opportunity, but population concentrations, once present within a regional center and its commuting field, generate additional production and consumption activity within that place. This reciprocal process continues to the present day, with the areas that are growing attracting additional people and investment, which then nurture additional growth as the process continues.

In the history of American higher education, it was customary for college campuses and their rambunctious students to be located at some distance from major population centers. In colonial times, for example, Harvard College was established in Cambridge, not in Boston. King's College (later Columbia University) was out in the country at the north end of Manhattan. The College of New Jersey (later Princeton University) as well was remote in colonial times from the cities. In Minnesota, private colleges, which trace their origins to religious communities' commitments to training clergy and teachers, followed the same location traditions, even though nearby cities often sprawled outward to eventually engulf the campuses and their countryside sites (e.g., Macalester College, St. Catherine University, University of St. Thomas). With the passage of time, the traffic generated by a campus becomes combined with that from other activity.

Findings from the First Study

After defining commuting fields (i.e., study areas) adjacent to the 20 sample regional centers in Greater Minnesota, we used maps and charts to portray population changes within the Minor Civil Divisions (MCDs)—the cities, towns and townships—located outside the key cities but within the study areas during each of three recent decades—the 1970s, 1980s and 1990s. Each population change map was accompanied by a scatter diagram illustrating the relationship between (1) the distance of each MCD in the commuting field from its regional center, and (2) population change during the decade in the MCD. We expected that if low-density suburban-style residential development were occurring near the center, population would be increasing fastest (or decreasing less rapidly) in MCDs close to the regional center and increasing more slowly (or decreasing) in MCDs farther away from the regional center. In 11 of the 19 study areas, the expected pattern was observed for each of the three decades. Divergence from expectations typically occurred in cases where commuting fields of nearby regional centers overlapped (e.g., Albert Lea, Little Falls, Mankato-North Mankato, New Ulm, Rochester), or where the influence of lakeshore developments overrode the influence of distance from regional centers (e.g., Park Rapids, Wadena). In the 4-county Worthington commuting field, steady loss of farm-based populations along with stability or growth of the larger towns in the region yielded a statistical profile generally unrelated to distance from the key city.

Traffic occasionally declined on minor highway segments as vehicles apparently shifted to superior and less-congested parallel routes (e.g., MN13 north of Waseca; MN30 parallel to I-90 south of Mankato), as loss of population along with farm consolidations yielded reduced demand for movement (e.g., MN40 west of Willmar), or as both occurred (e.g., minor routes north of Moorhead). Nevertheless, in the southwestern and western parts of Minnesota farm consolidations that produced larger farming operations probably meant longer hauls with heavier loads on selected segments of trunk highway.

Traffic volumes increased on almost all major highway segments examined in the 1980s and the 1990s. The combination of larger populations, number of households increasing faster than population, greater distances between home and work, multiple job-holding by workers, higher discretionary incomes coupled with more recreational shopping, more leisure, more complex household life styles, more cars and trucks, greater participation by women in the paid workforce, better highways, and other factors all contributed to enhanced traffic loads on the trunk highways in our study areas. Even as motor-fuel price increases in 2007 and 2008 curtailed some driving, on some trunk highway segments in the vicinity of fast-growing regional centers, congestion may be approaching capacity on certain days of the week and at times of day, but this study made no attempt to compare traffic volumes with available or planned trunk highway capacities.

In general, findings were consistent with expectations:

- Population increases during each decade were greater in MCDs close to the regional centers, and smaller or negative farther away.

- For regional centers and parts of Minnesota experiencing slow growth or decline, places closer to the regional center appear to be doing better than places farther away.

- For regional centers and parts of Minnesota within the "crescent of growth" the patterns of growth are more mixed, with growth not necessarily corresponding to distance from regional centers.

- On the other hand, many of the fast-growing study areas lie within Minnesota's lake districts and outdoor recreation areas, with the location of amenities providing a pull in the opposite direction and diluting to some extent the effect of highway distance from regional centers.

These regional demographic trends form part of the settings within which we consider the traffic generated by college and university campuses within Greater Minnesota.

Findings from the Second Study

In the second study, we examined three trends that affect daily traffic flow in and around regional centers in Greater Minnesota: (1) population and housing change; (2) the restructuring and growth of the state's economy; and (3) changes in daily travel behavior, specifically the journey to work and other daily and weekly personal travel on the state's highways. The study was stimulated by the fact that major changes are underway in Greater Minnesota, and each of them appears to have relevance for the next two decades of highway planning at scales from the state to the local level. [4]

The original functions of Minnesota's highways have been changing to support modern production and consumption needs and wants. The state's *major* highways were originally built to link cities and towns, while *minor* roads were intended to connect towns with countryside so that output of farm and forest could be marketed through towns, and towns could distribute goods and services to rural customers. Those traditional functions persist, but road system usage is in transition. Historic uses of roads in Greater Minnesota are being superseded by their use as *residential streets* serving dispersed neighborhoods in forested areas, throughout the lake districts, and across the agricultural countryside. That report discussed some of those uses, paying special attention to daily commuting.

Underlying the study was the question whether Greater Minnesota's trunk highway design and capacity was likely to be sufficient to handle the increasing loads that a changing society, expanding economy, and new travel patterns would be imposing on it in the years ahead. We cannot predict the future of the state or its sub-areas with any degree of certainty, but we could describe selected demographic, economic and travel behavior trends under way in Greater Minnesota, and we did. We related them to trends in society at large, and speculated on what they seemed to imply for state, regional and local transportation planning in the coming decade or two. That was the goal of the report.

Together with the earlier study it considered new ways to think about land use, transportation, and emerging settlement types across the country in general and throughout Greater Minnesota in particular. A major focus was to examine the forces driving socioeconomic change in the country, and to illustrate how evidence of those drivers of change appeared in the form of

landscape impacts and modified transportation requirements. The project also demonstrated ways to use specialized census data sources in analyzing these questions.

The principles surrounding road congestion apply in the same way to Minnesota's smaller regional centers as they do to large metropolitan regions and their tributary areas. It boils down to the relationship between the *demand for road capacity at specific times and places* compared with the *supply of road capacity at those times and places*.

Demographic and Economic Trends and Commuting in Greater Minnesota

Chapter 1 presented an overview of major trends affecting Minnesota's countryside, and their implications for highway transportation. We discussed how increases in fuel prices would raise transportation costs, cut discretionary spending on other goods and services, and prompt reconsideration of tradeoffs involving cheaper land and housing at locations remote from jobs *versus* long-distance commuting. Fuel price increases in 2007 and 2008 demonstrated exactly those tradeoffs.

The next three chapters examined trends in and around 26 of the 49 *regional centers* that form the principal nodes on Greater Minnesota's trunk highway system, and *adjacent commuting fields* (also called or *commute sheds*). We presented profiles, analyses, interpretations, and forecasts of population, economic, and travel behavior change. Chapter 2 discusses how population age structure and household composition within the sample study areas changed between 1970 and 2000, and suggested what some of the trends imply about labor force participation and housing needs and wants in the years ahead. Greater Minnesota's population and local economies are diverse. When population change in sample regional centers in the 1990s is compared with change in the nearby counties that comprise the centers' commuting fields, four situations appear:

- Centers and their commuting fields both had population increases;
- Declining populations in the centers, but increases in the commuting fields;
- Growing populations in centers, but with declines in their commuting fields; and
- Both the center and the commute field lost population.

A good portion of the 1990s net population growth in the 26 study areas reflected growth in non-white and Hispanic populations.

Population increase usually accompanies increase in the number of households and pressure on the housing stocks within some study areas. In the 1990s, the statewide housing inventory increased, with many of the same growth leaders of the previous period maintaining or exceeding the state in net additions of new housing units. Steady expansion of the housing stock in a study area usually accompanies house price inflation, which yields positive *wealth effects* for residents, while stimulating additional rounds of local consumption and investment.

Chapter 3 examined changes in employment levels within the study areas between 1970 and 2000. Employment changes were examined in terms of *industries* of employment as well as by the changing mix of *occupations* pursued. The study areas are grouped into (1) fast-growing recreation and retirement areas, located mainly in northern lake districts; (2) areas with mixed economies and moderate job growth; and (3) slow-growth areas in the west and southwest parts of Minnesota that have depended on a weak farm economy, plus northern areas supported largely by mining and forest products industries. Structural changes in regional economies brought about changes in household activity within those sub-regions, and vice-versa. Along with changes in economic activity and household behavior come changes in daily travel behavior, which yield corresponding impacts on the state's trunk highways. Expanding activity on college and university campuses contributes to this travel behavior and associated traffic loads.

During the 1990s, the three geographic settings displayed the following trends: (1) areas of *fast growth*, mainly in the northern lake districts, saw employment expansion; (2) areas of *modest growth* and diversified economies had employment growth; while (3) slow-growth natural-resource-based economies lagged with employment change.

On the demand side of the picture–where trips *originate*–the number of people and number of households will continue increasing as an outcome of a relatively robust state economy. Of the state's 5 million-plus population, 40 percent live outside the greater Twin Cities, and that number is likely to continue rising even though growth rates are unlikely to match those of the Twin Cities area. Like the Twin Cities area, the number of households and number of cars in Greater Minnesota may rise faster than the population.

On the other side of the planning equation are *trip destinations*. Locations of homes and jobs continue to change. Like the Twin Cities metropolitan area, we see dispersal of practically everything over the last 50 years. The retailing functions of villages and hamlets have given way to ubiquitous shopping malls and superstores. Retailing is farther away from the customers, but with disposable incomes higher, shopping baskets have been fuller, and vehicle miles traveled have kept rising although rates of increase dropped off in 2008 with the onset of recession and high fuel prices. Recreation continues to form a bigger share of household lives, and should generate more daily and weekend recreational travel in the coming years. As jobs, shopping and recreation opportunities disperse, trips of all kinds increase in number and length, generating complex *trip chains* that are hard to measure, to model, and to plan for in the countryside for the same reasons they pose challenges for Twin Cities planners.

Chapter 4 examined changes between 1980 and 2000 in commuting trends, including the share of all workers who commuted to jobs away from home, workers commuting to jobs outside their county of residence, and the share of commuters driving alone to work. In every one of the Minnesota counties included in the study areas, the percentage of workers who commuted to jobs outside their county of residence increased between 1980 and 2000. The number and the percentage of workers driving alone to work rose sharply in the 1980s. Daily commuting traffic has been rising steadily, partly due to a greater number of workers, but increasingly due to workers commuting alone. Moreover, those solo commuters, on average, are spending more time in their commutes. There seems to be little difference among the study areas grouped by growth rates in their experiences regarding average commuting times. The census data do not

reveal whether the longer commute times are due to longer commutes, slower commutes, more complex commutes (e.g., due to stops along the way), or some combination of factors.

Pairing of these data sets implies relationships and issues that were explored in chapters 5, 6, and 7 using illustrations from census-provided Public Use Microdata Sample (PUMS) files, as follows:

- *Population* and *economy*—what can census data tell us about how new working-age populations of different backgrounds (e.g., different ages, Hispanic origin) are participating in the job opportunities in our sample study areas?

- *Population* and *travel*—what can census data tell us about patterns and trends in travel behavior (e.g., time spent commuting by different household members) by different subsets of the population (e.g., grouped by income) in diverse sub-regions of Minnesota?

- *Economy* and *travel*—what can census data and highway traffic data suggest about how the reshaping of local economies in rural areas of the state relates to commuting patterns, and contributes to changes in trunk highway traffic volumes?

The detailed data analysis was followed by a summary and conclusions. In the two studies we tried to shed light on how the Minnesota countryside is rapidly urbanizing, and what that might mean for highway transportation planning. New housing on large lots is dispersing across the countryside, while average commuting times are steadily increasing. Evidently households select places to live in the general vicinity of available employment opportunities, but once they decide where to live they seem willing to drive to available jobs, sometimes with a commute of an hour or more. But neither the location of jobs nor the location of housing opportunities is fixed in space. Both are in constant flux. Once jobs and housing are matched up, the journey to work is the result. In cases where a worker holds multiple jobs away from home, more than one journey is needed. In cases where more than one household member works away from home the household undertakes multiple journeys to work.

The journey to campus is somewhat complex with regard to the use of census data for estimating traffic impacts. The decennial census up through 2000, and the American Community Survey more recently, contain questions about the "journey to work" but not about any "journey to school," unless one's job is located on a campus. It is this gap in the census that stimulated our current inquiry.

Disparate rates of population growth in Greater Minnesota can be expected to continue in the coming two decades, while additional dispersion of population is likely to occur, not only in the high-amenity forest and lake districts, but also in sparsely populated parts of the state experiencing only modest growth–or no growth at all. People seem to like spreading out, many (probably most) preferring low-density living over high-density, and as long as easy movement on the state's trunk highways and the roads that feed them is available and roads are well maintained, our conclusion was that trends toward dispersion with more time spent commuting seem likely to continue–even as commuting becomes less efficient in the face of high motor fuel prices.

Road capacity in most parts of greater Minnesota seems more than adequate to handle *commuting* loads, although that is only one element in total traffic loads. Besides the journey to work (and school), congestion during certain hours (due to commuting) and parts of certain days (due to daily and weekend *shopping and recreation* traffic) on segments of Interstates and other trunk highways has been building steadily. Finally, over-the-road *trucking and business traffic* provides an important share of highway traffic, but that was beyond the purview of our study.

The present study examines one specific traffic-generating element in the regional centers *outside* the Twin Cities area, namely their post-secondary colleges, universities, career schools and campuses. For our purposes, the Twin Cities area is defined as it was in previous studies, namely the 24-county commuting field defined by commuting data from Census 2000. It includes the 7-county Twin Cities Metropolitan Council governance and planning area, plus 17 others (including four in Wisconsin) that sent at least 5 percent of their daily commuters to the 7-county core.

Chapter 3: Colleges and Universities as Generators of Vehicle Traffic

Certain colleges and universities in Greater Minnesota generate only a few hundred trips per day, while the largest state universities generate daily trips in the tens of thousands. For comparison, an average of about 80,000 persons visit the Twin Cities campus of the University of Minnesota each weekday, making it the third-largest traffic destination in the metropolitan area. [5] A proportionately smaller traffic impact occurs in Minnesota's regional centers that contain one or more schools and campuses. In the years ahead, those impacts will change as the number persons in the college-going age cohorts change, as the proportion of persons attending college changes, and as online courses and programs modify the number of trips to campuses in ways that are yet to be fully understood.

In the 1970s and 1980s, as communication systems were rapidly improving, some analysts predicted that business and professional communities would increasingly substitute electronic communication for business travel. It turned out that both expanded together: fast growth in communication accompanied increased rates of business and professional travel. It is possible that expansion of online colleges courses and establishing of new campus-based educational and training programs, along with increases in life-long learning, will lead to more–not less–travel to campuses. Only time will tell.

Who Comes to Campus?

In addition to students, staff and visitors traveling to and from campuses, a full range of food, merchandise, mail, and service personnel visit schools and campuses daily to support maintenance and program activities. Although a significant fraction of enrolled students often live on or near their campuses, especially in the cases of certain private colleges, this is not the typical case for most schools. But for those who come from off-campus origins, how they travel to campus determines the impacts on roads and modes of movement. At the Twin Cities campus of the University of Minnesota (West Bank, East Bank, St. Paul), the total number of weekday visitors includes 50,000 students, 16,000 faculty members and other staff, 15,000 delivery personnel and other visitors such as patients for hospitals and clinics, and audiences for lectures, concerts, and other special events. Modes of campus access include walking (30 percent), bicycling (7 percent), busing (24 percent), carpooling (7 percent), and driving in single-occupancy vehicles (32 percent). [6]

In this report we estimate and evaluate the ways that colleges and universities generate trips, and assess the impacts of those trips. We suggest how things are likely to change as the higher education enterprise in Minnesota evolves and reorganizes on both the supply side (how conventional instruction and other on-campus programs are delivered) and the demand side (how many students, how they access their courses of study; other extra-curricular programs) in the decade ahead, and how like other enterprises they outsource selected functions that formerly were done on campus by school employees.

Finally, the *supply* side for educational services provided to part-time and full-time degree-seeking students as well as for an array of workers and others who attend classes part-time, on evenings and on weekends, takes place *on campus* as well as at *remote sites* off campus. Minnesota State University at Mankato, for example, teaches classes off site in Bloomington, while the University of St. Thomas and the University of Minnesota offer classes in Rochester.

The Changing Markets for Post-secondary Education and Job Training

The *supply side* of the post-secondary education and training enterprise is currently changing in several ways. Government appropriations for higher education that are provided directly to institutions have been shrinking as a share of school budgets, with part of the reduction redirected to direct student loans and grants. In response, schools have raised tuition and fees and widened the array of program offerings on and off campus and online, to attract new groups of students as they compete with one another in an increasingly privatized and competitive higher education market.

Schools also have expanded their development activity and encouraged grant seeking by faculty and staff to compensate for shortages of other monies and to finance expansions into new program areas. These initiatives are matched by efforts to retrench and reallocate in a continuing effort to improve efficiencies; however, most academic institutions are conservative and have trouble moving fast in response to changes in their external environments. For a variety of reasons, such as political considerations and work-rule rigidities, private and proprietary schools may be "faster on their feet" than the large public institutions. To the extent that this is true, private and proprietary schools may grow faster in the years ahead than the publics. If that happens, traffic generation patterns in and around schools and campuses may diverge from what we see today.

Meanwhile, the *demand side* for educational services offered by Minnesota's public and private colleges and universities, while concentrated mainly in the 18-to-30 age group, has become increasingly diversified in terms of what students seek, what they are willing to pay for, and what employers of advanced and mid-career students are willing to help pay for. Aside from changes in what is wanted from the schools is the number of potential students seeking education and training. The low point for births in the U.S. in recent decades was 3.1 million in 1975, after which numbers rose steadily until they peaked in 1990 at 4.2 million. Part of the expansion of enrollments in the last decade can be traced to these numbers, but after 1990 the number of births steadily declined, which means that we have been in the midst of a temporary bulge in the traditional college-going age group. That bulge has begun to pass through college, and will be followed by smaller cohorts. On the other hand, many students delay entry into post-secondary schooling (or post-baccalaureate schooling), while others already matriculated are stretching out their college years, so total enrollment of full-time and part-time students may increase in the years ahead. If that happens, more trips to campuses can be expected rather than fewer.

Greater Minnesota's Higher Education Landscape

The major players on the higher-education *supply side* in Greater Minnesota include (1) the University of Minnesota, (2) Minnesota State Colleges and Universities (MnSCU), (3) Minnesota's private colleges and universities, and (4) a variety of private proprietary vocational and technical colleges—over 60 organizations in all, with many of them operating programs at more than one site or campus. Their locations and the highways that link them with their service areas form part of the supply picture, along with the curricula that they offer and the tuition and fees they charge.

On the *demand side* are the potential students for these schools, who live in the cities and towns where the schools are located, plus those living throughout the commuting fields adjacent to the schools. Previous work on population change near Minnesota's regional centers illustrated major differences in population change in the centers and in nearby areas, and related those changes to trunk highway traffic volumes. [7] That report from 1973 described the state's colleges, universities, and career schools as trip generators, and portrayed the changing supply and demand for post-secondary educational services as one way to shed light on how this element of traffic generation and trunk highway demand had been changing, and would continue to change in the years ahead.

The Office of Higher Education (OHE) of the State of Minnesota (formerly the Higher Education Services Offices, or HESO) published a listing of 225 private and public post-secondary institutions and campuses throughout the state that are either (1) licensed and registered by OHE, or (2) a campus of the Minnesota State Colleges and Universities (MnSCU), system, or (3) a campus of the University of Minnesota. [8] The institutions vary greatly in size and local impact as measured by budgets, enrollments, and number of employees, from the small, private and proprietary Classy Beauty School (St. Paul), to private Carlton College (Northfield), to public MnSCU's 5-campus Minnesota West Community and Technical College (Canby, Granite Falls, Jackson, Pipestone, and Worthington), and the campuses of the University of Minnesota (Minneapolis, St. Paul, Duluth, Morris, Crookston–and Rochester as of 2007). As of Census 2000, there were 67 counties in Greater Minnesota located outside the Twin Cities 24-county commuting field (with 4 in WI). These counties contained 78 of the 225 campuses.

There are different ways to measure how a campus wields economic and traffic impacts on a community, and the relative importance of those impacts. For many smaller communities in Greater Minnesota that host one or more campuses, colleges or universities, their capital improvements to the campuses plus daily purchases of goods and services, plus those by students, employees and visitors, form the communities' main "economic base." On the economic side is the money that flows in and out of the campus by the school itself as well as by the students, staff and visitors. The campus budget, for example, includes campus revenues, capital expenditures, and outlays for daily operations of all kinds. These outlays are augmented by purchases of all manner of goods and services by students, staff and visitors. When totaled, these are *direct* measures of economic impact, which subsequently yield a multiplied indirect effect when outlays are spent and then spent over and over within the community.

A parallel impact occurs with the traffic. The operation of a school or campus within a community generates both direct and indirect impacts on traffic. Students, staff, visitors, and

delivery personnel travel to and from the campus. That traffic is a direct impact of campus operation. But the multiplied expenditures generated by campus activity yield indirect traffic effects as well. In the next chapter we focus on how to use campus enrollments and employees to estimate the extent to which a campus generates traffic.

Chapter 4: Measuring Campus Traffic Generation Rates

Recent decennial U.S. censuses, up through 2000, used the census *long form* to gather and report the number of county residents attending college or graduate school[1] [9]. Because students are usually counted as residents of the campus if they are living in the community while attending school, this student head count provides a rough measure of the importance of the school(s) in the county as potential traffic generators. (Table 1)

The top-ranked county by this measure is Blue Earth, home of Minnesota State University-Mankato and other schools. Second ranked is Stevens County (University of Minnesota–Morris), then Winona County (Winona State University, St. Mary's University), Clay County (Moorhead State University, Concordia College), and Nicollet County (Gustavus Adolphus College, and also part of the Mankato-North Mankato commuting field).

This measure–enrollments as a share of population–hints at likely traffic impacts on local roads and nearby highways, but is too crude a measure for our purposes because, although students are usually enumerated where they are living while attending school, these counts are incomplete as there is not a perfect correspondence between county of residence and county of school attendance. A student who lives in one county may attend a school in a nearby county[2]. [10] Moreover, census statistics ignore students attending vocational, trade, career and business schools.

The better measure of the relative importance of a campus as it affects traffic is the *functional size* of the campus compared with the size of the community within which it is located, which raises the questions (1) how to measure functional size of campuses, and (2) how to define the community and measure its size. The candidates for "community" are the city, the county, and the counties that comprise the nearby commute field.

Each campus generates vehicle traffic due to employees and students commuting to the campus when classes are in session. That traffic is augmented by delivery and service personnel, plus others visitors to campus on weekdays and for special events on weekends, such as sports and theater events. The *relative importance* of that combined daily traffic depends on the size of the campus compared with the size of the community within which it is located. In the analysis of 27 cases (i.e., cities with campuses) that follow, we use 2006 population estimates for counties, along with recent enrollment and employment counts for campuses in the county. We consider 27 centers with campuses, and 28 counties. Two centers–Hibbing and Duluth–are both in St. Louis County. Mankato (in Blue Earth County) and North Mankato (in Nicollet County) are analyzed as a single county. Data come from the U.S. Census Bureau, the Minnesota State

[1] Census 2000 was the final U.S. decennial census to collect this information by means of the census long form. Beginning in Census 2010, only the short form will be used. Currently and into the future, school enrollment information is gathered annually on a sample basis by the American Community Survey

[2] Question No. 8 on the Census 2000 long form asked: "At any time since February 1, 2000, has this person attended regular school or college? (*Include only nursery school or pre-school, kindergarten, elementary school, and schooling which leads to a high school diploma or a college degree.*)" Answer options were: No, has not attended since February 1 >>> Skip to 9; Yes, public school, public college; Yes, private school, private college.

Colleges and University System, and the schools themselves, many of which were contacted by phone in 2008. Sometimes a school with more than one campus cannot assign a student to a single campus because the student takes classes at more than one of the school's campuses. The same problem arises with employees who work at different days on different campuses. In these cases we used what information we had to estimate enrollments and employment by campus.

Table 1–County Residents in Greater Minnesota Attending College or Graduate School, 2000

County	County Population, 2000	County Residents Attending College or Graduate School 2000*	Enrollments as a percentage of Population	Rank
1-Becker	30,000	784	2.6	30
2-Beltrami	**39,650**	**3,916**	**9.9**	**7**
3-Benton	34,226	2,068	6.0	11
4-Blue Earth	**55,941**	**10,105**	**18.1**	**1**
5-Brown	26,911	1,418	5.3	13
6-Carlton	31,671	1,582	5.0	15
7-Clay	**51,229**	**7,152**	**14.0**	**4**
8-Crow Wing	55,099	1,951	3.5	21
9-Douglas	32,821	1,348	4.1	16
10-Freeborn	32,584	789	2.4	34
11-Hubbard	18,376	467	2.5	33
12-Itasca	43,992	1,681	3.8	19
13-Jackson	11,268	350	3.1	25
14-Kandiyohi	41,203	1,628	4.0	18
15-Koochiching	14,355	475	3.3	23
16-Lake	11,058	322	2.9	26
17-Lyon	**25,425**	**2,194**	**8.6**	**8**
18-Mahnomen	5,190	149	2.9	26
19-Martin	21,802	492	2.3	35
20-Mower	38,603	211	0.5	36
21-Nicollet	**29,771**	**3,662**	**12.3**	**5**
22-Nobles	20,832	593	2.8	28
23-Olmsted	124,277	6,285	5.1	14
24-Otter Tail	57,159	1,858	3.3	23
25-Pennington	13,584	795	5.9	12
26-Pine	26,530	690	2.6	30
27-Pipestone	9,895	256	2.6	30
28-Polk	**31,369**	**2,029**	**6.5**	**10**
29-St. Louis	**200,528**	**16,743**	**8.3**	**9**
30-Stearns	**133,166**	**15,315**	**11.5**	**6**
31-Steele	33,680	1,184	3.5	21
32-Stevens	**10,053**	**1,713**	**17.0**	**2**
33-Todd	24,426	663	2.7	29
34-Wadena	13,713	569	4.1	16
35-Winona	**49,985**	**7,565**	**15.1**	**3**
36-Yellow Medicine	11,080	405	3.7	20

ND: no enrollment provided by MOHE. * Schooling that leads to a college degree; correspondence school counts if credit can be obtained in a regular school. Vocational, trade, and business schools excluded. Enrollments by county, and county populations, from U.S. Bureau of the Census, Census 2000, Table DP-1, Profile of Selected Characteristics: 2000

School or Campus Size

When estimating the functional size of a campus as a traffic generator, the two main measures are *student enrollment* and *campus employment*, because almost all students and employees visit the campus regularly. We focus on two measures of functional size of campus: *student* head count, and *employee* head count. In addition, the volume of other traffic to and from campus–delivery and service personnel and other visitors–is almost certainly highly correlated with these two measures.

To be sure, these are crude measures. Students and employees may be either full-time or part-time. Some students are part-time employees, and some regular employees may also be part-time students. Some students may live on campus while working part-time on or off campus. Other students and employees come to campus walking, cycling, on public transit, driving alone, in car pools, vanpools or by other means.[3] [11]

An additional complexity arises when a school operates on more than one campus, as many do. For example, Minnesota State Community and Technical College, part of the MnSCU system, has campuses in Detroit Lakes (Becker County), Fergus Falls (Otter Tail County), Moorhead (Clay County), and Wadena (Wadena County).

The goal of this inquiry was to estimate the volume of traffic generated by the schools, and assess the relative importance of that traffic.

ITE Trip Generation Estimation

The Institute of Transportation Engineers provides summaries of studies of vehicle trip generation rates for sites containing each class of land use. In the case of college and university campuses, the ITE manual provides summary estimates of trip generation based on school enrollments, school employees, and school floor area. The text accompanying the estimates cautions that acreage, floor space, staff and parking accommodations vary widely with the student populations served, as well as with the social and economic characteristics of the area. As a result, the number of students may be the most reliable independent variable for forecasting trip generation rates.

The traffic generation studies summarized by ITE took place on different campuses across the U.S. and at the same campuses at different times of the year. One component of such land uses comprises *Land Use 540: Junior & Community Colleges*. This land use "includes two-year, community, or technical colleges … many of which operate sizable evening programs." [12] For this class of land use, the estimates of vehicle trips generated by students are as follows (Table 2). For the same class of land use, the estimates of vehicle trip generation per employee are also available (Table 3).

[3] See reference 11: This publication contains data for fiscal year 2006, including full-year headcount for credit courses, noncredit courses, and unduplicated headcounts. Some students take both kinds of courses. See p. 3 of this report for summary totals.

A second site component comprises *Land Use #550: Universities & Colleges*, which "includes four-year universities or colleges that may or may not offer graduate programs." [13] Sites were surveyed from the late 1970s to the 1990s throughout the U.S. Vehicle trip generation rates by students as estimated from a variety of studies and summarized by ITE are as follows (Table 4).

The vehicle trip generation rates by employees as summarized by ITE from a range of studies are as follows (Table 5).

Table 2–Trip Generation per Student–Junior/Community Colleges

Number of Studies	Time of Survey	Average Number of Students	Directional Distribution: % entering	Directional Distribution: % exiting	Trip Generation per Student	R^2
6	**weekday**	**10,336**	**50**	**50**	**1.20**	**0.84**
5	**weekday**	**11,933**	**82**	**18**	**.12**	**0.99**
5	**weekday**	**11,933**	**64**	**36**	**.12**	**0.65**
6	**weekday**	**10,336**	**65**	**35**	**.12**	**0.98**
6	**weekday**	**10,336**	**55**	**45**	**.12**	**0.83**
3	**Sat or Sun**	**13,503**	**50**	**50**	**.42**	*******
3	**Sat or Sun**	**13,503**	**57**	**43**	**.05**	*******
3	**Sat or Sun**	**13,503**	**50**	**50**	**.04**	*******
3	**Sat or Sun**	**13,503**	**46**	**54**	**.01**	*******

Source: ITE. *Trip Generation*, 7th Ed., pp. 961ff.

Table 3–Trip Generation per Employee–Junior/Community Colleges

Number of Studies	Time of Survey	Average Number of Employees	Directional Distribution: % entering	Directional Distribution: % exiting	Trip Generation per Employee	R^2
4	**weekday**	**740**	**50**	**50**	**15.55**	**0.84**
3	**weekday**	**913**	**74**	**26**	**1.64**	*******
3	**weekday**	**913**	**58**	**42**	**1.39**	*******
4	**weekday**	**740**	**50**	**50**	**1.75**	**0.92**
4	**weekday**	**740**	**44**	**56**	**1.49**	**0.85**
3	**Sat or Sun**	**913**	**50**	**50**	**6.16**	*******
3	**Sat or Sun**	**913**	**57**	**43**	**.78**	*******
3	**Sat or Sun**	**913**	**50**	**50**	**.66**	*******
3	**Sat or Sun**	**913**	**46**	**54**	**.11**	*******

(ITE. *Trip Generation*, 7th Ed., pp. 961ff)

Table 4–Trip Generation per Student–Universities and Colleges

Number of Studies	Time of Survey	Average Number of Students	Directional Distribution: % entering	Directional Distribution: % exiting	Trip Generation per Student	R^2
7	**Weekday**	**3,002**	**50**	**50**	**2.38**	**0.98**
6	**Weekday Peak-AM**	**9,545**	**80**	**20**	**0.21**	**1.00**
7	**Weekday Peak PM**	**8,353**	**30**	**70**	**0.21**	**1.00**
5	**Weekday**	**2,463**	**75**	**25**	**0.45**	**0.95**
5	**Weekday**	**2,463**	**30**	**70**	**0.49**	**0.97**
2	**Saturday**	**2,749**	**50**	**50**	**1.30**	*******

Source: ITE. *Trip Generation,* 7th Ed., pp. 989ff.

Table 5–Trip Generation per Employee–Universities and Colleges

Number of Studies	Time of Survey	Average Number of Employees	Directional Distribution: % entering	Directional Distribution: % exiting	Trip Generation per Employee	R^2
5	**Weekday**	**639**	**50**	**50**	**9.13**	**0.78**
4	**Weekday Peak-AM**	**779**	**82**	**18**	**0.73**	**0.64**
4	**Weekday Peak-PM**	**779**	**29**	**71**	**0.88**	**0.52**
5	**Weekday Peak-AM**	**639**	**75**	**25**	**0.78**	**0.72**
5	**Weekday Peak-PM**	**639**	**30**	**70**	**0.91**	**0.69**
2	**Saturday**	**1,143**	**50**	**50**	**3.12**	*******

Source: ITE. *Trip Generation,* 7th Ed., pp. 989ff

From these four tables of Trip Generation Factors, we extracted the following:

- For *students at Junior/Community Colleges*, we averaged the second through fifth weekday rates (discarding the first one, which is an obvious unexplained outlier) and calculated the average as **0.12**;

- For *employees at Junior/Community Colleges*, we likewise averaged the second through fifth weekday rates and calculated the average as **1.57**;

- For *students at Universities and Colleges*, we averaged the second through fifth weekday rates (again discarding the first one, an obvious unexplained outlier) and calculated the average as **0.34**; and

- For *employees at Universities and Colleges* we likewise averaged the second through fifth weekday rates and calculated the average as **0.825**.

We used these factors along with enrollment and employment data for each campus to estimate vehicle traffic generated by the campuses in the 28 counties in Greater Minnesota that contained campuses of interest.

(1) An Example: Campuses in Bemidji in Beltrami County

An example illustrates one way to estimate vehicle trips generated by campuses in the city of Bemidji (2007 est. pop. 13,419), the county seat of Beltrami County (2006 est. pop. 43,169). There are two MnSCU campuses in Bemidji–Northwest Technical College (NWT) and Bemidji

State University; Oak Hills Christian College; and two private career or trade schools– Professional Salon Academy and Northern Cosmetology Institute.

Enrollments. Fall 2006 enrollments at these schools were as follows: NWT: 1,095; Bemidji State: 4,729; and Oak Hills: 187. On the other hand, NWT's total unduplicated headcount, for credit and noncredit courses in fiscal year 2006 was **1,628**. Similarly, Bemidji State's total unduplicated headcount, for credit and noncredit courses, for the same period was **6,820**, so this is the number we used. Enrollment data for the trade schools were not available. Sometimes enrollment data for such schools are proprietary and not shared; sometimes a knowledgeable source could not be reached. Total reported enrollments were **8,635**.

Employment. Recent full-time (FT) and part-time (PT) employment at the schools was reported as follows: NWT: 51 FT, 27 PT, total: 78; Bemidji State: 459 FT, 102 PT, total 561; Oak Hills: 24 FT, 19 PT, total 43; and the two trade schools: no data. Total reported employment was **682**, or approximately one employee for every nine enrolled students.

Vehicle-Trip Generation. Estimates of vehicle-trip generation rates are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- NWT (Jr./Community Colleges): (1,628 x 0.12) + (78 x 1.57) = **318**
- Bemidji State (Universities & Colleges): (6,820 x 0.34) + (561 X .825) = **2,782**
- Oak Hills (Universities & Colleges): (187 x 0.34) + (43 x .825) = **99**

Estimated total vehicle trips generated on a typical weekday in Beltrami County when schools are in session: **3,199**.

Relative Impact of Schools on Traffic. To obtain a rough impression of the *relative* magnitude of this estimated total of 3,199 vehicle trips, we compare it to totals of county population (43,169) and county employment (19,554). Total enrollments, some of which originate from the commuting field outside Beltrami County equal 8,635, while total employment equals only 682. Although there may be occasional traffic congestion or other traffic problems in the immediate vicinity of Bemidji State, the overall impact of the campuses on county traffic loads is certainly modest.

There are different ways to assess the relative impact of vehicle trips generated by the campuses in one particular county compared with another. One way is to divide the estimated number of vehicle trips generated by the campuses by the county population (or by county employment), and then rank counties according to the resulting ratio. This is the procedure used below, using county population as the base. County employment as a percentage of county population varies within a relatively narrow range, so the eventual rankings are likely to be similar regardless of which number is used as the base. Each county is discussed in turn, then the results are summarized and counties are ranked.

(2) Detroit Lakes in Becker County

The city of Detroit Lakes (2007 pop. est. 8,030) is the county seat of Becker County (2006 pop. est. 32,230), and site of one of the four campuses of Minnesota State Community & Technical College (MSCTC). Other campuses of MSCTC are in Fergus Falls, Moorhead, and Wadena. MnSCU reports that 7,624 students were served in credit courses in fiscal year 2006, with another 3,872 enrollments in noncredit courses. The total unduplicated headcount for the four MSCTC campuses was 11,265. There apparently are no other post-secondary schools in the county.

MnSCU was unable to allocate this total to the four campuses, so in the absence of other information we divided the total by four and allocated one-fourth of the total, or **2,816**, to each campus. We did the same with employment counts: 346 full-time and 215 part-time workers for a total employment count of 561, or an estimated **140** per campus.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- MSCTC-Detroit Lakes (Jr./Community Colleges): (2,816 x 0.12) + (140 x 1.57) = **558**

Estimated total vehicle trips generated on a typical weekday in Becker County: **558**.

Obviously this estimate of vehicle trips per day is based on several assumptions and estimates, but it is the best that can be generated under the circumstances of data availability.

(3) Mankato and North Mankato in Blue Earth and Nicollet Counties

Mankato (2007 pop. est. 35,881) in south-central Minnesota is the county seat of Blue Earth County (2006 pop. est. 58,254) and is contiguous with North Mankato (est. pop. 12,401) in Nicollet County (est. pop. 31,313; county seat is St. Peter). For purposes of this analysis, we treat the two cities as a single urban center. It is one of Minnesota's major educational centers with eight post-secondary schools and campuses in the area: two MnSCU campuses (Minnesota State University, Mankato, and one of the two campuses of South Central College); Bethany Lutheran College; and five proprietary career/trade schools (Rasmussen College, Continental School of Auctioneering, Cosmetology Training Center, Jeane Thorne Career Training Center, and Sr. Rosalind Schools and Clinics of Massage).

Enrollments. Total unduplicated headcount at Minnesota State University during fiscal year 2006 was **17,924**, and at South Central College it was 19,842 with roughly 80 percent of enrollment at the Mankato campus, or **15,874**. Some of the Minnesota State enrollment occurred at off-site centers in the Minneapolis-St. Paul area, but counts of such enrollments are not available. Bethany Lutheran enrollment in fall 2006 was **596**. Rasmussen reported enrollment of **546** for the same period, and Cosmetology Training Center reported 22 but no employment data, while Continental School reported 27 employees but no student numbers. The two other trade schools reported neither enrollment nor employment. Total campus enrollments reported by the four schools with complete data were **34,940**.

Employment. Full-time employment at Minnesota State University in 2006 was 1,242 with part-time employment of 294, for a total of **1,536**. Employment was **229** at South Central College's Mankato campus. Bethany Lutheran reported 117 full-time and 84 part-time employees, for a total employment of **201**. Rasmussen College reported **30** employees, and Continental reported **27**. Total campus employment reported by the four schools with complete data were **1,996**.

Vehicle-Trip Generation. Estimates of vehicle-trip generation rates are calculated as above by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Minnesota State (Universities & Colleges): (17,924 x 0.34) + (1,536 x .825) = **7,361**
- South Central College (Jr./Community Colleges): (15,874 x 0.12) + (229 x 1.57) = **2,265**
- Bethany Lutheran (Universities & Colleges): (596 x 0.34) + (201 x .825) = **369**
- Rasmussen College (Treated as Jr./Community Colleges): (546 x 0.12) + (30 x 1.57) = **113**

Estimated total vehicle trips generated on a typical weekday in Blue Earth and Nicollet Counties when schools are in session, and focused on Mankato-North Mankato: **10,108**.

But there is a bit more to the Nicollet County story. Gustavus Adolphus College is in St. Peter, MN, the county seat of Nicollet County and located about ten miles north of North Mankato.

Fall 2006 enrollment was 2,618; full-time employment was 130; and part-time employment was 586. Total employment was **716**. Many of the part-time employees were probably student employees. Using the same ITE factors as above, the estimated weekday vehicle-trip generation would be:

- Gustavus Adolphus College (2,618 x 0.34) + (716 x .825) = **1,481**

The college's web site explains that it is a "residential college … and all students are expected to live in college-owned residences all four years," however because recent on-campus housing demand has exceeded capacity, a small number of juniors and seniors were granted permission to reside off-campus. From this policy statement we may infer that our estimated daily trip-generation rate for the college is probably an over-estimate, and that the impact of Gustavus Adolphus enrollments and employment contribute only a small fraction of the impact from other schools in the two counties.

(4) New Ulm in Brown County

The city of New Ulm (2007 pop. est. 13,158) is the county seat of Brown County (2006 pop. est. 26,361), and site of Martin Luther College. The college reports that **820** students were served in credit courses in fiscal year 2006. The school also reported 123 full-time and 13 part-time employees in 2006, for a total employment of **136**. There apparently are no other post-secondary schools in Brown County.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Martin Luther College (Universities & Colleges): (820 x 0.34) + (136 x .825) = **391**

Estimated weekday vehicle-trip generation for Brown County: **391**. As in earlier examples this estimate of vehicle trips per day is based on several assumptions and estimates.

(5) Moorhead in Clay County

The city of Moorhead (2007 pop. est. 35,329) is the county seat and main job center of Clay County (2006 pop. est. 54,476), as well as the site of one of the four campuses of Minnesota State Community and Technical College, as well as the site of Minnesota State University Moorhead.

We treat Moorhead's MSCTC campus in the same way we did its campus in Detroit Lakes in Becker County. MnSCU reported that 7,624 students were served in credit courses in fiscal year 2006, with another 3,872 enrollments in noncredit courses. The total unduplicated headcount for the four MSCTC campuses was 11,265. MnSCU was unable to allocate this total to the four campuses, so in the absence of other information we divided the total by four and allocated one-fourth of the total, or **2,816**, to each campus. We did the same with employment counts: 346 full-time and 215 part-time workers for a total employment count of 561, or an estimated **140** employees per campus.

For Minnesota State University Moorhead, MnSCU reported a headcount of **9,675** students in fiscal year 2006, with 649 full-time and 215 part-time for a total of **864** employees.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- MSCTC (Jr./Community Colleges): (2,816 x 0.12) + (140 x 1.57) = **558**

- Minnesota State (Universities & Colleges): (9,675 x 0.34) + (864 x .825) = **4,002**

Estimated vehicle-trip generation for Clay County: **4,560**.

(6) Brainerd in Crow Wing County

The city of Brainerd (2007 pop. est. 13,724) is the county seat of Crow Wing County (2006 pop. est. 61,009), and site of the larger of the two campuses of Central Lakes College, a MnSCU institution. A small outlying campus of Central Lakes College is in Staples, a city west of Brainerd, which straddles the boundary separating Todd and Wadena Counties. MnSCU reports that 3,953 students were served in credit courses in fiscal year 2006, with another 2,288 enrollments in noncredit courses. Some students enrolled in both kinds of courses, so the

unduplicated headcount was 6,183 for the two campuses. There apparently are no other post-secondary schools in the county.

The registrar's office at Central Lakes College reported that about 85 percent of the school's course enrollment or an estimated **4,946** at the Brainerd campus and 15 percent or 927 were at Staples. The precise split is hard to determine because some students take classes at only one campus, and some take classes at both. The college administration also estimated that 80 percent of full-time and part-time employees, or **302**, work mainly on the Brainerd campus, and 75 at Staples, which are assigned to Todd and Wadena counties.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation for each relevant county are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Central Lakes College: Brainerd (Jr./Community Colleges): (4,946 x 0.12) + (302 x 1.57) = **1,068**

Estimated weekday vehicle-trip generation for the Crow Wing County campus: **1,068.**

The Wadena County totals are added to Wadena County, below. Todd County's estimated share of Central Lakes College enrollment and employment is included with Todd County below. As in earlier examples this estimate of vehicle trips per weekday is based on several assumptions and estimates.

(7) Alexandria in Douglas County

The city of Alexandria (2007 pop. est. 11,187, up from 8,820 in 2000) is the county seat of Douglas County (2006 pop. est. 35,467), and site of Alexandria Technical College, a MnSCU school that reported **3,356** students served in fiscal year 2007-08. The school reported full-time employment at 168, and part-time employment at 83, for a total of **251**. There apparently are no other post-secondary schools in the county.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Alexandria Technical College (Jr./Community Colleges): (3,356 x 0.12) + (251 x 1.57) = **797**

Estimated vehicle-trip generation for Douglas County: **797.**

(8) Albert Lea in Freeborn County

The city of Albert Lea (2007 pop. est. 17,552) is the county seat of Freeborn County (2006 pop. est. 31,636) and the site of a branch campus of Riverland Community College that serves about 20 percent of Riverland's unduplicated fiscal year 2006 student headcount of 10,206–or about **2,040** students. The main campus is in Austin in Mower County, with the other branch campus

at Owatonna in Steele County. The Albert Lea campus has **58** full- and part-time college employees. There seem to be no other post-secondary schools in Freeborn County.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Riverland Community College:Albert Lea (Jr./Community Colleges): (2,040 x 0.12) + (58 x 1.57) = **336**

Estimated vehicle-trip generation for Freeborn County: **336.**

(9) Park Rapids in Hubbard County

The city of Park Rapids (2007 pop. est. 3,578) is the county seat of Hubbard County (2006 pop. est. 18,890), and site of Park Avenue School of Cosmetology, a private trade school for which no enrollment or employment data were available. There apparently are no other post-secondary schools in the county.

(10) Grand Rapids in Itasca County

The city of Grand Rapids (2007 pop. est. 8,725) is the county seat of Itasca County (2006 pop. est. 44,729), and site of Itasca Community College, a MnSCU school. There were 1,530 students served in credit courses in fiscal year 2006, with another 1,696 enrollments in noncredit courses. Total unduplicated student headcount was **3,145**.

The school reported 76 full-time and 57 part-time employees, for a total of **133**. There apparently are no other post-secondary schools in the county.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Itasca Community College (Jr./Community Colleges): (3,145 x 0.12) + (133 x 1.57) = **586**

Estimated vehicle-trip generation for Itasca County: **586.**

(11) Willmar in Kandiyohi County

The city of Willmar (2007 pop. est. 17,860) is the county seat of Kandiyohi County (2006 pop. est. 41,088), and site of the main campus of Ridgewater Community College, a MnSCU school which also operates a branch campus at Hutchinson in McLeod County. MnSCU reports that 5,492 students were served in credit courses in fiscal year 2006, with another 6,615 enrollments

in noncredit courses. The unduplicated headcount was 11,412. Two-thirds of the enrollment is at the Willmar campus, or about **7,608**, and one-third at the Hutchinson campus.

The school reports 400 full-time and part-time employees, with three-fourths or **300** at the Willmar campus and school headquarters. There apparently are no other post-secondary schools in the county.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Ridgewater Community College (Jr./Community Colleges): (7,608 x 0.12) + (300 x 1.57) = **1,384**

Estimated vehicle-trip generation for Kandiyohi County: **1,384**.

(12) International Falls in Koochiching County

The city of International Falls (2007 pop. est. 6,039) is the county seat of Koochiching County (2006 pop. est. 13,658), and site of Rainy River Community College, another small MnSCU school. MnSCU reports that 584 students were served in credit courses in fiscal year 2006, with another 456 enrollments in noncredit courses. Total unduplicated enrollments were **998**.

The school reported 34 full-time and 23 part-time employees, for a total employment of **57**. There are no other post-secondary schools in the Koochiching County.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Rainy River Community College (Jr./Community Colleges): (998 x 0.12) + (57 x 1.57) = **209**

Estimated vehicle-trip generation for Koochiching County: a modest **209**.

(13) Marshall in Lyon County

The city of Marshall (2006 pop. est. 12,500) is the county seat of Lyon County (2006 pop. est. 24,640), and site of Southwest Minnesota State University, one of MnSCU's seven universities. MnSCU reports that **7,353** students were served in credit courses in fiscal year, with no noncredit enrollments reported. There apparently are no other post-secondary schools in the county.

There were 334 full-time and 116 part-time employees, for a total employment of **450**.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Southwest Minnesota State University (Universities & Colleges): (7,353 x 0.34) + (450 x .825) = **2,871**

Estimated vehicle-trip generation for Lyon County: **2,871**.

(14) Fairmont in Martin County

The city of Fairmont (2007 pop. est. 10,251) is the county seat of Martin County (2006 pop. est. 20,768), and site of Presentation College, which reported enrollments of only 74 students. No other data are available. A South Dakota-based tribal college also reports activity in Martin County, but enrollment and employment data are not available.

The Southern Minnesota Educational Campus (SMEC) is Fairmont's newest higher education center, and draws students from across the community. Starting in Spring semester 2005, Fairmont brought an array of higher educational opportunities to Fairmont through SMEC. Institutions offering courses at SMEC include: Presentation College, Minnesota State University–Mankato, Riverland Community College, Minnesota West Community College, and Saint Mary's University of Minnesota. The campus is equipped with general classrooms, a computer lab, interactive video classrooms, a nursing lab, biology and chemistry labs, student resource areas, conference rooms, and offices. Employers can host customized training programs or employee continuing education opportunities at SMEC.

Individuals enrolling in a college course or obtain a college certificate, associate, or bachelor degree can do so due to flexible scheduling with courses offered evenings and weekends by host institutions, and through distance learning opportunities. SMEC is a new venture, and there are no current data available that would permit estimating its impact on local traffic.

(15) Hutchinson in McLeod County

Hutchinson (2007 pop. est. 13,929), an hour's drive west of Minneapolis on MN7, is the largest city in McLeod County (2006 pop. est. pop 37,279) and more than twice the size of Glencoe (pop. 5,586), the county seat. Hutchinson is the site of the branch campus of MnSCU's Ridgewater Community College, headquartered in Willmar. It has an estimated enrollment of **3,804**, and full-time and part-time employment of about **100**. There apparently are no other post-secondary schools in the county.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Ridgewater Community College–Hutchinson (Jr./Community Colleges): (3,804 x 0.12) + (100 x 1.57) = **613**

Estimated vehicle-trip generation for McLeod County: **613**.

(16) Austin in Mower County

The city of Austin (2007 pop. est. 22,947) is the county seat of Mower County (2006 pop. est. 38,666). It contains two of the campuses of Riverland Community College, one on Austin's east side and one on the west side. Riverland is a comprehensive community college that is part of the MnSCU system, with branch operations at Albert Lea in Freeborn County, and at Owatonna College and Community Center in Steele County. There apparently are no other post-secondary schools in Mower County.

Riverland enrollments in the 2007-08 school year totaled 4,591 in credit courses, and another 5,743 in non-credit courses. Total unduplicated headcount was 10,206. About 65 percent of Riverland's enrollment was at Austin, or about **6,630**, with **168** full-time and part-time employees.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Riverland Community College: Austin (Jr./Community Colleges): (6,630 x 0.12) + (168 x 1.57) = **1,060.**

Estimated vehicle-trip generation for Mower County: **1,060**.

(17) Worthington in Nobles County

The city of Worthington (2007 pop. est. 10,919) is the county seat of Nobles County (2006 pop. est. 20,445), and the headquarters and site of one of the five campuses of Minnesota West Community and Technical College. The other four campuses are at Canby, Jackson, Granite Falls, and Pipestone. MnSCU reports that 4,414 students were served in credit courses in fiscal year 2006, with another 7,201 in noncredit courses. Total unduplicated headcount was 10,991, and total full-time and part-time employment was 216. There apparently are no other post-secondary schools in the county.

The school estimated that 48 percent of total enrollment, or **5,276**, was at Worthington, and 38 percent of total employment, or **82**, was at the Worthington campus.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Minnesota West Community and Technical College–Worthington (Jr./Community Colleges): (5,276 x 0.12) + (82 x 1.57) = **762**

Estimated vehicle-trip generation for Nobles County: **762**.

(18) Rochester in Olmsted County

The Rochester (2007 pop. est. 99,121) is Minnesota's third largest city, the seat of Olmsted County (2006 pop. est. 137,521), and site of eleven schools or branch operations of schools headquartered elsewhere:

- Winona State University, a part of MnSCU, reported 9,168 students enrolled in credit courses in fiscal year 2006, plus 1,168 in non-credit enrollments; total unduplicated headcount: 10,225. The school reported full-time and part-time employment as 790. The university also reported that about 9.5 percent of the enrollment was at the Rochester Center, estimated at **971**. We assumed that approximately that same proportion of employment was at Rochester, or **75** full-time and part-time employees.

- Rochester Community and Technical College, also a part of MnSCU, reported 7,791 students enrolled in credit courses in fiscal year 2006, plus 3,187 in non-credit enrollments; total unduplicated headcount: **10,797**. The school reported full-time employment at 318, and part-time employment at192, for a total of **510**.

- Crossroads College, a small 4-year Bible college reported recent enrollment at **170**, full-time employment of 24, and part-time employment as 19, for a total of **43**.

- Mayo Clinic College of Medicine reported enrollment at 767, but could not break out employment numbers. Similarly, the Mayo Graduate School reported enrollment of 237; Mayo Medical School reported enrollment of 164, and Mayo School of Health Sciences reported enrollment of 291. Collectively these four programs had total enrollment of **1,459,** but we have no employment data.

- There are four private career/trade schools in Rochester for which we have no enrollment or employment data: a branch of the Minnesota School of Business, Nova Academy of Cosmetology; Rochester School of Cosmetology, and the Center for Massage Therapy.

There apparently are no other post-secondary schools in the county.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Rochester Community & Technical College (Jr./Community Colleges): (10,797 x 0.12) + (510 x 1.57) = **2,097**

- Winona State + Crossroads College + Mayo Schools (Universities & Colleges): (2,600 x 0.34) + (118 x .825) = **981**

Estimated vehicle-trip generation for Olmsted County: **3,078**. As in earlier examples this estimate of vehicle trips per weekday is based on a variety of assumptions and estimates. Data are incomplete, so final estimates are likely to be underestimates under the best of assumptions.

(19) Fergus Falls in Otter Tail County

The city of Fergus Falls (2007 pop. est. 13,697) is the county seat of Otter Tail County (2006 pop. est. 57,817), and site of one of the four campuses of Minnesota State and Community and Technical College, a MnSCU school. See the discussion of this college in Detroit Lakes and Becker County above.

MnSCU was unable to allocate the school's enrollment and employment totals to the four campuses, so in the absence of other information we divided the total by four and allocated one-fourth of the total, or **2,816**, to each campus. We did the same with employment counts: 346 full-time and 215 part-time workers for a total employment count of 561, or an estimated **140** per campus.

There apparently are no other post-secondary schools in Otter Tail County.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- MSCTC-Detroit Lakes (Jr./Community Colleges): (2,816 x 0.12) + (140 x 1.57) = **558**

Estimated daily vehicle-trip generation for Otter Tail County: **558**.

(20) Thief River Falls in Pennington County

Thief River Falls (2007 pop. est. 8,477) is the site of one or the two campuses of MnSCU's Northland Community and Technical College and the seat of Pennington County (2006 pop. est. 13,709). Northland's other campus is in East Grand Forks in Polk County. MnSCU reports that Northland served 5,011 students in credit courses in fiscal year 2006, with another 4,119 enrollments in noncredit courses. Total unduplicated headcount was 8,870. MnSCU estimated that 48 percent of total enrollment was at the Thief River Falls campus, or **4,258**. If total employment of 348 is divided in the same proportions, then the estimated full-time and part-time employment at East Grand Forks is **167**. There apparently are no other post-secondary schools in Pennington County.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Northland Community and Technical College (Jr./Community Colleges): (4,258 x 0.12) + (167 x 1.57) = **773**

Estimated daily vehicle-trip generation for Pennington County: **773**.

(21) East Grand Forks and Crookston in Polk County

The city of East Grand Forks (2007 pop. est. 7,740) in Polk County (2006 pop. est.31,088) forms part of the Grand Forks, ND-East Grand Forks MN Metropolitan Area, which is the job center and economic capital of a multi-county commuting field in far northwestern Minnesota and northeastern North Dakota. East Grand Forks has one of the two campuses of Northland Community and Technical College, a MnSCU school. The other campus is in Thief River Falls (2007 pop. Est. 8,477), the county seat of Pennington County (13,709). MnSCU reports that 5,011 students were served in credit courses in fiscal year 2006, with another 4,119 enrollments in noncredit courses. Total unduplicated headcount was 8,870. MnSCU estimated that 52 percent of enrollment was at the East Grand Forks campus, or **4,621**. If total employment of 348 is divided in the same proportions as enrollments, then the estimated full-time and part-time employment at East Grand Forks is **181**.

The second campus in Polk County is the four-year University of Minnesota-Crookston, which combines a liberal arts college and technical school. In fall 2008 it had 1,207 students enrolled in courses for credit, and another 992 in non-degree courses, for a total enrollment of **2,199**. Assuming one employee per 12 students, there would be about **183** full-time and part-time employees at Crookston.

There apparently are no other post-secondary schools in the county.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Northland Community and Technical College (Jr./Community Colleges): (4,621 x 0.12) + (181 x 1.57) = **839**

- University of Minnesota-Crookston (Universities & Colleges): (2,199 x 0.34) + (183 x .825) = **899**

Estimated vehicle-trip generation for Polk County: **1,738**.

(22) Duluth and Hibbing in St. Louis County

The city of Duluth (2007 pop. est. 84,397) (Hibbing: 16,255) is the county seat of St. Louis County (2006 pop. est. 196,067), and site of five post-secondary schools: University of Minnesota-Duluth, College of St. Scholastica, Lake Superior College, a MnSCU school, and two private career schools–Duluth Business University, and North American Training Institute.

University of Minnesota, Duluth reported total enrollment in fall 2008 as **11,366**, and total employment of **975**. The College of St. Scholastica reported enrollment as **3,304** and employment at **480**. Lake Superior College reported that 8,698 students were served in credit courses in fiscal year 2006, with another 3,246 enrollments in noncredit courses. Total unduplicated enrollment was **11,372**. There were 225 full-time employees and 169 part-time for a total employment of **394**. Duluth Business University enrollments have fluctuated recently but

average around **300** in recent years, with employment of **29**. We have no data for the North American Training Institute.

Hibbing Community College, a MnSCU school, reported 1,934 enrollments in credit courses in fiscal year 2006, plus 10,564 in non-credit courses. Total unduplicated enrollment was **12,350**. There were 110 full-time employees and 68 part-time for a total of **178**.

There apparently are no other post-secondary schools in the St. Louis County.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Lake Superior College (Jr./Community Colleges): (11,372 x 0.12) + (394 x 1.57) = **1,984**
- Duluth Business University (Jr./Community Colleges): (300 x 0.12) + (29 x 1.57) = **82**
- Hibbing Community College (Jr./Community Colleges): (12,350 x 0.12) + (178 x 1.57) = **1,761**
- University of Minnesota-Duluth (Universities & Colleges): (11,366 x 0.34) + (975 x .825) = **4,668**
- College of St. Scholastica (Universities & Colleges): (3,304 x 0.34) + (480 x .825) = **1,519**

Estimated daily vehicle-trip generation for St. Louis County: **10,014**.

(23) Owatonna in Steele County

The city of Owatonna (2007 pop. est. 24,719) is the county seat of Steele County (2006 pop. est. 36,221), and site of three post-secondary institutions: one of the three campuses of Riverland Community College, Pillsbury Baptist Bible College, and Model College of Hair Design, a private career school. There apparently are no other post-secondary schools in the county.

Riverland Community College enrollments in the 2007-08 school year totaled 4,591 in credit courses, and another 5,743 in non-credit courses with total unduplicated headcount was 10,206. Total employment at all locations was 325. About **700** students or 7 percent of the total enroll at the Owatonna center, so we estimate the same percentage at Owatonna, or **23**. Pillsbury Baptist Bible College reported enrollment of **175** and employment of **58**. Model College of Hair Design had **136** students and **13** employees.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Riverland Community College-Owatonna (Jr./Community Colleges): (700 x 0.12) + (23 x 1.57) = **120**
- Model College of Hair Design (Jr./Community Colleges): (136 x 0.12) + (13 x 1.57) = **36**
- Pillsbury Baptist Bible College (Universities & Colleges): (175 x 0.34) + (58 x .825) = **108**

Estimated vehicle-trip generation for Steele County: **264**.

(24) Morris in Stevens County

Sparsely settled Stevens County (2006 pop. est. 9,827) is the site of the four-year University of Minnesota-Morris, a liberal arts college in the small western Minnesota city of city of Morris (2007 pop. est. 4,969). In fall 2008 it had 1,510 students enrolled in courses for credit, and another 97 in non-degree courses, for a total enrollment of **1,607**.

Assuming one employee per 12 students, there would be about **134** full-time and part-time employees at Crookston.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- University of Minnesota-Morris (Universities & Colleges): (1,607 x 0.34) + (134 x .825) = **656**

Estimated vehicle-trip generation for Stevens County: **656**.

(25) Staples in Todd County

A small MnSCU campus of Central Lakes College, which is headquartered in Brainerd, operates in Staples (2007 est. pop. 2,041), a city straddling the boundary separating Todd County (2006 est. pop. 24,375) and Wadena County (2007 est. pop. 13,445). We assigned half the enrollment and half the employment at the Staples campus to each of the two counties as explained in the Crow Wing County discussion above. This means that the Todd County part of Staples is assigned **464** students and **38** employees.

Vehicle-Trip Generation. Estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Central Lakes College: Staples (part) (Jr./Community Colleges): (464 x 0.12) + (38 x 1.57) = **116**

Estimated vehicle-trip generation for Todd County: **116**.

(26) Wadena in Wadena County

The city of Wadena (2007 pop. est. 3,983) is the county seat of Wadena County (2006 pop. est. 13,445), and includes part of the city of Staples, which straddles the boundary separating Todd County and Wadena County. As described in the discussion of Todd County above, a small campus of Central Lakes College operates in Staples. We assigned half the enrollment and half the employment at the Staples campus to each of the two counties as explained above. This means that the Wadena County part of Staples is also assigned **464** students and **38** employees.

Vehicle-Trip Generation. Estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Central Lakes College: Staples (part) (Jr./Community Colleges): (464 x 0.12) + (38 x 1.57) = **116**

Estimated weekday vehicle-trip generation for Wadena County: **116**.

(27) Winona in Winona County

The city of Winona (2007 pop. est. 26,726) is the county seat of Winona County (2006 pop. est. 49,228), and site of three campuses: Winona State University, a MnSCU school with a branch operation in Rochester; one of two campuses of Minnesota State College-Southeast Technical, another MnSCU operation, and St. Mary's University of Minnesota, a private university.

MnSCU reports that 2,629 students were served in credit courses at Minnesota State College in fiscal year 2006, and another 4,134 enrolled in noncredit courses. Total unduplicated headcount was 6,415. It also estimated that about 36 percent of total enrollment was at the Winona campus, or **2,309**, served by **117** employees. The second and larger campus of this school is in Red Wing, which is inside the greater Twin Cities commuting field.

Winona State University enrolled 9,168 students in credit courses in fiscal year 2006, and another 1,168 in non-credit courses, for a total unduplicated headcount of 10,225. There were 790 full-time and part-time employees, with an estimated 90.5 percent of them at the Winona campus, or **715** employees. Using this same ratio, we estimated that of the total headcount, **9,254** enrollments were at the Winona campus.

Finally, St. Mary's University of Minnesota reported total enrollment of 5,950, and 608 employees. St. Mary's operates at three main campuses: Winona, Minneapolis, and Rochester,

and offers courses through dozens of sites around the country and at a campus in Nairobi, Kenya. There are 1,350 undergraduate students at the Winona campus, and 4,600 other graduate and professional school students served at Winona and at the other sites. We lack data on the share of the graduate and professional enrollments at Winona, so we arbitrarily estimated the number as 1,000, for a total enrollment at Winona of **2,350**, or roughly 40 percent of a total of 5,950. If employment is estimated using the same fraction, then Winona employment would be **243**.

Vehicle-Trip Generation. As before, estimates of vehicle-trip generation are calculated by multiplying enrollment and employment data by the respective ITE factors for the category of school:

- Minnesota State College-Southeast Technical (Jr./Community Colleges): (2,309 x 0.12) + (117 x 1.57) = **461**
- Winona State University (Universities & Colleges): (9,254 x 0.34) + (715 x .825) = **3,736**
- St. Mary's University of Minnesota-Winona (Universities & Colleges): (2,350 x 0.34) + (243 x .825) = **999**

Estimated weekday vehicle-trip generation by these campuses in Winona County: **5,196**.

Relative Importance of Campuses as Traffic Generators

As discussed in the introduction to this report, the daily operations of college and university campuses, along with community colleges, technical colleges and private career schools, generate motor vehicle traffic. The schools we contacted personally, with the exception of the University of Minnesota–Twin Cities, make little or no effort to estimate the motor vehicle traffic that they generate on a typical weekday aside from their efforts to accommodate parking by students, staff and visitors.

The *relative* importance of traffic that is generated by a school depends on the volume of that traffic *compared with* the traffic volumes generated locally by other activities–commercial, industrial, household, and recreational. Secondly, the relative importance of the school or schools in an area as traffic generators depends on the geographic framework that is used as the basis for analysis and comparison. For example, the immediate neighborhood of a campus usually experiences a level of local traffic converging on the campus that neighborhoods a half-mile or a mile away may not feel. At such an extremely local geographic scale, any traffic congestion generated by a campus is usually understood and managed as a city responsibility.

At the wider county scale of analysis, the traffic generation impact of a campus on county roads and city streets is more dispersed and diluted, and when an entire commuting field is taken as the geographic frame of analysis and comparison, with impact on state highways being considered, then in many cases the impact could range from noticeable to inconsequential. It seemed to us that the *county scale* of analysis was the best compromise and the most appropriate geographic unit for analysis, so we decided to use the county as the geographic frame of reference for our *relative-impact* analysis.

With the notable exceptions of MnSCU universities and the Duluth campus of the University of Minnesota, the large majority of the schools examined in Greater Minnesota had relatively small enrollments and only modest numbers of employees. Moreover, mid-decade estimates of population and employment are less reliable for sub-county areas, while many of the schools had difficulty providing consistent estimates of mid-decade enrollments and campus employment.

In asking the question, "How important is a campus within a community?" we need a measure of the *campus impact* and a measure of *community size*. The previous section provided county-by-county estimates of daily vehicle generation rates. Measures of community size could be city, county, or commute field populations, or employment at any of those scales. We used county employment estimates for 2006 from the Census Bureau as the basis for comparison because commuting by motor vehicle is highly correlated with employment. The result is a table with the 28 counties in Greater Minnesota that contain the campuses, with the columns containing (A) estimated weekday vehicle traffic generated, (B) estimated county employment in 2006, (C) ratio of traffic to estimated employment, and (D) ranks of the "traffic impact ratios" (Table 6).

Table 6–Counties in Greater Minnesota Ranked by the Relative Importance of Weekday Motor Vehicle Traffic Generated by Post-Secondary Institutions

County	(A) Estimated Weekday Vehicle Traffic Generated	(B) Employment, 2006	(C) = Traffic Impact Ratio = (A) ÷ (B)	(D) = Rank of (C) *
Becker	558	16,339	.034	15
Beltrami	3,199	20,567	.156	**4**
Blue Earth + Nicollet	**10,108	54,485	.186	**3**
Brown	391	14,519	.027	19
Clay	4,560	30,809	.148	**5**
Crow Wing	1,068	31,480	.034	15
Douglas	797	19,651	.041	13
Freeborn	336	15,983	.021	21
Hubbard	ND	ND	ND	ND
Itasca	586	21.463	.027	19
Kandiyohi	1,384	22,754	.061	11
Koochiching	209	6,376	.033	17
Lyon	2,871	14,425	.199	**1**
Martin	ND	ND	ND	ND
McLeod	613	20,426	.030	18
Mower	1,060	19,841	.054	12
Nobles	762	11.043	.069	**10**
Olmsted	3,078	77,388	.040	14
Otter Tail	558	28,675	.019	22
Pennington	773	8,080	.096	**9**
Polk	1,738	16,491	.105	**7**
St. Louis	10,014	98,170	.102	**8**
Steele	264	19,397	.014	24
Stevens	656	5,668	.116	**6**
Todd	116	12,005	.010	25
Wadena	116	5,949	.019	22
Winona	5,196	27,766	.187	**2**

* Highest ratio has rank of 1. **If the Gustavus Adolphus estimate of 1,481 is added, the Traffic Impact Ratio (C) for Blue Earth/Nicollet becomes .213, and its Rank (D) rises to 1, while Lyon and Winona each drop by one rank.
Sources: (A) Estimated as shown in text; (B) Bureau of the Census, *County and City Data Book, 2007*. pp. 453-454.

The top-ranked counties are as follows:

1. Lyon–Southwest State University

2. Winona–Winona State University, Minnesota State College–Southeast Technical, St. Mary's University of Minnesota

3. Blue Earth/Nicollet–Minnesota State University, South Central College, Bethany Lutheran College, Rasmussen College, Continental School of Auctioneering, Cosmetology Training Center, Jeane Thorne Career Training Center, Sr. Rosalind Schools and Clinics of Massage. (See footnote to Table 6)

4. Beltrami–Northwest Technical College, Bemidji State University, Oak Hills Christian College, Professional Salon Academy, Northern Cosmetology Institute.

5. Clay–Concordia College, Moorhead, Minnesota State Community and Technical College.

6. Stevens–University of Minnesota-Morris.

7. Polk–Northland Community and Technical College.

8. St. Louis County–University of Minnesota-Duluth, College of St. Scholastica, Lake Superior College, Hibbing Community College, Duluth Business University, North American Training Institute.

9. Pennington– Northland Community and Technical College.

10. Nobles–Minnesota West Community and Technical College.

The average traffic impact ratio of the four top-ranked counties (.182) is *more than twelve times* the average of the ratios of the four bottom-ranked counties (.015). That said, it seems to us that even in the cases of the top-ranked counties, the traffic-generation impact of the campuses is modest and manageable compared with traffic generated from other sources.

In summary, it bears repeating that the estimates and ratios presented above rely on only a small number of ITE surveys, and cannot account for distinctive local situations. For example, South Central College, a technical college with a campus in North Mankato, has no dormitories and few apartments within walking distance of campus. Many of its enrolled students are non-traditional, attending school part-time students, and often leaving campus to work and then returning. For such a student, trip generation would be at least two trips per day on days they attend classes, and for a cohort of such students probably substantially more than the ITE factor of 0.12. Employees would also probably generate more trips than the ITE factor would suggest.

A further consideration is that students living in campus dorms or other housing adjacent to campus will generate additional traffic when they leave campus or home for jobs and social activities. Anecdotal evidence reports substantially reduced traffic not only near campuses but

around the cities when schools are not in session. But until we have better data and more sensitive ITE ratios, we are obligated to use only what we have.

Chapter 5: Trends Likely to Affect Colleges and Universities as Traffic Generators Putting Pressures on Highway Capacity

The *traffic impact ratios* that were calculated in the previous chapter and used in ranking the counties are somewhat unreliable as already noted. They are useful for making approximate comparisons of counties, but less useful for precise forecasting because of forces that affect the reliability and consistency of both the numerators and denominators used to calculate the ratios. The numerators were based on campus *enrollments*, campus *employment*, and the *ITE factors* available to calculate weekday vehicle traffic generation rates for each campus. The denominators were estimates of total *county employment*.

Enrollments

The number of live births in the U.S. peaked in 1990 at 4.158 million, and dropped to levels 6 to 7 percent lower for much of the 1990s. [14] This birth record means that the number of 18-year olds in 2008 was the country's largest cohort compared with those either older or younger. It was a temporary bulge. In the next few years, therefore, the number of college-age persons will be stable or declining. In other words, for the earlier years of the 2000s included in our analysis, the number of persons achieving college-going ages had been increasing, and enrollment numbers at most schools reflected those increases.

On the other hand and at the same time, some persons born in the peak birth years who may have completed secondary school and delayed entry into post-secondary schooling for various reasons may enter school later. Also, large numbers of students have been attending school part-time, and in difficult economic times many delay graduation, hang onto part-time jobs, and delay entry into the full-time job market. These trends mean that the changing numbers of potential students in post-secondary institutions may be modified by changes in attendance patterns that are due to the health of the economic environment and other circumstances.

The responses of colleges and universities to the diminished pool of traditional-age prospective students will differ by institution. The community colleges, technical colleges, and private career schools will widen their array of course and program offerings, and open campuses at new locations where populations are growing and local economies are expanding. The MnSCU universities have been expanding their online course and program offerings, as are some of the private schools. The MnSCU universities are also expanding their post-baccalaureate programs with an increasing array of professional master's and doctoral programs, as are some of the private colleges and universities.

In the face of changes in student demand and school offerings, it is difficult to predict the profile of upcoming enrollments, whether on campus or online, in the next few years. What seems clear is that the robust growth rates in enrollments at many brick-and-mortar campuses seen in Greater Minnesota in last two decades is unlikely to continue.

Campus Employment

The economic environment surrounding different classes of post-secondary institutions has been changing steadily in ways that have affected employment patterns and will continue to affect them. What students and the public want from the schools has changed, and what students expect has been changing as well[4]. [15][16][17] Like many businesses, schools have been outsourcing selected services for years, and increasingly the teaching itself is provided by non-regular faculty and by contractors. Some instruction has moved to the Internet, which reduces trips to campus by both students and teachers, while new courses and programs are added to supplement on-campus instruction.

As finances of the schools tighten, there will be increased attention to questions of efficiency and productivity. Student-faculty ratios may rise, and student-employee ratios may rise as well. As higher education has become a mature industry, its ability to sustain the wide political and financial support that it enjoyed from the 1850s through the 1970s has been waning. Meanwhile demands from other sectors of the economy, such as health care and retirement benefits, have risen in prominence to dilute the clout and prestige that higher education enjoyed for decades. These recent pressures, which have been building for some time, will probably create a different pattern of traffic generated by employees of post-secondary institutions, but in ways that have not yet been fully appreciated yet alone measured.

ITE Factors

The changes listed above are modifying traffic to and from campuses, but in ways that have not yet been measured so as to modify the ITE factors. In metropolitan areas, it is plain that business outsourcing of many services (e.g., information technology, accounting, janitorial, human resources, advertising, food services, etc.) has dramatically increased vehicular traffic on metropolitan streets and highways as work that once was done under one roof is outsourced, thereby generating traffic in order to connect scattered work sites and dispersed vendors. If fuel prices rise to levels that trigger more carpooling, transit, and other modes, traffic per student and per employee could decline.

County Employment

In our 2006 CTS report, *Urbanization of Minnesota's Countryside: 2000-2025*, and in the one that preceded it in 2003, *Urbanization of the Minnesota Countryside: Population Change and Low-Density Development Near Minnesota's Regional Centers, 1970-2000*, we tried to shed light on how the Minnesota countryside has been rapidly urbanizing and what that probably means for highway transportation planning. New housing on large lots is steadily dispersing across the countryside, while average commuting times are increasing. Evidently households select places to live in the general vicinity of available employment opportunities, but once they

[4] These challenges to the mismatch between what schools offer, what students and the public want and expect from them, and what it all costs in tuition, legislative appropriations, grants and gifts are not new. A serious debate has been under way for a decade or more about the role of the schools, how to pay for them, and how to transform the way that they operate.

decide where to settle they appear willing to drive to available jobs, sometimes with a commute of an hour or more.

Neither the location of jobs nor the location of housing opportunities are fixed in space. Both are in constant flux. Once jobs and housing are matched up, the journey to work is the result. In cases where a worker holds multiple jobs away from home, more than one journey is needed. In cases where more than one household member works away from home the household undertakes multiple journeys to work. The same patterns hold for students attending colleges, universities, and career or trade schools. In fact, there is a significant overlap between employees and students because most students also are working.

Disparate rates of population growth in Greater Minnesota's counties can be expected to continue in the coming two decades. Moreover, additional dispersion of population is likely to occur, not only in the high-amenity forest and lake districts, but also in sparsely populated parts of the state experiencing only modest growth–or no growth at all. People like to spread out, with many (perhaps most) preferring low-density living over high-density. As long as easy movement on the state's trunk highways and the roads that feed them are available and well maintained, our sense is that the trends toward dispersion with more time spent commuting to jobs and to school seem likely to continue. [18]

Implications of Trends for Highway Planning

As observed in our previous reports, road capacity in most parts of Greater Minnesota seems more than adequate to handle *commuting* loads, although that is only one element in total traffic loads. Besides the journeys to and from work and school, local congestion during certain hours (due to commuting) and parts of certain days (daily and weekend *shopping and recreation* traffic) on segments of the Interstates and other trunk highways has been building steadily. [19]

The bottom line seems to be that colleges, universities and other post-secondary schools in Greater Minnesota certainly contribute to weekday traffic loads on highways and on city local streets, but their overall impact is quite modest while the capacity of the road system is more than adequate to handle this component of traffic load in the years to come.

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