



POLICY MEMO

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Traffic Congestion:

Refuting the notion that increasing the gas tax and building more transit reduces traffic congestion.

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Congestion is a problem, but it is a good problem to have. Traffic congestion is the result of a vibrant economy. Policymakers must accept that congestion is a market-driven phenomenon and manage congestion to maximize “mobility” – the ability of people to get from where they are to where they want to go to do what they want to do when they want to do it. That approach is a sharp contrast to the “tax first plan later” strategy for massive, across-the-board investments in transportation – especially light rail in the seven-country metro area. It is ignorant at best and disingenuous at worst to tell Minnesotans that they will achieve any real relief from the costs of congestion by paying higher taxes, even if those taxes are dedicated to transportation. Only by grasping the multifaceted nature of congestion – considering congestion as a market-driven phenomenon in the context of Levels of Service – can we develop a coherent strategy for reducing congestion that is focused on the lowest cost/highest benefit solutions.

Traffic Congestion:

Refuting the notion that increasing the gas tax and building more transit reduces traffic congestion.

by

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SITUATION SUMMARY: Congestion is a problem, but it is a good problem to have. Traffic congestion is the result of a vibrant economy. While there are a great number of highly technical definitions of “congestion,” the common sense, experiential sense of “congestion” is what can happen when many people choose to use the same form of transportation to go to the same place at the same time.¹

Causes of congestion can fall into two general categories, each accounting for approximately 40-45 percent of highway congestion: Systemic causes and random causes. Systemic causes include bottlenecks (40 percent) and poor signal timing (5 percent). Random causes of congestion include bad weather (15 percent) and traffic incidents (25 percent). Other causes of congestion might be described as “Planned Congestion” – Special Events (5 percent) and Work Zones (10 percent).²

To completely understand congestion and effectively address it, policymakers must accept that congestion is a market-driven phenomenon and manage congestion to maximize “mobility” – the ability of people to get from where they are to where they want to go to do what they want to do when they want to do it.

MEASURING CONGESTION: Describing traffic congestion, quantitatively or qualitatively, traffic experts and policymakers are much like the six blind men that went to see the elephant. How transportation experts understand traffic congestion depends on where they touch it – what they measure and what that measurement means. Transportation experts look at various

¹ Highways are congested when people drive to work between 7 and 9 in the morning and leave work between 4 and 6 in the evening. It takes longer to travel a given distance on the highway during those times. The Hiawatha Line is congested following a Twins or Vikings game. Actual “ride” time doesn’t vary as much as during highway congestion, but total travel time is extended by standing in line to get on the train, waiting for “the next train” to avoid overcrowding and traffic delays caused by many people leaving the park and ride lot at the same time.

² http://ops.fhwa.dot.gov/congestion_report/executive_summary.htm#what_is_congestion

measures of traffic congestion to gain a complete understanding. Politicians tend to pick and choose their measures to support their policy positions rather than increase their understanding.

Because there is no one overall metric definition of congestion, congestion discussions depend on one's starting assumptions about acceptable levels of traffic flow in the context of place and time.

CONGESTION MEASURED BY TRAVEL TIME: In its loosest sense, traffic congestion is characterized by “an excess of vehicles on a portion of roadway at a particular time resulting in speeds that are slower – sometimes much slower – than normal or “free flow” speeds.³ A useful metric that correlates to this definition is the Texas Transportation Institute's Travel Time Index (TTI), which compares actual travel times to what they would be if all trips were taken under conditions of free traffic flow.⁴

Implicit in the TTI measure of congestion (and in computing its cost) is the assumption that traffic should always be moving at free flow speeds (usually defined as the posted speed limit). From the policymakers perspective, that assumption leads to the conclusion that free flow traffic at all times is a viable objective that can be achieved if only we have the will to spend whatever it takes to achieve it. Because there are always costs associated with less than free-flow traffic, there is always justification (so reasons the policymaker) to spend more money to capture the savings.

However, as enticing an appeal as that is to a commuter stuck in traffic, it is a false assumption and a bad basis for policy. There is no one singular cause of traffic congestion; although some causes of congestion lend themselves to direct remedial actions, others have less direct corrective measures. Some cannot be corrected. In some instances, congestion must actually be planned.

CAUSES OF CONGESTION: Public discussions of the causes of congestion are usually driven by an overly simplistic model focused on roadway capacity. The over emphasis on capacity distorts the debate and drives assumptions about solutions producing misleading cost/benefit analysis.

³ U.S. Department of Transportation, Federal Highway Administration, [Traffic Congestion and Reliability: Trends and Advanced Strategies for Congestion Mitigation](http://ops.fhwa.dot.gov/congestion_report_04/index.htm), July 19, 2004 (http://ops.fhwa.dot.gov/congestion_report_04/index.htm)

⁴ Texas Transportation Institute, **Travel Time Index:** “The ratio of the travel time during the peak period to the time required to make the same trip at free-flow speeds. A value of 1.3, for example, indicates a 20-minute free-flow trip requires 26 minutes during the peak period.” (http://mobility.tamu.edu/ums/media_information/glossary.stm)

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In a report for the Federal Highway Administration, *Cambridge Systematics* identified seven sources of congestion grouped into three categories.⁵

- Traffic Influencing Events
 - Traffic incidents
 - Work Zones
 - Weather
- Traffic Demand
 - Fluctuations in normal traffic
 - Special Events
- Physical Highway Features
 - Traffic control devices (railroad crossings, poorly timed traffic signals)
 - Physical bottlenecks/capacity (insufficient capacity, lane drops, vehicle merging lanes, poor design)

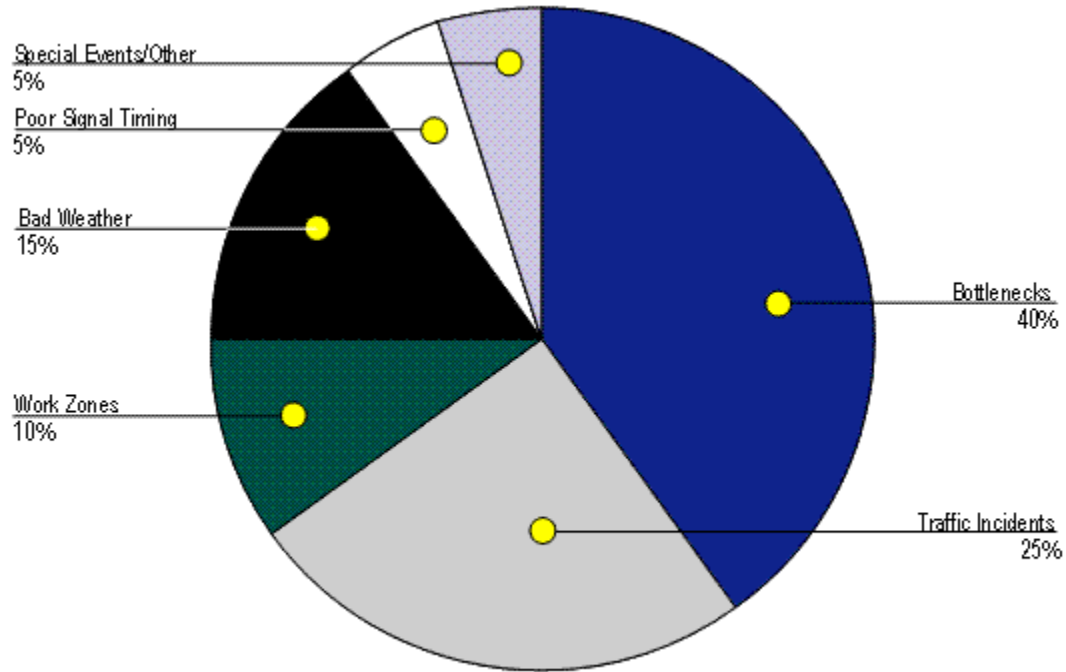
These categories and the percent they contribute to congestion are summarized in the figure on the following page.

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⁵ U.S. Department of Transportation, Federal Highway Administration, [Traffic Congestion and Reliability: Trends and Advanced Strategies for Congestion Mitigation](http://ops.fhwa.dot.gov/congestion_report_04/index.htm), July 19, 2004 (http://ops.fhwa.dot.gov/congestion_report_04/index.htm)

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Figure 1



Source: U.S. Department of Transportation

Implications of multiple causes of congestion

Given multiple causes for congestion and the randomness of some of these causes, any plan that lays claim to eliminate congestion or even significantly reduce congestion is ignorant at best and outright disingenuous at worst. Eliminating all congestion requires elimination of all traffic accidents, highway repair and construction work and adverse weather conditions. It requires uniformity of traffic demand at all times of every day and elimination of special events like concerts, sporting events, conventions, store sales and even “rush hours.”

Even remedial aspects of congestion relief involve significant trade-offs; for example, balancing access to freeways against the travel time cost imposed on the system by frequent merge lanes and entrance and exit ramps. Poor design and clearly insufficient highway capacity is more easily remediated through new construction than downtown congestion, which may require other types of remediation like congestion pricing.

Although multiple causes of congestion negates the idea that the congestion problem on Minnesota roads can be “solved” in the sense of being significantly eliminated, it is not a reason to throw up our hands, shrug our shoulders and assume nothing can be done. To the contrary,

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accepting the reality of congestions frees wise policymakers from the wasteful pursuit of utopian plans and focuses them on realistic parameters that can reduce individual frustrations and greatly increase the aggregate mobility of society by maximizing “Levels of Service” measures.

CONGESTION MEASURED BY LEVELS OF SERVICE: Previously we look at the implications of measuring congestion as a function of travel time – the difference between travel time in the context of time and place and the “free flow” standard, usually the posted speed limit. Levels of Service (LOS) offers an alternative, more qualitative look at congestion based on what the individual driver is experiencing.

Planners define six roadway Levels of Service:⁶

Level of Service	Driving Conditions	Driving Experience ⁷
A	Free flow. Low volume of traffic moving at posted speeds.	Relaxing drive, radio on, enjoying a feel of the open road.
B	Zone of stable flow. Operating speed somewhat restricted by traffic conditions. Reasonable freedom to select speed and change lanes.	No worry about reaching your destination on time. If need be, can make lane changes to maintain faster speed than surrounding traffic.
C	Mostly stable flow. Speed and maneuverability are somewhat constricted by higher volumes of traffic.	May settle into the “fast lane” if travel time is important. Move into another lane must wait for an opening.
D	Flow is unstable. Tolerable speeds, however speed is considerable affected by changes in operating conditions.	Frequent mirror checks. Difficult to change lanes. Need to remain alert to brake lights.
E	Speed is unstable down to stop-and-go situations. Traffic volume at or near the capacity of the roadway.	Tense driving. Few, if any options if running late. Opportunity to exercise more colorful vocabulary.
F	Forced flow operation -- operating speeds are controlled by stop-and-go mechanism like stop lights. Volume of traffic is actually below roadway capacity.	Start to wonder if light rail might not be a bad idea ... then come to your senses. ☺

The Level of Service metric provides insight into the tradeoffs and compromises with mobility as more vehicles try to use limited, finite amount of road capacity. In turn, individual driver response to congestion is key to a proper response from transportation policymakers.

⁶ American Planning Association, “The Language of Travel,” <http://www.planning.org/thecommissioner/spring02.htm>

⁷ Minnesota Free Market Interpretation of APA conditions.

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CONGESTION CONSIDERED AS A MARKET-DRIVEN PHENOMENON: Congestion is a problem, but it is a good problem to have. Traffic congestion is the result of a vibrant economy. There is “rush hour” congestion because many people are heading to work. Congestion can be caused by a confluence of commercial activity like is found along the Bloomington strip or along I-94 in Woodbury. Special events like concerts, sporting events and conventions create economic activity – and congestion.

Individual roadway users have a greater or lesser tolerance for congestion. As Yogi Berra famously said, “Nobody goes there anymore. It’s too crowded.” There is some truth in that. As congestion increases people will start to make tradeoffs with mobility.

If their business commute is too long, they may move closer to work or look for work closer to home. They may time shift and leave later or earlier for work or consider telecommuting. They may consider public transit. Employers might consider moving their businesses, using telecommuting or changing shift times. Each of these activities can have the effect of moving traffic off the roads. There is corollary to those actions, however – as some drivers change their habits and relieve congestion, others that previously did so will notice the reduced congestion and resume old habits until congestion again reaches an equilibrium Level of Service.

A policymaker looking at congestion as the result of economic activity and in the context of Levels of Service certainly doesn’t want people following Yogi’s advice and stop pursuing their interests because “it is too crowded.” The policymaker doesn’t just want people to continue to expand their businesses, continue to shop in central locations or promote or attend special events. Ideally the best scenario is enabling even more people travel to these destinations.

In that sense, congestion becomes a mobility issue – enabling the maximum number of people to get from where they are to where they want to go to do what they want to do when they want to do it in the most cost-effective manner. Congestion will always be a given at some Level of Service. The trick for the policymaker is maximizing the number of people at that Level of Service getting from where they are to where they want to go to do what they want to do when they want to do it.

CONGESTION RELIEF – WHAT CAN AND CANNOT BE ACCOMPLISHED:

Analyzing congestion as a market-driven phenomenon in the context of Levels of Service provides a sharp contrast to the “tax first plan later” strategy of some business groups and policymaker who focus on massive, across-the-board investments in all forms of transportation – transit and road and bridge infrastructure, more road capacity, more rail, especially light rail in the seven-country metro area.

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The “tax now, plan later” strategy creates solutions (more roads, more rail) and raises revenue (higher taxes on more things) without ever seriously addressing the vital question, “What is the problem we are trying to solve?” Their focus is on their vision of a transportation system rather than on individual mobility.

As previously noted, only about 40-45 percent of highway congestion is due to system capacity and design issues. The bulk of traffic congestions, some 60 percent, is caused by factors other than basic system capacity and hence will not be significantly affected by simply expanding capacity or reducing road usage at the margins by introduction of expensive rail projects.

Further, it is ignorant at best and disingenuous at worst to state to Minnesotans that they will achieve any real relief from the costs of congestion by paying higher taxes, even if those taxes are dedicated to transportation, a claim made by a progressive Minnesota think tank.⁸

Assume the cost of congestion to a Twin Cities commuter is \$790. Using percentages in Figure 1, \$474 of that amount is due to weather, construction work zones, traffic accidents and other such incidents. Only \$316 of congestion cost is caused by insufficient capacity and poor road design. Thus, the think tank proposal that portends to eliminate congestion costs for individual taxpayers will in fact return to taxpayers much less than \$1 in benefits for each tax dollar taken in.

In real terms, higher taxes means the taxpayer will be paying out real money and continuing to incur all or most of the costs of congestion.

Only by grasping the multifaceted nature of congestion – considering congestion as a market-driven phenomenon in the context of Levels of Service – can we develop a coherent strategy for reducing congestion that is focused on the lowest cost/highest benefit solutions.

The Need for Cost/Benefit Analysis

Traffic congestion cannot be eliminated, but its costs and impacts can be reduced. Obviously the strategic addition of capacity, correction of design flaws (like the Crosstown Interchange), improvements in traffic flow management and other such strategies can increase the Level of Service, at least in specific areas.

However it is important not to promise what cannot be delivered (free flowing traffic at all times), or to devote significant chunks of scarce resources to “solutions” that will have marginal impact on the overall

⁸ Moving Forward: The Benefit of Transportation Investment to Minnesota Economy”, Minnesota 2020 (http://www.mn2020.org/index.asp?Type=B_BASIC&SEC=%7B94CB2076-8BB7-4D57-8055-596FA4B2CA4C%7D&DE=)

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problem. A good example of the latter is devoting excessive resources to projects that promise very little return on investments in congestion reduction like the Central Corridor LRT line.

According to the Draft Environmental Impact Study on the Central Corridor, the total reduction in Vehicle Miles Travelled along the corridor would amount to .005 percent of the total were no additional transit options provided. Similarly, the number of automobile trips would be reduced by .04%, an unnoticeable amount. Transit ridership will increase by just 2%.⁹ At a cost of about \$900,000,000, the Central Corridor represents a very poor investment in congestion reduction.¹⁰

Table S.4-8: Forecast Regional Travel Demand

Alternative	Total Daily Transit Boarding Trips	Daily Automobile Person Trips	Daily Vehicle Miles of Travel
Baseline Alternative	382,000	544,050	23,815,800
LRT Alternative (Change from Baseline)	390,300 (+8,300)	542,050 (-2,000)	23,813,600 (-2,200)
BRT Alternative (Change from Baseline)	386,200 (+4,200)	543,350 (-700)	23,814,600 (-1,200)

Obviously the best and only rational way to evaluate investments in the transportation system is through the use of rigorous cost/benefit analyses and comparisons of competing projects. Without rigorous total system comparisons of alternatives, policymakers can easily get trapped into major investments in projects with no serious prospects of genuine congestion reduction or mobility improvements.

Not all congestion reduction strategies are created equal. For instance, given that 25% of all congestion is incident-related, a low-cost and high-value investment might be a more aggressive incident management system that clears highways of accidents as quickly as possible.

Similarly, addressing design flaws such as the Crosstown Interchange offer particularly high-value investments in congestion reduction. The only way to be make sure we make investment in high value projects is by comparing the costs and benefits over an appropriate time frame, and measuring the results by expected increases in the LOS provided to users of the system.

CONCLUSION: Given multiple causes and randomness of some causes of congestion, we will never be able to eliminate congestion and its attendant costs; but we can develop strategies to mitigate the most remediable causes of congestion. We will never achieve free flow of traffic on our highways at all times, but we can establish a Level of Service that provides an aggregate mobility enabling a the optimal number of Minnesotans to get from where they are to where they want to go to do what they want to do when they want to do it.

⁹ Central Corridor Draft Environmental Impact Statement, Executive Summary, Page S-22

¹⁰ Ibid

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Obviously, with 40 percent of congestion caused by insufficient capacity or poor design, strategic investments in increased capacity or design improvements can improve Levels of Service. But we must also recognize that 60 percent of congestion is less amenable to remediation, or at least will not be improved by simple addition of capacity. In light of this, a strategy based solely on capacity improvements is doomed to failure.

A clear-eyed strategy for congestion reduction or mitigation has to look at options that go beyond simple capacity improvements to the system, and begin to incorporate new strategies, including increasing the productivity of the existing system through changes in land use, demand management, and the incorporation of intelligent transportation systems.

In subsequent papers we will focus on strategies likely to provide the highest return on taxpayer investments and on ways to improve the delivery of transportation services such as transit.

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The Minnesota Free Market Institute collects, analyzes and distills research to advocate for policy that limits government involvement in individual affairs and promotes competition and consumer choice in Education, Healthcare and Transportation; it creates and builds constituencies supporting that policy. By analyzing the actions of the past and applying the enduring lessons of the free market, the Minnesota Free Market Institute creates policy options for the future.

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