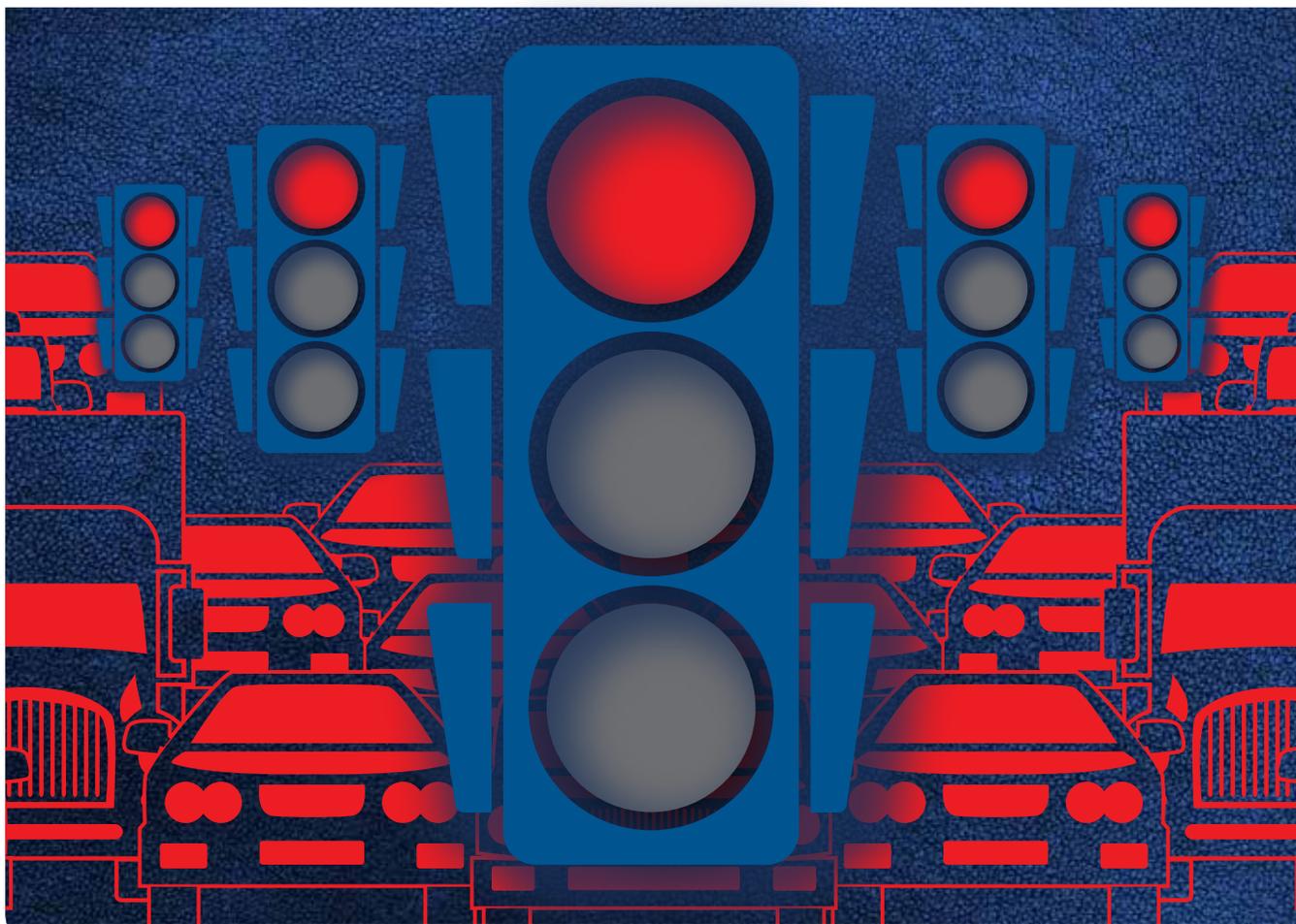


Twin Cities Traffic Congestion: It's No Accident



BY RANDAL O'TOOLE

Randal O'Toole is a senior fellow at the Cato Institute who has written extensively on transportation, urban growth, and public land issues. In his book *Gridlock, Why We're Stuck in Traffic and What to Do About It*, O'Toole revealed the prime causes of our ailing system are a government transportation planning philosophy whose primary goal is to diminish auto use—hence, personal mobility—in combination with federal budget incentives that perversely encourage transportation planners to increase congestion. O'Toole has testified at the Minnesota Legislature on the Twin Cities transportation system and the impact of the Metropolitan Council. His previous writings for Center of the American Experiment include “Ten Fallacies of the Thrive MSP 2040 Plan” and “Off the Rails: How the Met Council Misplans the Twin Cities.”



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EXECUTIVE SUMMARY

Residents of the Twin Cities consistently rate traffic congestion among their principal concerns and complaints, and properly so. The Twin Cities is among the most congested cities in the country. Congestion costs commuters and businesses close to \$4 billion in the Twin Cities region. Not only is the state not adequately funding congestion relief, the Met Council and the Minnesota Department of Transportation (MnDOT)—the state agencies responsible for the transportation system—pursue policies that make congestion worse. Congestion can be relieved with the right policies.

Congestion worsening. Twin Cities congestion has consistently grown worse and worse over the past few decades. The amount of time the average Twin Cities driver wastes, stuck in traffic, quadrupled between 1982 and 2014, from 12 hours to 47 hours. MnDOT's most recent congestion report shows congestion rose to a higher level in 2015 than any year since it began measuring in 1993.

Congestion costs billions every year. All that time sitting in traffic imposes substantial costs in terms of wasted time, wasted fuel, and increased pollution. The Texas Transportation Institute estimates the cost of congestion in the Twin Cities equaled \$2.2 billion in 2014, and approaches \$4 billion when the cost to business is fully accounted for.

Congestion growth is worse than most cities. In 1982, the Twin Cities were rated the 35th most congested urban area in the U.S., while by 2014, the Twin Cities had become the 21st most congested urban area. A new report ranks Minnesota 17th among 52 large urban areas.

The American Transportation Research Institute recently identified the 100 worst bottlenecks in the U.S. The Twin Cities had four, more than Chicago, Los Angeles, New York, or any other urban area except Atlanta and Houston.

Congestion is not inevitable. The Twin Cities' congestion problems are much worse than in comparable cities like Indianapolis and Kansas City. In 1982, Indianapolis was more congested than the Twin Cities. By 2016, the Twin Cities had become significantly more congested, even though Indianapolis's population has grown nearly twice as fast since 1990. Similarly, Kansas City has twice as many lane miles of highway per million residents as the Twin Cities. As a result, the average travel speed in the Kansas City metro area—41.1 mph—is much faster than in Minneapolis/St. Paul, 29.4 mph.

Why are Twin Cities roadways so congested? Funding is always a legitimate issue, and Minnesota's legislature took a step in the right direction this year with its transportation bill. But the unreported cause of the extraordinary delays suffered by Twin Cities

drivers is the misplaced priorities of the Metropolitan Council and MnDOT.

Agencies' strategy shifts from reducing congestion. Those agencies specifically disclaim relieving traffic congestion as a priority. MnDot's most recent Annual Minnesota Transportation Performance Report explains, "MnDOT expects congestion to remain the same or increase as the region continues to grow. Since 2010, MnDOT's strategy has shifted from reducing congestion toward providing alternatives to congested travel." Taking a similarly defeatist tone, the Met Council wrote in its 2030 transportation plan, "The Council recognizes that congestion will not be eliminated or significantly reduced in the Metropolitan Area."

Agencies prioritize future spending on rail and bikes. Instead of making a serious effort to reduce congestion, Minnesota's agencies prioritize alternative modes of transportation like light rail trains and bicycles. For example, the Met Council's 2040 plan calls for spending \$6.9 billion in state and regional funds on transit capital improvements and only \$700 million in state funds on increasing road capacities. Incredibly, the Council proposes that an equal amount in state funds—\$700 million—be spent on bike paths, pedestrians, and safety. But those methods of transportation carry only infinitesimal proportions of total travel in the metropolitan area. Moreover, on top of diverting money from congestion relief, light rail and bike lanes have increased congestion and will continue to do so as more are built out.

Plans ignore people's preferences and, instead, try to change behavior. Met Council plans prioritize getting people out of their cars by directing denser housing developments along transit corridors connected to central cities and by making streets more usable by bikes at the expense of cars. Research shows these efforts fail to alter driving habits. That's because the whole strategy is based on an obsolete, polycentric version of a city in which jobs are located in downtowns, when jobs are in fact dispersed across the entire region.

There is no moral advantage to prioritizing transit. The Met Council's emphasis on reducing driving in favor of transit carries with it the implicit assumption that transit is somehow more moral, ethical, or sustainable than driving. But, if anything, it's transit that is the less moral approach. Trains are less safe, transit uses more energy, and there is little to no pollution ad-

vantage. Moreover, there are far better ways than fixed line transit to get lower-income people to jobs.

How can the Twin Cities address the congestion problem? There are, broadly speaking, four approaches to congestion: 1) adding new capacity; 2) making sure that traffic never exceeds roadway capacities; 3) increasing the number of vehicles that can move per hour; and 4) ignoring congestion while providing alternative modes of travel.

A combination of one and two make the most economic sense. However, the Metropolitan Council has chosen the fourth approach, ignoring congestion and providing alternatives that tend to be used only by a minority of people. This paper concludes by presenting institutional changes that might bring driver preferences into closer alignment with the economics of the roadway.

Minnesota lawmakers recently took the first step toward making congestion relief a priority. The transportation bill that Republicans passed in the House and the Senate, signed by Gov. Mark Dayton, will add \$1.4 billion in spending on transportation in the next budget cycle and \$5 billion over 10 years.

There is no reason why the Twin Cities cannot have a highway system adequate to meet the needs of residents, but achieving that goal will require a drastic re-ordering of priorities away from transit and toward roads and highways.

INTRODUCTION

Congestion may be the most important problem facing the Twin Cities. Not only does congestion cost the region billions of dollars a year—an amount greater than the entire budget of the Minnesota Department of Transportation (MnDot)—it is growing rapidly. The total number of hours Twin Cities commuters waste sitting in traffic doubles every 11 years and nearly octupled between 1982 and 2014.¹

Unfortunately, as Mark Twain said about the weather, everyone talks about congestion but no one does anything about it. Some government officials actually believe that congestion is good because it supposedly saves energy and reduces air pollution by forcing some people out of their cars and onto transit, bicycles, or other alternative forms of transportation. In fact, it appears that the rapid growth in congestion is partly, if not mainly, due to government policies aimed at promoting alternatives to driving, rather than at relieving congestion.

This paper will look at the cost of Twin Cities congestion, the causes of that congestion, and ways of fixing the problem. Rather than recommending one particular course of action, the paper will present a smorgasbord of alternatives, with benefits and costs for each, and let the reader decide which make the most sense.

The Cost of Twin Cities Congestion

According to the Texas Transportation Institute's most recent report on urban mobility, the number of commuters in the Twin Cities has doubled since 1982, but the region added just 48 percent more freeway lane miles.² As a result, the number of hours wasted by congestion grew from 13 million in 1982 to 100 million in 2014 and the time wasted by the average commuter has grown from 12 hours per year in 1982 to 47 hours in 2014. MnDot's *Metropolitan Freeway System 2015 Congestion Report* shows that 2015 was the most congested year since they began reporting congestion in 1993.

Congestion does more than waste peoples' time. The urban mobility report estimated that the amount of fuel Twin Cities' commuters waste sitting in traffic grew from 5.0 million gallons in 1982 to 38.5 million in 2014. Wasted fuel means more toxic air pollution and more greenhouse gas emissions.

Based on the value of peoples' time and the cost of fuel, the report estimated that the cost of congestion to commuters grew from \$700 million in 1982 to \$1.9 billion in 2014. However, this only counts the cost to commuters. Businesses also pay for congestion. A list of the nation's 100 worst bottlenecks to freight movement prepared by the American Transportation Research Institute—the research arm of the American Trucking Association—includes more bottlenecks in the Twin Cities than Chicago, Los Angeles, New York, or, in fact, any other urban area except Atlanta and Houston.³

The Texas Transportation Institute estimated the cost of congestion to truckers was \$327 million in 2014. However, this is the only part of the cost to businesses. Thanks to congestion, the average driving speed in Minneapolis is less than 30 miles per hour, whereas it is more than 40 miles per hour in less congested cities such as Kansas City and Tulsa.⁴

This means delivery companies such as FedEx and UPS must buy more trucks and hire more drivers. Manufacturers must maintain increased inventories

of raw materials due to uncertain delivery schedules. Retailers and wholesalers must build new distribution centers, some of them outside of the Twin Cities, to avoid Twin Cities traffic. Hospitals and other health-care providers must maintain larger inventories of medicines and other medical supplies. Utilities must hire more crews to maintain electrical, telecommunications, and other services.

No one has estimated all of these costs for businesses in the Twin Cities area. However, one study of other cities found that the cost to delivery companies is only a little less than the cost to commuters. For example, the cost to delivery companies in Chicago was about 70 percent of the cost to commuters.⁵ When all business costs are totaled, they must be equal to or greater than the cost to commuters. Thus, the total cost of congestion in the Twin Cities is likely to be more than \$3.8 billion per year. For comparison, the 2016 budget of the Minnesota Department of Transportation was less than \$3.4 billion.⁶

Twin Cities congestion is not the worst in the United States, but it is growing faster than most. Measured by the travel time index—the percent of extra time required to get anywhere during rush hours—the region was rated as having the 35th worst congestion among 101 urban areas studied by the Texas Transportation Institute (TTI) in 1982.⁷ By 2014, it had grown to become the 21st worst.⁸ In 2016, Minnesota ranked 17th worst in a similar report TTI now produces annually for the federal government comparing congestion across 52 urban areas. By comparison, congestion in Indianapolis—whose urbanized area is growing nearly twice as fast as the Twin Cities since 1990—improved from being the 28th-worst in 1982 to the 46th-worst in 2014. In 2016, among the 52 urban area comparison, it ranks 47th.

With these trends it's not surprising that numerous polls have found that Twin Cities residents consider congestion to be among the region's most serious problems.⁹ When congestion doesn't take the top spot, it's usually edged out by crime.¹⁰ Unlike crime, however, congestion is a problem that most residents must deal with most days of the year.

The Causes of Twin Cities Congestion

According to MnDOT and the Metropolitan Council, the reason Twin Cities congestion has grown so fast is simple: There isn't enough money to keep up with the demand for new roads. At first glance, this appears

to be plausible. Yet a closer look reveals a deeper problem: The Metropolitan Council and, in recent years, MnDOT doesn't want to relieve congestion, so they haven't sought cost-effective solutions.

Lack of funding

Superficially, the idea that congestion results from a lack of funds is believable for several reasons. First, most states' highways are largely paid for out of gasoline taxes, yet gas taxes are the most important tax we pay that isn't indexed for inflation. Income taxes, property taxes, and most sales taxes effectively grow as incomes, property values, and prices of goods increase in value with inflation. Gasoline taxes, however, are in cents per gallon and so do not grow with inflation. Even if they were in cents per dollar, the price of gasoline does not track well with inflation, so still would not be indexed for inflation.

To deal with this problem, the state periodically raises the gas tax. From 1988 through 2007, the tax was 20 cents per gallon. In 2008, the gas tax began a five-year phased increase to the present rate of 28.5 cents per gallon. After adjusting for inflation, however, the current rate is still only 67 percent of what it was in 1988.¹¹ Similarly, Congress hasn't raised the federal gas tax (most of which is passed to the states) since 1993, which means it has lost 35 percent of its value to inflation.

The problem of inflation is compounded by increasing fuel efficiency. The average car on the road today is about 20 percent more fuel efficient than the average 20 years ago, and almost 50 percent more than the average 40 years ago.¹² To make matters worse, the growing number of electric vehicles doesn't pay any fuel taxes at all. The result is a steady decline in the revenues the state needs to maintain and expand the highway system. When combined with inflation, state taxes collected per mile of driving are less than 65 percent of what they were 30 years ago.

Gas taxes aren't the only source of funds for Minnesota roads. In 2016, state gas taxes provided 27 percent of MnDOT's funds, while federal funds, mostly from gas taxes, provided another 21 percent. Motor vehicle registration fees and motor vehicle sales taxes provided 34 percent. The remainder came from bond sales and a variety of smaller funds.¹³ Since sales taxes and most other tax sources are effectively indexed for inflation, these partly mitigate the declining value of gas taxes.

Yet that decline is real and significant. After adjusting for inflation, MnDOT had 6.1 cents to spend on state highways for every mile driven in Minnesota in 1970. This declined to 3.7 cents in 1980, and to just 2.7 cents in 1995. The average during the 1990s and 2000s was 2.9 cents per mile, less than half of the 1970 funding.¹⁴ Moreover, inflation in the construction industry has been greater than in the rest of the economy, so the situation is even worse than indicated after adjusting for inflation using gross domestic product deflators. This decline in funding is a major reason why congestion has grown so much in the last three decades.

Strategy shifts from reducing congestion

While funding is an issue, a more serious problem is that MnDOT and Metropolitan Council transportation officials have made a conscious decision to *not try* to relieve most congestion. Instead, their focus is on encouraging people to ride transit and other alternatives to driving. Given that goal, they know that relieving congestion will allow more people to drive instead of use alternatives, so instead they often adopt policies that make congestion worse.

MnDOT is quite open about how their policy shifted from reducing congestion soon after Gov. Mark Dayton won election in 2010. The agency's most recent Annual Minnesota Transportation Performance Report explains, "MnDOT expects congestion to remain the same or increase as the region continues to grow. Since 2010, MnDOT's strategy has shifted from reducing congestion toward providing alternatives to congested travel."

This shift in strategy is revealed in the declining proportion of highway investments directed toward Twin Cities mobility in last three successive Minnesota State Highway Investment Plans (MnSHIP). MnDOT prepares this plan every four years to guide their project selection process. The 2009 plan directed 6.9 percent of funding to congestion relief, which halved to 3.5 percent in the 2013 plan and then plummeted to just 1.1 percent in the 2017 plan.¹⁵

MnDOT has further argued that "we can't build our way out of congestion," at least in certain corridors.¹⁶ This is absurd; if new roads automatically filled up with vehicles, then rural highways in South Dakota would be just as clogged with traffic as freeways in Minneapolis. Imagine if AT&T announced that it couldn't build enough cell towers to meet demand and its customers should expect more dropped calls. People would

quickly shift to other cell phone providers.

MnDOT's recent attitude towards congestion is contradicted by the agency's own experience. As the Metropolitan Council's 2030 transportation plan noted in 2010, "MnDOT has pursued a very aggressive construction program since 2004."¹⁷ Between 2004 and 2010, the number of freeway lane miles in the region grew by 23 percent. Driving didn't completely fill up those lane miles as freeway driving grew by just 10 percent. As a result, the amount of delay experienced by the average auto commuter declined by 10 percent. Some of that decline might have been due to the recession, but the number of commuters grew by 13.5 percent, so the major factor was the increase in freeway miles.¹⁸

MnDOT's "aggressive" construction program has slowed since 2011, partly because the Metropolitan Council's plans have diverted funds from highways to transit. The council's attitude towards congestion is not simply defeatist; it appears to welcome more congestion.

"The Council recognizes that congestion will not be eliminated or significantly reduced in the Metropolitan Area," says the council's adopted 2030 transportation plan. "Therefore, to maximize regional mobility, congestion and demand must be managed to the extent possible and alternatives to congestion provided where feasible."¹⁹ In response to comments from people pleading with the council to relieve congestion, the council replied, "The 2030 Transportation Policy Plan recognizes it is not possible fiscally, socially, or environmentally to build our way out of highway congestion."²⁰

The council conveniently blames lack of funding for its inability to relieve congestion, noting that MnDOT's state transportation plan "estimates that statewide trunk highway investment needs exceed \$65 billion over the next 20 years, while projected revenues total only about \$15 billion," adding that most of the \$50 billion statewide gap is for the Twin Cities metropolitan area. "It is unrealistic to expect that future transportation funding will increase to meet the \$50 billion 'unmet need,'" concluded the council.²¹

Met Council strategy makes congestion worse

Yet, if MnDOT has merely given up trying to relieve congestion, the Metropolitan Council is trying to make it worse. Blaming a lack of funding fails to

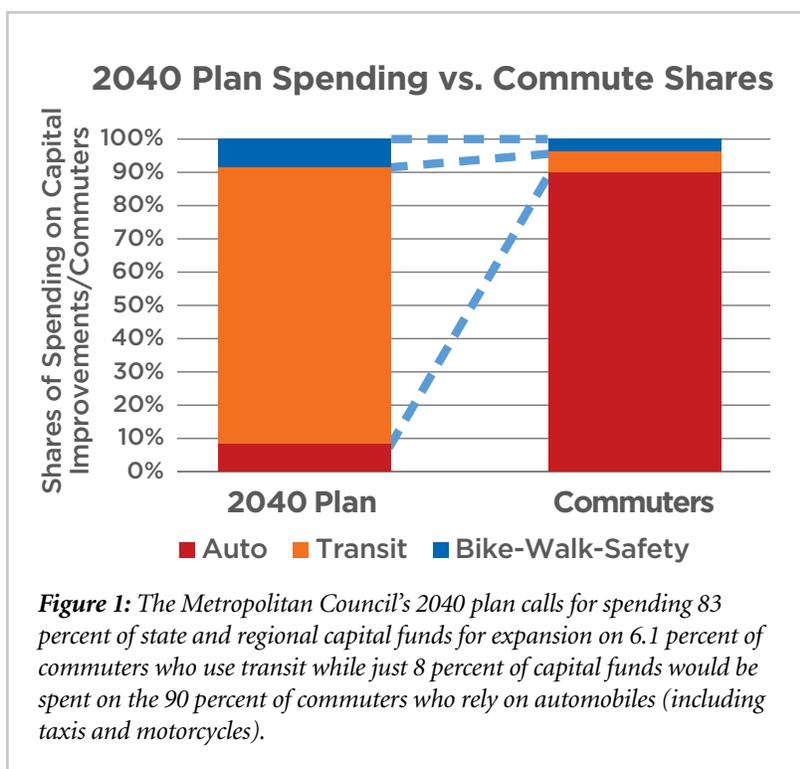
acknowledge several important facts. First, the council failed to consider many low-cost ways of relieving congestion in its 2040 plan. Second, many parts of the plan itself will make congestion worse. Third, the mobility provided by the alternative modes in the plan will fail to make up for the lost mobility resulting from the increased congestion.

One low-cost way of relieving congestion is improving traffic signal coordination. The latest signal technologies allow signals to communicate with one another and dynamically respond to minute-by-minute changes in traffic flows. "Traffic light re-timing probably has the best cost-benefit ratio of any dollar spent" on congestion relief, says the Washington State Department of Transportation.²² Yet, rather than spend money installing the latest technology in Twin Cities-area signal systems, the Metropolitan Council's goal is to give transit priority over cars at traffic signals, thus increasing congestion for everyone else. While prioritizing trains at lights creates the largest disruption, policies that allow buses to drive down highway shoulders and bypass ramp meters also increase congestion for everyone else by disrupting traffic flows on and off highways.

"MnDOT, counties, and cities should provide advantages for transit on highways and streets, including bus-only shoulders, transit stations, bus bump-outs, transit signal priority, and ramp meter bypasses," says the council's *2040 Transportation Policy Plan*.²³ Transit carried 6.1 percent of Twin Cities-area commuters to work in 2015.²⁴ Counting all travel, it carried just 1.4 percent of passenger miles and virtually no freight ton miles in 2014.²⁵ Yet the Metropolitan Council's plans call for giving 6.1 percent of commuters and 1.4 percent of all travelers signal priority and other advantages over the 89.5 percent of commuters and more than 95 percent of all travelers who travel by car.

Light rail worsened congestion

When the Hiawatha light-rail line opened in 2004, rather than relieve congestion in the Minneapolis-Bloomington corridor, it made it worse. The light-rail tracks did not cross Hiawatha Avenue, Minnesota State Highway 55, at grade, but they did cross many streets that crossed Hiawatha. Since the signals on those streets were coordinated with signals on Hiawatha, giving light-rail trains priority at the signals disrupted the coordination of traffic signals on Hiawatha.²⁶ This added 20 to 40 minutes to travel times



between Minneapolis and Bloomington.

“This is not a sinister plot to make traffic as miserable as possible and move everybody onto the train,” a MnDOT official assured the public in 2004.²⁷ Yet this was soon contradicted by the revelation that, in 1999, a consultant had warned MnDOT and the council that giving trains priority over cars would cause severe problems—a warning that was deliberately ignored. “We needed to give an advantage to transit,” an MnDOT engineer explained in response to the warning. “If we were going to carry more people through this corridor, transit had to have an advantage.”²⁸

The opening of the Green line between downtown Minneapolis and downtown St. Paul also increased congestion. A 2015 study conducted for MnDOT by the University of Minnesota Center for Transportation Studies found that a “considerable” amount of traffic “displaced from University Avenue” by the light-rail line has gone to I-94 between Snelling and downtown St. Paul, and as a result I-94 “speeds have dropped greatly.”²⁹

Plans prioritize future spending on rail and bike paths

In fact, it appears that the council’s 2040 transportation plan is itself a sinister plot to make traffic as miser-

able as possible and move more people onto trains. Despite how light rail has already increased Twin Cities’ congestion, the plan calls for spending \$31.2 billion on transit and \$52.7 billion on roads over the 26 years between 2015 and 2040.³⁰ That means 37 percent of transportation spending would go to a form of travel that carries less than 1.5 percent of passenger miles and, for all practical purposes, no freight.

To make matters worse, the plan calls for spending billions on new rail lines and bicycle paths, but relatively little on new highways. Specifically, the plan budgets \$6.3 billion for constructing new “transitways,” meaning rail lines or possibly dedicated bus lanes, plus \$600 million for bus modernization and expansion.³¹ The 2040 plan also includes \$700 million of state money for bike paths, pedestrian, and safety improvements. But state highway im-

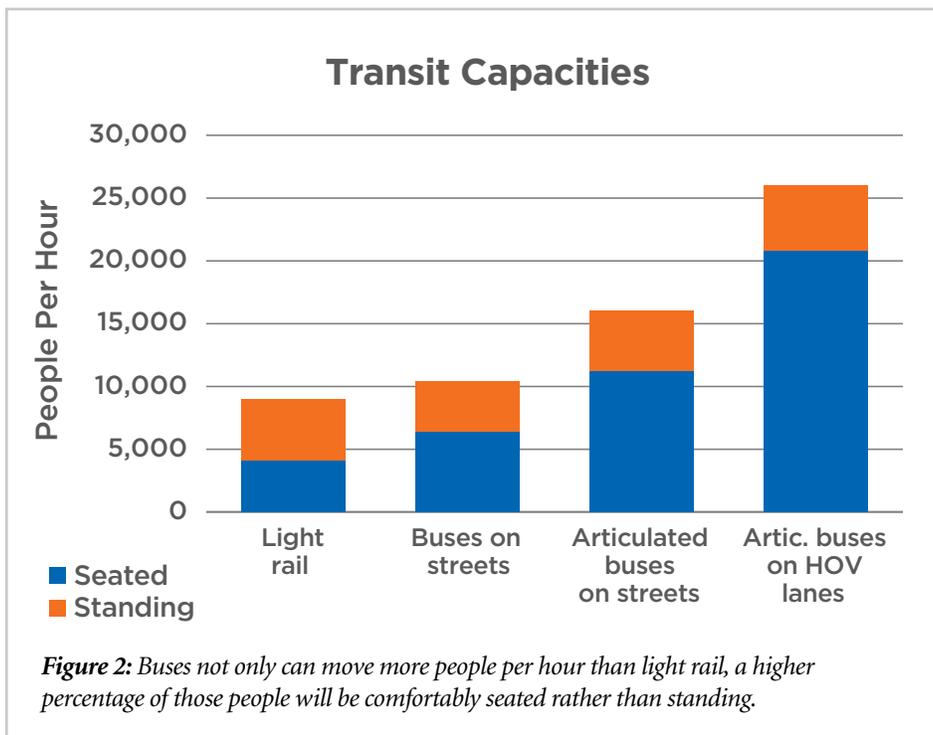
provements would get no more than \$700 million allocated to “regional mobility improvements” including “traffic management technologies, spot mobility improvements, MnPASS lanes, strategic capacity enhancements, and highway access investments.”³² As shown in Figure 1, that amounts to just 8.4 percent of planned spending on capital improvements whereas transit consumes 83.1 percent.

MnDOT’s state highway investment plan proposes similar spending on bikes, pedestrians, and safety—specifically, \$140 million on bike infrastructure and \$530 million on accessible pedestrian infrastructure between 2017 and 2037.³³ Yet, over the same time period, MnDOT plans to spend just \$240 million on Twin Cities mobility.

Trains deliver lower capacity

Part of the problem is the Metropolitan Council’s infatuation with light rail, a high-cost, low-capacity form of transportation. As financial data outlined above shows, the 2040 plan calls for spending almost 10 times as much money on transit improvements and at least as much money on bike paths, pedestrian, and safety improvements as it would spend on increasing the capacity of state highways.

Not many people realize it, but the word “light” in



light rail doesn't refer to weight: Light-rail cars actually weigh more than heavy-rail cars. Instead, it refers to capacity: Light rail is, according to the definition used in the American Public Transit Association's glossary, "an electric railway with a 'light volume' traffic capacity."³⁴ Although one three-car light-rail train can hold 450 people (most of them standing), which is far more than a single bus, light-rail tracks can safely move only about 20 such trains per hour, meaning each track has a capacity of only 9,000 people per hour.

Bus route capacities can be much higher. A standard bus can hold about 60 people (most of them seated) while articulated and double-decker buses can hold more than 100. Because buses are fast and nimble, a single street can move many more buses per hour than a rail line. Portland, Oregon has streets that support 160 buses per hour.³⁵ Istanbul has a busway that moves more than 250 buses per hour. This means articulated or double-decker buses can easily move 16,000 people per hour on city streets and more than 25,000 people per hour on busways.

Despite the false claim that light rail is superior to buses because it is "high-capacity transit," the Twin Cities doesn't even need what can truly be called high-capacity transit. In contrast, during afternoon rush hours, the Hiawatha Line carried fewer than 2,900 people per hour in 2013. Morning rush-hour

ridership was even lower at under 2,200 people per hour. These numbers could easily be carried by rapid buses at a tiny fraction of the cost of rail. In fact, one of the great advantages of buses over rail is that bus service can easily be scaled to demand, whether high or low, while light rail is extremely expensive in low-demand service and unable to handle high demands.

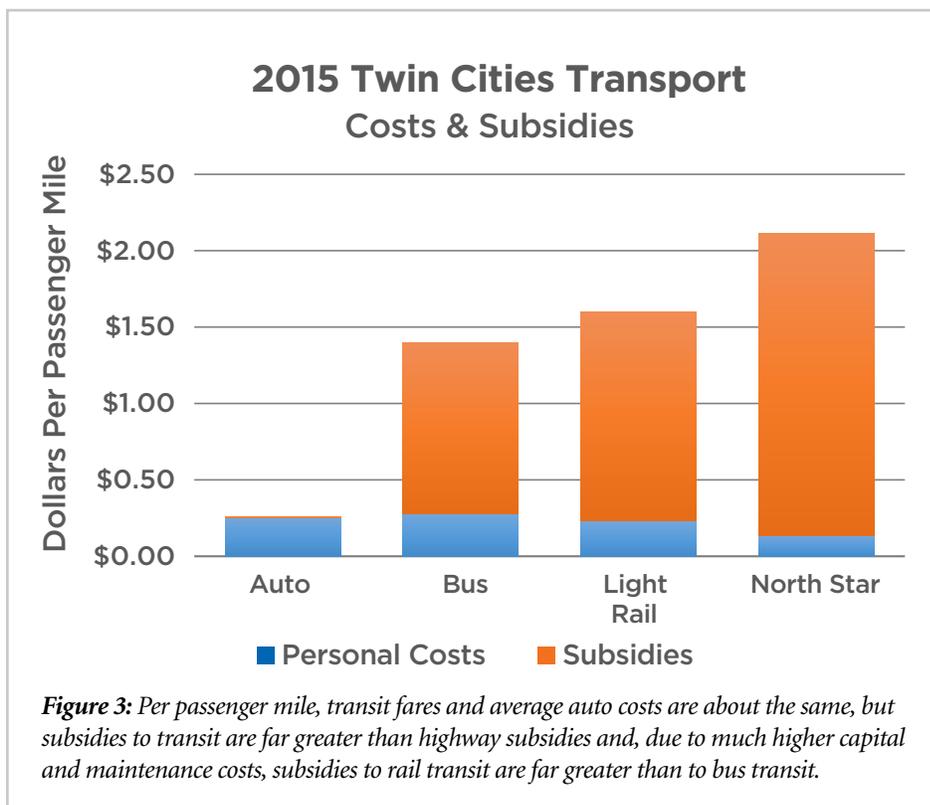
The North Star commuter train is even more wasteful than light rail. In 2015, it carried an average of just 1,274 round-trips per weekday, collecting fares averaging less than

\$3.50 per trip. Operations and maintenance costs alone amounted to more than \$27.50 per trip, and if capital costs were amortized over 30 years at 3 percent interest and added to the total, the subsidy per trip would be nearly \$50.

For the same cost as the North Star trains, the Metropolitan Council could have given every daily round-trip commuter-train rider a brand-new Toyota Prius every single year for those 30 years. More practically, North Star service could be provided by 16 buses costing about \$12 million initially compared with \$350 million for the trains. The buses would be faster than the trains and would also cost significantly less to operate.

Plans prioritize getting people out of cars

The Metropolitan Council's plans are also influenced by an ideology that places a higher priority on getting a few people out of their cars than on making transportation safer, cleaner, and more efficient for everyone. Instead of improving mobility by relieving congestion, for example, a large part of the 2030 and 2040 plans focus on attempting to manipulate people's transportation choices by influencing land uses. One part of the 2040 *Thrive* plan calls for putting "moderate- to high-density development" along transit corridors.³⁶ Council planners assume that higher density



housing will put more people within walking distance of transit stops and make them more likely to rely on transit rather than driving. They call this “improving accessibility” rather than mobility.

“The Council will promote land use planning and development practices that maximize accessibility to jobs, housing and services,” says the 2030 plan. In particular, “transportation investments and land development will be coordinated to create an environment supportive of travel by modes other than the automobile including travel by transit, walking and bicycling.”³⁷

One way this will be attempted is through “increased jobs [sic] and housing concentrations,” continues the plan. “Transportation investments and land development along major transportation corridors will be coordinated to intensify job centers, increase transportation links between job centers and medium-to-high density residential developments and improve the jobs/housing connections.”³⁸

This is based on an obsolete, polycentric version of a city in which most jobs are located in downtowns or other job centers, and most people live near their jobs, thus minimizing travel. This vision was accurate in 1920, when most urban jobs were in manufactur-

ing, and most factories were clustered in factory districts. Today, the vast majority of urban jobs are service jobs, including health care, education, retail, wholesale, and utilities.³⁹ Those jobs are too finely scattered across the landscape to be served well by mass transit; on average, less than 30 percent of jobs are located in downtowns or other concentrated job centers.⁴⁰ With the proliferation of cars and the dispersal of jobs, Twin Cities transit ridership dropped from 292 million per year in 1920 to 128 million in 1940 to 86 million in 1960 and to 78 million in 2000.⁴¹ Annual transit ridership amount-

ed to 83 million in 2016. The Metropolitan Council’s goal to recreate cities of the 1920s will fail because the nature of jobs has changed.

In another attempt to increase transit usage and discourage driving, the council also seeks to increase population densities. Historically, zoning ordinances have set maximum densities allowed in each zone. In order to increase the region’s densities and thereby increase accessibility, the council’s plans call for adding *minimum density* requirements to each zone.⁴² The council has also set a target for the number of multi-family housing units that must be built and distributed that target to each of the cities in the region.⁴³

At the same time, the council is discouraging low-density development at the urban fringe by setting maximum allowable densities outside of the urbanized portion of the seven-county area. Much of the area, for example, is limited to one home for every 40 acres.⁴⁴ These restrictions on rural development would force most new development into the existing urban footprint. While the council’s plan is not as strict as the urban-growth boundaries used in, for example, California or Oregon, the council’s goal is clearly to increase population densities within the existing urbanized area.

Plan will fail to alter driving habits

All of these ideas are based on current urban planning fads that have been proven not to work when they have been tried in other urban areas. The most spectacular failure is the San Francisco Bay Area, which has built 200 miles of new rail transit routes in the past 35 years. Along those routes, the region has encouraged developers to build numerous high-density, mixed-use transit-oriented developments. The region's overall population density has increased by nearly 50 percent since 1980. Yet per capita transit ridership has declined by a third and per capita driving has increased.⁴⁵

Numerous studies have asked whether increasing densities and other changes to urban form can change people's travel habits. A literature review of those studies by University of California, Irvine, economist David Brownstone found that many of them failed to account for self-selection. That is, people who prefer to use transit rather than drive will tend to locate in high-density housing along transit corridors, but this doesn't mean that building more such housing projects will lead other people to drive less.⁴⁶

Studies that corrected for self-selection, Brownstone learned, still found a link between driving and density, but that link was "too small to be useful" in attempting to reduce driving. "The magnitude of the link between the built environment and VMT [vehicle miles of travel] is so small that feasible changes in the built environment will only have negligible impacts on VMT," concluded Brownstone.⁴⁷ Nonetheless, most of the Metropolitan Council's transportation plans are based on the assumption that such land-use changes will greatly alter the region's travel patterns.

Rather than significantly reduce driving, increased densities in transit corridors will significantly increase congestion. Putting more people in a given area is going to result in more driving within that area. Given the council plans almost no new roadway capacity, that means more congestion. More congestion means wasted energy, more greenhouse gas emissions, and, since cars pollute more in stop-and-go traffic, more toxic air pollution.

Traffic calming and complete streets

The 2040 plan also encourages local governments to adopt traffic calming, complete streets, and other techniques that supposedly improve travel for pedestrians and cyclists.⁴⁸ These tools have been used in

many cities but few, if any, have ever assessed whether they achieve their claimed objectives.

Traffic calming, for example, consists of narrowing streets, putting barriers at intersections, installing speed humps, and other devices aimed at slowing automobile traffic. In addition to slowing autos, they also slow emergency service vehicles, and research has shown that these slowdowns are likely to result in far more people dying due to delays to paramedic and fire vehicles than are saved by slowing auto traffic.⁴⁹ At least 24 cities in the Twin Cities area have used traffic calming techniques.⁵⁰

A related traffic calming program is the conversion of one-way streets to two-way operation, which has recently been done by the city of Minneapolis.⁵¹ Numerous studies have proven that one-way streets relieve congestion, speed traffic, and increase safety.⁵² Pedestrians in particular enjoyed greater safety because they only had to be wary of traffic coming from one direction: one study called one-way streets "the most effective urban counter-measure" to pedestrian accidents.⁵³ Predictably, cities that have recently converted one-way streets back to two-way operation suffered an increase in accidents.⁵⁴ But two-way streets are still favored by planners because they slow traffic and increase congestion.

Complete Streets programs often include converting automobile lanes to bicycle lanes. Hennepin County, for example, is currently reconstructing Washington Avenue between Hennepin Avenue and Fifth Avenue South to reduce the number of general lanes from six to four in order to provide two lanes for bicycles. Eventually, the county wants to extend this from I-35W to Portland Avenue. The county is doing this despite an analysis that it commissioned showing that the project would significantly increase traffic congestion not just on Washington but on parallel streets as some of the traffic that would otherwise use Washington would be diverted to other streets. This congestion would increase both fuel consumption and air pollution. The analysis estimated an annual congestion cost to motorists and transit riders of more than \$15 million due to delay, vehicle wear and tear, and extra fuel consumption.⁵⁵

The safety benefits to cyclists are not likely to be worth the added costs of congestion and pollution. The National Highway Traffic Safety Administration's Fatality Analysis Reporting System (FARS) reveals that far more bicycle fatalities take place at intersec-

tions than from automobiles overtaking cyclists. Nationwide, there were 617 bicycle fatalities at intersections and 450 from autos overtaking bicycles in 2014 and 2015 combined.

While the bike lanes on Washington Avenue are aimed at reducing the latter kind of accidents, they may lead to an increase in intersection-related accidents if the lanes succeed in attracting more cyclists to Washington Avenue.⁵⁶ For cyclist safety, it would have been far better to turn First Street into a bicycle route, as that street has fewer cross streets and less auto traffic than Washington Avenue. This could have been done for a lower financial cost with a negligible impact on congestion.

Plans prioritize core cities at expense of suburbs

Hennepin County and Minneapolis are naturally enthusiastic about the Metropolitan Council's plans, which call for dedicating most of the region's resources to maintaining the preeminence of the central cities and counties at the expense of the suburbs. Yet if transportation resources were placed where they are most needed, they should go mainly to the suburbs, where most of the region's growth is taking place. Census data reveal that, between 2000 and 2015, Minneapolis and St. Paul gained 42,000 residents while the suburban portions of the urbanized area grew by 370,000. Similarly, Hennepin and Ramsey counties gained 134,000 people while the five suburban counties grew by 236,000.

As joint comments on the 2040 plan submitted by the five suburban county commissions noted, "goals, strategies and corresponding performance measures" in the 2040 plan "don't align with regional growth patterns." Though the plan itself projects that most future growth will take place in the suburbs, "non-local transportation investment does not address these projections," meaning the 2040 plan doesn't put state and federal transportation dollars where the growth is taking place.⁵⁷ Specifically, the plan is "prioritized towards transit and non-motorized modes," with highway expansions "focused on MnPASS." This bias "represents a bleak future for the regional highway system in most counties," argued the counties.⁵⁸

The Metropolitan Council's pro-congestion plans stand in sharp contrast to those of other urban areas that have actively sought to minimize congestion. The Kansas City urban area, for example, has seen the

number of lane miles of freeway per million people grow from 1,081 in 1982 to 1,320 in 2014. By comparison, the Twin Cities population has grown faster than lane miles so lane miles per million has shrunk from 683 in 1982 to 670 in 2014. While Kansas City's travel time index has barely grown from 1.04 in 1982 to 1.15 in 2014, the Twin Cities' index has grown from 1.11 to 1.26, meaning Twin Cities residents waste far more time in traffic than those in Kansas City.⁵⁹

This means residents of Kansas City have greater mobility than those of the Twin Cities. Average driving speeds in Kansas City are 40.1 miles per hour, more than a third greater than Twin Cities speeds of 29.4 miles per hour.⁶⁰ Since, for most Americans, time is more likely to limit travel than cost, faster speeds mean access to more jobs and other economic opportunities. This helps explain why per capita driving in Kansas City averaged 34.0 miles per day in 2014, or 30 percent more than the Twin Cities average of 26.2 miles per day: Kansas City residents can travel those 34 miles in less time than it takes Twin Cities residents to travel 26 miles.⁶¹

At the same time, the average resident of the Twin Cities area rode transit 178 miles in 2014 compared with just 46 miles in Kansas City. This might make it appear that the Metropolitan Council's plan to suppress driving in favor of transit is working. But the extra 132 miles of transit riding fail to make up for the lost 2,847 miles of driving per capita, especially since (at an average occupancy of 1.67 people per vehicle) that driving represents something like 4,750 passenger miles.⁶² Despite the extra transit ridership, Kansas City-area residents are still 29 percent more mobile than those of the Twin Cities.

Another city that has worked hard to prevent increased congestion is Indianapolis. In 1982, Indianapolis congestion was worse than in the Twin Cities. Since then, the Indianapolis urban area has been growing twice as fast as the Twin Cities, but rather than allow congestion to increase, Indianapolis is the first American city to completely coordinate all of its traffic signals. As a result of this and other improvements, Indianapolis travel speeds today are 15 percent faster than those in Minneapolis and, with a travel time index of 1.18, congestion is far lower.

Met Council's conflict of interest

One last key problem is that the Metropolitan Council has a conflict of interest because it manages

the region's main transit agency. This means that most of the funds that it plans to allocate to transit are retained in its budget, while funds allocated to roads go to other agencies. By building overly expensive transit, the council enhances its own budgets and prestige while short-changing the needs of the vast majority of the region's commuters.

This conflict is especially pronounced in the Met Council's role as the Metropolitan Planning Organization (MPO) responsible for distributing federal funds. Every other large MPO for a large city, and possibly every MPO in the country operates as a separate planning body that distributes federal funds to different agencies.⁶³ The Met Council is the only MPO for a large city that puts planning and transit operations under one roof, giving Met Council planners an incentive to retain federal dollars for their own operations.

Moreover, the Met Council is also the only MPO in the country that does not include elected officials from the planning region. To assure a fairer and more accountable distribution of funds, federal law requires MPOs to be led by elected officials. The Met Council, however, received an exception to this requirement when it was enacted allowing it to operate as an MPO under its existing governance structure. Instead of being accountable to local elected officials, the Met Council is appointed by the governor and therefore entirely accountable to the governor. Naturally, the governor's Met Council will be less attentive to areas of the region that did not support the governor in the last election cycle.

The Morality of Mobility

The Metropolitan Council's emphasis on reducing driving in favor of transit carries an implicit assumption that transit is somehow more moral, ethical, or sustainable than driving. This assumption may have had some validity fifty years ago when cars were deadly, polluting gas guzzlers. But these problems have been greatly reduced today. If anything, it is transit that is less moral—that is, transit produces more negative externalities than driving.

Trains are less safe

In 1967, automobile accidents killed 53.5 people for every billion vehicle miles of travel.⁶⁴ By 2015, safer vehicles and safer roads had reduced this to 11.3 fatalities per billion vehicle miles. Urban roads have

always been safer than rural roads, with fatalities in urban areas declining from 36.2 per billion miles in 1967 to 7.1 in 2015. At an average occupancy rate of 1.67 people per vehicle, that's 4.3 fatalities per billion passenger miles. Minnesota has significantly lower fatality rates than the national average, suffering just 4.0 urban fatalities per billion vehicle miles (2.4 per billion passenger miles) in 2015. Minnesota urban freeways are the safest of all, seeing just 1.6 fatalities per billion vehicle miles or less than one fatality per billion passenger miles.⁶⁵

By comparison, transit is no safer than cars today, and some forms of transit, in particular light rail and commuter rail, are far more dangerous. Because transit vehicles are so much bigger than other vehicles, they are fairly safe for people on board, but can be deadly to pedestrians, bikers, and automobile occupants.

While figures are not available for Minnesota, nationally transit buses killed an average of 4.0 people for every billion passenger miles they carried in 2014, the latest year for which data are available. That makes buses about as safe as automobiles. Commuter rail, however, did much worse at 7.3 fatalities per billion passenger miles. Light rail is the deadliest of all, at 15.7 fatalities per billion passenger miles. The numbers vary from year to year, but—unlike automobiles—transit is not getting much safer over time. The average over the past 10 years was 4.3 fatalities for buses, 8.8 for commuter rail, and 13.9 for light rail.⁶⁶

Transit uses more energy

Similarly, cars have become far more energy efficient in the last fifty years while transit has become less energy efficient. According to the Department of Energy, the average car used close to 4,900 British thermal units (BTUs) per passenger mile in 1970, dropping to 3,100 today. Light trucks, which include pick ups, full-sized vans, and sports utility vehicles, use about 3,500 BTUs per passenger mile. The energy used by transit buses, however, increased from under 2,500 BTUs per passenger mile in 1970 to more than 3,800 today.⁶⁷ Energy consumption by rail transit, including light rail, heavy rail, and streetcars, grew from under 2,200 BTUs to nearly 2,400 BTUs per passenger mile.⁶⁸

Light rail tends to be less energy efficient than heavy rail, on average using more than 4,000 BTUs per passenger mile in 2015 compared with under 2,000 for heavy rail. Metro Transit's light-rail lines are even less energy efficient than average, using more than 4,100

BTUs per passenger mile in 2015. The Northstar commuter trains used nearly 3,200 BTUs per passenger mile in 2015. When all Twin Cities transit is counted together, including transit provided by agencies other than Metro Transit, transit used more than 4,300 BTUs per passenger mile in 2015.⁶⁹ In short, Twin Cities transit uses more energy per passenger mile than the average SUV.

No pollution advantage

The emissions of toxic air pollutants are more difficult to calculate because they depend on many factors, including the type of technology used to control emissions, the age of vehicles, and how well maintained they are. In general, diesel-powered buses produce more particulates and nitrogen oxides per passenger mile than cars, while producing slightly less carbon monoxide and volatile organic compounds. The diesel-powered Northstar commuter train is likely to be a heavy polluter. Minnesota still gets more than half of its electrical power from burning fossil fuels, and this also results in more pollution.

Estimating greenhouse gas emissions is more straightforward because the emissions from most fuels are proportional to the BTUs consumed. Burning gasoline produces 0.071 grams of carbon dioxide per BTU, so the average car emits about 220 grams per passenger mile. Diesel produces slightly more, 0.073, grams per BTU.⁷⁰ Metro Transit uses between 5 and 20 percent biodiesel from soybeans.⁷¹ It is debatable whether this reduces greenhouse gas emissions since production of soybeans themselves results in greenhouse gas emissions. Generously assuming that Metro Transit uses 20 percent biodiesel and that this reduces emissions from that 20 percent by 75 percent, then buses emit 0.062 grams per BTU. Since Metro Transit buses use about 3,475 BTUs per passenger mile, they emit at least 215 grams per passenger mile.

In 2015, 43 percent of the electricity generated in Minnesota came from burning coal, while another 13 percent came from natural gas.⁷² This means that, on average, Minnesota electricity generated about 0.048 grams of carbon dioxide per BTU. Since light rail used about 4,100 BTUs per passenger mile, it produced nearly 200 grams of carbon dioxide per passenger mile. The diesel-powered Northstar commuter train produced about 230 grams per passenger mile in 2015.

In short, Twin Cities transit does not produce significantly more greenhouse gas emissions per pas-

senger mile than cars, but neither does it produce significantly less. The construction of light-rail lines generates huge amounts of greenhouse gases that will never be recovered from savings from light-rail operations. If the Metropolitan Council were seriously interested in saving energy or reducing greenhouse gas emissions, it would focus on encouraging people to buy and drive more fuel-efficient cars, not on getting a handful of people out of cars and onto transit vehicles that don't save energy anyway.

Better ways to connect the poor with jobs

Another important moral issue is poverty, and transit is often promoted as a way of helping low-income people reach jobs and other important destinations. But few people are so poor that they lack cars. According to the Census Bureau, just 3.2 percent of workers in the Twin Cities area live in households that have no cars. Only 36 percent of those workers take transit to work, while 33 percent get to work by car, either carpooling or in a borrowed car (perhaps provided by their employer).⁷³ This suggests that transit isn't even very useful for people who have no cars, partly because—as noted above—most jobs are too finely distributed to be easily reached by transit.

Studies have found that giving low-income people access to a car is far more helpful to them getting and keeping a job than giving them a free transit pass; even in the most transit-intensive areas, free transit passes don't provide access to anywhere near as many potential jobs as an automobile.⁷⁴ On the other hand, efforts to reduce auto driving by increasing congestion fall hardest on low-income people, who are less likely to have jobs that offer flextime or flexible locations.⁷⁵

Automobiles are as safe or safer than transit; just as energy efficient; just as clean; and far superior to transit in helping people get out of poverty. For all these reasons, the Metropolitan Council's preference for transit over roads is inappropriate and, arguably, immoral.

Physical Approaches to Congestion

Before considering specific actions the Twin Cities can take to reduce congestion, it is important to understand why congestion happens. This is illustrated by Figure 4, which is based on actual counts of the number of vehicles per hour that can travel on a freeway lane at various speeds (based on a freeway in

Washington state). The figure shows that number on this particular highway is maximized at about 50 miles per hour, when about 2,000 vehicles per hour move on the lane. If the average vehicle is 18 feet long, then cars are spaced about 7 car lengths apart, which is somewhat more than the recommended safe distance.

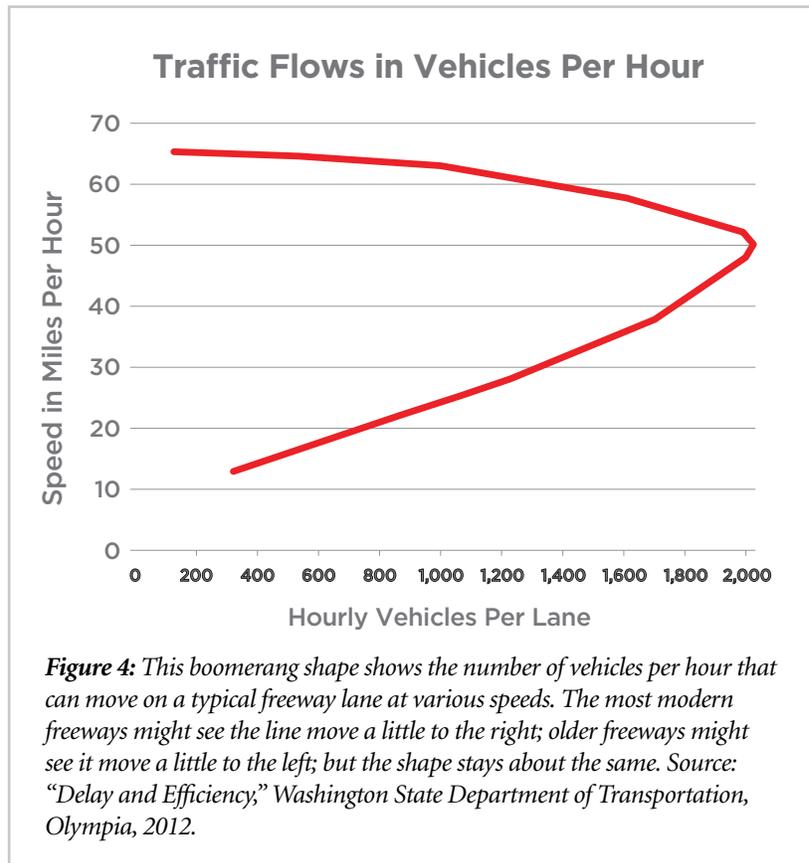
If traffic increases above 2,000 vehicles per hour, then speeds slow down. This has a perverse effect of reducing the number of vehicles per hour that can move down the lane. At 40 miles per hour, fewer than 1,800 vehicles can travel per hour, and at around 25 miles per hour, the number falls to 1,000 vehicles per hour.

This chart means that highways are practically unique in that they are the only resource whose supply declines when demand increases. Airplane seats don't disappear when lots of people want to fly at Thanksgiving. Florida hotel rooms don't disappear when lots of people want to escape to warmer climates in the winter. But the flow rates on highways decline when too many people want to use those roads.

Once the flow rate on a lane has been reduced to, say, 1,000 vehicles per hour, flows won't be able to increase again until fewer than that number of vehicles per hour try to use that lane. During a rush hour period, there may only be a few minutes during which more than 2,000 vehicles per hour try to use the road, but there may be several hours during which more than 1,000 vehicles per hour try to use it. This means the road will be congested for several hours even though for most of that time the road is theoretically able to move all of the traffic at speed.

A traditional rule of thumb is that drivers should maintain one car length between them for every 10 miles per hour they are driving. At 50 miles per hour, five car lengths should be sufficient. Yet highways are unable to support as many vehicles per hour as this rule of thumb. The reason for this is slow human reflexes.

Suppose a line of cars is driving with safe distances between them. When a car in an adjacent lane moves between two cars in the first lane, the distance be-



tween it and the car behind it falls below the safe distance. The driver in the following car responds by slowing, perhaps as little as one mile per hour. The car behind that car catches up and, by the time the driver is able to respond, closes to an unsafe distance. The second driver overcompensates by slowing by two miles per hour. This causes the third car in the line to close with the second car even faster, so the driver slows by three miles per hour. If the line was going 50 miles per hour before the first car slowed, and there are 50 cars in the line, the last car may end up coming to a complete stop.

This explains why vehicles moving at speed on a crowded highway may suddenly enter a zone of stop-and-go traffic for no apparent reason. Someone tapped their brake slightly, perhaps because of a vehicle changing lanes, leading to a chain reaction of slowdowns, and a wave of slow traffic continues up the highway until the number of vehicles trying to use that lane falls below the lane's flow rate at the slower speed. This process may require hours to work itself out.

For example, Oregon once installed a large electronic sign on Interstate 5 between Salem and Portland to

warn people of congestion ahead. When initially installed, the sign said, “No congestion ahead.” Yet motorists, unused to the sign, slowed slightly to read what it said. This led to huge traffic jams at the sign. The state soon removed the sign to prevent the kind of congestion that the sign was supposed to mitigate.

Traffic signals and traffic circles have similar problems. Each have certain capacities, but when flows exceed those capacities, they result in serious congestion.

This suggests there are several ways of dealing with congestion.

1. Build enough road capacity that flows on any given lane never exceed 2,000 vehicles per hour or whatever that lane’s capacity is.
2. Persuade drivers to adjust their travel times so that no one ever tries to move more vehicles per hour than any given lane can handle.
3. Improve driver reaction times so that lanes can move more vehicles per hour.
4. Accept that lanes are going to become congested and offer people alternative ways to travel.

1. Build More Road Capacity

If the right of way is available, new roads are inexpensive. New freeways cost about \$3 million per lane mile, compared with \$50 million to \$100 million per rail mile for light rail (\$100 million to \$200 million per route mile). Typical freeway lanes move five times

as many people (not to mention many times more freight) than light-rail lines, making the cost difference even greater. In the Twin Cities, for example, the average light-rail mile moved about 5,200 passenger miles a day in 2015, while the average freeway lane mile moved more than 26,000 passenger miles a day.⁷⁶

Building complex highway interchanges can cost much more than \$3 million a lane mile, but when all of the costs of a highway are averaged, they are still lower than rail projects of a similar length. Per lane mile, Boston’s Central Artery Project, also known as the Big Dig, was by far the most expensive project ever constructed. Really a city beautification project rather than a highway project, it cost about \$120 million a lane mile in today’s dollars. No highway project in the Twin Cities is likely to cost anything close to this much. By comparison, the lowest cost light-rail line being planned or built today is \$100 million a route mile, and the average cost is \$162 million per route mile.⁷⁷

One problem is that many urban highways already occupy all of the available right of way, and acquiring new right of way is both economically and politically expensive. However, there is another alternative: Build elevated highways above existing roads. A company called FIGG Bridge Group, which built the Twin Cities’ new I-35W bridge across the Mississippi, has designed and built elevated highways in Florida, Virgin-

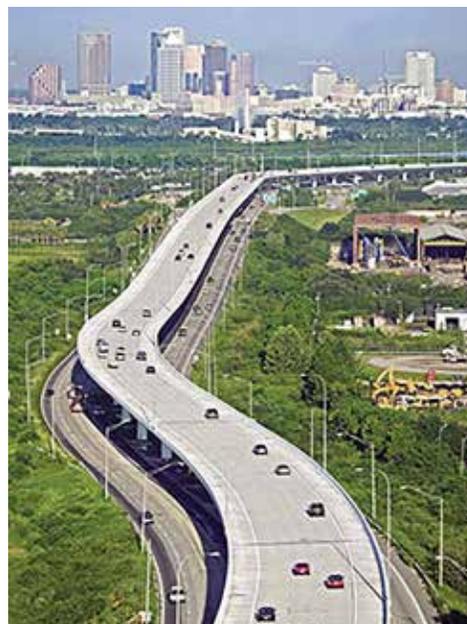


Figure 5: Elevated freeway lanes built in the median strip of an existing freeway, thus saving the cost of purchasing additional right of way. This example shows three reversible lanes serving inbound traffic in the morning and outbound traffic in the afternoon. If traffic is more balanced, the elevated structure is wide enough to allow for four lanes, two in each direction. Source: Tampa-Hillsborough Expressway Authority.

ia, and elsewhere that rest on six-foot pillars that stand in the median strips of the existing highway.

For example, FIGG built a 14-mile elevated structure above Tampa’s Selmon Expressway. The highway’s three lanes are used for in-bound traffic in the morning and outbound traffic in the afternoon and they virtually eliminated congestion on the expressway. The total cost was about \$10 million a lane mile in today’s dollars, more than the cost of building at surface level but a tiny fraction of the cost of rail transit. Average morning commute times dropped from 30–40 minutes to 10 minutes or less.⁷⁸ Elsewhere, FIGG has put four lanes on the elevated roads, two for each direction of traffic. Such elevated lanes could be added to many if not all of the congested freeways in the Twin Cities.

Beyond building new lanes, the Federal Highway Administration has identified a variety of ways of reducing congestion at bottlenecks. Traffic signal coordination is one. Another interesting idea is the double crossover diamond interchange, used where an arterial crosses a freeway. Stoplights to allow left turns at the freeway on- and off-ramps can be a significant source of congestion during rush-hour periods. This can be greatly reduced by having the arterial lanes cross one another so vehicles drive on the left side of the road. This eliminates left-turns from the signal period, greatly increasing flows.

The nation’s first double crossover diamond was installed in Springfield, Missouri in 2009. MnDOT has installed two double crossover diamonds in the Twin Cities region, one at the intersection of 34th Avenue South and I-494—though the advantages at that location are offset by the light-rail tracks that cross both crossovers (Figure 6)—and one at the intersection of County Road 96 and I-35W in Arden Hills.⁷⁹

MnDOT would probably like to install more such crossovers but may not be able to do so because the council would rather spend most of the region’s transportation dollars on rail transit and bike lanes.⁸⁰ In 2008—a time when MnDOT was taking aggressive steps to reduce congestion—a joint MnDOT-Metropolitan Council study reviewed several alternatives



Figure 6: The double crossover diamond (DCD) reduces the number of crossing conflicts from ten to two. Even those conflicts can be eliminated with small overpasses. This aerial photo shows the 34th Avenue and I-494 intersection in Bloomington with crossovers bisected by light-rail tracks. Source: Google maps.

for relieving congestion in the Twin Cities area with the Metropolitan Council’s 2030 plan. One of the alternatives called for spending money on “low-cost, high-benefit projects” that identify bottlenecks and “design solutions that are relatively cheap and can be implemented in a short length of time.” In all, 185 such projects were identified that would cost a total of \$1.7 billion. By comparison, the 2004 update of the 2030 plan alternative was projected to cost \$3.0 billion.

Another alternative called for building enough lane miles of new roads to completely eliminate all congestion. This “fix-congestion” alternative was projected to cost \$43 billion.⁸¹ However, one of the reasons for this high cost was right-of-way acquisition; MnDOT did not consider the alternative of building elevated structures similar to Tampa’s Selmon Expressway. Relatedly, when assessing the options for relieving congestion along I-35W through Roseville, MnDOT concluded that we cannot build our way out of congestion due in large part to the high cost of acquiring ROW without any discussion of an elevated option.⁸²

The Twin Cities region has about 350 miles of freeways.⁸³ If such elevated structures, whether striped for three or four lanes, cost about \$40 million per mile including on- and off-ramps, then MnDOT could add them to 150 of those freeway miles for \$6 billion, or less than the 2040 plan calls for spending on light rail and other transitways. Since these lanes could be

used by buses along with other vehicles, they would not only relieve congestion, they could provide greater transit benefits than spending the same dollars on light rail. At an average of \$100 million per mile, \$6 billion could build only 100 miles of light-rail lines.

While implementing the 2030 plan was projected to require an 8-cent-per-gallon increase in gasoline taxes and more than a doubling of vehicle registration fees, the low-cost, high-benefit alternative could be implemented with no new funding. The fix-congestion alternative was considered infeasible due to its high cost, as it would require a gas tax increase of well over \$2 per gallon.

By some measures, the low-cost, high-benefit alternative provided more congestion relief than the 2030 plan, while by other measures it didn't provide quite as much. The two "approaches produce about the same level of improvement," the study concluded.⁸⁴ But since the low-cost, high-benefit alternative cost far less than the 2030 plan, it should have been given serious consideration. Instead, most of the projects in that alternative were not funded by either the 2030 plan or the more recent 2040 plan. Instead, as noted above, the 2040 plan allocates just \$700 million to road improvements.

The fix-congestion alternative showed that it is possible for the Twin Cities to build its way out of congestion, but the cost is extraordinarily high. Demand peaks may last only a few minutes to a couple of hours per week day. The rest of the time, that extra capacity is unused. It would be much more efficient to utilize the entire road for more hours of the day, as proposed by the next approach to congestion.

2. Adjust Travel Times to Prevent Congestion

Far less than half of the vehicles on the road at rush hour are people going to or from work. If people in some of the other vehicles could be persuaded to shift their travel times slightly, roads might never be congested. Economists have long known that the best way to prevent congestion is to use variable pricing to encourage some people to travel at less-congested periods of the day. Airlines, hotels, and other services all use variable pricing to deal with congestion. Variable pricing is easy to add to either electronic tolling or mileage-based user fees.

MnDOT already uses variable pricing for its MnPASS express lanes, also known as high-occupancy/

toll (HOT) lanes, on parts of I-35E, I-35W, and I-394. Such express lanes give people a choice between paying a toll and driving in congested conditions. Figure 7 shows that, since the express lanes are uncongested, they can move far more vehicles per hour than the congested lanes. As a result, while they may not look very crowded, they can relieve congestion on the untolled lanes because they attract so many vehicles away from those lanes. MnDOT studies project installing a MnPASS lane on I-35W in Roseville will serve 10 percent more people daily than a general purpose lane.⁸⁵

In addition to the low-cost, high-benefit and fix-congestion alternatives, the 2008 arterial study described above also considered an alternative of providing such express lanes for every major arterial in the Twin Cities. This alternative was projected to cost about \$8.0 billion, far more than the low-cost, high-benefit alternative, but it was also projected to provide far more congestion relief, reducing overall congestion delays by about 25 percent.⁸⁶

A more recent study of Twin Cities arterials prepared for the Metropolitan Council by Parsons Brinckerhoff estimated the benefits and costs of adding MnPASS express lanes to 18 different arterials in the region. The benefit-cost ratios of such express lanes ranged from 3.1 to nearly 140, that is, for every dollar spent on the lanes, benefits ranged from \$3.10 to \$140.⁸⁷ Only four of the projects had benefit-cost ratios of less than ten-to-one. Such high benefit-cost ratios are extraordinary and suggest that such lanes should be added to every single major arterial. Yet the 2030 and subsequent 2040 plans proposed doing only a handful of these projects.

While it is commendable that the Metropolitan Council is considering MnPASS express lanes for any arterials at all, the benefits of variable pricing would be far greater if it were applied to all lanes on a highway, rather than just selected express lanes. At first glance, pricing all lanes during congested periods would appear to suppress travel and be particularly unfair to low-income people. In fact, exactly the reverse is true because of the peculiar effect of road flow rates declining when speeds slow below 50 miles per hour, as shown in Figure 7. Paradoxically, by preventing this from happening, congestion pricing can actually double the number of vehicles that can use highways during rush hours. When only express lanes are priced, the remaining lanes still become congested as their flow rates decline to well below their capacities (Figure 7).

Now that inexpensive electronic tolling is available,

most economists would support pricing of all congested roads. This would completely eliminate congestion without spending the \$43 billion estimated by the MnDOT arterial study. The revenues earned from such tolls would pay to maintain the roads and any surplus revenues would be used to build more roads, thus allowing more travel during peak periods. Neither MnDOT nor the Metropolitan Council have considered this alternative, possibly because tolling of interstate highways requires permission from Congress.

Variable-priced user fees provide far better feedback to users and providers than gasoline taxes. Users get information about when demand to use the roads is highest, and rather than sit in traffic they can choose to travel at another time or pay the higher toll. Since more than half the vehicles on the road at rush hour are not people going to or from work, many can change their travel times without seriously disrupting their schedules. At the same time, highway owners get information about where demand is greatest. When revenues are greater than costs, it is a signal that owners should consider capacity expansions.

Perhaps the best thing that can be said for variable

pricing is that it costs taxpayers nearly nothing since the road users are paying the costs. Thus, the policy's cost effectiveness is probably even greater than that of traffic signal coordination.

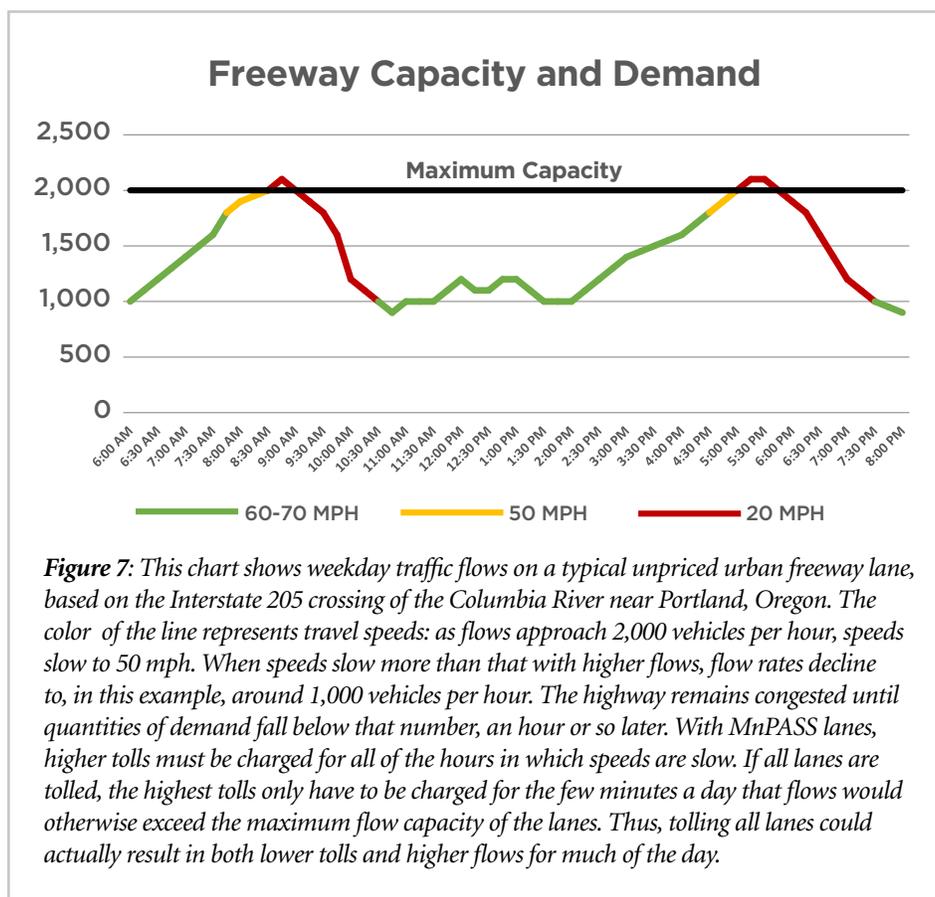
3. Improve Driver Reaction Times to Increase Road Capacities

As described above, most congestion is due to slow human reflexes that can lead to stop-and-go traffic even when there is no visible cause of a slowdown. While human reaction times cannot be changed, they can be replaced by computer reaction times using adaptive cruise control, a feature that is found on increasing numbers of cars. A car with adaptive cruise control monitors the vehicle in front of it and maintains a fixed driving distance at all times.

Simulations by researchers at the University of Minnesota estimate that congestion will significantly decline when as few as 20 percent of cars on the road are using adaptive cruise control because such cars will interrupt the waves of slowdowns that can take place when the first car in a line slows slightly.⁸⁸ More recently, actual experiments performed by engineers

at the University of Illinois found “that with as few as 5 percent of vehicles being automated and carefully controlled, we can eliminate stop-and-go waves caused by human driving behavior.”⁸⁹

Even greater congestion relief will be gained when autonomous vehicles enter the market, which should be soon. Ford Motor Company has vowed to be mass producing fully autonomous cars—cars with no steering wheel or foot pedals—by 2021.⁹⁰ Waymo (the autonomous car company started by Google) is already giving autonomous cars to families in Phoenix for test purposes. Apple, Uber, Tesla, Volkswagen, Nissan, General Motors, and many other



companies are also working on fully driverless cars. MnDOT projects fully autonomous vehicles will hit the road in 2025.⁹¹ One projection estimates that 95 percent of all travel will be in driverless cars by 2030.⁹² Some experts believe that autonomous cars will increase road capacities by three to four times.⁹³

While these projections may be optimistic, it is certain that driverless cars will be available soon and that they will completely reshape travel experiences. For example, Uber-style shared, driverless cars will probably be price-competitive with urban transit, but far more convenient. Thus, autonomous cars are likely to spell the end of mass transit as we know it except in New York City and a few other places whose population and job densities are too great to be served by personal vehicles.

This suggests that it doesn't make sense to make long-term investments in light rail or commuter rail, whose ridership will probably drop to very low numbers due to shared, driverless cars before the end of their 30-year expected lifespans. New roads should only be built to access newly developed areas or where congestion is already so severe that the returns from expansions will pay off the costs in a few years.

4. Accept Congestion and Provide Alternatives

The Metropolitan Council's current policy is probably the least productive because only a few people use the alternatives, which include transit, cycling, walking, and a handful of MnPASS express lanes. Most people still remain stuck in traffic, and the increased traffic increases energy consumption and pollution as well.

Light rail, the council's most glamorous—and most expensive—tool carries too few people to relieve congestion and in most cases makes it worse.⁹⁴ Commuter rail is little better. Bus-rapid transit at least won't make congestion worse if it operates on express lanes that are open to other vehicles paying a toll. But lanes dedicated exclusively to buses are a waste because the Twin Cities has no corridors where bus traffic would be dense enough to justify giving buses their own lanes. A busway in Istanbul, for example, moves more than 250 buses per hour and still has capacity to spare. By comparison, an exclusive busway in Los Angeles moves just 15 buses per hour at rush hour, meaning it is at least 94 percent underutilized.

Even the worst taxes that take from the poor and

give to the rich at least benefit someone. Congestion, however, is a dead-weight loss to society. The costs are high and no one benefits except those who enjoy watching other people be miserable, which may or may not include Metropolitan Council planners.⁹⁵ Thus, the alternative of doing little or nothing to relieve congestion has a high economic cost which in the Twin Cities' case is close to \$4 billion per year.

Institutional Approaches to Congestion

The previous discussion suggested that a combination of variable pricing of congested roads with construction of new road capacity makes the most economic sense. Yet the Twin Cities is not the only region whose metropolitan planning organization decided instead to do little or nothing to relieve congestion and instead focus on providing alternatives to congestion for the few people who would use those alternatives. Los Angeles, Portland, Seattle, and the San Francisco Bay Area, to name a few, follow similar policies.

As someone once said, "There's a simple solution to this traffic problem: We'll have business build the roads and government build the cars."⁹⁶ This makes the point that government is often slow and inefficient while private businesses are more responsive and cost-effective. But a deeper meaning is that the differences between political agencies and private businesses are institutional in nature, so any efforts to relieve congestion must consider institutional reforms as well as physical changes to transportation infrastructure. This section will consider three possible reforms: performance measures, user-fee funding, and privatization.

Performance Measures

The federal government requires both MnDOT and the Metropolitan Council to write long-range and short-range transportation plans defining how they will spend federal, state, and local dollars on transportation programs. To insure these plans are effective, some states have required that planners score proposed projects using *performance measures* that include congestion relief, safety, environment, and economic development. Under this system, the projects with the highest scores should be selected for construction.

Virginia, for example, has divided the state into four regions. Northern Virginia (suburban Washing-

ton, DC) is the most congested, so congestion relief gets 45 percent of the weight in scoring. In less-congested regions, congestion relief gets only 15 percent of the weight while safety and economic development benefits get great weight.⁹⁷

The problem with this system is that it is easy to game the performance measures or scores so that they favor projects that provide little congestion relief. Maryland, for example, has adopted a performance measurement system that doesn't consider congestion relief at all but does consider such subjective criteria as "community vitality" and "resiliency." The result is that projects that increase congestion are favored over those that reduce it.⁹⁸

Utah passed legislation requiring planners to evaluate the cost-effectiveness of projects in relieving congestion. A state audit found, however, that Salt Lake City planners "cooked the books" of their scoring system to make rail transit seem more cost effective than it really was. The result was that most of the area's funds that were supposed to be dedicated to congestion relief went into building light-rail and commuter-rail lines that did almost nothing to relieve congestion.⁹⁹ Despite the auditor's findings, the rail projects were built.

The Washington state legislature adopted performance measures in 2000 including a requirement that congestion be "significantly reduced."¹⁰⁰ An analysis by TDA, a Seattle engineering firm, found that adding just six percent to the region's lane miles of roads would reduce future congestion (measured by hours of delay) by 30 to 36 percent even with a projected 26 percent increase in driving.¹⁰¹ Instead, however, the plan adopted for that region by the Puget Sound Regional Council, like the Metropolitan Council's 2040 plan, emphasizes light rail over highway improvements. To implement that plan, the Regional Council persuaded the legislature to repeal the performance measures in 2007.¹⁰²

MnDOT uses performance measures that are mainly oriented to safety, pavement, and bridge quality. The only measure it uses for congestion is "percent of metro area freeway miles below 45 miles per hour in AM or PM peak." This is not useful for deciding which projects should be selected for funding, and clearly has not been successful in relieving congestion as the agency's latest report on performance measures concluded that "metro-area freeway congestion reached an all-time high" in 2015.¹⁰³

Performance measures are politically attractive because they can make it appear that politicians are doing something about congestion. Yet, unless they are rigorously monitored and enforced, they are likely to do little good and can end up being more harmful than helpful.

Funding Out of User Fees

Before 1964, most surface transportation in the United States was funded out of user fees. Railroads were private and received little or no subsidies. Eighty-eight out of the 100 largest transit systems were private and even most of the public systems covered operating costs out of user fees. State highways were funded out of gas taxes, tolls, and other user fees. Most local streets had been built by private developers and property taxes on the owners of the land that relied on the streets paid for maintenance. The system wasn't perfect, but America's transportation system at the time was widely regarded as the best in the world.

User fees have many advantages over subsidized transportation. They are equitable, in that those who get the benefits are the ones who pay the costs. More important, user fees provided a link between users and transportation providers. Fees send signals to users suggesting what type of transportation was most efficient and signals to providers suggesting where they needed to invest in more infrastructure. User-fee-funded infrastructure tends to be well maintained because the infrastructure managers know that users will stop using and paying for infrastructure if it is falling apart.

The user-fee system began breaking down when Congress passed the Urban Mass Transportation Act of 1964 and began offering capital grants to every city in America that took over its private transit system. Within a decade, the vast majority of transit systems had been "municipalized." The result, as it turned out, was a huge increase in costs with little or no increase in transit ridership.¹⁰⁴

Starting in 1973, Congress allowed cities to spend federal gas tax funds on transit in special circumstances. Diversions of highway user fees to transit and other uses grew until today more than 20 percent of federal gas taxes and nearly 15 percent of state gas taxes go for transit. With less gas tax money available for roads, local governments increasingly relied on sales or other taxes to pay for roads.

Today, user fees play little role in transportation. Gas taxes, which were never a very good user fee in the first place, cover only about half the total costs of roads.¹⁰⁵ Transit fares cover only about 20 percent of the costs of transit.¹⁰⁶ Amtrak fares cover a little more than half the costs of intercity passenger trains. Ironically, air travelers—the one transportation use that was heavily subsidized before 1970—now cover nearly all of the costs of airports and air traffic control through ticket fees and taxes.

Transportation agencies that are more dependent on tax dollars than on user fees become more responsive to politicians than to their customers. Politicians in turn know there is greater political value in funding highly visible projects such as new light-rail lines than in funding routine activities such as maintenance and traffic signal coordination. Thus, infrastructure funded out of tax dollars, such as rail transit systems, tends to be in poor condition while infrastructure funded out of user fees, such as state highways and airports, tends to be in better shape.

There are three ways of returning to a user-fee system for highways. One is to increase gas taxes to insure that the revenues cover all state and local roads. The problem is that the taxes would have to be repeatedly increased to account for inflation and more fuel-efficient cars, plus electric vehicles would never pay such taxes.

Beyond these problems, gas taxes do not provide as clear of a signal between users and providers as more direct fees. Funding roads out of gas taxes is like a grocery store that charges customers based on the number of minutes they use shopping carts; shoppers would grab all the most valuable foods, such as filet mignon, and leave less valuable food, such as hamburger. Funding roads exclusively out of gas taxes is likely to make MnDOT and other road owners take better care of the roads, but won't solve congestion problems.

A second user-fee system is tolls. When tolls were collected at toll booths, the costs of collection were high and the booths themselves became a source of congestion, so Congress decided in 1956 that new interstate highways would be untolled (existing toll-roads such as the Pennsylvania Turnpike were grandfathered in). Today, electronic tolls both reduce the costs of tolling and eliminate toll booths, so tolls make more sense. Tolls could supplement the gas tax by providing funds to build and maintain specific new highways and to rehabilitate some existing highways.

A third user-fee system is to completely replace gas taxes with a mileage-based fee system. While states share some gas taxes with local governments—though never enough to cover all local road costs—a mileage-based fee system would allow the owners of each road, federal, state, county, city, or private, to collect their own fees from users. Oregon, which pioneered the gas tax in 1919, is now experimenting with a mileage-based user fee system that protects people's privacy and gives people a number of options for tracking mileage. The author happens to be one of the volunteers for this experiment, so I pay by the mile when I drive in Oregon and my gas taxes are refunded.

Proposals for mileage-based user fees raise privacy concerns for many people. But, as a report from MnDOT's Mileage-Based User Fee Task Force noted, there are several ways of collecting mileage-based fees without invading people's privacy. These include keeping all data in vehicles with only the charges transmitted to the state; allowing users to delete in-vehicle data after paying fees; use of anonymous or pre-paid accounts; and contracting fee collections to a non-governmental entity.¹⁰⁷

This paper previously described how tolls or mileage-based user fees can be used to directly relieve congestion. Here, the point is that a user-fee system is more likely to make government agencies such as MnDOT and city transportation bureaus more responsive to users and less likely to promote congestion.

While the vast majority of people would benefit from a user-pays solution, many of those same people protest against any road user fees other than gas taxes—and further protest against increasing gas taxes. One of the reasons many people object to road user fees is they don't trust the government to spend those fees on roads. At least 20 percent of federal gas taxes, more than 12 percent of state gas taxes, and more than 10 percent of vehicle registration fees are diverted to transit or other uses each year. A constitutional restriction that mileage-based user fees or electronically collected tolls can only be spent on roads might help reduce objections.

Road Privatization

Americans are so used to roads owned by public agencies that privatization seems almost unthinkable. Yet it is only an accident of history that roads were public. In the early nineteenth century, the United

States had many private intercity toll roads. Between 1792 and 1845, states had chartered more than 1,500 turnpike companies, and the roads they built greatly reduced transportation costs and were well maintained out of toll revenues.¹⁰⁸

When automobiles became popular in the early twentieth century, the Progressive Movement, which called for government control of many resources, was at its peak. As a result, few road supporters ever considered the option of private roads, favoring instead the Oregon plan of paying for roads out of fuel taxes. By 1929, every state had adopted such taxes.

Although funding roads out of gas taxes did not prevent congestion, the system otherwise worked well. Funded exclusively out of user fees, the Interstate Highway System was the largest and arguably most successful public works project in history. Today, those highways represent just 2.5 percent of the nation's lane miles of roads yet carry nearly a fifth of all—including road and non-road—passenger and freight movements in the country.¹⁰⁹

While public agencies funded out of user fees can be as responsive to user needs as private companies, the problem is that politicians are always more tempted to interfere with public agencies than private operations. For example, when the Interstate Highway System was nearly completed in 1982, instead of reducing the federal gas tax that was created to build it, Congress increased the tax from four to nine cents a gallon.

In addition to dedicating one of those cents to transit, Congress started earmarking funds to special projects so individual senators and representatives could take credit for bringing federal dollars to their states or districts. The earmarks came out of funds that would have gone to the states anyway, and many of them diverted funds away from road maintenance to construction of glitzy but low-priority projects that states wouldn't have built without the earmarks.

Private ownership of transportation infrastructure could be just as inefficient as public ownership if the private owner is funded out of tax dollars. Funding out of user fees is the real key to efficiency and responsiveness to user needs. The main advantage of privatization of roads is that it would help insulate them from political interference. Since most urban trips have alternate routes, competition would also spur road owners to keep roads in good condition and find innovative ways to attract more users.

CONCLUSION

Rather than spend scarce transportation funds trying to relieve congestion, the Metropolitan Council has had a policy of dedicating most of those funds to offering alternatives to congestion such as light rail and bike routes. In recent years MnDOT began applying a similar policy. Yet this policy is actually making congestion worse and is failing to help the vast majority of people who rely on automobiles for daily transportation.

In 2017, the Minnesota legislature passed and the governor signed a bill to substantially increase spending on transportation by \$1.42 billion over two years and \$4.99 billion over ten years. Most of these new dollars are directed to roads and bridges. This bill should send a signal to MnDOT and the Metropolitan Council that its transportation policy is no longer acceptable. Instead, it must target far more capital spending on projects that are the most cost-effective in relieving congestion. No more than \$700 million of the \$8.3 billion in capital spending in the 2040 transportation plan meets this cost effectiveness test. Devoting the \$6.9 billion that the Metropolitan Council wants to spend on transit to congestion relief would result in a genuine reduction in congestion over the next decade even with an increase in driving.

In the long run, driverless cars may allow more vehicles per hour to use a given road. But autonomous vehicles may also increase total driving as people send their empty cars to the store to pick up orders or send them home from work rather than pay for parking at work. Thus, it is important to find a solution to Twin Cities congestion now so the region's road systems will be ready for whatever changes are brought about by autonomous vehicles. In the long run, the best way to do this is to return to user-pays transportation. This would discourage wasteful construction projects that few people use, encourage better use of the transportation system that exists today, and target capacity expansions where they are most needed and will pay off quickly. ●



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