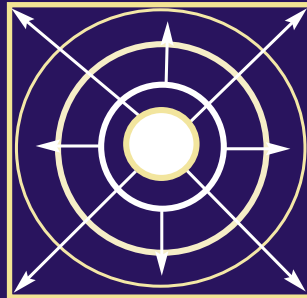


TRANSPORTATION & REGIONAL GROWTH

MARKET CHOICES AND FAIR PRICES:

*Research Suggests Surprising Answers
to Regional Growth Dilemmas*

Report #17 in the Series:
Transportation and Regional Growth Study



January 2003

CTS 03-02

UNIVERSITY OF MINNESOTA

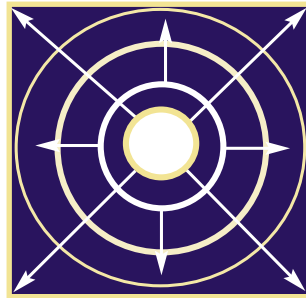


CENTER FOR TRANSPORTATION STUDIES

TRANSPORTATION & REGIONAL GROWTH

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Minnesota Department of Transportation

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Opinions expressed in this document are those of the author and do not represent official policy of the study's sponsors. Any factual errors are the sole responsibility of the author.



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PREFACE

The Transportation and Regional Growth (TRG) Study produced a series of research reports designed to analyze the relationship between transportation and land use in the Twin Cities region and lay out policy alternatives that seem well supported by that research.

The study was begun in order to bring fresh perspectives with solid academic research to the vexing transportation/land use debate taking place in our region and elsewhere. Its intention was to reveal the many variables and their interaction, and, it is hoped, to inform that debate.

The Twin Cities metropolitan area is among those American regions that have experienced substantial growth in both commercial and residential development over the past decade. As growth has consumed land and daily vehicle miles driven have increased even faster than population, some obvious research questions were begging for clear answers. Could transportation infrastructure keep pace with or adapt to this pattern of growth? What investments would produce the most benefits and be affordable in view of expected public revenues? What are the social and environmental implications of the present growth pattern? And what are the policy options worth considering?

The TRG Study explored the linkages between land use, community development, and transportation in the Twin Cities metropolitan area. It investigated how transportation-related alternatives might be used in the Twin Cities region to accommodate growth and the demand for travel while holding down the costs of transportation and maximizing the benefits. The costs of transportation are construed broadly and include the costs of public sector infrastructure, costs to the environment, and those costs paid directly by individuals and firms. Benefits are also broadly construed. They include the gains consumers accrue from travel, the contribution of transportation and development to the economic vitality of the state, and the amenities associated with stable neighborhoods and communities.

The University of Minnesota's Center for Transportation Studies coordinated the TRG Study at the request of the Minnesota Department of Transportation and the Metropolitan Council, with support from the Minnesota

Local Road Research Board. In all, the project generated 16 research reports. A brief description of each can be found in the appendix of this report. All of these studies are available for more intensive review by policymakers, agency staff, advocacy organizations, and citizens.

The study's sponsors see this body of research as a springboard for a wider public discussion about the policy alternatives facing this region. These research findings and implications should stimulate fresh coverage of the issues by the media and a better-informed debate among elected and appointed public officials at all levels. Advocacy groups will find no silver bullets with which to arm their push for preferred solutions, but every group interested in better transportation and land-use policy will find a body of facts and analysis that will change the way the region considers its future choices. This publication serves as a starting point for that discussion.

RESEARCH STUDY AREAS

Part 1: Twin Cities Regional Dynamics

John Adams, Professor and Chair, Department of Geography

Study Reports

The Role of Housing Markets, Regulatory Frameworks, and Local Government Finance (Report No. 1 in the series)

Development Impact Fees for Minnesota? A Review of Principles and National Practices (Report No. 3 in the series)

Synthesizing Highway Transportation, Land Development, Municipal and School Finance in the Greater Twin Cities Area, 1970–1997 (Report No. 4 in the series)



House Price Changes and Capital Shifts in Real Estate Values in Twin Cities-Area Housing Submarkets (Report No. 7 in the series)

Highway Improvements and Land Development Patterns in the Greater Twin Cities Area, 1970–1997: Measuring the Connections (Report No. 8 in the series)

Urbanization of the Minnesota Countryside: Population Change and Low-Density Development Near Minnesota's Regional Centers, 1970–2000 (Report No. 10 in the series)

Case Studies of Development in the Minneapolis-St. Paul Metropolitan Region (Report No. 14 in the series)

Part 2: Passenger and Freight Travel Demand Patterns

Gary A. Davis, Associate Professor, Department of Civil Engineering, and **Gary Barnes**, Research Associate, State and Local Policy Program, Humphrey Institute of Public Affairs

Study Reports

Understanding Urban Travel Demand: Problems, Solutions, and the Role of Forecasting (Report No. 2 in the series)

Land Use and Travel Choices in the Twin Cities, 1958–1990 (Report No. 6 in the series)

Part 3: Transportation Costs and Cost Incidences

Gerard J. McCullough, Associate Professor, Department of Applied Economics, and **David Anderson**, former Research Associate, Department of Applied Economics

Study Reports

The Full Cost of Transportation in the Twin Cities Region (Report No. 5 in the series)

The Distribution of Transportation Costs in the Twin Cities Region (Report No. 15 in the series)

Part 4: Transportation Financing Alternatives

Thomas F. Stinson, Associate Professor, Department of Applied Economics, and **Barry Ryan**, Research Fellow, Department of Applied Economics

Study Report

Road Finance Alternatives: An Analysis of Metro-area Road Taxes (Report No. 9 in the series)

Part 5: Transportation, Urban Design and the Environment

Lance M. Neckar, Professor and Associate Dean, Department of Landscape Architecture, and **Carol J. Swenson**, Senior Research Fellow, Design Center for the American Urban Landscape

Study Reports

Urban Design, Transportation, Environment and Urban Growth: Transit-Supportive Urban Design Impacts on Suburban Land Use and Transportation Planning (Report No. 11 in the series)

Transportation, Urban Design and the Environment: Highway 61/Red Rock Corridor (Report No. 13 in the series)

Part 6: Institutional and Leadership Alternatives

Thomas M. Scott, Professor, Department of Political Science, and Director, Center for Urban and Regional Affairs, and **Barbara Lukermann**, Senior Research Fellow Emeritus, Humphrey Institute of Public Affairs

Study Report

Public Policy, Transportation, and Regional Growth (Report No. 16 in the series)

Research reports are available for download from the TRG Study's web site at www.cts.umn.edu/trg/index.html.



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TRANSPORTATION &





EXECUTIVE SUMMARY

Serious congestion invaded the Twin Cities region in the 1990s, ending the 40-year luxury Minnesotans had of thinking of traffic the way people in Arizona think of snow—as someone else’s problem. What’s worse, today’s congestion is merely the leading edge; a million more people will live here within the next 30 years.

Among American regions, the Twin Cities now ranks number one, along with Atlanta, for the annual rate at which congestion is worsening. Sixty-five percent of daily travel on freeways takes place under congested conditions; travel delays will double over the next 20 years. The suburbs are home to the worst of some two dozen bottlenecks. These zones could be redesigned and rebuilt, but funding exists to tackle only one-third of them.

People are asking their elected officials to explain how the problem got to this level and what government is going to do about it.

The short answer is, we grew and got more affluent. Roaring up from 17th place in U.S. household income to 5th, we used growing wealth to buy new, usually larger homes on spacious lots, farther and farther from the metropolitan center. We drive more miles.

Minnesota legislators appear to agree that there is a problem, though they part paths over what the problem is, what caused it, and what solutions are most sensible. Did infrastructure simply fall behind our growth? Should we have expanded the road system more rapidly? Should we have invested earlier in transit options? Does the way we have spread the metropolitan area out to at least 19 counties have anything to do with our transportation trouble?

The research findings in this report aim to cut through the fog of competing claims and lay out what research suggests as a menu of sensible choices.

WHAT’S THE PROBLEM?

To begin with, all those vehicles trying to use the same stretch of road at the same time testify to the region’s success. People have resources and good reasons to be going places. All the world’s great urban regions have congestion. But the patience people show while standing in line

for a great concert or finding walking space around a popular lake turns to irritation during a long wait to get on a freeway. Freeways have spoiled us. We expect fast trips. These big roads may take up only 3 percent of the land in the region, but they carry 44 percent of the total traffic. Freeways make us forget that congestion was a way of life before they were built.

And growing congestion poses a problem for the region’s commerce. If a UPS truck takes double the usual time to get through traffic for deliveries, twice as many trucks and drivers will be needed to fulfill commitments. By 1994, 102 miles of freeways were in the

grip of congestion; by 2020, it will be 220 miles. Would massive road construction fix this? Not according to the long-range plans of either the Minnesota Department of Transportation (Mn/DOT) or the Metropolitan Council. Few government officials see new construction, by itself, as a cure.

Congestion is the symptom, not the problem.

This research series reveals a new definition of the problem: it is the community development system that sponsors a spread-out growth pattern, coupled with nearly total dependence on personal vehicles. As the region grew, the number of households grew proportionately faster, each acquiring more vehicles than ever before. Growing distances between destinations for work, shopping, professional services, and recreation generated more driving.

People took little note of this, for a while. Freeway

The research findings in this report aim to cut through the fog of competing claims and lay out what research suggests as a menu of sensible choices.



speeds made 10-mile trips seem like 5 miles. Employers followed residential developers, capitalizing on this shrinking sense of distance. Two-earner families found themselves heading in different directions, in longer commutes.

As long as fuel remained relatively cheap and the time it took to get places did not grow excessively, people responded to the built-in incentives of the classic American dream—the best home you could get on the nicest lot for the lowest price. Those locations became, each year, farther from the region’s center.

Meanwhile, apart from sustaining a general level of service to downtowns and other major employment centers for weekday commutes, the legislature did not invest in transit as a parallel system to provide mobility choices. And, other than a one-time windfall from the state’s surplus, lawmakers let revenue capacity for road improvements remain at 1980s levels. Now the region is headed toward the point when traffic differences between peak and non-peak times of day will disappear. Roads will fill and stay full. Once a highway is full, it cannot get fuller—it can only stay fuller longer.

Expectations of easy mobility, though, came packaged with the freeways. So now most people assume that if traffic gets terrible, lanes can be added and new roads built. More roads and added lanes would provide some relief, but neither option is a quick cure and both are formidable to finance, given the staggering costs of acquiring road right-of-ways and the long, sometimes litigious path through regulations that officials must navigate before any concrete is poured. Besides, research shows that the day new lanes or roads open, new drivers show up who had been using other roads, or other modes of travel, or who had been traveling at other times of day to avoid the jams. On freeways in particular, people are often amazed to find that adding lanes does not deliver as much relief as they expected.

Transit: what it does and does not do

Another means of distributing demand for road travel is offering good transit service. Transit accounts for less than 3 percent of all trips—though more than 5 percent of work trips, and over a quarter of all work trips headed for the two downtowns (closer to half for downtown Minneapolis).

Areas with the largest employment concentrations seem well served by the current bus system. These are zones of

relatively high density, where employment and retail and entertainment and nearby residential areas are all mixed together. Research reveals that regardless of where people live, their tendency to use transit is higher when these zones are the destinations. As the region spreads, though, more development takes place that simply cannot be affordably served by bus transit. The pattern of community development falls well below Metro Transit’s standard of what is

As the region spreads, more development takes place that simply cannot be affordably served by bus transit.

supportable (seven dwelling units per acre).

On the other hand, where transit service is seen as a permanent commitment, it seems to attract near its stations and major destinations even more intense urban use, mixing offices and shops, condos and townhouses. Analysis of trends in the region’s major commercial centers confirms this point (a dividend consistently brought up by supporters of the region’s first light rail line, scheduled to open in the Hiawatha Corridor in the spring of 2004). The region’s official planning documents call for doubling transit capacity over the next 20 years with a mixture of light rail, commuter rail, and dedicated bus corridors.

Even with improved road and transit capacity, research forecasts for 2020 indicate a 29 percent increase in daily trips just for the seven-county core of the region. Those trips will average 14 percent more miles than today, which means there will be at least 46 percent more daily vehicle miles traveled. Transit can provide choices and reshape land uses in urban centers, but transit is no cure for the level of congestion the Twin Cities region is courting. Even urban regions with good transit systems remain congested. But like good and bad cholesterol, it matters whether you have the “good” congestion.

Negative externalities

Negative externalities is an economics term that refers to a bundle of bad effects, byproducts of a benefit enjoyed by



those who use a service. Drivers, for example, enjoy the abundant accessibility of major highways. Those living near the highways, however, inherit the foul air and the dull roar of traffic. These “externalities” are new only in form and magnitude; horses on dirt roads generated externalities, too.

But research now finds the “DNA” of the conventional spread-out suburban pattern posing a genuine threat to Minnesota’s basic resource of available clean water. A conventional low-density development pattern means paving over thousands of acres for new arterial and collector roads, plus laying asphalt for parking lots around strip malls and office complexes, car shops and fast-food places. This spreading infrastructure covers surfaces and prevents water from absorbing back into the underground aquifer. In addition, runoff from rain carries all the chemistry of modern living—from lawn fertilizer to road salt to dust particles spun off tires—straight into the surface water system of the region.

Minneapolis, St. Paul, and several suburbs draw their water from the Mississippi River watersheds. More than one hundred other communities in the region compete for a share of the Prairie du Chien aquifer, on which the region also relies to replenish the streams that feed principal rivers.

Reaching limits

Congestion is likely a permanent condition. Transit may provide choices but will not cure all types of congestion. The system of community development that sponsored the low-density, spread-out pattern may have come at costs not advertised, both in terms of the congestion the pattern made inevitable and threats to air and water quality. Moreover, the magnitude of the road infrastructure already built—and fast becoming obsolete—will consume existing road revenues just for its maintenance.

The region now faces choices among inherently unattractive options. Shall we carry on and hope for the best (like Atlanta)? Shall we be a congested place but with compensating virtues (like Boston)? What about a hybrid approach, combining continued low-density developments with selected higher-density zones served by transit (like Chicago, Denver, and soon, Seattle)? Thinking of the region as if it were a business, shall we protect and improve the product (mobility and access to all the places people want to go), but raise prices (taxes) to pay the bill?

Is transportation so critical that we should take money from another division of the company (e.g., schools, health care) to pay the bill?

WHAT ARE THE UNDERLYING CAUSES? HOW DID WE GET TO THIS POINT?

People made choices about where they would live and how they would get from place to place. Developers produced housing where they could make a profit, delivering products experience taught them would sell. People buying homes chose from what was available, and that reinforced the “wisdom” of the market.

Underneath that superficial rendering of market behavior, however, is a complex subterranean set of causes. The incentives in the tax code, the influence of zoning ordinances, and the myriad land and housing development rules and regulations make up a system that encourages additional development of low-density suburban areas and discourages investment in the redevelopment of the older parts of the region. Despite the modest effects of Minnesota’s tax-base sharing law and the highly redistributive character of the state’s fiscal policies, this incentive system shapes the region’s development.

Regional policies encouraged the spreading out.

State and regional policies were never conceived as an intentional strategy for stretching the boundaries of the region. But neither are the policy effects accidental. Even when there was a 500-mile network of streetcars back at the turn of the twentieth century, landowners sold off relatively large parcels for homes at the edges of the region, now mature suburbs. With the surge of the automobile, this land-use pattern was locked in. Ever since, road construc-

With no ocean shores for boundaries or mountains erupting from the rolling prairie, nothing but river crossings slowed the region’s development.



tion consistently favored high-speed arterials, facilitating more spreading out.

With no ocean shores for boundaries or mountains erupting from the rolling prairie, nothing but river crossings slowed the region's development. The Metropolitan Council was formed in 1967 and given tools with which to keep that growth orderly and contiguous; the Council controlled the extension of sewer interceptors and later, the allocation of federal and state road funds for the seven counties designated by the legislature as the metropolitan area. The metropolitan urban service area (MUSA) grew gradually over the years.

More river crossings accelerated the dispersal. An upgraded Cedar Avenue Bridge spanned the Minnesota River, encouraging more movement into Dakota County; later the new Bloomington Ferry Bridge opened upstream, crossing into Scott County. Today the debate rages about new capacity across the St. Croix River.

Ironically, the Council's sewer and road tools may have spurred, in the faster-growing 1990s, more development spilling over into the counties surrounding the "official" seven, making the functional metro area even more spread out. Driving this outward push was a home-buying market on a relentless quest, as it is sometimes said, for closets and bathrooms (bigger and better ones). Driving farther was a willing trade-off, as long as the family qualified for the loan. Council control inside seven counties may have pushed growth beyond its borders.

Issues of fairness arise, though, when home prices, property value increases, and residential taxes come under a 25-year research microscope. Property value increases exceed inflation rates for the newer/larger home model. And property taxes are lower for those homes than on homes of similar value in older core communities. Is that a capitalized tax differential caused by public policy?

If charges to join the wastewater treatment system are less for new users than the marginal cost to the public to provide the service, while users in core communities pay more than the marginal cost for sewer services, is that fair? The common practice of applying averages to all users (also done by phone and gas and electric companies) has the unintended effect of biasing the buyer market toward the newer product.

Local governments dominate land-use decisions.

Local governments in the seven-county area are required to submit comprehensive plans for review by the Metropolitan Council for their congruence with major regional systems. Even so, local governments hold most of the cards in determining development patterns. Their zoning ordinances and rules for developing communities favor a low-density and largely homogeneous pattern, with homes separated from every other land use except that of churches and schools.

Zoning ordinances often spell out so many specifications, at least on size if not style, that homes built look very much the same. Homes affordable to people below the median income level are scarce.

When people taking service jobs cannot live in the community where they work, they have to drive from wherever they can find housing. When jobs and shopping and services are kept deliberately apart, everyone has to drive to get nearly everywhere.

Local governments in still-developing communities also deploy an arsenal of tools to encourage commercial development, thus stabilizing their tax bases. Erecting new commercial structures is usually cheaper than rehabilitating older ones, especially if older buildings in mature communities are candidates for historic designation, or sit atop areas of pollution that carry unknown costs and certain liabilities. Land is less expensive at the edge and parking for users appears, on the surface, to be free. Communities have made extensive use of tax-increment financing to assemble and write down the cost of land. Then a new road is provided. The real marginal costs of infrastructure investments are rarely handed to the new user. So the deal often becomes too good for buyers to turn down.

People have a time budget for travel. It's minutes that matter, not miles.

Research looking back over the last two decades reveals that people have a "time budget" for commutes, which grew from 20 minutes in 1980 to 21 minutes in 1990 to 23 minutes in 2000. In other words, not much. Looking back a half century, when the region was nearly three times as dense and transit reached most major destinations, the record shows people spent just as much time making most trips. It seems that the time it takes to get places every day



It seems that the time it takes to get places every day matters more than the distances involved.

matters more than the distances involved.

Averages, of course, conceal the variation in trip times. Someone commuting from the communities at the region's edge spend 80 minutes a day compared to 68 minutes for people living near the region's center. But whether you live in Minneapolis or Apple Valley, trip times for groceries, dry cleaning, or the movies are about the same, suggesting that policies directed at reducing these trips are not likely to have much effect.

These studies show that work trips are the key issue in tackling congestion. Research results cast serious doubt on pushes for higher residential densities, since densities in commercial employment zones make a bigger difference. Destinations with high concentrations of employment invite more use of transit, even by workers from far-out suburban communities. It is the form of commercial, rather than residential, development that creates the congestion in the first place. If your work lies in the busy I-494 corridor, it doesn't matter much whether your journey started along the dense residential streets of Highland Park in St. Paul or the latest spread-out subdivision of Lakeville.

It is the form of commercial, rather than residential, development that creates the congestion in the first place.

Automobile owners and drivers pay most of the costs of the system.

The costs of the automobile system start with the astonishing amount of daily travel. On a typical day in the metro region in 1998, research shows that 2.6 million people made 9.1 million trips, 94 percent of them by personal vehicle, adding up to 71 million miles of travel in one day.

Expenses for this travel averaged \$9,000 per person in 1998 (inflated to at least \$11,200 by 2020), 84 percent of

which is directly paid by users as the cost for vehicles, parking, insurance, fuel, and maintenance. The logical assumption: in addition to a budget for time, people have a dollar budget for transportation and housing. Some families accept higher transportation costs, usually associated with traveling longer distances, because they satisfy their housing needs at lower costs.

Costs paid by government amount to 9 percent of the total. These costs cover expenses for streets and highways, transit, law enforcement, emergency medical, environmental protection, and parking. While motorists do not ordinarily think about these costs, they are growing. Law enforcement and safety costs are likely to rise 33 percent faster than the growth in population. And energy security costs will surely exacerbate this liability in the coming years.

The external costs from harder-to-measure sources such as pollution add the remaining 7 percent. Even if technology offers some relief of air pollution, the number of vehicle crashes are on a course to rise by 50 percent by 2020 while the measurable costs of congestion triple. Still, government costs for transportation (through taxes) could double, but users would see only about a 10 percent rise in their budgets for transportation.

WHAT ARE THE POLICY CHOICES?

People shopping for houses apparently make the same assumption that businesses make when they are looking for locations for offices and commercial facilities. They expect government will extend roads and other infrastructure to where they build or buy. They expect to get where they need to go inside that historic time budget.

Both the assumption and the time budget are vulnerable. Despite the durable averages, a 20-minute commute is now enjoyed by less than half of daily travelers. Commutes of longer than 40 minutes have increased by 32 percent since 1990. Ever since the streetcar bred desire to move outward, the region has been on a steady spreading-out pattern, with no sense of a looming problem. But there is a problem, starting with the growing costs of sustaining a larger development and transportation system. The region faces a reality in which the road system should be improved and transit choices added even while revenue capacity is strained to support the existing transportation



infrastructure.

So what policies would make a significant difference in positioning this region to be more competitive with transportation and community development while still being affordable? Two policy areas emerge from research: use of honest pricing and expansion of development and transportation choices.

Honest pricing is the way to let the market work.

Investors and developers calculate the pricing potential of land for a class of buyers. Homebuyers make their own calculations of costs, trying to minimize tax exposure and maximize value increases. Transportation costs rarely drive the decision unless they obviously exceed the time budget people have adopted. Every decision is driven by a business or personal sense of costs and benefits.

If the real public costs associated with new development fell in fair proportion on buyers who benefit from these purchases, the market would reflect that impact.

One implication of this research series implies that the easy march to farther-out home locations would surely slow if potential buyers were confronted with something closer to the true costs of transportation. Seventy percent of public costs are hidden in state aids to local governments, local property taxes, and motor vehicle registration taxes. If the 70 percent share now borne by the public at large were added to what users absorb, homebuyers would pay much more attention to transportation costs. Market research suggests that developers would abandon projects that generated \$5,000 or more in additional annual costs to commuters.

Research on the “demand” side of road use shows the potential of using the “pricing” tool for congested roads. “Value pricing” moderates congestion in a growing number of urban areas around the world. Twice in recent years, pricing emerged in the Twin Cities region as a proposal, first as a means of accelerating road construction (Highway 212 in the southwest corridor) and then as a means of

managing demand in the heavily congested I-394 corridor. Both proposals were shot down. Even the region’s successful ramp-metering access system came under popular assault in recent years.

So charging people for using roads they think they already paid for is a losing strategy unless the revenue is dedicated to something people see as a worthwhile investment. Whether or not the revenue would be invested in more roads or in transit alternatives, no proposal has yet been persuasively explained to citizens in the metropolitan area as progress.

Charges for infrastructure to people buying homes are also caught in a tangle. People naturally resist if they don’t see the benefit to the value of their own homes, and the courts have generally supported this point of view. Even so, if the real public costs associated with new development fell in fair proportion on buyers who benefit from these purchases, fees would be higher than they are today and the market would reflect that impact.

If, as this research suggests, people locating businesses and buying homes in newly developed areas of the region are not paying the true marginal costs that development generates, the obvious issue is one of fiscal fairness.

A policy of expanding choices would make the region more competitive.

Today’s political rhetoric runs at a high temperature over transit. Transit skeptics see proposals for rail and rapid busways as punitive to automobiles. They suspect that congestion is “manufactured” by undernourished road budgets, and they charge transit advocates with “social engineering.” This is, of course, a reversible canard, just as easily assigned to a half century of policies that favored single and segregated land uses and nearly total dependence on automobiles to get to necessary destinations. Meanwhile, congestion continues to get worse. So, if the problem is that this spreading-out pattern is indeed not sustainable—environmentally, logistically, or financially—then the challenge would seem to be one of rebalancing policy back toward a market of choices.

The most obvious market is the region’s commercial centers, which have proved to be magnets for housing, offices, clinics, shops, and restaurants. The two downtowns, along with the University of Minnesota area, prove the point. But there are many other districts in the region



with similar potential. If zoning were made more market-oriented, the good kind of congestion might follow. Indeed, the popular rush to create real civic and commercial centers in both mature and newer suburbs—from Burnsville to Hopkins to Maple Grove—is all the evidence anyone should need.

Research further indicates that local community development, if it emphasizes connections to next-door neighborhoods and provides infrastructure for walking and biking, can significantly reduce the need to drive from place to place. If this would work in the communities of the North Metro I-35 Coalition, as research modeling suggests, it would work anywhere in the region.

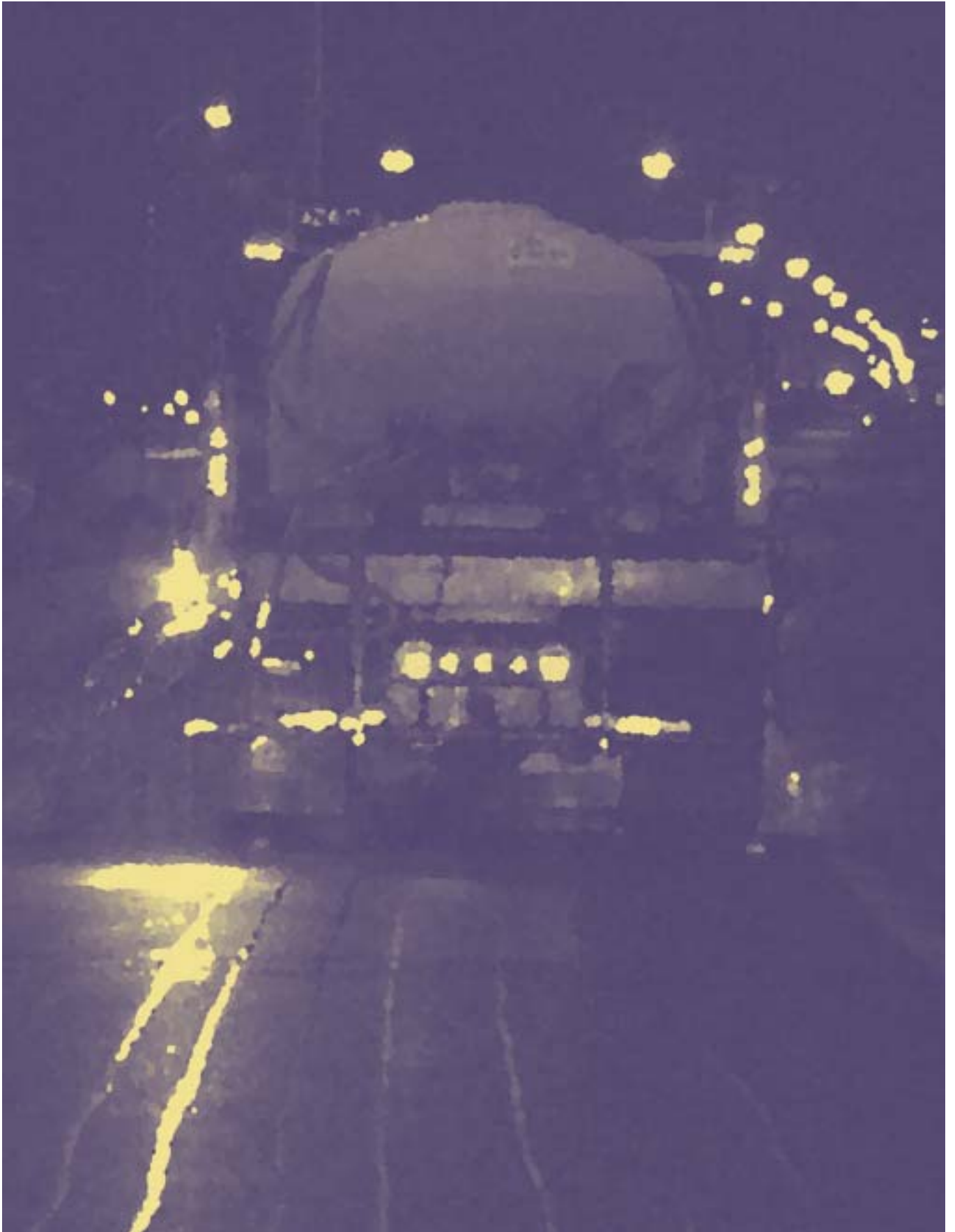
Could markets for more efficient use of land by employers and homebuyers be affected by providing commuter-passenger rail service to major destinations? Research suggests this is also a winning strategy if local governments change their zoning to welcome a dense mixture of employers, services, amenities, and residential developments in 12-minute proximity to rail stations. Families just might choose smaller lots and homes in return for better amenities and more transportation choices. The question is whether other communities can succeed without transit. But if costs for automobile dependence soar, why would not the market for alternatives rise too?

New market trends are already saluting the needs of immigrants streaming in to fill jobs, as well as the residential migration of the gargantuan boomer generation now more interested in high-amenity, low-maintenance living close to regularly visited destinations.

Any policy interventions that the state might authorize for the Twin Cities region will carry a significant price tag, whether it is for funding for local communities trying to expand choices for residents and business or for resources for an integrated system of transit. The somewhat surprising reminder from this entire body of recent research on the region is how important markets are. Markets determine locations for commerce, preferences about housing, choices of mobility. This research suggests that policies of honest pricing of land development and transportation services, along with expanded choices about places to live and work, offer the best chances to improve the economic competitiveness, the mobility, and overall livability of the region for the next generation.



TRANSPORTATION &





INTRODUCTION

Serious traffic invaded the Twin Cities region in the 1990s. For a 40-year interlude, Minnesotans had the luxury of thinking of traffic the way winter residents in Arizona think of snow—as someone else’s problem. As congestion on freeways and major roads increasingly undermines the region’s long-enjoyed easy mobility, people are asking why this has happened and what can be done about it.

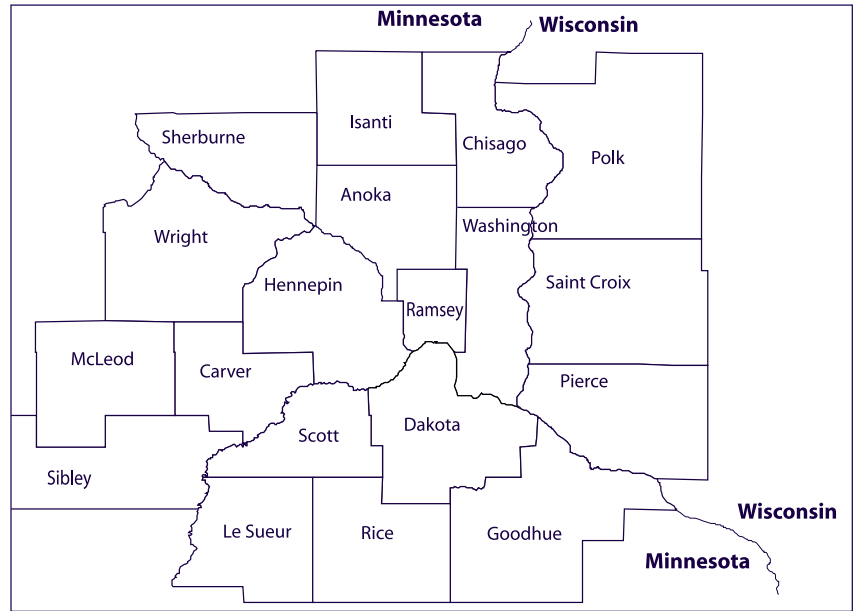
Traffic complaints now top most local political polls. Transportation was a central issue in the 2002 governor’s race, despite an atmosphere of budget gloom as state and local governments faced large fiscal gaps.

When people hear that today’s traffic is merely the leading edge of an emerging future, one in which 700,000 more people will be living here within 20 years—and over a million more within 30 years—they are putting tough questions to government officials: How did this problem get to this level? And what are you going to do about it?

Twin Cities residents are acquiring an *attitude* about traffic. This should not surprise anyone. The region has long been an easy place to get around. Land and water seemed in almost endless supply. Median income for a four-person household has soared, rising by 2000 to \$70,500. That is 13 percent above the national average and 64 percent higher than it was in 1990. The region ranked 17th in the nation on this measure in 1990; today it ranks 5th.

Many families found that the region’s former farm and forest land was now bursting with large houses on spacious lots. Feeling affluent, they harvested a crop of new homes. Bargain-hunting families found more house for the buck at the edge, too. The result: a spreading out, farther and farther from traditional employment centers.

Figure 1: The Twin Cities Region



But the region remains organized as though the metro area comprised only the seven counties designated in 1967. The final census reports are likely to peg the region’s

geography somewhere between 19 and 24 counties, three or four of which are in Wisconsin (Figure 1). If we used the standard of counties in which 5 percent or more commute back inside the beltway, 24 counties would be in the metro orbit. Regardless of the mapping, we have urbanization where it was never before contemplated, resulting in increasing traffic on roads leading to employment and commercial centers.

In its *2001 Urban Mobility Report*, the Texas Transportation Institute said the Twin Cities is tied for first with the Atlanta region for the fastest rate of congestion growth. No one is saying the Twin Cities has become Bangkok, or even Boston, but the Minnesota Department of

Transportation (Mn/DOT) says 65 percent of freeway travel in the region now occurs under congested conditions. Worse, Mn/DOT says that vehicle miles traveled will increase by at

Today’s drivers may not be able to recite the number of congested lane miles, or ratios of travel delays, but they know they are stuck in traffic—a lot. And they don’t like it.



least one-third over the next 20 years, which will double today's experience of traffic delays.

The people of this region already know all this. Today's drivers may not be able to recite the number of congested lane miles, or ratios of travel delays, but they know they are stuck in traffic—a lot. And they don't like it.

The suburbs are home to the worst of more than two-dozen bottleneck zones, where nearly every workday, serious congestion is routine. Most bottlenecks are design problems, usually the result of limited original construction funds. Most have plausible cures. But current funding levels, Mn/DOT officials say, make it possible to take on only one-third of those bottlenecks.

Meanwhile, the march outward continues. More business and commercial centers are built in the developing suburbs and beyond. Housing starts are highest farther from the metropolitan center, even as single-family detached home production recently became less than half the annual production. In general, though, the pattern remains vaguely true to the stereotypical American dream—as much house as a family can get, on as much ground as possible, for the lowest possible price.

Surveys over the last decade suggest a majority of households still prefer newer, low-density housing in middle-class suburbs to older, higher-density housing in mixed social-class neighborhoods close to the metropolitan center. The majority prefer detached houses to apartments or condominiums. They choose patterns that rely on automobile travel rather than public transit or walking. That said, it is equally true that this real estate model has been the predominating product in the market for the past half century. Developers produced what experience suggested would sell best, and people bought what was available. The low-density, single-family subdivision, with all other land uses but churches and schools banned, became the norm. Mortgage financing and local zoning lined up to make it the way to go (Adams).

Three generations have experienced this pattern, with the effect that it seems like the way the world was meant to be. It's the norm now. And, in recent years, this develop-

ment pattern has spread to rural counties surrounding the metro area, producing pockets of suburbanization that soon require services, from roads to sewers to schools.

The Builders Association of the Twin Cities (BATC), in a 1996 report that focused on 13 of the region's counties, called this spreading out “the random development of unsewered large lots and the non-contiguous, leapfrog development of sewerred subdivisions that create physical and social barriers to the orderly and economical extension of urban services.” The BATC report finds that this pattern raises the costs of urban services that are first passed to the developer and then shared with the

housing consumer—and the public at large. The builders say this leapfrogging is the direct result of running out of land with access to urban services within the seven-county Metropolitan Council area. So builders and buyers push out to find affordable land friendly to development and let the consequences pile up for the next generation (Adams).

The first taste of those consequences is today's traffic.

While the benefits of travel for most residents of the region continue to outweigh the burdens, congestion has undermined the expectations of enough people to become a major political issue. The legislature has already concluded that something must be done.

So, surely, something will be done. And that probability is the calling card for this body of research. Because even if legislators agree on what the problem is, they part paths over what has caused it, and over what remedies would work. Did we not keep up on road building? Did we postpone transit investments too long? What solutions would now make any difference?

Getting to a plan of action has been a tough challenge. Politics demands quick and simple judgments, often at the expense of complex realities. Land-use choices and transportation investments are rather permanent decisions, the effects of which are difficult to reverse. The costs of transportation investments are usually very high and lead times very long; policymakers have to persuade citizens to pay for something long before the benefits can be demonstrated.

Yet the whole idea of urban planning, rather than leaving every decision to a presumably pure market, is that

Even if legislators agree on what the problem is, they part paths over what has caused it, and over what remedies would work.

REGIONAL GROWTH



there are better and worse ways of organizing how land is developed and how people move around.

The research findings summarized in this report are aimed squarely at cutting through the fog of competing claims and informing the choices facing policymakers who must decide how to preserve the region's livability and competitiveness for the next generation.



TRANSPORTATION &





WHAT'S THE PROBLEM?

Congestion, while it confirms the popularity of the Twin Cities area, poses a growing threat to the region's way of life and points to controversial issues in the community development system.

In one respect, road congestion is a success story: it is visible evidence that a growing population has the money and motivation to go many places. Congestion—put simply, too many vehicles trying to pass through the same stretch of road at the same time—offers daily confirmation that the region is growing, not declining.

Many of the most envied urban regions anywhere are congested places, and this has always been true. Congestion is a positive signal when long lines form for a great concert or museum exhibit, or crowds through a retail and entertainment complex, or wonderful restaurants require advance reservations. Congested sidewalks are a good sign. Inside shops and restaurants, it's all “kaching” and merchants smiling.

On roads, however, congestion attracts criticism. People forget that there was congestion before there were freeways. It used to take much longer to get from place to place. The addition of the freeway system dramatically expanded access for more people to more destinations. While covering only 3 percent of the land in the region, the freeways now account for eight times the number of vehicle miles than the region had before the freeway era.

Nonetheless, today's growing congestion challenges the region's competitiveness and its reputation as a good place to live. By 1970, 25 percent of the region's traffic converged daily on the 2 percent of its roads that were freeways. A quarter century later, freeways were still just 2 percent of the region's roadway capacity, but they carried 44 percent of total traffic (Davis and Barnes).

Much of the region's economy depends on the effi-

ciency of freight movements. More firms than ever rely on just-in-time inventories of parts and supplies, not to mention perishable goods. In this sector, time is money. If a UPS driver's route slows to half the usual efficiency, the company needs twice as many trucks and drivers to maintain the same level of service. The costs are a hit not just to the UPS budget; they spread over the economy. Over time, the region, which needs higher productivity to be competitive, finds itself with a comparative disadvantage (even though UPS volumes may reflect more orders placed by telephone or the Internet, and fewer shopping trips by car).

Or consider the possible plight of Fridley-based

Medtronic—one of Minnesota's most successful research and manufacturing firms. If medical devices cannot be transported reliably and efficiently to the airport, the company's costs grow; if the situation becomes critical, why would Medtronic continue to manufacture these devices here? At the very least, Medtronic is likely to create an assembly and distribution system closer to its principal markets.

Since new road infrastructure is not keeping pace with growth, congestion strikes employers and citizens like a darkening cloud over the region's prosperity.

By 1997, during peak traffic periods, 35 percent of the freeway miles in the seven-county area and 55 percent of the principal arterial miles had traffic volumes exceeding the designed capacity (Davis and Barnes). Miles of congested freeway have grown from 72 in 1984 to 102 in 1994, and numbers are expected to increase to 220 by 2020. Re-engineering bottleneck zones would bring some relief, and some roads seem clearly to need more lanes. But today's official 20-year transportation plans suggest that few government officials see massive new road construction as a cure for congestion.

In one respect, road congestion is a success story: it is visible evidence that a growing population has the money and motivation to go many places. Congestion offers daily confirmation that the region is growing, not declining.



Congestion is only a symptom. The problem is the “system” that sponsors a spread-out growth pattern coupled with nearly total dependence on personal vehicles.

Today’s problem is complex but not mysterious. A list of what the region has more of than before tells the story (Adams):

- A rapid rise in number of households—reflecting everything from higher incomes and personal preferences to divorces.
- The trend toward more vehicles per household—the effects of multiple work destinations and teens owning cars (1.1 vehicles for every Minnesotan over 16).
- The increase in number of trips and length of trips—reflecting relative prosperity and the sheer distances between destinations resulting from a spreading out of the region.

cars, they will be used (Davis and Barnes).

The same period saw a dramatic decentralization in *where* work was done. Firms contracted for services to do accounting, clean buildings, manage computer information. Services went to clients rather than clients traveling to service places as they had in the past. In sum, travel went up.

The initial freeway system, once completed, made 10-mile trips seem like 5-mile trips. Speeds were fast and no stop signs interfered. People drove significantly more miles, but did not spend substantially more time doing it. Freeways seemed like pure pathways to progress. Time spent traveling became more important than miles, and it still is.

Bus service, always caught in the vagaries of legislative appropriations, cannot keep pace with the development pattern. Service to downtowns remains high, and over the past decade an earnest effort to better serve suburban trips emerged, which included several operations run separately from the Metro Transit system. Since the early 1970s, periodic proposals emerged for rail or light rail routes to provide alternatives in certain corridors; nothing was approved until the mid-1990s, when the legislature agreed to matching federal, county, and airport authority funding for a light rail line extending from the Mall of America to downtown Minneapolis along Hiawatha Avenue. In general, though, funding for transit fell behind the pace of development.

Today’s traffic scene looks like this (Davis and Barnes):

- Work trips are longer when measured in miles, though only slightly longer when measured in minutes.
- Transit works best headed for downtowns or other major employment centers. Because auto use has increased so much, the share of trips served by transit has dropped to roughly the national average—2.5 percent of all trips, 5.2 percent of work trips, and 25 percent of all trips into central business districts. Walking and biking to work claim about 4 percent. The number of people per car at peak times, 1.12, is only slightly higher today than in 1948, suggesting that driving alone has long been a Twin Cities habit.
- Work trips are complicated by trip “chaining,” as people add stops to pick up children at day care, to collect the dry cleaning, to mail a package (though these are minor miles compared with work trips).
- The size and duration of the evening peak, by 1990, were higher than the highest point of the morning rush

Table 1: Aggregate Statistics (all numbers in millions)

	1958	1970	1990	Change 58 - 70	Change 70 - 90
Population	1.4	1.9	2.3	36%	22%
Households		.57	.88		53%
Jobs	.59	.85	1.3	44%	52%
Autos	.54	.85	1.5	57%	79%
Person-Trips	3.4	5.1	8.9	51%	73%
Person-Miles	7.5	23.8	55.3	217%	132%

Understanding Urban Travel Demand, G. Barnes and G. Davis, 1999, p. 14.

Between 1970 and 1990, almost all of the increase in automobile trip rates was attributable to more trips taken by women and by older men. Women joined the work force, and men could drive into their later years, but both groups were generally discriminating in their use of automobiles. By contrast, succeeding generations have grown up in an atmosphere of easy use of cars, now the universal trip tool for most people and most trips.

Retail centers, once fairly concentrated in specific locations, spread with the region’s growth. The shopping day got longer, and Sundays became yet another shopping day.

Further stimulating this dramatic increase in the number of miles traveled each day was the sheer expansion in the number of jobs. Growth in jobs directly translates into more people with a need to get to work. As this created more income for people, they demanded more mobility. Car ownership continued to expand. And where there are



time, and the majority of trips were not work-related.

That portion of trips that are not work trips carry important policy implications, if there is potential for spreading them out across the day and evening. Certainly,

Table 2: Auto Trip Lengths and Times

	1958	1970	1990	Change 58 - 70	Change 70 - 90
Miles/Trip	2.2	4.9	6.6	122%	33%
Minutes/Trip	20.0	16.9	15.5	-15%	-8%
Miles/Hour	6.6	17.4	25.5	164%	47%

Understanding Urban Travel Demand, G. Barnes and G. Davis, 1999, p. 15.

when congestion reaches a tipping point, drivers seem to find other routes or other times of day to travel. Before long, however, that mid-day trough, when congestion traditionally let up, will just disappear.

While travel into the central business districts has continued to grow, the growth rate to suburban destinations has been faster. In one sense, the market registered the central business districts as “full,” while the suburbs seemed still relatively empty. Growth goes to places not already full.

A “chicken-and-egg” type debate rages among analysts as to whether accommodating the automobile has led to inefficient land uses (such as spread-out office or commercial centers, and relatively few houses on large tracts of land) or whether inefficient uses of land have generated the longer, less direct trips. What seems undeniable, though, is that decisions about where to live and work and shop all have something to do with the travel equation. People are responding to the implied incentives in the land-use and transportation system.

The market, among developers and buyers, drivers and riders, is always incentive-driven. The evidence is transparent in every major decision about land use and transportation investments. Interacting back and forth, these multiple parties and decisions form a continuing process of “circular and cumulative causation” (Adams).

Our land development/transportation problem has no simple cure.

Regardless of cause, this region is headed toward a point where the difference in traffic between peak times and non-peak times will be insignificant. Roads will fill and stay filled. Once a highway is full, it cannot really get fuller—it can only stay fuller longer (Davis and Barnes).

First people sense “diminishing returns.” Their trip

times are less certain. Then it feels like the system has hit the wall, with seeming suddenness. To illustrate this, assume that lily pads in a pond, consuming water and space, tend to reproduce by doubling each day. On one inevitable day, they cover up half the pond; the next morning, it’s the entire pond. And it seems like a surprise (Ward).

Of course, most people assume that if a road is full, lanes can be added, and if that proves insufficient, more roads can be built to take the excess demand. Back when the freeways were built, expectations of an easy mobility were permanently packed into the new and wide roadbeds. Low fuel prices still make auto travel seem inexpensive. So, naturally, many people conclude that expanding road capacity is a sure cure.

Increasingly, transportation officials representing the region and the state advise against this convenient optimism. They cite problems with acquiring right-of-ways for expansion, now enormously more difficult in the already built-up areas. And the cost of acquisitions, compounded

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by the regulatory steps through which any construction must navigate, produces staggering estimates for significant expansion of road capacity.

Over the next 20 years, almost every dollar now projected for allocation to Mn/DOT may well be needed just to care for the system already in place. The interstates, built between the 1950s and the 1970s, have a working life of about 30 years. It is obvious that many sections of this system are wearing out.

Even if money were not a problem, officials say, adding lanes and roads is no panacea for the congestion pain ahead. Almost at the moment that new capacity shows up, so do a host of drivers who had been using other routes, or other modes of travel (such as buses or van-pools), or who had been traveling at other times of day to avoid the jams. A new road also attracts “new” drivers,



who see opportunities for travel not seen before. For some period, of course, this behavior must be releasing capacity elsewhere, making it easier to travel other routes. But in the zone of greatest concern—on major freeways—it is now common for people to wonder why adding lanes did not deliver as much relief as expected.

There are only three classic remedies (Davis and Barnes):

1. Add more lanes, more roads.

Case in point: spend the \$1 to \$2 billion it will take to add a lane to the I-494/694 beltway. The trouble is, the effects are not simple. If two lanes run each way and two more are added, twice the lanes should mean twice the throughput. But often, this increase has the hydraulic effect of building a greater mass, which transfers the congestion to another stretch not designed to handle it. Or it induces so many people to use the road who had not done so previously that the remedy is nullified.

On the other hand, it is undeniable that at present the metro areas in the United States with the least congestion are the ones with the greatest number of lane miles per capita (think Kansas City, San Antonio), suggesting that at least technically, it is possible to “build your way out of congestion.” Others say those regions merely have excess capacity awaiting the impact of serious growth pressure, and that the Twin Cities region would not have today’s problem if it had not become a growth center.

2. Restore the capacity for faster travel.

Redesign the use of existing freeways and major arterials for higher speeds, either by using grade separations or by reducing access points so that only users making longer trips qualify. Either of these interventions, when proposed, generates considerable controversy even for a freeway corridor.

Clearly, though, some of the serious congestion zones are the result of past political decisions about capacity, such as erasing the I-335 connection around downtown Minneapolis, forcing today’s higher traffic volumes through the Lowry Hill Tunnel. And today,

It is now common for people to wonder why adding lanes did not deliver as much relief as expected.

the political compromise that produced the compound merges where the Crosstown and I-35W meet seems ludicrous. About a half dozen such decisions—not to build new capacity—have shaped the road-capacity status of today’s system.

3. Reduce demand.

This approach turns the issue on its head by suggesting that demand for using roads, at least at certain times of day, can be substantially reduced. Here an

increased investment in transit plays a role. If convenient transit choices are offered in zones of the region’s highest densities, those who prefer riding to driving might switch, for some trips. New choices, however, constitute no warranty against congestion, as the road capacity released may fill up rapidly. And, if the transit service is popular, it becomes its own zone of congestion.

So perhaps the fundamental issue is not to reduce congestion, but to provide choices and improve accessibility. Congestion, in large part, has to do with the number of people trying to access popular destinations—whether for work trips, errands, or pleasure. Transit provides another means of access to major destinations.

A policy of “value pricing,” charging a fee to use uncongested lanes in traffic-clogged corridors, is slowly spreading in regions around the world that are coping with rising peak traffic loads. The fees collected are often dedicated to redesigning bottleneck zones or for improving transit, or both.

A major issue for continuing research also lingers here. In a policy environment that encouraged and rewarded closer grouping of these destinations (often described as “higher densities”), would the market respond with more people living in and near these zones and making a significant share of trips without using an automobile? This research suggests that activity-rich commercial zones have that potential (Davis and Barnes).



Transit can be used selectively to provide choices and strategically to induce new development patterns, but it will not significantly reduce congestion.

When measured in 1990, 90 percent of all trips in the region were made using automobiles, which is roughly at the national average for metropolitan areas. Transit carried 2.5 percent of all trips—though, significant in terms of the congestion challenge, 5.2 percent of all work trips and a quarter of all work trips headed for the central business districts (Davis and Barnes).

Transit, at its peak share, carried 25 percent of all trips back in 1949 (about one-third of which was school buses). In raw numbers, transit has held its own, but the population has tripled. The Metropolitan Council’s current policy features a commitment to double transit capacity in the next 20 years (Figure 2). If that is done, depending on how and where that capacity is deployed, it is conceivable that transit could, if not significantly alleviate congestion in the zones of greatest urban density, at least provide better choices than people have today for getting where they want to go.

Transit advocates point to its two primary assets: efficiency—more roadway carrying-capacity than cars, and equity—a minimal provision of accessibility to critical destinations for people who do not own a car.

Figure 2: 2025 Transitways Map

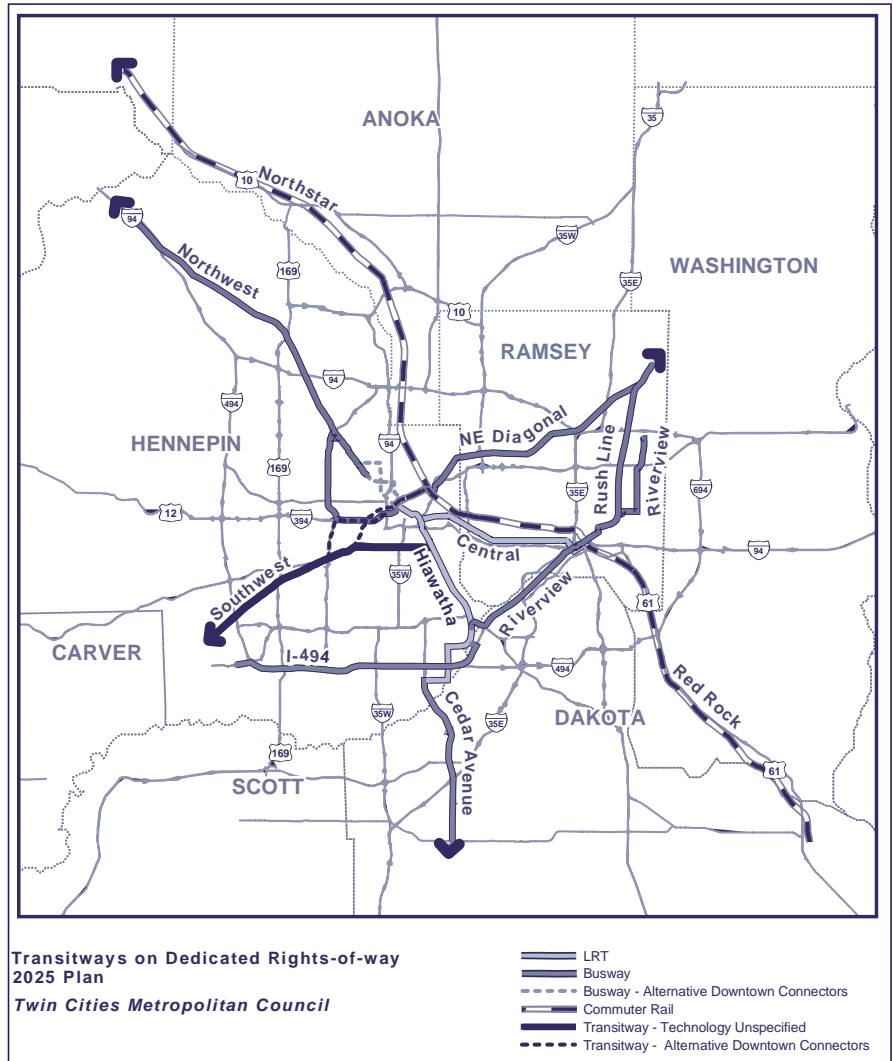


Table 3: Daily Transit Trips and Share

	1949	1958	1970	1990
Transit trips	430K (270K?)	252K	162K	225K
Auto trips	1.2M	3.0M	4.6M	8.3M
Transit share	26% (16%?)	7.5%	3.2%	2.5%

Understanding Urban Travel Demand, G. Barnes and G. Davis, 1999, p. 21.

The “efficiency” point is generally persuasive for peak-hours conditions, if the service is convenient and frequent and goes where the demand is. However, when the service does not meet those standards, and attracts few riders, the efficiency argument falls flat. Transit run as a public service is often forced to provide a large vehicle for a small number of people at the edges of the travel day—as an equity policy. It is not clear that bus or rail service is an

efficient response to this need.

Rail is the subject of long-running Twin Cities debate, made all the more lively by the approval and current construction of the Hiawatha light rail line. Advocates point to lower energy costs and emissions for operating rail and, in the case of the Hiawatha line, to potential community redevelopment impact. Critics point to the capital costs per rider and to energy consumption during construction and say it will take 50 years to break even on energy (Davis and Barnes).

Commuter rail—passenger cars on regular heavy-gauge train tracks (usually shared with freight traffic)—can claim lower capital costs, but operating costs are sufficiently significant as to require large subsidies and hence, produce troublesome politics. Supporters point to places



such as Chicago, where commuter rail is a popular option for suburban communities, many of which have residential densities comparable to those in the Twin Cities region.

Carpooling, a slam-dunk success theoretically, runs headlong into preferences for privacy and real needs for scheduling flexibility. Lanes reserved for carpools are underutilized and thus under constant criticism.

The ultimate low-capital approach is, of course, more facilities friendly to walking and biking. Here weather is the big discourager, despite resurgent attention to the health effects of more exercise. Support for these facilities is passionate but pales beside the dominant car culture. While walking and biking claim 20 percent or more of commute trips in some cities (mostly smaller ones) of northern Europe, they generate less than 1 percent of commute trips in the Twin Cities region (Davis and Barnes).

Buses, given a dedicated right-of-way, can compete even with rail at providing superior service and could play a significant role in expanding choices for mobility and accessibility. Although the region has become richer, on average, it also has attracted immigrants, many of whom take lower-paying jobs and need public transportation. The historic problem has been a steady reluctance to build and operate a significantly better bus service.

Playing the dark horse role in this script of uncertainties is something called PRT—Personal Rapid Transit. PRT, neither an auto nor a train, but rather, a small vehicle running on a single elevated rail, might play a circulation role in defined zones. But it is as yet an unproven technology.

Despite these prospects, the forecast for travel growth is a formidable factor. By 2020, there will be at least 29 percent more trips taken daily in the core seven counties of the region, with a 14 percent greater average length. Multiplying these two variables produces a forecast of 46 percent more daily vehicle miles traveled than was true in 1995 (Davis and Barnes).

These forecasts are of course assumptions, not facts. But they are assumptions rooted in the tenacious trends of the past 50 years, which suggest that development densities will continue to decline while population grows. If so,

trip lengths and miles traveled will continue their march up the charts.

The future impact of greater congestion on this trend is the key issue to debate, however. The prospect of higher speeds, and the ease of getting to farther-away places, have given us today's land-use and travel patterns. As more roads fill up and traffic slows down, will the incentives shift toward working and shopping closer to home? Even so, there is no basis on which to project more people using

transit unless transit service becomes something that it is not today. Should transit service become more extensive and more convenient to users, the balance of trips could shift. But the pessimists will win this argument if the preponderance of new jobs continues to show up in outlying metropolitan locations (Neckar).

Research also shows that, while they are necessary and useful in data analysis, averages lie. Averages often

form a statistical mask over important differences. Averages on road congestion projections might seem unduly optimistic, mixing in many roads not yet under traffic pressure with a few critical corridors choking on traffic.

Conversely, averages might understate the potential for transit to play a significant role. To the degree that exclusive corridors for rail or buses form an integrated pattern within the densest zones of the metro area, they might serve not only as serious alternatives for transportation but also provide incentives for more employment and commercial locations, thus altering the historic land-use pattern. Recent experience in other regions shows high densities building up around effective transit corridors. Obviously, zoning policy that forces separation of housing and employment and shopping forces the number of vehicle trips higher. Zoning changes toward mixed use create opportunities and choices.

In any event, without an unprecedented investment in transit, the forecast becomes self-fulfilling. By 2020, the zone served by the circumferential freeways will be fully congested. Evoking that Yogi Berra quote that “no one goes there anyway, it’s so crowded,” the prospect increases that commercial and retail firms will see no choice but to continue the outward migration.

There is no basis on which to project more people using transit unless transit service becomes something that it is not today.



What economists call “negative externalities” is another bundle of bad news.

If you are a driver enjoying abundant accessibility to all those places you want to go in as efficient a time as possible, you may declare the system a success. However, if you live near a roaring concrete canyon of cars whose drivers are enjoying their rights of efficiency, you may appreciate it less. The noise is irritating and the emissions worrisome. It’s that old principle again—that one person’s opportunities are another’s burden (Adams, Davis and Barnes).

Economists and transportation planners define these adverse effects, these byproducts of a benefit enjoyed by those who use a service, as “negative externalities.” In the road system, that includes noise, pollution, and sometimes just the visual sacrifice of seeing a crowded roadway where once there may have been trees and tranquility. (It is worth remembering, of course, that horses on dirt roads also generated negative externalities.)

Nearly everyone can identify these downsides to the automobile and roadway system. But there is another downside that is particularly sensitive to Minnesotans, for whom lakes and rivers are virtually a sacred resource. As development covers more of the region’s land, the danger to water may loom as the largest threat.

Research reveals how much the “DNA” of the conventional suburban development necessitates large commitments of concrete and asphalt for principal arterials, collector roads, neighborhood roads, and, of course, driveways. The byproduct is chemical pollution from engine emissions, road maintenance products, even dust particles from tire wear.

Large residential lawns are kept green by chemicals laden with organic and toxic residues that run off when it rains. In addition, development brings the strip malls, the clinics and car shops, schools and fast-food establishments—all surrounded by large parking lots. The spreading infrastructure covers surfaces, reducing the porosity of the ground, and diminishes the recharging of the underground aquifer supply. And when it rains and water runs off or through storm drainage systems, it carries the chemistry of modern living—nitrogen, geneterovirals, and road salts—straight into the surface water system of the region. Seventy-five percent of the region’s drinking water comes from the Mississippi River watershed. Minneapolis, St.

Paul, and several suburbs draw all their drinking water from surface sources. More than one hundred other suburban communities compete for a share of the Prairie du Chien aquifer, on which the region also relies to replenish the streams that feed principal rivers (Neckar).

It is now common also to see newspaper articles citing nanoparticles from diesel emissions as likely causes of the surge in the incidence of asthma and other pulmonary diseases.

So there are multiple burdens borne by everyone, byproducts of the benefits enjoyed by users of the system. By what means could these externalities be met? There are three main ways (Davis and Barnes):

1. Reduce access.

Limit the number of places it is easy to get to, with the result that fewer miles (theoretically) are driven. Politically, this is a non-starter. And like many solutions, it is too simple. Externalities are not mere functions of how many miles are driven. For example, a new car might be driven dozens of miles and produce less pollution than an old one with worn-out emission controls in just one mile. “Where” also matters. Slow, congested driving in a densely populated zone has more negative impact than getting up to speed in the countryside.

2. Rely on technological innovation.

A second approach has demonstrated more potential for impact: technological innovation. Go to Mexico City or San Jose, Costa Rica, or any number of metropolitan areas where the vehicle fleet is not technologically up to date. The difference is palpable. Forty years of innovation makes it possible to have cars in U.S. cities and still breathe the air. But even in this country, technology has not guaranteed good air. For example, pollution in the Atlanta region in the 1990s, along with severe congestion, forced a radical reform in regional planning for transportation and land use.

3. Soften the impacts.

A third way is to use all sorts of mitigating measures. Noise barriers on freeways, for example, reduce the sounds emanating from the traffic. In neighborhoods, though often controversial, traffic-calming devices such as speed bumps or small roundabouts at intersections reduce speeds as well as noise.



Air and water quality are likely to become increasingly sensitive subjects in the Twin Cities political scene. Occasionally there are rumblings about this region skirting the edge of the Environmental Protection Agency's non-attainment threshold for air quality. And while the connection between spreading, low-density development and water quality does not seem firmly set in the minds of most Minnesotans, it is an issue whose time is coming.

All this adds up to conditions that are reaching limits.

Congestion, something that Twin Cities-area residents could for so long conveniently associate with other places, has taken up permanent residence in this region. Even with more roadway capacity, congestion will get worse.

Major investment in transit might have some mitigating effect, but only if it offers trip times competi-

tive with the automobile; if they have to wait longer for a ride than it takes to drive, most people will drive. Transit's largest role may be to provide choices for ways to get around in some parts of the region. Think of the urban regions with effective transit services; they are still congested places. But like good and bad cholesterol, it matters whether you have the "good" congestion.

Land use practices also have consequences and limits. The spread-out, low-density pattern of development—especially commercial development—brought some costs that were not advertised. Beyond congestion, there are now serious threats to air and water quality. All the mitigating measures imagined by planners today are costly. Even the system as it stands cannot be afforded into the future on the financing model the state and region have today.

People have not changed their travel behavior significantly, largely because the time it takes for daily journeys has not yet exceeded their tolerances. But that may soon change.

Perhaps the region is finding its own version of limits to growth. Almost certainly, there will be a minimum of 700,000 more people living in the region in less than 20 years (a majority of whom will be born to people already living here). So, whether to grow is not the question (Adams).

The "limits" question is whether the region, because of past decisions on development and transportation patterns, now faces a choice among inherently unattractive options. By analogy, if the region were a business, one might say there is a problem with the convenience or attractiveness of the product. Shall we improve the product and raise prices to pay for the improvement, on the grounds that our customers will appreciate and pay for the solution? Or do we advertise that it isn't perfect but it's not

very expensive? None of these choices is very appealing.

But that may be the dilemma the Twin Cities region faces. Shall we be a congested place but

The "limits" question is whether the region, because of past decisions on development and transportation patterns, now faces a choice among inherently unattractive options.

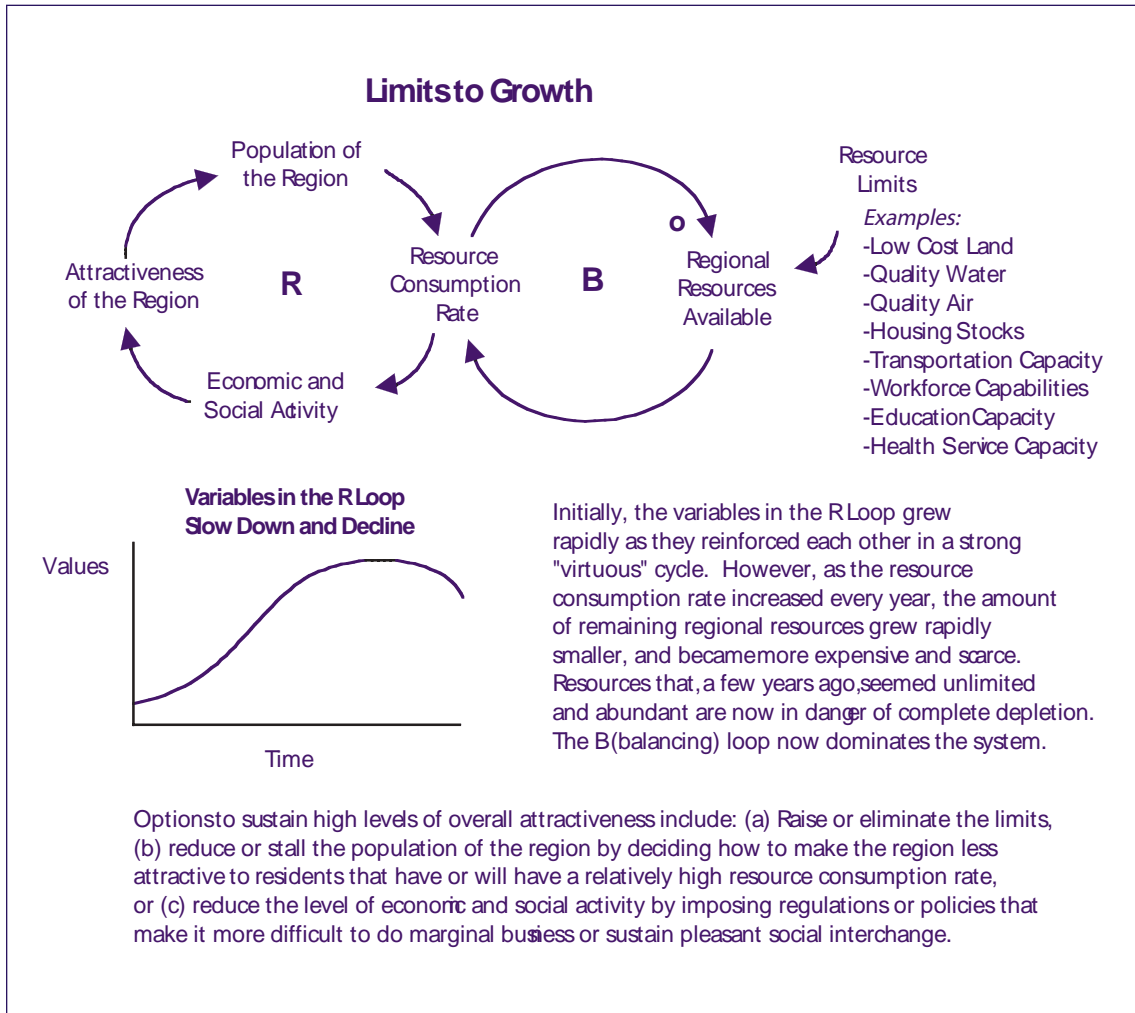
one with compensating virtues? Do we aspire to be more like Boston or more like Atlanta? Shall we protect and improve mobility and access to all the places people want to go, but raise our prices (taxes) to pay the bill? Is transportation so critical that we have to take money from another division of the "company" (schools, health care?) to pay for what needs to be done?

Should the region take a hybrid approach—accepting lower residential densities most places but building higher density destinations that are served by transit (think Chicago, Denver, and soon, Seattle)?

As Figure 3 illustrates, at some tipping point a combination of conditions starts to drag down the quality of life. It is at that point that the hardest choices have to be made. (Ward)



Figure 3: Limits to Growth





TRANSPORTATION &





WHAT ARE THE UNDERLYING CAUSES? HOW DID WE GET TO THIS POINT?

Anyone listening to the political debate over land use and transportation will surely hear the claim that today's pattern is the result of natural market forces. People made choices about where to live and how they would get from place to place. Developers produced housing where they could make a profit, delivering products experience taught them would sell. People buying homes chose from what was available, and that reinforced the "wisdom" of the market.

Underneath that superficial rendering of market behavior, however, is a complex subterranean set of causes. The incentives in the tax code, the influence of zoning ordinances, and the myriad land and housing development rules and regulations make up a system that encourages additional development of low-density suburban areas and discourages investment in the redevelopment of the older parts of the region. Despite the modest effects of Minnesota's tax-base sharing law and the highly redistributive character of the state's fiscal policies, this incentive system wields a strong and durable influence over development patterns (Adams).

Money for roads seems consistently to favor high-speed arterials. It is doubtful that state and regional policies were created as an intentional strategy for low-density development. But neither are the effects accidental. They are the direct result of the composite policies of the state and region (Adams).

The Twin Cities area has a history of low density. Today's larger lots and spread-out development are not a trend shift, but a continuation of historical patterns.

Low density, ironically, has its roots in the best transit era the region has known. In a long stretch of Twin Cities history, from the late 1880s to the 1920s, streetcar service operated on more than 500 miles of tracks. The system extended to first-ring suburbs such as Richfield, Columbia Heights, St. Louis Park, and South St. Paul; later tracks ran to Hopkins and on out to then-remote settlements in

Wayzata, Excelsior, Stillwater, and White Bear Lake (Adams).

In this era, there were streets and corners with shops and offices, and around streetcar stations, enough density of population to make transit a popular service. So suc-

Soon after came the surging dominance of the automobile as the principal mode of travel ... The interstate system emerged and freeways arrived in the Twin Cities, vastly increasing the commuting reach of Minnesota's workers and setting off a dispersal of major employment centers.

cessful was this service that its owners, at that time private parties, developed extravagant expectations for the system. They overbuilt. In the wake of this overbuilding, landowners sold larger-lot parcels, locking in a land-use destiny for the region as a lower-density place.

Soon after, of course, came the surging dominance of the automobile as the principal mode of travel. Money flowed to road building. The interstate system emerged and freeways arrived in the Twin Cities, vastly increasing the commuting reach of Minnesota's workers and setting off a dispersal of major employment centers.

People moved for opportunity, and employers followed. Commercial and retail investments followed where people went. Everyone enjoyed the near-term benefits of cheap land and easy commutes. For a long time, this formula worked well enough.



Regional policies encouraged a continued pattern of low-density, spread-out development.

The relative absence of natural barriers such as mountains or an ocean, combined with an abundance of good roads, gave nearly ceaseless encouragement to the outward spread of homes and jobs. Besides, it was the driving force in the development culture. From the corporate boardroom to the priorities of “highway” departments to the images in *House Beautiful* magazine, the larger home on the spacious lot away from other activities was the goal that drove growth (Neckar).

Since the formation of the Metropolitan Council in 1967, it has been a regional responsibility to manage this growth in an orderly fashion. The Council’s tools have principally been the rate at which sewer interceptors are provided to deliver urban wastewater treatment service, and its power to determine the allocation of federal highway money that comes to the region.

For about 20 years, this produced a slow but steady expansion of what was called the Metropolitan Urban Service Area (MUSA), with most of the growth added contiguously. However, still relatively inexpensive fuel prices, combined with rising prices for land inside the MUSA, stimulated a market for urban development beyond the seven-county jurisdiction of the Council. In recent years, this farther-out development in so-called collar counties accounted for a rising share of the new building permits (Lukermann, Adams). By 2001, permits for new housing in Chisago, Isanti, Sherburne, and Wright counties, along with Pierce and St. Croix counties in Wisconsin, were 25 percent of the total for the 19-county area.

For a long while rivers, certainly in sectors of the region without adequate bridge capacity, slowed the pace of this outward march. But witness how development accelerated when the Cedar Avenue Bridge was upgraded, when the new Bloomington Ferry Bridge was completed over the Minnesota River, and when the I-35E bridge crossed the Mississippi River. Note, too, the continuing ferocity of debate over the stalled proposal for a new St.

Croix River bridge.

On the other hand, the integrity of the potable water supply, while mostly unseen, may yet prove to be the most formidable natural barrier to the region’s further development (Neckar).

No one is surprised to find that a majority of people in the home-buying market has a preference for newer, larger houses on bigger lots. A minority prefers smaller, older, denser situations. As is often said, this market is a quest for closets and bathrooms (bigger and better ones) combined with the will to drive farther to qualify for loans.

When three sub-markets were subjected to a 25-year analysis of how housing prices change, it turns out that property value increases greater than inflation accrue disproportionately to the newer/larger home model. Research examined a sample of homes along lines drawn south and northwest from

the Minneapolis core and northwest from the St. Paul core. Of course, both core cities have pockets of affluence, homes that remain among the most expensive in the region. But on average nothing in the findings contradicts the principal finding (Adams).

Hard conclusions are elusive, however. Demographic shifts, such as an influx of immigrants, change the patterns, as does an outflow of retirees. And other conditions influence home location decisions, such as perceptions of the quality of schools or the safety of neighborhoods. Schools and safety are often cited as top-of-the-list in this decision.

But even absent hard conclusions, questions arise from this examination. If property taxes for a similarly situated home in a newer, outer area are lower than those for its cousin in the center of the region, why is that? Does that represent a “capitalized” tax differential that is simply not fair?

A similar question applies to charges for basic infrastructure. If the charge to join the wastewater treatment system for new users is less than the marginal cost to the public to provide the service, is that fair? Compared to what, one might ask? Previous regional research has concluded that houses—and businesses—in the core of the region actually pay more than the marginal costs for providing sewer services. So if data also indicate that property values

The integrity of the potable water supply, while mostly unseen, may yet prove to be the most formidable natural barrier to the region’s further development.



on newer, larger homes on larger lots are appreciating more rapidly than those for smaller and older homes nearer the region's center, then state and regional policy would certainly appear to be punitive to the latter group. And to be giving a break to homebuyers whom, on average, appear to be among the most affluent (Adams). That these policies and practices have influenced the development pattern in the Twin Cities seems clear enough.

Local governments play the predominant role in land development.

Local governments' zoning ordinances and development rules favor a low-density, generally homogeneous pattern in which homes are separated from all other uses except for churches and schools, and lower-priced housing is discouraged.

Local communities, while they create comprehensive land-use plans that are reviewed (by the Metropolitan Council) for compatibility with the prevailing regional framework, still hold most of the cards in determining development patterns. But no community can develop in a way that avoids impact on other communities. The location of commercial activity affects traffic patterns. Substantial growth in Savage affects Burnsville; both draw on a finite source of capital for all forms of publicly provided infrastructure—from main roads to sewer lines to schools (Adams, Neckar).

Local governments also draw commercial and industrial operations from older locations to newer ones. Since commercial enterprises pay higher rates of property taxes than do homeowners, having a healthy mix of commercial property owners in the tax base is a prized objective in all but the wealthiest communities of the region. Wealthy North Oaks can survive as a purely residential community. But ask the citizens of Centerville in Anoka County, where there is little commerce or industry, about their high residential property taxes. Cities that still have land supply and the political will to develop it possess a formidable arsenal of assets, such as:

- Still-abundant stretches of land on which it is easier and cheaper to develop compared with tackling tight sites, brownfields, and sometimes excessive bureaucracy in core cities.
- The opportunity to “start fresh,” compared with the relatively higher costs of rehabilitating existing structures, compounded by even more costs if any properties have “historic” designation (though those are sometimes mit-

igated by tax credits).

- Environmental regulations that are often more flexible in the developing suburbs.
- A market preference for suburban amenities, coupled with a majority preference for living in newly developed communities nearby.
- Free (or at least not directly charged to the user) parking.
- An increasing number of enterprises not requiring proximity to their suppliers or customers.
- Public subsidies—ranging from provision of tax-exempt industrial revenue bonds to uses of Tax Increment Financing (Adams).

The steady decentralization of commercial, light industry, and retail enterprises scatters the major employment sites in a pattern nearly guaranteeing more scattering of the population and more driving in total to access necessary daily destinations. These commercial-industrial zones are powerful centrifugal development forces, more so than building housing subdivisions at the edge (Adams).

Then there are zoning ordinances. These local “laws” directly affect, as they are intended to, the physical impact of development on the land patterns, and on the affordability of homes in that community.

Zoning ordinances often specify a long list of constraining requirements, designed in sum to produce predictability in the nature and quality of development the community experiences. These ordinances now typically spell out minimum lot widths and sizes, minimum floor areas for a single-family residence, and minimum number of garage spaces. Then add the standardization of product imposed by the mortgage financing industry. The visual result is a pattern of homes that look very much alike in size if not style, and a relative scarcity of homes that are affordable to people making less than the region's median household income. While land prices in some areas of the region have constrained lot sizes, in general the low-density ratio retains its tenacious hold on the region's housing pattern.

City officials, when they get pressure for more diversity of pricing in houses, characteristically point out that they have to rely on the property tax source for most urban services, and that lower-valued homes tend to cost a city more for services than the city can collect in taxes. (And for school districts, this tax-math can be even harsher if the average household has one or more school-age children on



whom several thousand local dollars must be spent each year). So, in some communities, this revenue effect becomes a stubborn standard for maintaining minimum specifications and giving a clear preference to developing upper-bracket homes.

Enabling this pattern is, of course, the provision of sewer capacity, the capital cost of which was, for a generation starting in the mid-1960s, paid in large part by the federal government as part of its effort to improve water quality. But in the last decade or so, the costs fall entirely to the region and sometimes the state. That the dollars are regional puts a decidedly different edge on the equity question: if it costs more per unit to provide sewer services in a low-density development pattern, are those marginally higher costs recouped? If they are not, why is the region subsidizing this more costly form of development?

If it costs more per unit to provide sewer services in a low-density development pattern, are those marginally higher costs recouped? If they are not, why is the region subsidizing this more costly form of development?

Roads are often the initial “enablers.” Built from funds that federal, state, and county taxpayers have provided, they essentially open up areas for profitable development and homeownership opportunities. Publicly provided sewer pipes often run right along the same right-of-way corridor. When buyers realize a gain in their property values that exceeds the rate of inflation in these newer areas, they are in essence pocketing a wealth transfer from their fellow taxpayers, some of whom may not be so fortunate (Adams).

On all these infrastructure questions, state and regional policies seem driven by “averages.” Indeed, it is into the realm of averages that policymakers take quick refuge, because by definition they smooth out differences. Most economists, though, argue that the best and most relevant measure of the cost of adding services is the “marginal” cost. Marginal costs will show when additional capacity is efficient by adding scale; conversely, they unmask inefficient or exceptionally expensive costs per unit of growth.

They reveal certain “lumpy” expenditures, such as when an entire additional school must be built. And, importantly, marginal costs, when taken from the pockets of beneficiaries, send an accurate “market” signal about what this growth actually costs. The charges then force a discussion about what is a public good, with costs justifiably shared, and what is a private good that merits no subsidy (Stinson and Ryan).

To the degree that averaging costs produces unfair results, it is not just a suburban/urban conflict. Marginal costs can exceed average ones quite dramatically when growth prompts expensive retrofitting of existing facilities in older parts of the region. And, government is not alone in practicing pricing by averages. Providers of natural gas, electricity, and telephone service in the region do substantially the same thing. In applying average costs for installations, the more expensive transactions become unearned bargains to users.

Other subsidies

The most controversial tool used by local governments to induce development is Minnesota’s tax-increment financing (TIF) provision. Originally designed as a tool to restore blighted areas, to encourage the building of more affordable housing, and to boost economic potential at sites with weak market characteristics, it evolved into the all-purpose tool for attracting new development (Adams).

Cities have used TIF to write down the costs of land acquisition and reduce ordinary fees. Most commonly it is used to underwrite the costs of assembling and improving a site to make it suitable and attractive for development. Then, as its name implies, the increment of additional revenue from the growing taxable value is used to retire the bonds used for the improvements.

The capacity of TIF as a primary revenue source for development was substantially reduced by complex changes the legislature made in the 2001 overhaul of the property tax system. Its leveraging power was reduced by about 30 percent (by even greater percentages for certain types of development).

People have a time budget for travel. It’s minutes that matter, not miles.

The conventional way of measuring the growth of traffic is the annual count of vehicle miles traveled, often expressed as “VMT.” VMTs offer an interesting statistic, quantifying



the general rise in congestion. This measure makes a case for faster cycles of road maintenance and replacement needs. But counting VMTs is no help at all in explaining the behavior of citizens in their role as regional motorists.

The reason: it is the *time* it takes to get from where you are to where you are going that matters. No one counts miles. And that “time budget” for commutes has grown from 20 minutes in 1980 to 21 minutes in 1990 to 23 minutes in 2000—in other words, not much.

To explain even the modest rise, some analysts point to residential land-use practices, but it is not clear from research data that any other patterns of land use would have reduced travel times. No one would look at a blue Neon and a black Porsche and conclude that black paint costs more than blue paint. Like paint, land uses are easily seen; because they are, they attract disproportionate attention compared with underlying causes like fundamental changes in the economy (Davis and Barnes).

A glance back a half century is useful. The Twin Cities’ urbanized area in 1958, compared with 1990, covered about one-fourth of the land area, was two to three times as dense, had nearly no purely residential zoning, and had transit serving almost all the built-up area (albeit at a 7.5 percent share of trips). Yet travelers in 1958 spent substantially the same amount of time per day getting around as travelers of 1990 did. Because speeds were slower, the 1958 crowd didn’t cover as many miles, but they spent as much time.

Now again, averages inform but can also mislead. Drilling down for differences among travelers, and looking for any variation that exceeds 10 percent, one finds that people traveling from outlying exurban or rural areas—no surprise—have longer trips in terms of times as well as miles. They are on the road 80 minutes a day, compared to 68 for a person living closer to the center of the region. All the variation in time is related to commutes; none of it is for trips not related to getting to work. People in Minneapolis or Apple Valley are spending about the same amount of trip time going to the grocery store, the dry cleaners, or the movies.

Notice in Table 4 that the substantial increase in speed between 1958 and 1970 had the effect of increasing distance traveled, not in reducing time on the road.

By the period 1970–1990, the data show people traveling a lot more; in fact, the most striking change is the huge

Table 4: Characteristics of auto-only households, 1958 and 1970

	1958	1970	% Change
Minutes/Traveler	68.2	67.5	-0.9 %
Trips/Traveler	3.63	3.85	6.1 %
Miles/Traveler	15.2	20.1	31.6 %
Average Speed	13.4	17.7	32.6 %
Minutes per Trip	19.1	17.2	-9.4 %
Miles per Trip	4.20	5.22	24.3 %
Cars/Household	1.23	1.43	16.3 %
Travelers/Household	1.93	2.04	5.7 %
Prob. of Traveling	0.56	0.62	10.4 %

Land Use and Travel Choices in the Twin Cities, 1958–1990, G. Barnes and G. Davis, 2001, p. 16.

Table 5: Characteristics of auto-only households, 1970 and 1990

	1970	1990/Z*	% Change	1990/7c*
Minutes/Traveler	67.5	69.6	3.1 %	70.9
Trips/Traveler	3.85	4.59	19.2 %	4.55
Miles/Traveler	20.1	26.9	33.8 %	28.5
Average Speed	17.7	23.2	31.0 %	24.2
Minutes per Trip	17.2	15.2	-11.8 %	15.6
Miles per Trip	5.22	5.86	12.3 %	6.27
Cars/Household	1.43	2.00	49.0 %	2.06
Travelers/Household	2.04	2.19	7.6 %	2.23
Prob. of Traveling	0.62	0.89	44.5 %	0.89

Land Use and Travel Choices in the Twin Cities, 1958–1990, G. Barnes and G. Davis, 2001, p. 17.

increase in the probability of traveling in any given day. People made more trips, traveled greater distances, but in about the same elapsed time as before. If the average vehicle is driven 15,000 miles a year, it is on the road an average of 41 miles every day.

But what about transit users? Certainly, proportionately more people live in the central cities that do not use automobiles for the work trip. A concentration of employment in a district significantly affects use of transit. Best examples: the two downtowns and the University of Minnesota area. These zones, while constituting less than 1 percent of the total land area of the region, claim 60 percent of all transit trips (as well as a majority of the walking and biking trips). These zones attract in excess of 15 percent shares for transit from many supposedly transit-hostile suburban locations. Parking costs, good bus service, and personal calculations about conve-



nience go a long way toward explaining this behavior (Davis and Barnes).

It makes more sense to focus on problem travel than on all travel generally. And research shows that work trips are the key. So instead of designing a policy framework that strives to build higher densities everywhere, including residential neighborhoods, the odds would seem to favor concentrating on major employment and commercial destinations. In these areas, transit service becomes feasible.

Think about it: congestion, peaking at work-trip times, shows up almost entirely in areas around commercial destinations, not residential zones. If you work along I-494 or Highway 212 in Eden Prairie, it does not matter much whether you started your journey in the dense neighborhood of Highland Park in St. Paul or in a spread-out subdivision of Lakeville.

These commercial zones, while congested, are also the zones in which people who decide they want a less auto-intensive lifestyle may create a market for housing (implications both for immigrants and the surging crowd of boomers who are rethinking their options for gray years).

These approaches suggest considerable potential for reducing automobile travel. But no one should imagine that housing markets will instantly convert auto travel to transit trips, or that congestion will be erased from daily experience. An increase of 1,000 people per square mile yields about a 1 percent increase in transit share of work trips and about a 1 percent decrease in overall daily driving per person. In other words, the region would have to boost density by 50 percent over the current average of 2,000 people per square mile—a formidable prospect considering the densest residential areas of the entire metro area have only 10,000 people per square mile.

Most of the costs for automobile travel are borne by users themselves, out of their personal and family budgets. In a climate of relatively low prices for fuel, the potential for incentives to change modes or other travel choices is limited.

The amount of travel each day is immense. On a typical day in the metro area in 1998, 2.6 million people made 9.1 million trips. Of those trips, 94 percent used a personal vehicle; 2.5 percent were by transit and another 3.5 by school bus. The total result that day was 71 million miles of travel (McCullough and Anderson).

Obviously, people see benefits in taking all these trips. They are worth what they cost. But two troubles are poised to ambush these benefits. One is that the amount of travel is expected to grow significantly, as the population swells. The other is that too little consideration is given, anywhere, to the full costs of these trips.

Table 6: Travel Projections, 1998 and 2020

	1998	2020	Change
Population	3,036,600	3,704,700	22.0%
Households	1,159,900	1,474,600	27.1%
Vehicles	2,685,000	3,514,000	30.9%
Daily Vehicle-Miles	71,000,000	100,500,000	41.6%
Daily Vehicle-Hours	2,620,000	3,650,000	39.3%

The Full Cost of Transportation in the Twin Cities Region, D. Anderson and G. McCullough, 2000, p. ii.

The full costs of transportation in the region for 1998 totaled \$27 billion, projected to be \$42 billion by 2020 (in 1998 dollars). Here is what most people do not think about: the total per person was \$9,000 in 1998 (which would be at least \$11,200 per person by 2020). Travelers themselves pay 84 percent of the total in fixed costs (vehicles, driveways, garages, etc.) and variable costs (fuel, insurance, maintenance). Those costs are considered “internal.” Since a car seems essential in today’s culture, most people do not spend time calculating or worrying over these costs.

In addition, there are costs paid by government at every level, about 9 percent of the total, which are funded through property, sales, fuel, and income taxes. Sixty percent of these costs are related to building and maintaining streets and highways, the rest going for services such as transit, law enforcement, emergency medical, environmental protection, and parking.

There are also “external” costs, 7 percent of the total, that are not borne directly by the user imposing them. External costs produce effects that translate to significant publicly shared costs. These kinds of costs are the most difficult to estimate, but some, such as costs associated with congestion (pollution, productivity), have significant potential to rise.

Congestion produces additional, obvious cost to drivers and riders caught in it, but that cost is mostly accounted for as “internal.”

Note Table 7, which assembles all transportation costs and projects ranges of likely increases up to 2020. Admittedly, these figures incorporate costs that few people ever calculate: time costs, annualized costs of investments in driveways, parking, and garages, costs of air pollution, and the



Table 7: The Full Costs of Transportation
(All figures are in millions of 1998 dollars.)

	Governmental Costs					
	1998			2020		
	Low	Mid	High	Low	Mid	High
Streets and Highways	1,340	1,535	1,735	1,820	2,195	2,570
Transit	245	260	270	355	415	470
Law Enforcement and Safety	225	315	405	370	565	760
Environmental Cleanup	60	105	155	90	165	245
Parking	205	270	340	295	415	540
Costs to Other Agencies	40	70	170	55	120	325
Total Governmental Costs	2,120	2,560	3,080	2,900	3,870	4,910
	Internal Costs					
	1998			2020		
	Low	Mid	High	Low	Mid	High
Fixed Vehicle	5,650	6,450	7,300	7,800	9,000	10,050
Variable Vehicle	2,200	2,650	3,150	3,050	4,350	6,100
Transit Fares & Travel Time	170	220	265	285	365	445
Non-Transit Travel Time	6,780	8,910	11,060	10,890	14,440	18,070
Other Personal Time	770	1,240	1,720	940	1,480	2,000
Crashes	1,115	1,365	1,810	1,640	2,005	2,635
Parking and Drives	1,100	2,040	3,925	1,700	3,165	6,075
Total Internal Costs	17,800	22,900	29,250	26,300	34,800	45,400
	External Costs					
	1998			2020		
	Low	Mid	High	Low	Mid	High
Congestion	165	330	525	565	1,145	1,860
Crashes	150	220	320	230	335	480
Air Pollution (Health)	260	725	4,035	260	800	5,040
Air Pollution (Other)	95	175	365	95	220	575
Global Warming	30	100	185	45	135	260
Petroleum Consumption	155	295	575	235	355	870
Noise, Fires, & Robberies	15	40	75	25	55	105
Total External Costs	870	1,890	6,040	1,450	3,050	9,190
Full Cost of Transportation	20,800	27,400	38,400	30,700	41,700	59,500

The Full Cost of Transportation in the Twin Cities Region, D. Anderson and G. McCullough, 2000, p. iii.

costs of a variety of government services that indirectly support transportation.

That people are routinely willing to spend such sums is by itself overwhelming evidence that the benefits of travel in the region greatly outweigh the costs. Any policy initiative narrowly aimed at reducing driving is likely doomed, given the percentage of costs borne by users. Policy is likely better focused on specific issues that pose more threat to the region's future—the work trip, congestion zones, and vehicles with faulty emission systems (Davis and Barnes).

Government and external costs account for only 16 percent of the total. But, in absolute terms, they are large and likely to grow.

The \$4.5 billion from taxpayers in the 1998 study year and the projected \$6.9 billion by 2020 are both large amounts. If state and regional policies can be refined to

have a beneficial effect on costs, while holding on to travel benefits people prize, a net gain for the region is possible (McCullough and Anderson).

Roads

A major share of the government costs is spending on streets and highways. Revenue constraints have held down the growth in road budgets for some time now. Current official plans do not contemplate many major new road-building projects. If this pattern holds, then total budgets for transportation in the region will rise between 36 and 48 percent in real terms by 2020, lagging the growth rate in per capita personal income. Even a burst of expanded spending on roads seems unlikely to alter this general trend.

Transit

The government costs for transit are the full costs of providing and running the transit system less the fares paid by users. Metro Transit by far accounts for the majority share of spending; taking federal data from 1995, total operating costs were \$132 million plus capital costs of \$35 million. Total fare revenue was \$47 million, yielding a net subsidy of \$119 million.

Table 8: Governmental Costs of Streets and Highways

Total Spending in the 19-county Twin Cities Region (Millions of 1998 Dollars)						
Spending Source*	1998			2020		
	Low	Mid	High	Low	Mid	High
State	345	445	550	470	640	815
Local	995	1,090	1,185	1,350	1,555	1,755
Total	1,340	1,535	1,735	1,820	2,195	2,570
Per Capita Spending						
Spending Source*	1998			2020		
	Low	Mid	High	Low	Mid	High
State	\$115	\$145	\$180	\$125	\$175	\$220
Local	\$325	\$360	\$390	\$365	\$420	\$475
Total	\$440	\$505	\$570	\$490	\$595	\$695

The Full Cost of Transportation in the Twin Cities Region, D. Anderson and G. McCullough, 2000, p. 63.

The overall regional transit system consists of four other service providers—private operators, small urban public service transit services, rural public transit services, and the so-called opt-out public transit services. Taxis, airport vans, limos, jitney service (if it exists) all make up a collection of private operators who provide important transit service. But because the data are not as accessible and the size of this system is relatively small, the private side of transit attracts only rare discussion.



Also, Metro Mobility is a system operated by the Metropolitan Council to serve citizens who qualify for transportation assistance under the Americans with Disabilities Act.

The “opt-outs” are bus systems that serve areas that lie within Metro Transit’s jurisdiction, where those communities have, under state enabling law, decided to provide their own service. Funded still through Metro Transit, their total costs for a study year of 1997 were just over \$22.5 million, with revenues of \$4.5 million, making the net government cost \$18 million.

The Metropolitan Council’s goals for 2020 include two light rail lines (one of which is under construction), five dedicated busways, and three commuter rail lines. The Council estimates capital costs for each light rail line at \$500 million, each commuter rail line at \$220 million, and each busway at \$110 million to build. Over a 22-year period, this works out to a \$100 million annual average. Annual operating costs associated with these projects are another \$75 million.

Other governmental costs

Law enforcement and safety costs associated with transportation will likely rise at a rate 33 percent faster than the growth in population.

The costs of environmental protection and cleanup—covering everything from leaking gas tanks to auto emission effects to providing noise barriers—will continue to rise, at least as rapidly as the general economy.

Few people ever think about energy security costs as part of the region’s transportation system. But these costs, which cover the region’s share of protecting foreign oil shares, the costs of the Strategic Petroleum Reserve, and the more localized costs of ethanol subsidies, are real and are expected to rise by 60 percent by 2020.

Parking costs are substantial and headed higher. Just the parking provided for directly by government agencies, less any fees paid by parkers and completely ignoring all other parking costs, will generate cost increases somewhere between 80 and 120 percent faster than the general economy, if present trends hold.

The “external” costs of transportation—at a midrange projection—will rise by almost 70 percent by 2020. Air qual-

Table 9: Governmental Costs of Transit

Metro Transit—Traditional Bus (Thousands of 1998 Dollars)						
	1998			2020		
	Low	Mid	High	Low	Mid	High
Operating Costs	135,900	138,100	140,400	169,200	195,200	221,200
Revenue	48,600	49,400	50,100	60,500	69,700	79,000
Op. Subsidy	87,300	88,700	90,200	108,700	125,400	142,100
Capital Cost	35,700	35,700	35,700	35,700	38,700	41,700
Metro Transit Total	123,000	124,400	125,900	144,400	164,100	183,900
Metro Transit—Special Projects (Thousands of 1998 Dollars)						
	1998			2020		
	Low	Mid	High	Low	Mid	High
Operating Subsidy	0	0	0	12,000	18,000	24,000
Capital Cost	0	0	0	23,000	34,000	45,000
Light Rail Total	0	0	0	35,000	52,000	69,000
Costs of Other Regional Transit Providers (Thousands of 1998 Dollars)						
	1998			2020		
	Low	Mid	High	Low	Mid	High
Private	5,200	5,200	5,300	6,400	7,400	8,400
Small Urban	500	500	500	600	700	800
Rural	4,300	4,300	4,400	5,300	6,100	7,000
Opt-Out	8,000	8,200	8,400	9,800	11,700	13,300
School Bus	87,700	97,500	107,200	131,000	145,600	160,100
Non-Metro Total	105,700	115,700	125,600	153,100	171,500	189,600
Total for Region						
	1998			2020		
	Low	Mid	High	Low	Mid	High
Total for Region	246,700	258,300	269,900	354,600	413,500	472,000

The Full Cost of Transportation in the Twin Cities Region, D. Anderson and G. McCullough, 2000, p. 67.

ity may benefit from continued technological progress on emissions, and noise, while irritating, is a relatively small part of the total cost. But vehicle crashes and congestion will rise much more significantly. Crashes are likely to rise by 50 percent while congestion costs may actually triple their impact. Nonetheless, even a doubling of all government spending (through a rise in taxes) would make scarcely more than a 10 percent dent in the transportation budgets of users (Davis and Barnes).



WHAT ARE THE POLICY CHOICES?

The context for any policy changes is what current politics makes possible. At least for the near term, the political scene will be swamped by the struggle to rebalance budgets around slower-growing revenues. Longer term, though, the politics of congestion will likely predominate, as the trend toward too many people using the same road at the same time persists.

The region's growing congestion results in part from the number of potential destinations accessed from a given road. Obviously, more destinations generate more traffic. But does land-use policy have any effect on transportation behavior? If the region succeeded in raising the density levels of housing, would trips be shorter on average? Would there be more use of public transit?

The converse question carries equal weight: would a change in transportation patterns make a measurable change in the market for land development and housing preferences? The disquieting conclusion from previous research is that surprisingly little is certain about these interactions. People

decide on housing locations for a variety of reasons. Where roads or rail lie may influence commercial locations, but transportation has not dominated residential decisions in a long time.

People choosing residential locations seem to have shared a key assumption with businesses locating office and commercial facilities: government will extend the transportation and other infrastructure to those locations. It is an assumption not yet overturned.

This ambiguous state of affairs may, however, be on its last legs. People still believe they can get just about anywhere in about 20 minutes. While the trip-time averages haven't moved much, that 20-minute traditional commute time is now enjoyed by less than half of all commuters. Commutes of 40 minutes or more have increased by 32 percent since 1990, reflecting the proportion of people living farther from major employment centers.

Ever since the streetcar bred desire to move outward, the Twin Cities region has been on a steadily spreading-out growth curve. If it were not for today's traffic, undermining expectations of convenient mobility, most people would not think there was any problem with this low-density spread-out pattern. But there is. The costs of maintaining the system are growing.

Think of it like a house the region's citizens own. To

avoid living too close to each other, we added wings and rooms, and then more and more, because we preferred it that way and because we could afford it. Then, one day, we woke up to find the whole thing needed painting and the roof needed replacing and all the landscaping was worn out. No one seems to have contemplated the costs of keeping up something more spread out than it needed to be.

Another analogy is the accountant's balance sheet. We are naïve if we think that just spending more chasing a problem produces an asset. Assets have to be compared

with liabilities to show whether the "net" is positive. If we spend more on health care, while ignoring prevention of disease, is that progress? We could generate a lot of cash flow with a big prison system and find we had not advanced any social progress. The same is true with transportation. Increasing the system's volume, if we are adding to the liability side of the ledger, neither tames congestion nor produces any alternatives (Adams).

So here is the fundamental question: what are the policy changes that would make a difference? The answer appears to lie in two, and only two, categories: adopting policies of honest pricing of transportation services and land development, and providing more choices than exist today for community development and travel modes.

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Honest pricing is the way to let the market work.

Honest pricing? That simply means full disclosure of true costs. How would that work? In theory, the estimated costs from land development impacts and transportation services could be more directly reflected in the hierarchy of decisions that now govern investor, developer, and buyer behavior (Stinson and Ryan). An honest price might slow the conversion of fresh land for development, stimulate more creative redevelopment in existing communities, and provide resources and incentives for investment in transportation alternatives.

First, recall how that decision chain generally works today. Investors look for land where they see potential for pricing value that exceeds rural or agricultural use. Developers come along, if they are not the investors, and assess the land's potential for a particular class of buyers; if that assessment is favorable, they seek to acquire or control the land to develop a market for those buyers.

Only if the time required for trips from this new location is seen as beyond reasonable is the buyer's sense of the "net relative benefit" of the home compromised.

Developers then evaluate the available land against the total supply that may be available for development. They size up the zoning scenarios that will likely apply, what demands there may be for developer-provided infrastructure, and what sort of regulatory environment development will occur in.

They must also take demand into consideration, estimating how buyers will intuitively see the net benefit of buying, how many such households might exist in the demand pool, how rapidly housing units would sell, and whether supportive retail and commercial development will follow.

Somehow the market keeps all these measures in equilibrium. If the rate of demand increases and supply is not keeping up, values and prices rise. If, however, prices rise too much, demand drops back.

When buyers enter this scenario, they have their own

mental calculations to make. Buyers typically look at what principal and interest will cost, and how this purchase will affect their property tax bill (modified by effects on income tax liability). Most buyers are also looking for long-term impact. They assume when they buy a new house in a good development, that the community will also offer good schools and a safe environment, and that their house value will rise faster than inflation (Adams).

Buyers apparently do give some thought to transportation costs associated with buying a new home, especially if a new location requires adding another vehicle. With fuel still relatively cheap, though, variable costs do not seem to get much respect with the possible exception of the "time" cost. Only if the time required for trips from this new location is seen as beyond reasonable is the buyer's sense of the "net relative benefit" of the home compromised.

Honest pricing of transportation costs

Transportation, research shows, both leads and lags development. But there is surely an interaction between the two, particularly when transportation decisions have the effect of promoting inefficient land development. And sometimes there is a fiscal impact on communities from a transportation decision, even if that decision cannot be technically considered a "cost" of transportation (Adams).

Shelter and mobility may start out as separate concerns for most people. But in economic systems, they inevitably become entangled. Economists remind us that when the demand for any "good" increases, the price of a complementary "good" is likely to fall. If the perceived cost of buying a car goes down, the demand for automobile-oriented destinations goes up. So as people conclude that owning and operating vehicles is cheap, relative to other costs, their demand for homes and job locations becomes less sensitive to distances they will have to travel.

So, what would it take for pricing to slow the rate of new land conversion (Stinson and Ryan)? The simple answer: expose the users of the road system to a larger share of the public costs. Of those costs, 70 percent are handled today through state aids to local governments, local property taxes, and motor vehicle registration taxes. Total Minnesota state and local public expenditures for the road system are \$2.4 billion a year; at today's rate of driving—52 billion miles a year—that is 4.8 cents per mile of travel. Much of that cost is borne by low-mileage households or by people who do not drive at all.



Without changing the total revenue collected, that 70 percent ratio could be reversed. To illustrate, suppose that the state income and sales taxes now used for transportation in local aid formulas were eliminated, and that the property tax and motor vehicle registration tax (which are not sensitive to how often a vehicle hits the road) were cut in half. Instead, collect that revenue through the motor fuels tax. This tax, currently set at 20 cents, would rise by 30 cents, with the result that 70 percent of system costs would be borne by those using the roads. (One immediate result might be an interest in more fuel-efficient vehicles.)

Another means of focusing cost on the user would be a tax on miles driven. Assuming the same cuts in income, sales, and property taxes, a three cents per mile charge would replace lost revenue. (One hundred miles of travel at three cents per mile would cost a motorist \$3.00. A 50 cent per gallon tax—assuming the 18 miles per gallon fleet average—would cost a motorist \$2.89 for the same 100 miles—roughly the same.)

So, taxing either miles or fuel asks users to finance the marginal costs of the system. The first reactions to proposals of this sort almost always suggest they are too complex to administer, or just too radical. On the other hand, the system as it stands rather radically hides the true costs from users. In addition to largely hidden general public costs, if the “external” costs of the road system were loaded on to users through the motor fuels tax, the price per gallon would rise by 67 cents (Stinson and Ryan).

Today’s tax system for transportation is only partially driven by use. Based on 1996 data, a family with a modest home and a five-year-old Taurus automobile pays at least \$400 in road-related property tax whether its members drive or not (Stinson and Ryan). (Transit costs hit every household, too. In 2000, the average household in the metropolitan service area paid about \$180 toward operating costs of all forms of transit.)

The threshold of a tax shift that would translate into measurable market behavior change is probably relatively high. Road system costs would have to be more visible and be directly paid by users for their impact to change buying-decision behavior. For developers, it is estimated that a rise of \$5,000 in annual commuting costs would push the development premium for land acquisition past the feasibility point. Up to a point, buyer behavior might be merely to trade current vehicles for more fuel-efficient ones.

Technology will likely continue to be a wild card in this

analysis. Once Intelligent Transportation Systems (ITS) technology hits the mass market, and people can equip their cars for computer-controlled spacing in traffic, this option may actually seem to insulate commuters from some effects of a congested commute. Conceivably, under conditions of persistently dangerous congestion and rising numbers of crashes, some roads might be open only to vehicles equipped with ITS.

Nonetheless, a policy of honest pricing appears to be a potentially effective tool. But can it gain a political foothold in today’s environment? Recent experience in the Twin Cities region with efforts to price use of roads generates very little optimism. In the late 1990s the state authorized a proposition to cooperate with the Federal Highway Administration in testing driver behavior incentives and revenue potentials by charging tolls—a “value pricing” demonstration. This proposal would have shifted more costs to road users and made creative use of the private sector in getting the long-awaited Highway 212 built faster. To leave no democracy stone unturned, the enabling statute set up an approval process resembling the decision rules of the United Nations Security Council—any member city affected by the road could veto the approach. Eden Prairie did.

In 1997 Mn/DOT proposed allowing motorists caught in the increasing congestion on I-394 to buy into the lanes reserved by agreement with the federal government for high-occupancy vehicles (a standard currently set at two persons per car). The public reaction was fast and ferociously against the proposal, which was summarily withdrawn. Some critics said these were lanes for the rich. The evidence, however, from a prior demonstration in San Diego on a similar stretch of freeway is that all income groups pay tolls for access to a faster road—tolls which, by the way, average about the same price as transit fares. Recent local surveys indicate receptivity may be increasing for this approach.

One way in which transportation costs are already “priced” is through the ramp-meter access system on the region’s freeways. The Twin Cities is among 11 such regions in the nation that use meters extensively to manage freeway flow. The objective is to move more vehicles through these corridors at higher average speeds and with lower trip times, greater predictability, and a lower incidence of crashes.

The ramp meter system does yield these benefits, but over time, as congestion has grown, metering has also irritated many motorists stuck in queues, waiting longer than they felt to be reasonable. Hearing those voices, the Minnesota



Legislature ordered a shutdown period in late 2000, around which Mn/DOT conducted a major analysis of effects and later, a market study of users. While results were uneven from area to area, during this period, average volumes went down by 9 percent and travel times went up by 22 percent. More important, crashes went up by 26 percent.

Based on the study of the shutdown period, however, and experiments in managing the meter system in the year thereafter, important changes were set for the fall of 2002 to use metering somewhat more selectively, to make the system more directly responsive to real-time congestion, and to assure motorists that wait times in the queue would not be excessive.

Clearly, any serious plan to shift more costs directly to users will have to come wrapped in a better explanation to citizens than any initiative seen so far. But progress will come slowly or not at all without shifting to full-cost accounting that is more transparent and better tied to user behavior. Even if tied more to users, however, pricing is unlikely to make a discernible difference in congestion levels. People pay more to buy and use cars in Europe, where support is balanced between roads and transit, and yet there is congestion in nearly every successful urban region. But charging directly for road use may still be sensible. Minnesota transportation revenues will have to exceed current rates just to sustain today's level of service (Stinson and Ryan).

Honest pricing of land development impacts

Cities have to build and support adequate infrastructure and assure a flow of revenue sufficient to provide local services. So their power to tax and to regulate land presents them with a constant balancing challenge. As costs have risen, so has the popularity of charging development impact fees, exactions, and special assessments in order to pay for improvements.

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Impact fees as practiced in many states have become rare in Minnesota, a casualty of the *Country Joe, Inc., et al. v. City of Eagan* decision in 1997, which stopped the city of Eagan's practice of charging new developments for road

access. But "exactions" continue in the form of charges to developers for on-site capital improvements such as hook-ups for sewer and water (in addition to a regional access charge for reserve capacity of the wastewater treatment system), storm-water management, or the creation of sidewalks and local streets. This pay-as-you-go approach is beginning to stir some reaction as fees in some communities have risen to eye-popping levels (Adams).

To avoid litigation, cities generally exercise considerable care that such charges are relevant to the new development and are exacted proportionately to the size of the project. But research indicates that, in the complex tangle of finance of development and taxation, the cost may not

actually fall on the developer (much less on the buyer market). The anticipation of the exaction may see more than half the cost translated into a lower market price for the landowner. As the sale proceeds anyway, it is difficult to see how the exaction is a tool for equity or for slowing the rate of development, if that is the objective.

If the fairness of forwarding a share of the real costs of development to the presumed beneficiaries is the objective, then special assessments that fall directly on the buyers of the housing units are a more direct and likely effective tool.

A policy of choices—realistic alternatives to driving and residential options closer to major employment and commercial amenities—would make the region a more competitive market economy.

Today's political rhetoric runs at a high temperature over transit. Transit skeptics see proposals for rail and rapid busways as punitive to automobiles, and they suspect that congestion is manufactured by undernourished road bud-



gets. They charge transit advocates with “social engineering.” This is, of course, a reversible canard, just as easily assigned to a half-century of policies that favored single and segregated land uses and nearly total dependence on automobiles to get to necessary destinations. Meanwhile, congestion continues to get worse. So, if the problem is that this spreading out pattern is indeed not sustainable—environmentally, logistically, or financially—then the challenge would seem to be one of rebalancing policy back toward a market of choices.

But how can this be done, with any assurance of impact on the travel and location decisions people make? Most past research indicates that making changes in residential land use, such as increasing densities, returning to mixed uses, or adding jobs or retail, have little impact on decisions about travel—unless somehow all those tools are applied together. People are going to travel, whether the road is fast or slow. And they will take jobs and pick places to live for a complex set of reasons. The challenge of daily travel is but one of those factors.

But three serious prospects do shine through the TRG research statistics and analyses.

1. Commercial centers—the key to transit success

Research shows that the densest sectors in the region, namely the two downtowns and the University of Minnesota district, prove to be significant in influencing the mode of travel people choose. People who live in or near these districts and work within them have multiple choices. They can drive (if they are willing to pay what parking costs), take transit, bike, or walk.

But, it is equally true that even suburbanites who live a considerable distance away, if they work in one of these zones, are much more likely to use transit to get there every day. These three destinations have many employers, multiple activity centers for meetings, eating, cultural events, and medical and other professional services as well as sports and entertainment. They are compact enough that arriving by transit (or parking once) encourages walking from place to place. The trouble is, we have only three such districts in the entire region. Could these characteristics be replicated? Almost certainly, increasing the densi-

ty of commercial development is much more likely to have a beneficial impact on travel behavior than creating higher suburban residential densities.

Major employment and commercial concentrations, once fairly centralized, are spread all over the region today. If zoning codes were liberalized to encourage mixing employment and housing and shopping and entertainment, how many of these districts might become major activity centers? Would paths for walking be demanded and delivered? And, just as both downtowns experienced in recent years, would a market for housing and supporting amenities follow? Research findings certainly suggest this is a plausible scenario.

There are other zones, smaller than most major employment centers, with potential to create the good kind of congestion. Across the Twin Cities area’s suburbs, enthusiasm is growing today to restore or create town centers. From Burnsville to Mendota Heights, Hopkins to Maple Grove, the trend has set

It turns out that creating higher densities, if that also produces a high-quality environment, is popular. Just crowding things together is not, and never will be.

in. People want a *there* there. Local officials are hearing the demand for a walkable town center with civic spaces, shops, cafes, and offices.

It turns out that creating higher densities, if that also produces a high-quality environment, is popular. Just crowding things together is not, and never will be. Higher densities also produce more taxable property and more capacity to provide services—up to a point. Up to that point, every additional property-owning citizen is another payer toward relatively fixed costs. But beyond a certain density of population, the actual per-capita costs of a city begin to rise. Law enforcement becomes a 24/7 proposition. Demand for emergency services rises. Everything wears out more rapidly (Davis and Barnes).



2. Neighborhoods—the intersection of community development and transportation

Trip-making behavior within neighborhoods and between neighborhoods actually can change, provided that local land-use planning is tied closely to transportation policy locally and regionally.

The evidence comes from an intense analysis of development and redevelopment sites in the communities in the North Metro I-35 Coalition. This coalition includes Arden Hills, Blaine, Circle Pines, Mounds View, New Brighton, Roseville, and Shoreview. These cities cover the full suburban range of development—from the tightly planned industrial suburb of the late nineteenth century to residential subdivisions with cul-de-sacs to agricultural land primed for development (Swenson and Dock). Despite the coalition’s name, these communities generally do not lie in one of the major transportation corridors.

Weaving together a fine-grained picture of the infrastructure, economic activity, and demographics of this stretch of communities, “modeling” research shows the potential of a higher density of jobs (more jobs than a lower-density commercial pattern would yield) in a physical pattern that makes transit commutes an option, facilitates circulation within the zone without the use of cars, and encourages walking. While the potential is there, the prospects of shifting to a more compact commercial form depend entirely on zoning and economic development and transportation and community infrastructure decisions being planned and implemented together, not separately (Swenson and Dock). This sounds like a sensible thing to do, but it is rarely done. Perhaps local officials see higher densities in Manhattan or Chicago terms, instead of the modest seven-units-per-acre threshold that makes transit service feasible.

Commuter rail—or any other means of providing a transit alternative—somehow gets debated all by itself, with capital and operating costs arrayed in newspapers alongside estimates of a potential ridership. This is not a useful market analysis without its being linked to land uses. If local governments become believers in choices, and open their zoning codes to densities and a mixture of land uses that might be supported by a robust market of residents

and business investors, then transit access becomes a feasible option. Neither Portland nor Boston is all high density. But they do contain zones of choice, and that is what is missing in the Twin Cities region outside of the urban core (Neckar).

Some communities—inner suburbia—either have or will have a chance at all-day transit service within the next 20 years. Outer suburban communities have only peak-hour service to major employment destinations such as the core cities. Neighborhoods in all of these communities, however, could be designed with a higher density of destinations connected by walking and biking paths—a plan that sounds both sensible and simple. But today’s practices starkly contradict this pattern.

The common human experience in most suburban commercial centers is the necessity to use a vehicle to go from place to place, even if the second destination, not really very far away, can be seen from the first. The design of these areas assumes an automobile for every movement. Some of these centers are actually dangerous places in which to be a pedestrian.

But for policymakers, the message is optimistic. The key is an environment with incentives for more people to live and work in or near a commercial zone, and with a reasonable balance of jobs and housing. An environment where a majority of daily needs can be satisfied with a short trip, where community design facilitates walking or biking, and where a serious investment in transit accessibility is visible to everyone living there.

Could markets for more efficient use of land by employers and homebuyers be affected by providing commuter-passenger rail service to major destinations? Research suggests this is also a winning strategy if local governments change their zoning to welcome a dense mixture of employers, services, amenities, and residential developments in 12-minute proximity to rail stations. Families just might choose smaller lots and homes in return for better amenities and more choices for transportation. The question is whether other communities can succeed without transit. If costs for automobile dependence soar, why would not the market for alternatives rise, too?



3. New markets for housing—a push from changing demography

The third prospect that seems to make the numbers stand up and salute is simply the differences in people. Not everyone is looking for the same life experience in the region. While a large market may still be attached to the twentieth-century version of the American dream, some population groups are developing decidedly different preferences.

Immigrants continue to stream toward the core city areas, in part because that's where most of the housing that is affordable for lower-income families is located. Many students see advantages in living near the University of Minnesota campus. Some people from a wide range of population groups who work in either downtown have chosen to avoid the daily road commute by living in the downtown district or nearby.

And here is the bonus: the boomers. In a trend that was just beginning to accelerate as these research studies were being conducted, boomers—people born between 1945 and 1963—began to move. The oldest boomers are turning 50 at the rate of one every eight seconds. According to real estate trend reporting, at least one in five are opting out of the large lot, the big house, and the long commute. In most of their households, the kids are gone, and, as it's often put, the dog's died. They're prime candidates for high-amenity, low-maintenance living near the places they like to go. Hence the rush to townhouses and condos in not only Minneapolis and St. Paul, but also in a growing set of suburbs now tapping the trend. Attached townhouses are springing up from Woodbury to Hugo.

Any policy interventions that the state might authorize for the Twin Cities region will carry a significant price tag, whether it is funding for local communities trying to expand choices for residents and business, or resources for an integrated system of transit. The somewhat surprising reminder from this entire body of recent research on the region is how important markets are. Markets determine locations for commerce, preferences about housing, choices of mobility. This research suggests that policies of honest pricing of land development and transportation ser-

vices, along with expanded choices about places to live and work, offer the best chances to improve the economic competitiveness, the mobility, and the overall livability of the region for the next generation.



TRANSPORTATION &





APPENDIX: TITLES AND ABSTRACTS, TRG REPORTS 1–16

Research reports are available for download from the TRG Study's web site at www.cts.umn.edu/trg/index.html.

1. The Role of Housing Markets, Regulatory Frameworks, and Local Government Finance, John S. Adams, Mark D. Bjelland, Laura J. Hansen, Lena L. Laaken, and Barbara J. VanDrasek. 1998. CTS 98-01.

This four-part report is the first in a series of studies that addresses Twin Cities regional dynamics, using an integrated mix of statistical and cartographic analyses.

This report examines the land use/transportation dynamic and its influence on metropolitan development in postwar U.S.; changes in housing supply, housing demand, and residential price movements between 1970 and 1990 in minor civil divisions (MCDs) within the seven-county metropolitan area and adjacent counties; a classification of state and local regulations that promote low-density development on the built-up metropolitan edge and beyond and that raise obstacles for cost-effective redevelopment in older settled areas near the cores of Minnesota's major urban centers; and, the changing profiles of taxation, intergovernmental revenue transfers, and expenditures by function for counties and MCDs within the Twin Cities region.

2. Understanding Urban Travel Demand: Problems, Solutions, and the Role of Forecasting, Gary Barnes and Gary Davis. 1999. CTS 99-02.

This report is a general examination and critique of transportation policymaking, focusing on the role of traffic and land-use forecasting. There are four major components: 1. Current, historical, and projected travel behavior in the Twin Cities; 2. The standard travel forecasting model, and some of its shortcomings; 3. The potential application of integrated land use and transportation model; 4. Specific transportation problems and proposed policies in the Twin Cities.

The most important result is that the standard traffic forecasting model in its current form is not well suited for evaluating many of the policies of great-

est current interest, in particular, those that seek to reduce the overall amount of travel through changes in land use or travel behavior. This model was developed to predict road capacity needs, taking the quantity of travel as more or less uninfluenced by policy.

However, currently available improvements, including integrated transportation and land-use models, often add little value because they are not based on a well-established theoretical and empirical understanding of travel behavior. The most urgent need in forecasting is not for more complex models, but for a better understanding of the real-world processes that the models are attempting to capture.

3. Development Impact Fees for Minnesota? A Review of Principles and National Practices, John S.

Adams, Julie L. Cidell, Laura J. Hansen, Hyun-joo Jung, Yeon-tack Ryu, and Barbara J. VanDrasek. 1999. CTS 99-04.

This report explores the social, economic, and legal bases for imposing development impact fees, a type of development exaction imposed by local governments in some states. It introduces the concept of charging for infrastructure and outlines the basic issues. It describes the history of financing public improvements, leading to the imposition of impact fees.

Building on this background, the report then outlines the advantages and disadvantages of using impact fees as a financing mechanism to allow new growth to pay its own way. Methods of calculating impact fees are explained and examples of fee usage around the country are included, including cases from the Twin Cities of Minneapolis and St. Paul.

4. Synthesizing Highway Transportation, Land Development, Municipal and School Finance in the Greater Twin Cities Area, 1970–1997, John S. Adams, Julie L.

Cidell, Laura J. Hansen, and Barbara J. VanDrasek. 2000. CTS 00-01.

This report presents results of analyses of land development, school finance and local government finance, and statistical analyses of the relationship between land development and transportation infrastructure investment in the Twin Cities

region from 1970 to 1997.

The report is second in a series on Twin Cities Regional Dynamics, which is one of six parts of the Transportation and Regional Growth Study sponsored by the Center for Transportation Studies, University of Minnesota, the Metropolitan Council of the Twin Cities, and the Minnesota Department of Transportation.

5. The Full Cost of Transportation in the Twin Cities Region, David Anderson and Gerard McCullough. 2000. CTS 00-04

The goal of this work is to calculate the full costs of transportation for autos, trucks, and buses in the Twin Cities region for the years 1998 and 2020. Our midrange estimate is that the costs were \$27 billion in 1998, and the costs will grow to \$42 billion in 2020 (\$9,000 and \$11,200 in per capita terms, respectively).

These estimates include monetary and nonmonetary costs to individuals, firms, and units of government. Costs are divided into three main categories: governmental costs, internal costs, and external costs. Our midrange estimates were that 84 percent of full costs were internal, 9 percent were governmental, and 7 percent were external. Road construction and maintenance accounted for approximately 70 percent of governmental costs.

Most time costs were nonmonetary and internal. The costs of travel time accounted for 40 percent of all costs and the costs of owning and operating vehicles also accounted for 40 percent.

Approximately 98 percent of external costs were due to congestion, crashes, air pollution, and petroleum consumption. We project that most types of costs will increase at approximately the same rate as regional economic output between 1998 and 2020.

6. Land Use and Travel Choices in the Twin Cities, 1958–1990, Gary Barnes and Gary Davis. 2001. CTS 01-01

This report examines the effects of land development patterns on travel choices by residents of the Twin Cities area. A historical analysis studies changes in travel behavior between 1958 and 1990, focusing in particular on total daily time spent traveling. The conclusion is that daily



time per traveler changed only very slightly over this time, despite very significant changes in land use.

The second major analysis in the report looks at travel choices in 1990 in greater detail. Again, the conclusion was that land use per se did not play a significant role in travel choices when other factors were controlled for. Dense central areas generated much less mileage per person, but this was almost entirely because of lower speeds, not because central city residents spent much less time driving.

Overall, there was less than a 20 percent difference in average time spent driving per day between central city and outer suburbs, and this difference arose entirely from commute times. Non-work travel time showed no systematic variation by location, in contrast to expectations. The one area in which land use played a significant role was that large dense job locations attracted very high shares for non-auto modes.

7. House Price Changes and Capital Shifts in Real Estate Values in Twin Cities-Area Housing Submarkets, John S. Adams, Julie L. Cidell, Laura J. Hansen, and Barbara J. VanDrasek. 2002. CTS 02-01.

This report explores the movement of average prices and price changes for single-unit houses between 1970 and 1995 in three housing submarkets that radiate outward from downtown Minneapolis and downtown St. Paul.

The report investigates one way of measuring gains and losses in housing values that might be traced in part to processes of economic growth, tax policy, and the outward movement of jobs, incomes, and the capital represented by housing assets.

The report theorizes that these capital shifts are the result of the capitalized value of tax expenditures and property tax differentials between city and suburb, the impacts of utility pricing schemes, and the nature of consumer demand for housing.

Additional factors that drive flux in this general pattern of outward movement of capital include energy and consumer price fluctuations, general economic conditions, significant immigration, and perceptions about both public safety and school quality in different parts of the metropolitan region.

The result of this dynamic is that

some households realize unearned capital gains simply by virtue of their location, while others find themselves holding a depreciating asset due to factors beyond their control.

8. Highway Improvements and Land Development Patterns in The Greater Twin Cities Area, 1970–1997: Measuring the Connections, John S. Adams, Julie L. Cidell, Laura J. Smith, and Barbara J. VanDrasek. 2002. CTS 02-03.

This report uses statistical methods to measure the relationships between improvements in highway transportation and patterns of land development in suburban and exurban areas of the greater Twin Cities. The methods used measure the timing and levels of residential, commercial, industrial, and residential land development as indicators of the strength and causality of those relationships.

The report investigates the key question of leads and lags between highway improvement and land development. Findings of the report suggest that the impact of major highway improvements on land development patterns took one form in the 1970s, another in the 1980s, and still other forms in the 1990s. Findings also illustrate how the lead-lag relationships differ by development type.

Although statistical relationships describing correlations of leads, lags, and contemporaneous change were found to be highly significant, the measures of those relationships seldom were constant. They changed from one time period to the next, from one type of development to another, and from one location to another within specific time periods.

9. Road Finance Alternatives: An Analysis of Metro-Area Road Taxes, Barry Ryan and Thomas F. Stinson. 2002. CTS 02-04.

The average Twin Cities household paid about \$500 in state and local taxes for roads in 1996. The total tax burden for the region was nearly \$1 billion, with two-thirds coming from revenues that are fixed or hidden from the traveler's perspective.

Tax alternatives that favor use-related charges can send travelers a clear price signal, ultimately encouraging more efficient travel behavior. Tax policy might have an effect on housing location decisions at the rural-urban fringe, where

farmland development premiums are still small. Road tax policy will need to change in order to keep pace with higher construction costs.

10. Urbanization of the Minnesota Countryside: Population Change and Low-Density Development Near Minnesota's Regional Centers, 1970–2000, John S. Adams. In press.

Today's Minnesota settlement pattern and economy were almost completely transformed during the past three decades. "Urbanization of the countryside" is under way in functional terms, and the settlement system is catching up with the economic and social transformation that has been proceeding since World War II.

Like the greater Twin Cities area, which spreads over more than 24 counties in Minnesota and Wisconsin, Minnesota's regional centers have been doing the same, whether or not their populations are increasing. Towns, villages, and hamlets within highway commuting ranges of regional job centers are becoming bedroom suburbs, and income brought home from those jobs brings new vitality to Main Street.

Meanwhile, in unincorporated townships surrounding the regional centers and around the state's lakes, new houses are going up for retirees, weekenders, and commuters—especially along major and minor highways and country roads that provide access to nearby malls. The report describes these trends playing out around 24 regional centers in rural Minnesota.

11. Urban Design, Transportation, Environment, and Urban Growth: Transit-Supportive Urban Design Impacts on Suburban Land Use and Transportation Planning, Carol J. Swenson and Frederick C. Dock. In press.

This report summarizes the development and utilization of enhancements to the regional transportation model to measure the individual and accumulative impacts of transit-supportive urban design strategies.

The report has three main sections: 1) urban design analysis of four transit-supportive development proposals; 2) development of model enhancements in the form of a subarea model; and 3) use of the subarea model to analyze a subregional transit-supportive growth



scenario.

The urban design analysis demonstrated that transit-supportive development principles are adaptable to suburban settings and that use of the principles does improve land-use mixes and walkability. It also confirmed that guidelines for transit-supportive development can be used to create a network of suburban sites that meets city and regional goals.

The subarea transportation model proved sufficiently sensitive to detect changes in tripmaking patterns at the site and subregional scales. Two types of trip-making contributed to these changes: short-distance trips between transit-supportive developments and walk or bicycle trips within developments.

Results from the subregional analyses most clearly demonstrated the benefits of transit-supportive development strategies. At the subregional scale, the model tracked travel interactions between transit-supportive development sites, which revealed the accumulative benefits. If the entire region were modeled accordingly, it is expected that benefit indicators would show even greater improvements.

12. A Systems Thinking Perspective on the Transportation and Regional Growth Study, Ed Ward. In press.

This report integrates the findings of the individual reports that make up the Transportation and Regional Growth (TRG) Study into a comprehensive “systems thinking perspective” on the Twin Cities’ transportation and land use system. This document explores the findings and rationale in TRG reports by several principal investigators.

The purpose of this report is to use systems thinking tools and methods in a consistent and disciplined way, to generate new insights that are valuable for policy makers, and to surface the systemic assumptions underlying the research of the principal investigators.

13. Transportation, Urban Design and the Environment: Highway 61/Red Rock Corridor, Lance Neckar. In press.

Landscape architects often refer to the “genetic code of sprawl” to describe all of the legal and formal frameworks and the systematized structures engendered

by them that tend to create a sprawled suburban landscape. This “code” is embedded into the designs, planning practices, and policies that encourage conventional suburban-style development and is embedded deeply in the culture of the Twin Cities region. This study develops designs for new, alternative patterns of regional growth, both urban and suburban, in broad corridors served by commuter rail service.

The study also demonstrates the designs’ effects on two principal problems of sprawl embodied in the street and highway network that is the bones and circulatory system of growth: 1) unstratified, single-mode transportation infrastructure designed for peak demand, and 2) degradation of environmental resources, especially water, the state’s namesake resource and a central article of its competitive advantages.

14. Case Studies of Development in the Minneapolis-St. Paul Metropolitan Region, John S. Adams and Barbara J. VanDrasek. In press.

The Minneapolis-St. Paul metropolitan region’s population and territorial extent expanded vigorously after World War II, with census commuting data showing that by 1990 it comprised at least 24 counties in Minnesota and Wisconsin.

This study illustrates consequences for cities, townships, and school districts of regional population growth and the increasingly dispersed land development that accompanies it. Specifically, we describe some of the problems and issues that arise from the ways that development imposes fiscal burdens on local governments—specifically, the school districts, the cities, towns, and townships.

As the built-up area sprawls outward in all directions, it encounters a network of cities, towns, and townships (i.e., minor civil divisions, or MCDs) along with a network of school districts. Each MCD and school district is defined by more or less stable boundaries. Encroachment of new land development, households, and businesses into an MCD produces profound changes within it while changing its relationships with other MCDs and with the school district serving the new development.

In a recursive cycle of cause and effect, new housing units added to an area attract additional households along with their wealth and purchasing power.

New growth means that the city, town or township containing the new houses and households is obligated to supply them with municipal services. But a development containing new houses and new households also lies within one or more school districts, and state law requires that school services be provided to children living within a district’s boundaries.

Depending on how the development process unfolds, it triggers demands for new services along with claims for new tax revenues to support them, and it may lead to support for additional development or deflect subsequent development into other areas. This report describes and analyzes this process, its implications, and its relationships with the region’s major transportation systems.

15. The Distribution of Transportation Costs in the Twin Cities Region, David Anderson and Gerard McCullough. In press.

The purpose of this report is to determine who bears the costs of transportation in the Twin Cities region for 1998 and 2020. In a previous report, *The Full Cost of Transportation in the Twin Cities Region*, we determined the total social costs of transportation in the region.

In this study we determine who bears the governmental, internal, and external costs of transportation (i.e., who pays for or experiences these costs). We also determine who imposes or causes the marginal external costs of transportation. Most of the costs are caused and borne by residents of the region, but some are caused or borne by people who live outside the region. We analyze cost incidence for 78 sub-regions and for nine income/vehicle ownership groups.

This report contains three appendices. The first appendix describes other studies of cost incidence. The second appendix defines the regions that we examine. The third appendix examines the efficiency and equity of a hypothetical improvement in express bus service. The purpose of the third appendix is to demonstrate ways that information on transportation costs can be used to help evaluate policy alternatives. It is not intended to reflect on the desirability of any actual projects.



**16. Public Policy, Transportation,
and Regional Growth**, Thomas M.
Scott and Barbara Lukermann. In press.

This report describes and analyzes the role of the public sector in land development decisions over the past half century in the Twin Cities Metropolitan Area. The analysis traces key pieces of legislation, allocation of public funds for major infrastructure facilities, and mandated processes for decision making in three major areas: transportation, waste water treatment, and land use planning and zoning.

While most land use decisions are made at the local level, the state and federal legislation, funding levels, and mandated processes for decision making have in many ways been the driving forces in facilitating growth and directing the patterns of development within the metropolitan area. This study examines availability and pricing of public infrastructure, together with the rules of the game for approval of private developer and business decisions, to point out how the public sector has influenced the location, type, and timing of urban development over this period. The report also identifies some of the national emerging political-governmental trends in development and related transportation issues.

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