www.vtpi.org

Info@vtpi.org

250-508-5150

Congestion Costing Critique

Critical Evaluation of Traffic Congestion Costing Studies

21 August 2026

By
Todd Litman
Victoria Transport Policy Institute

Summary

Many planning decisions involve trade-offs between congestion impacts and other planning goals such as affordability, safety and equity, so decision-makers need accurate information on congestion costs and the effectiveness of potential solutions. This report defines congestion evaluation best practices recommended by experts and investigates how well they are applied in congestion costing studies such as the INRIX's *Global Traffic Scorecard*, the *TomTom Traffic Index* and the *Urban Mobility Report*. These studies often violate best practices: they use excessive baseline speeds, overestimate congestion exposure, overvalue delay time, and ignore congestion dynamics. Much of their estimated congestion costs consist of traffic law compliance, drivers slowing to legal speed limits and much of their measured long-term growth in congestion costs reflects faster off-peak speeds rather than more congestion delays. These studies' estimates represent upper-bound values that are higher than results using best practices. This report is a companion to the *Congestion Costing Research Slideshow*, *Congestion Costing Best Practices* and the *Smart Congestion Relief* reports which provide additional guidance for congestion impacts analysis.

Table of Contents

This report critiques congestion cost studies including the Urban Mobility Report, INRIX's Global Traffic Scorecard, and the TomTom Traffic Index.

Executive Summary

Transportation planning requires accurate information on traffic congestion impacts. How congestion is measured affects analysis results. This report identifies best congestion evaluation practices recommended by experts, summarized in the table below, and investigates how well they are applied by various congestion cost studies including the *Urban Mobility Report*, the *Global Traffic Scorecard* and the *TomTom Traffic Index*.

Table ES-1 **Congestion Costing Best Practices**

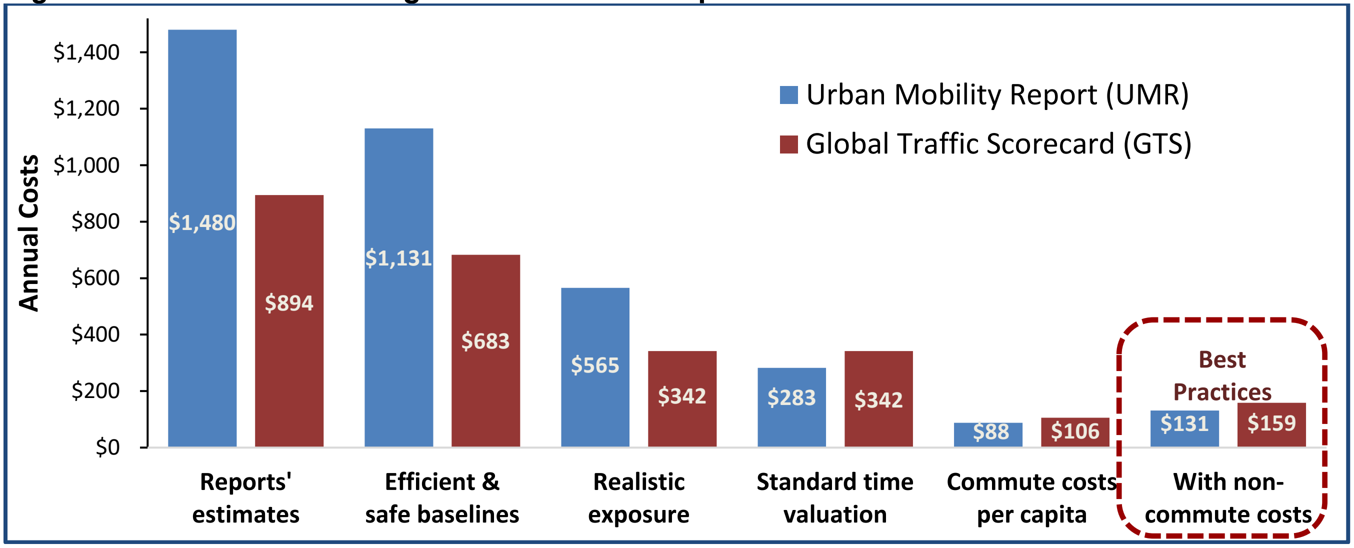
Costing Factor	Recommended Best Practices
Congestion metrics – how congestion is measured.	Measure internal and external congestion costs on all modes and trips, not just delays to auto commuters.
Baseline speeds – Traffic speeds considered optimal	Use economically optimal baseline speeds that maximize efficiency and reflect users' willingness to pay for faster travel.
Congestion exposure – the amount of travel that experiences congestion.	Use realistic estimates of congested vehicle travel. Measure congestion costs per capita or commuter, not per motorist or auto commuter.
Peak to off-peak speed trends – how speed differentials are calculated and interpreted.	Recognize that faster off-peak traffic increases estimated congestion delay hours.
Travel time valuation – monetary costs assigned to delay.	Use realistic values of time that reflect travellers' willingness-to-pay, such as 30-50% of median wages, unless other values are justified.
Congestion dynamics – the tendency of congestion to affect traffic and travel	Recognize that congestion is self-limiting, is affected by the quality of alternatives, and urban road expansions often induce more vehicle travel.
Additional impacts – impacts on fuel consumption, emissions, noise and risk	Use best current fuel consumption, emission and crash models for evaluating impacts of higher traffic speeds and induced vehicle travel.
Research standards – overall quality of research methods.	Maintain professional standards including transparent methods and data to allow replication, comprehensive references, plus peer review.

This table summarizes factors to consider in congestion costing, and their best practices.

These studies often violate best practices. They measure delays based on freeflow speeds that exceed what is legal, efficient and safe. They overestimate congestion exposure, the amount of travel that experiences significant delay, overvalue travel time compared with travellers' willingness to pay, and ignore the additional fuel, crash and emission costs caused by higher traffic speeds and induced vehicle travel. Much of what they call *congestion costs* are really *traffic law compliance*, drivers slowing to legal and safe speeds, and much of their estimated year-to-year delay growth reflects higher off-peak speeds rather than more congestion. Most only measure the congestion costs borne by auto commuters which ignores the congestion avoided by shifts to other modes and delays that wider roads and increased traffic impose on other travellers. They ignore congestion dynamics, the tendency of traffic to achieve equilibrium and for roadway expansions to induce more vehicle traffic. These omissions and biases tend to exaggerate congestion costs and roadway expansion benefits. More comprehensive analysis tends to recognize more benefits from multimodal planning, TDM incentives and Smart Growth policies.

The graph below adjusts *Urban Mobility Report* and *Global Traffic Scorecard* to reflect recommended best practices. The results are much lower than those studies claim.

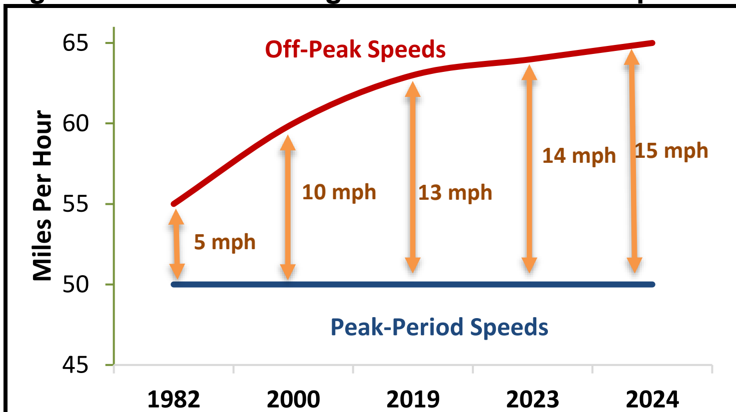
Figure ES-2 **Estimated Congestion Costs Per Capita**



This figure adjusts UMR and GST cost estimates to reflect realistic baseline speeds, congestion exposure and travel time values, averages costs per capita rather than per motorist, and adds non-commute delays. This indicates that properly measured congestion costs are an order of magnitude less than these studies claim.

These studies claim that congestion problems are increasing, but that reflects analysis biases and contradicts other travel data. For example, the *Urban Mobility Report* estimates that between 1982 and 2024 per motorist congestion delays approximately tripled from 20 to 63 annual hours, but since it is measured by comparing peak and off-peak speeds, this increase appears to reflect faster off-peak travel rather than increased congestion, as illustrated below.

Figure ES-3 **Increasing Peak and Off-Peak Speed Differentials, 1982 to 2025** ([UMR 2025](UMR 2025))

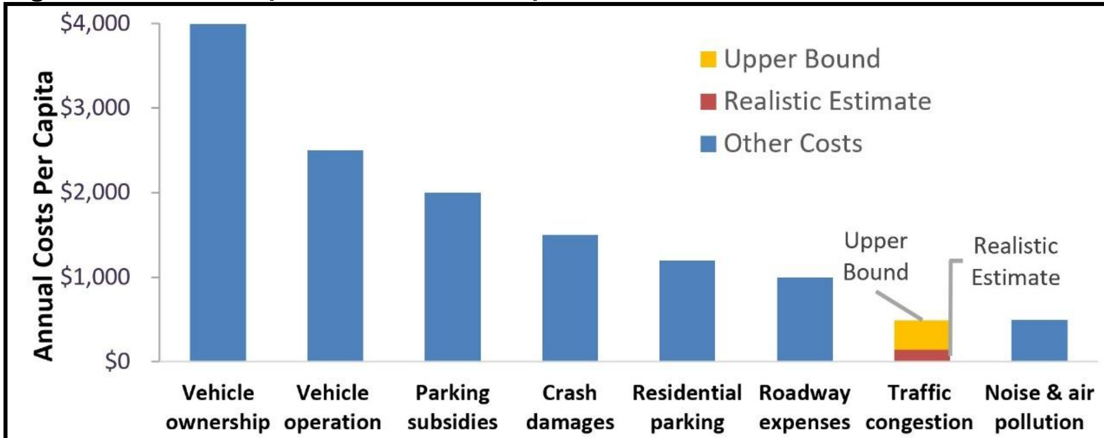


Between 1982 and 2024 higher speed limits (the 55 mph national speed limit was rescinded in 1995, leading to higher limits on most highways) and roadway design speeds, faster and more efficient vehicles, and reduced speed enforcement increased freeflow traffic speeds. Census data show that from 1980 to 2024 average commute speeds increased 38%, from 24 to 32 mph, contradicting the claim that congestion delays tripled during that period. This explains claimed congestion delay growth during that period.

Our understanding of congestion is improving. Traffic was previously modelled as a fluid that flows through a road system, but we now recognize that it often behaves like a gas that fills available space and can be condensed with suitable incentives. Congestion tends to self-limit; it increases until delays discourage more peak-period vehicle trips. As a result, future congestion problems are less severe and roadway expansions provide smaller congestion reductions than conventional models predict.

Congestion is a moderate cost, as illustrated below, so a reduction strategy is generally not justified if it increases other costs, such as vehicle expenses or crashes, but is far more cost-efficient and beneficial if it provides other savings and benefits. Overestimating congestion costs favors automobile travel over other modes and congestion reduction over other goals, resulting in wasteful and unfair planning decisions.

Figure ES-4 **Transportation Costs Compared**



Congestion cost estimates range from about $150 (realistic estimate) to $500 (upper bound estimate) annually per capita. Even the higher estimate is modest compared with other costs.

Most congestion costing studies ignore these issues: they frame congestion as a cost that motorists *bear* rather than *impose*, they only report costs per *auto commuter* rather than *per capita*, and they compare congestion impacts *between* rather than *within* regions, which provides little useful guidance for reducing congestion costs.

As a result of these biases these studies inaccurately reflect user demands. For example, the *Urban Mobility Report* estimates that auto commuters experience 63 annual average delay hours valued at $1,480, implying that typical motorists would willingly pay about $3.20 to save eight minutes per trip. That seems unlikely. There is no popular movement to increase taxes to finance roadway expansions, and only a minority of drivers are willing to pay optional tolls to use uncongested lanes. New technologies significantly reduce congestion costs: traffic apps that accurately predict delays help travellers choose the best time, mode or route for crossing a city, and telework (telecommuting and at-home work, on-line shopping and education, e-medicine and their variations) reduces the need for vehicle travel. Motorists treat traffic congestion as sailors do tides: a predictable constraint to consider when planning trips. Most congestion cost studies ignore these factors.

Many congestion costing biases are obscure, even to practitioners. They reflect assumptions about the nature of congestion, and technical details about how impacts are measured. Few congestion costing studies include detailed literature reviews of best evaluation practices, discussions of possible omissions and biases, peer review, or other basic research principles.

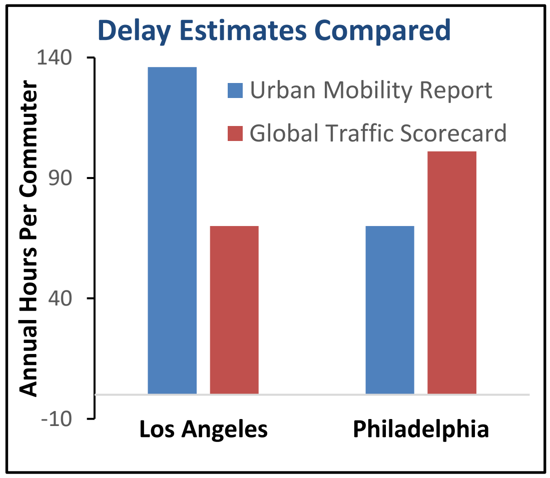
This report explores these issues. It identifies congestion costing best evaluation practices based on expert recommendations, evaluates the degree that congestion cost studies apply best practices, describes common omissions and biases, and recommends reforms for better analysis. This study should be of interest to practitioners (planners, engineers, economists and analysts), policy makers and anybody who wants more accurate transportation impact analysis.

Introduction

Traffic congestion is frustrating and wasteful, and large resources are devoted to reducing it, so decision-makers need accurate information on its impacts and the effectiveness of potential solutions. Congestion is an *economic trap* in which individuals are encouraged to use resources inefficiently. For example, commuters often save time by driving instead of using space-efficient modes, but doing so imposes costs on other road users: as roads approach capacity, each additional vehicle added to the traffic stream imposes far more total delay than it bears. Congestion is virtually unsolvable without reforms to give travellers incentives to limit peak-period vehicle trips to each road's optimal capacity.

Various studies quantify and monetize (measure in monetary units) congestion impacts. For example, the *Urban Mobility Report* (UMR) claims that average Americans bear 63 annual delay hours costing $1,480, the *Global Traffic Scorecard* estimates that urban motorists bear 49 annual delay hours costing $894, and a trucking industry study estimated that congestion costs truckers $108.8 billion annually.

Despite their wide use, these studies receive little critical analysis. There are good reasons to be skeptical of their results. Most fail to reflect best practices recommended by experts and their results are inconsistent. For example, although they use the same methods and data sources, the *Urban Mobility Report* estimates that motorists experience 136 annual delay hours in Los Angeles and 70 delay hours in Philadelphia, but the *Global Traffic Scorecard* estimates that Philadelphia motorists experience 101 delay hours and Los Angeles motorists only 70, as illustrated right.



These studies tend to exaggerate congestion costs in several ways. Because they use freeflow baseline speeds, much of what they call "congestion costs" consist of *traffic law compliance*, vehicles slowing to legal and safe speeds. They apply the delay rates measured on the most congested roadway to *all* urban auto-commutes including off-peak, reverse and short trips. They value delays much higher than most motorists are willing to pay. They ignore the additional pedestrian delay, fuel, crash and emission costs caused by wider roads, high traffic speeds and induced vehicle travel.

Practitioners, decision-makers and the public need comprehensive and accurate congestion cost information. Transportation planning often involves trade-offs between congestion and other impacts such as affordability, safety and environmental quality. For example, a roadway expansion may be justified if it provides large and durable congestion reductions, but not if those benefits are smaller, shorter or offset by other costs.

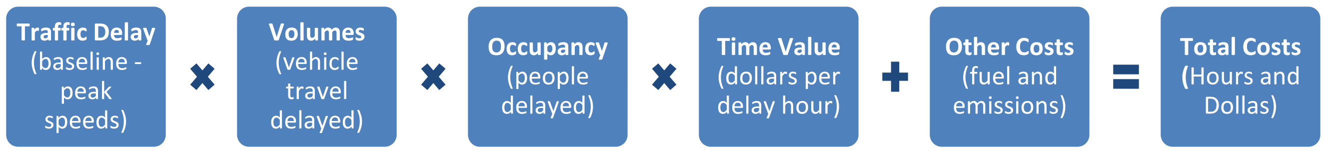
This study explores these issues. It defines congestion costing best practices recommended by experts, evaluates the degree that congestion cost studies reflect them, identifies common omissions and biases, and recommends improvements. This study should be of interest to practitioners (planners, engineers and economists), policy makers and anybody who wants more accurate transportation impact analysis.

Congestion Evaluation Best Practices

This section describes congestion costing methods. For more information see the companion report, Congestion Costing Best Practices.

Congestion costs are usually calculated by multiplying traffic delay (the differential between peak and target baseline speeds), times volumes (the number of vehicles and people delayed), times delay values (dollars per hour), plus any additional fuel and pollution costs, as illustrated below.

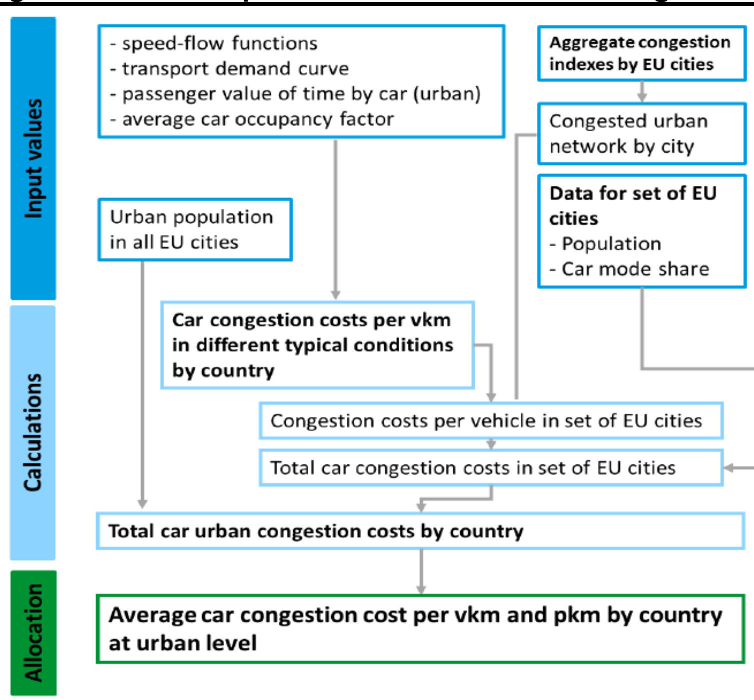
Figure 1 **Congestion Costing Process**



This figure illustrates a typical congestion costing process. Each step can affect analysis results.

Various experts and professional organizations provide guidance for congestion costing including Aftabuzzaman (2007), Grant-Muller and Laird (2007), Litman (2014), Wallis and Lupton (2013), the European Commission, the UK's *Transport Analysis Guidance* (DfT 2025), the *Australian Transport Assessment and Planning Guidelines* (ATAP 2020), New Zealand's *Monetized Benefits and Costs Manual* (Waka Kotahi 2025), and USDOT (2019). The figure below from European Commission's *Handbook on External Costs of Transport* illustrates recommended congestion costing data inputs and methods.

Figure 2 **European Commission Urban Congestion Costing Methods** (EC 2020)



This figure from the European Commission's External Costs of Transport handbook illustrates congestion costing data inputs and calculation methods. Other studies use similar methods.

Key factors include traffic speed data, traffic flow functions, amount of driving under congested conditions, and travellers' value of time.

The following section examines these factors in detail.

Congestion Metrics

This section describes factors to consider when measuring congestion costs.

Intensity Vs. Costs

Congestion can be measured by *intensity* (the amount that traffic slows during peak periods) or by *costs*. Intensity indicators include *volume to capacity ratios* (V/C), roadway *level of service* (LOS), and the *travel time index* (TTI). Volume to capacity ratios less than 0.85 are considered *under-capacity*, 0.85-0.95 *near capacity*, 0.95-1.0 *at capacity*, and 1.0+ *over-capacity* (FHWA 2004). The following table summarizes these indicators.

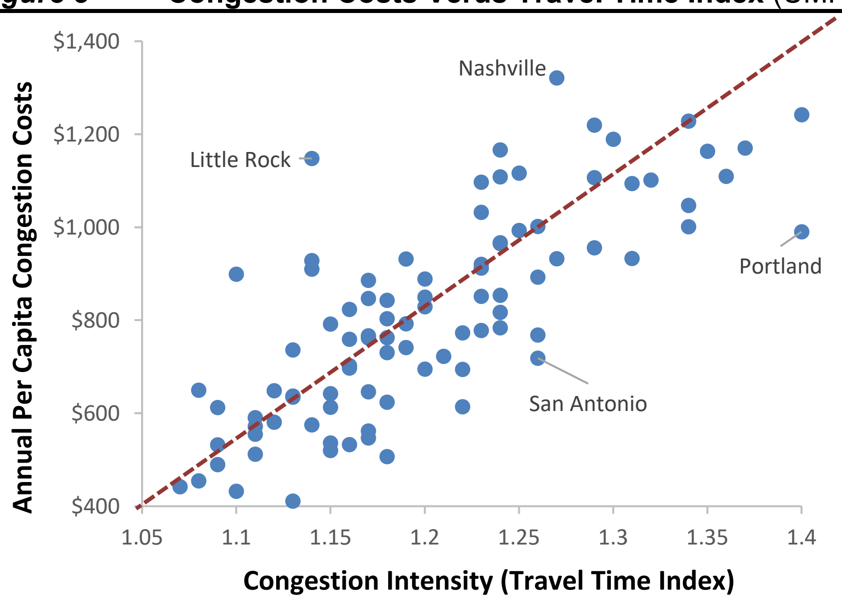
Table 1 **Congestion Intensity Indicators** (TRB 2022; USDOT 2017)

LOS	TTI	Description	Speed (mph)	Flow (veh./hour/lane)	Density (veh./mi.)
A	1.00-1.10	Unrestricted flow. Speeds often exceed legal limits.	Over 60	Under 700	Under 12
B	1.11-1.20	Slight congestion. Maneuverability is constrained.	57-60	700-1,100	12-20
C	1.21-1.30	Reduced speeds and ability to pass or change lanes.	54-57	1,100-1,550	20-30
D	1.31-1.40	Traffic speeds and maneuverability are reduced.	46-54	1,550-1,850	30-42
E	1.41-1.50	Speed is usually below legal limits. Irregular flow.	30-46	1,850-2,200	42-67
F	>1.50	Slow, stop-and-go traffic. Flow is unstable.	Under 30	Unstable	Over 67

This table summarizes highway Level of Service (LOS) and Travel Time Index (TTI) ratings.

Congestion intensity indicators are useful for short-term decisions such as how to travel through an urban region, but most policy and planning decisions require cost analysis to evaluate trade-offs between delays for different modes, and between congestion and other impacts such as infrastructure costs, affordability or safety. Compact, multimodal areas tend to have more intense congestion, but sprawled, auto-dependent areas tend to have higher congestion costs because residents must drive more (Kuzmyak 2012; Levine, et al. 2012). The figure below illustrates this for U.S. urban regions.

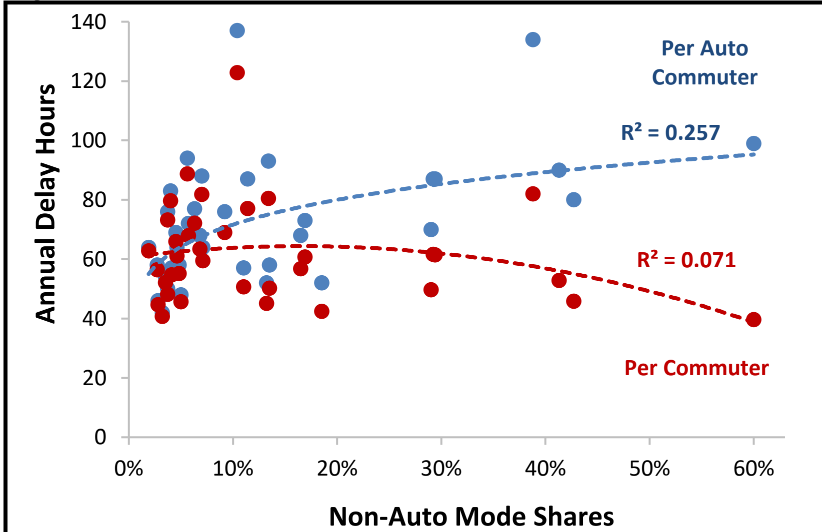
Figure 3 **Congestion Costs Verus Travel Time Index** (UMR 2025)



Sprawled cities such as Little Rock and Nashville have low Travel Time Index (TTI) values indicating less intense congestion, but high per capita delay costs because residents drive more, while compact, multimodal cities like Portland and San Antonio have high TTI ratings but lower congestion costs because residents drive less.

Auto Vs. Multimodal Analysis
Many congestion cost studies only report impacts on motorists or auto commuters. Multimodal analysis considers impacts on all travellers and trips, and therefore the congestion avoided by shifts from driving to other modes. For example, multimodal communities tend to have higher congestion cost per auto commuter but less per commuter because they drive less, as illustrated below.

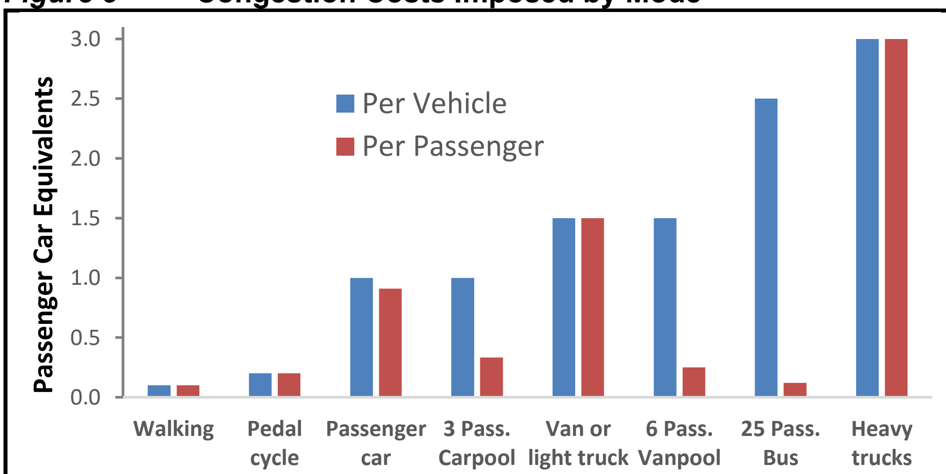
Figure 4 **Non-Auto Mode Shares Versus Per Motorist or Commuter Delays**



*Most congestion costing studies only measure delays **per motorist**. Measured this way (blue), congestion delays increase with non-auto mode share, making compact, multimodal cities look bad. However, when measured **per commuter**, which recognizes the congestion avoided by non-auto travel, the relationship is slightly negative, suggesting that multimodal planning reduces total congestion costs.*

Internal Vs. External
Most congestion cost studies only measure the internal costs that motorists bear, but policy decisions such as strategic planning, efficient pricing and equity analysis should be based on the marginal external cost a traveller imposes on other road users (EC 2020; USDOT 2019). External congestion costs are measured by *Passenger Car Equivalents* (PCEs) which increase with vehicle size and weight since larger vehicles require more road space and heavier vehicles tend to accelerate more slowly. The figure below compares congestion costs imposed by various urban travel modes.

Figure 5 **Congestion Costs Imposed by Mode**

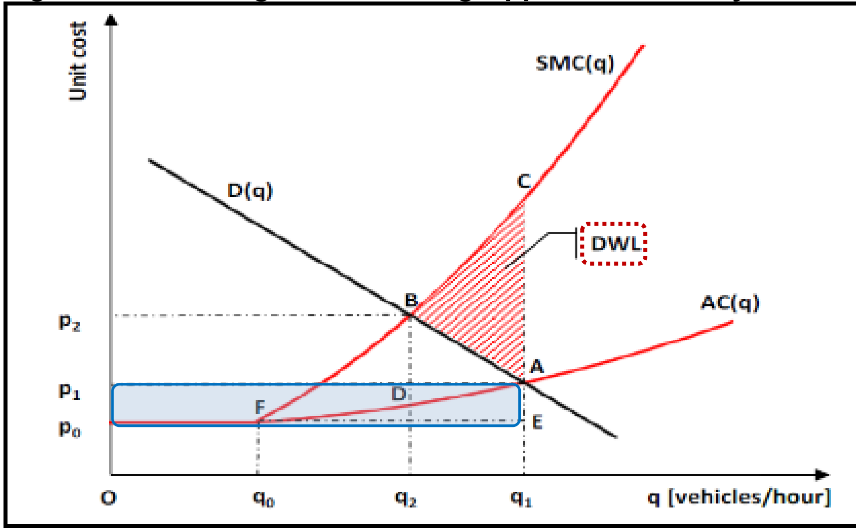


Road space requirements, and therefore congestion costs imposed, increase with vehicle size and speed, and decline with vehicle occupancy. Auto travel imposes much more congestion than walking, bicycling, ridesharing (car- and vanpools) and bus travel. Strategic planning, efficient pricing and equity analysis require information on congestion costs imposed.

Delay Costs Vs. Deadweight Losses

Most congestion cost studies only measure *delay costs*, which counts any reduction from freeflow speeds as a cost. Many economists recommend measuring *deadweight losses*, which measures economically excessive delays beyond what is most efficient and users' willingness to pay (EC 2020; Wallis and Lupton 2013). Most planning, pricing and equity analysis should reflect deadweight costs.

Figure 6 **Congestion Costing Approaches: Delay and Deadweight Losses** (EC 2020)



On uncongested roads, travel costs equal p_0. As volumes increase speeds decline, increasing costs shown by the $AC(q)$ curve, until it reaches equilibrium (delays limit traffic volumes) at point B on the road's demand curve, $D(q)$,.

*The **delay cost approach** measures all time below free-flow speeds, the blue rectangle $p_0EA\,p_1$. The **deadweight loss approach** freeflow speeds are inefficient (such speeds increase costs that exceed travellers' willingness to pay), measured as the red triangle ABC, labeled DWL.*

The European Commission's *External Costs of Transport* report includes both delay and deadweight loss cost estimates for passenger and freight travel (EC 2020, tables 41-44 and 95). Delay costs are typically 4-8 times higher than deadweight costs, as indicated in the table below.

Figure 7 **European Road Vehicle Congestion Cost Estimates, 2019** (EU 2020)

Passenger Transport							
		Delay Costs			Deadweight Loss Costs		
		Total [Billion €]	€-cent/ pkm	€-cent/ vkm	Total [Billion €]	€-cent/ pkm	€-cent/ vkm
Passenger car	Total	206.2	4.37	7.03	35.6	0.75	1.21
Passenger car	Urban	172.6	11.82	19.03	30.0	2.06	3.31
Passenger car	inter-urban	33.6	1.03	1.66	5.5	0.17	0.27
Coach bus	inter-urban	2.1	0.74	14.49	0.2	0.08	1.50
Total Passenger		***208.3***			***35.8***		
Freight Transport							
		Total [Billion €]	€-cent/ tkm	€-cent/ vkm	Total [Billion €]	€-cent/ tkm	€-cent/ vkm
Light commercial vehicles	urban	32.6	27.75	19.21	5.6	4.78	3.31
Heavy Goods Vehicle	urban	17.6	3.81	51.94	3.1	0.67	9.11
Total Freight		*62.3*			*10.4*		
Total Road Transport		**270.6**			**46.2**		

This table summarizes estimated congestion costs for various vehicles and conditions in Europe. Delay cost estimates are typically 4-8 times higher than deadweight cost estimates, highlighted in red. For example, 208.3/35.8=5.8, 62.3/10.4 = 6.0, and 270.6/46.2 = 5.7. (tkm = tonne-kms.).

Baseline Speeds

Another important congestion costing factor is the selection of baseline speeds, the target speed considered optimal, as summarized below. Older studies used legal speed limits, but since about 2015 most studies have used freeflow speed data from traffic apps such as INRIX and TomTom.

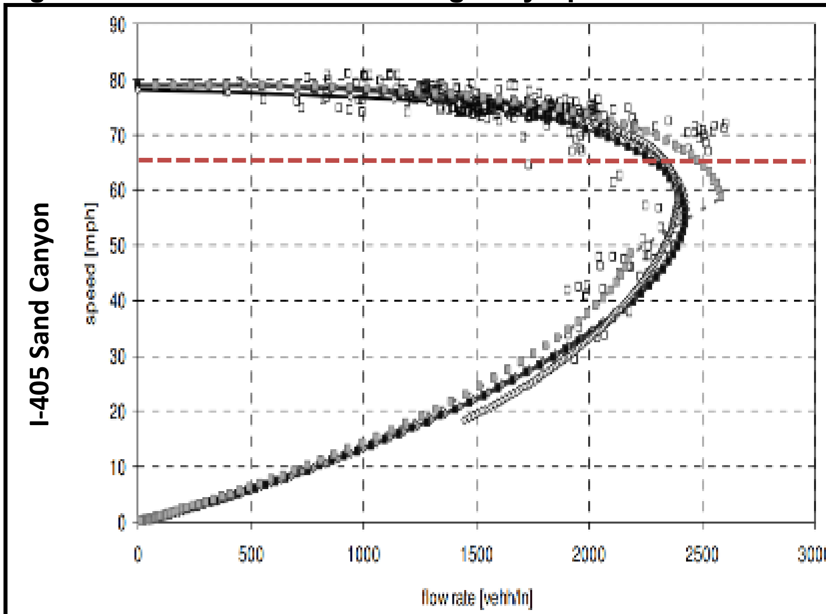
Table 2 **Baseline Speeds for Congestion Analysis**

Definition	Levels of Service	Typical Speeds
Freeflow – off-peak traffic speeds	A-B	5-15% over speed limits.
Speed limits – maximum legal speeds.	B-C	30-50 mph on urban arterials, 55-70 mph on urban highways.
Efficient – speeds that maximize traffic flow, cost efficiency and safety.	C-D	25-35 mph on urban arterials and at 35-50 mph on grade-separated highways.
User demands – travelers' willingness to pay for faster travel.	Varies. A-B for urgent trips, C-D for most trips.	10-30% of motorists are willing to pay cost recovery tolls to avoid congestion.

Baseline define target traffic speeds. Their selection significantly affects cost estimates.

Freeflow speeds usually exceed what is legal, efficient and safe, and therefore economically optimal (EC 2020; Wallis and Lupton 2013). Freeflow traffic is typically 5-15 mph faster than posted speed limits, as illustrated below (Deardoff, Wiesner and Fazioc 2011).

Figure 8 **California State Highway Speed/Flow Curves (**[Brilon and Lohoff 2011](#)**)**

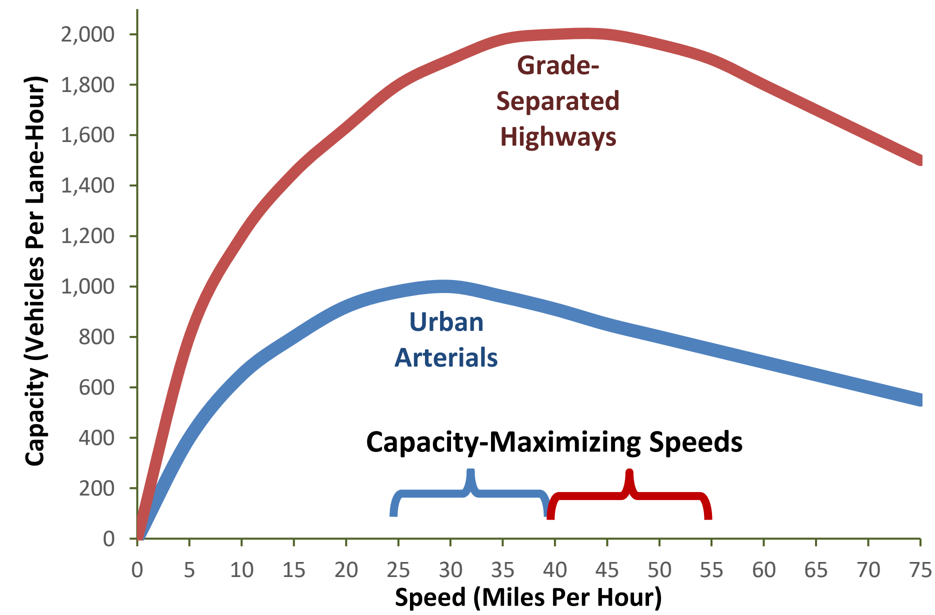


Under freeflow conditions most traffic usually exceeds speed limit by 5-15 mph, partiularly on high-speed highways. This graph shows that traffic significantly exeeds the 65 mph limit (dashed red line) on this California freeway. Speeding has increased over time due to higher roadway design speeds, faster and more fuel efficient vehicles, and reduced speed enforcement.

As a result, much of what these studies call congestion costs is really tarffic law compliance: motorists slowing to what is legal, efficient and safe.

Roadway capacity usually peaks at 25-40 mph (40-65 kph) on urban arterials and 40-55 mph (60-90 kph) on urban freeways, as illustrated below. As a result, moderate speeds tend to maximize roadway efficiency measured as vehicles per lane-hour.

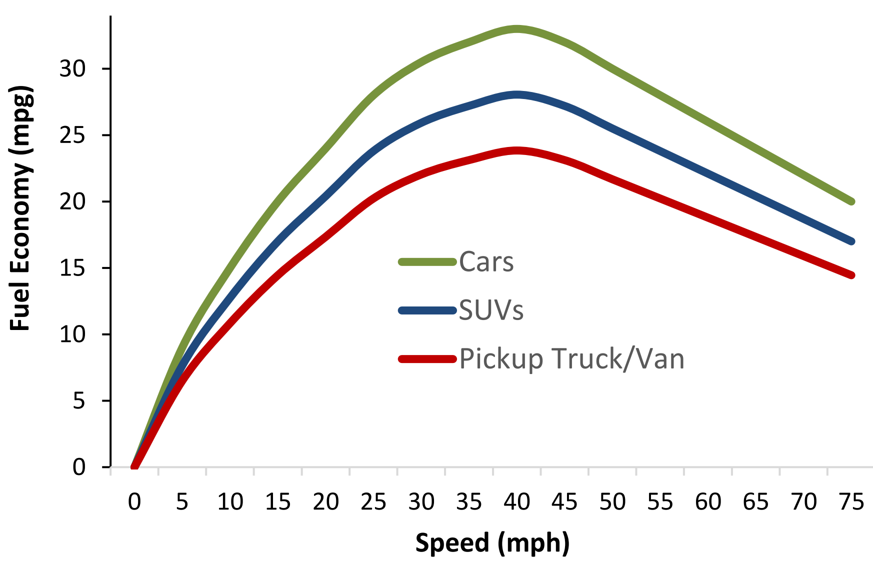
Figure 9 **Roadway Efficiency, Capacity Versus Speed** (Litman 2025)



Since faster traffic requires more shy distance (separation) between vehicles, roadway capacity declines as speeds increase. Under optimal (dry, clear and level) conditions capacity typically peaks at 25-40 mph (40-65 kph) on urban arterials and 40-55 mph (60-90 kph) on grade-separated highways, reflecting LOS C-D. Capacity-optimizing speeds tend to decline with more interchanges and denser traffic.

Fuel consumption, pollution emissions and noise usually increase above 40 mph (65 kph), as illustrated in the following graphs, and higher speeds tend to increase crash casualty rates (Potts, et al. 2014; Zhou and Sisiopiku 1997).

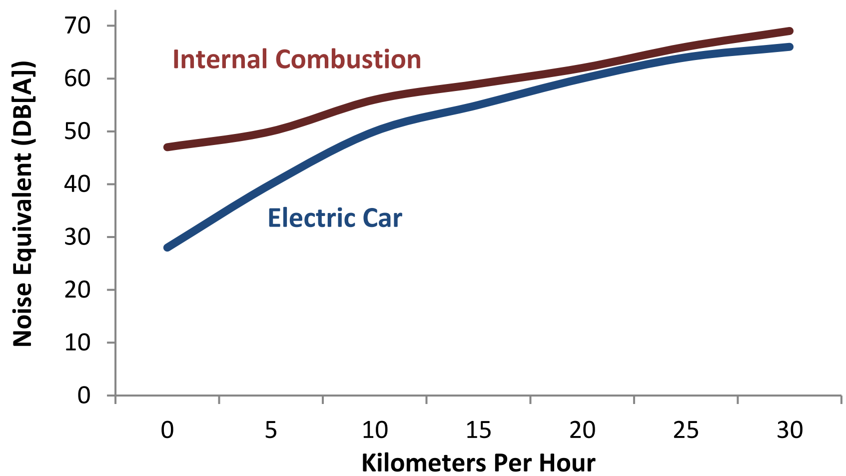
Figure 10 **Fuel Economy Versus Speed** (USDOE 2025)



Although fuel economy varies depending on vehicle design and driving conditions, mileage usually decreases at speeds above 50 mph, particularly for light trucks, SUVS and vans due to their poor aerodynamics.

As a result, moderate congestion (LOS B-D) that reduces speeds from higher speeds to 30-50 mph usually reduces fuel consumption and emissions.

Figure 11 **Noise Versus Speeds** (Salleh, Md zain and Hamzah 2013)



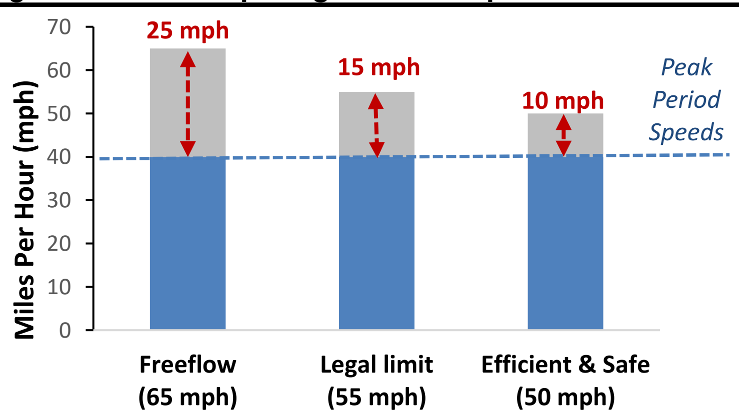
Vehicle noise increases with speed. Although electric cars produce less noise than internal combustion engines (ICEs), the differences decline with speed over 20 kph, as tire and wind noises increase.

For these reasons, most experts recommend using efficiency-maximizing baseline speeds, which are typically LOS C to D (Grant-Muller and Laird 2007; Wallis and Lupton 2013). As one economist explains,

> The most widely quoted congestion cost studies may not be very useful for practical purposes, since they rely, essentially, on comparing the existing traffic conditions against a notional 'base' in which the traffic volumes are at the same high levels but all vehicles travel at completely congestion-free speeds. This situation could never exist in reality, nor (in my view) is it reasonable to encourage public opinion to imagine that this is an achievable aim of transport policy (Goodwin 2003).

The figure below illustrates the effects of different baseline speeds. In this example, freeflow speeds result in 2.5 times the estimated delays as an efficient and safe baselines.

Figure 12 **Comparing Baseline Speeds**



In this example a road has 65 mph freeflow speeds, 55 mph speed limits, 50 mph efficiency-maximizing speeds and 40 mph peak-period speeds.

In this case, congestion delays are 25 mph using a freeflow baseline, 15 mph using a speed limit baseline, and 10 mph using efficient and safe baseline.

The table below shows how baseline speed selection affects costs. Estimated costs are about twice as high for freeflow as efficient and safe speeds. With freeflow baselines, much of reported "congestion costs" consists of *traffic law compliance*, drivers slowing to what is legal, efficient and safe.

Table 3 **Baseline Speed Effects on Congestion Cost Estimates**

Baseline	Travel Time Index (TTI)	Annual Delay Hours	Valued at $24/hr
Freeflow	1.63	44	$1,062
Legal limits	1.38	31.4	$753
Efficient & Safe	1.25	23.0	$552

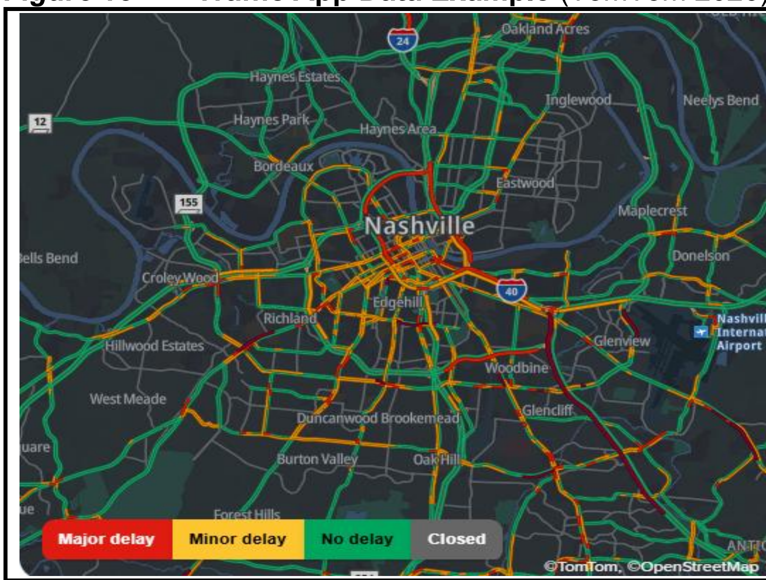
Baseline speed selection significantly affects congestion costs. Estimates based on legal speed limits are about 30% lower, and efficient and safe speeds about 50% lower, than freeflow speeds.

Some studies use other methods. Compared with estimates based on freeflow baseline speeds congestion costs are about 50% lower when calculated using motorists' willingness-to-pay for faster travel (BTRE 2007), and 70% to 80% lower using economically optimal baselines or deadweight losses (EC 2020; Wallis and Lupton 2013). Because optimal speeds can be difficult to determine, Transport Canada recommends calculating congestion costs uses 50%, 60% and 70% of free-flow speeds (TC 2006).

Congestion Exposure

Congestion exposure refers to the amount of travel that experiences delay. Congestion cost studies often overestimate this by uncritically applying the high delay rates measured on major highways during peak periods to all urban commute trips. For example, the *Urban Mobility Report* claims that 40% of urban-peak travel experiences severe or extreme congestion and only 1% is uncongested, and TomTom claims that U.S. urban motorists experienced 27.4% delays averaged over their entire trips. These estimates are unrealistic. Traffic maps, such as the one below, typically show that most urban-peak highways have no delay (green), about 10% minor delay (orange) and less than 5% major delay (red). Congestion is even less severe in smaller cities and suburbs, for reverse commutes, and shoulder periods such as 6-7 am and 3-4 pm.

Figure 13 **Traffic App Data Example** (TomTom 2026)



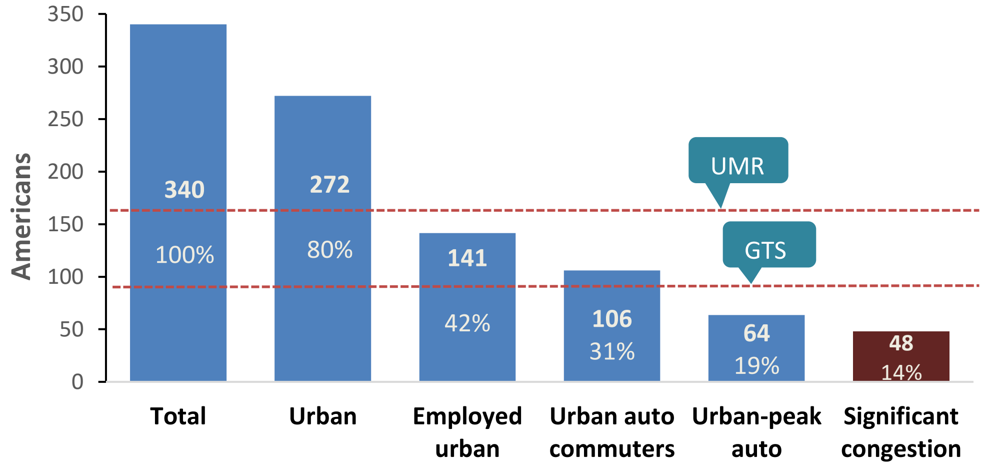
	Nashville, TN
Average congestion level	38.1%
Average speed	24.4 mph
Average distance driven in 15 min	6.1 mi
Highway trip ratio	51.3%

This typical traffic map that only a small portion of total urban-peak roadways experience major delays (marked red).

Of course, congested roads carry more than average traffic volumes so the 3-5% of road-miles with major delays might carry 10-20% of vehicle-miles, which is still a minority of total vehicle-miles, far less than could justify 38.1% average delay for *all* urban peak travel. For example, if half of driving were on uncongested roads, a 38.1% overall average delay would require that the congested roads experience 76.2% delay, level-of-service F, which is unrealistic because such severe congestion is uncommon and significantly suppresses driving.

The *Urban Mobility Report* assumes that 158 million auto commuters experience 63 average annual delay hours, and the *Global Traffic Scorecard* estimates that 95 million urban motorists bear 49 average annual delay hours. More realistic estimates that exclude small city, suburb-to-suburb, off-peak, reverse and short commutes results in much lower congestion exposure estimates, as illustrated below.

Figure 14 **Americans Who Bear Significant Congestion** (Burrows and Burd 2024; Litman 2025)

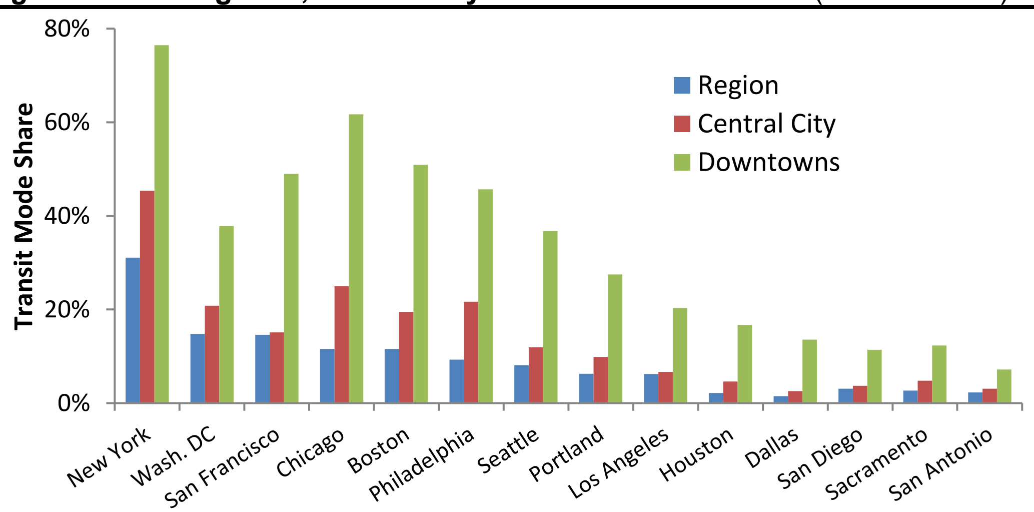


The Urban Mobility Report and Global Traffic Scorecard overestimate congestion exposure by assuming that all urban auto commuters experience significant delays, two or three times what this analysis indicates. Census data indicate that only about 14% of Americans are urban-peak auto commuters.

Motorists also experience congestion delays during non-commute trips such as errands and recreation, but those trips tend to be more flexible and less urgent than commuting, so their delay costs tend to be lower.

Most congestion cost studies only report delays per motorist, which ignores the congestion avoided by non-auto travel. They justify this by citing high average auto commute mode shares, but non-auto mode shares are much higher on the most congested corridors, as illustrated below, and many travellers will use non-auto modes if they are convenient and affordable, so non-auto travel quality can significantly affect congestion.

Figure 15 **Regional, Central City and CBD Mode Shares** (Pisarski 2006)



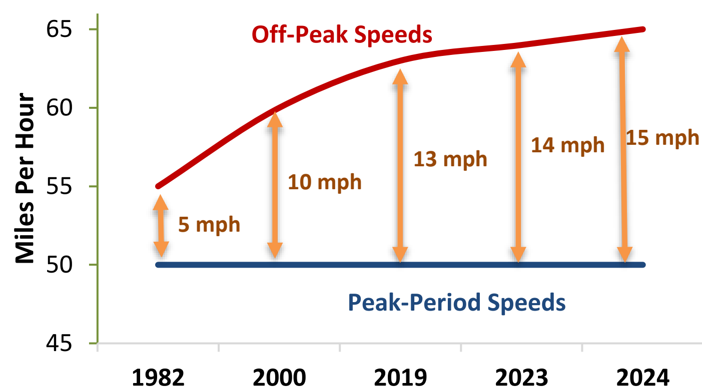
Although about 90% of commute trips are by auto, non-auto modes serve 20-50% of peak-period trips to major urban centers such as downtowns and campuses. As a result, non-auto mode shares significantly affect congestion costs.

Peak to Off-Peak Speed Differentials

Many studies claim that congestion problems are growing. For example, the *Urban Mobility Report* estimates that annual delay approximately tripled from 20 hours per motorist in 1982 to 63 hours per motorist in 2024, but that appears to reflect their analysis methods rather than congestion impacts.

These studies measure delay by comparing peak and off-peak speeds, so faster off-peak speeds increase estimated delays. Between 1982 and 2024 higher speed limits and roadway design speeds, faster and more fuel-efficient vehicles and reduced speed enforcement significantly increased freeflow speeds (Badger and Blatt 2024), while safety strategies such as complete streets and more speed enforcement reduced peak-period speeds (ITF 2018). If peak period speeds stayed 50 mph but off-peak freeflow speeds rose from 55 mph 1982 to 65 mph in 2024, these changes would increase the Travel Time Index from 1.1 to 1.3 and estimated delay hours would triple, as illustrated below.

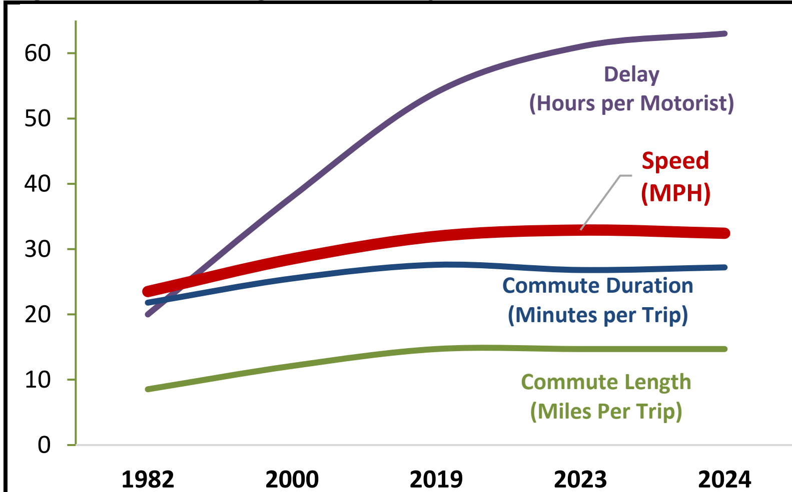
Figure 16 **Increasing Peak and Off-Peak Speed Differentials, 1982 to 2024** (UMR 2025)



Between 1982 and 2024, higher speed limits (the 55 mph speed limit was rescinded in 1995, leading to higher limits on most highways), higher roadway design speeds, faster and more efficient vehicles, and less speed enforcement significantly increased freeflow speeds. These increased off-peak to peak speed differentials. This explains much of estimated congestion cost increases.

During that period commute speeds increased significantly, as indicated below. This indicates that the UMR's reported delay growth mainly reflects higher off-peak speeds rather than more congestion.

Figure 17 **Congestion Delays Versus Commute Trends** (UMR and Census Data)



The UMR claims that congestion delays per motorist tripled between 1980 and 2024, but this is not reflected in commute speed trends. During that period average commute distance grew 71% from 8.6 to 14.7 miles, but commute duration only increased 25% from 22 to 27 minutes per trip, resulting in a 38% average speed increase from 24 to 32 mph.

This indicates that reported delay growth reflects faster off-peak traffic rather than more congestion delays. The UMR ignores this issue.

Travel Time Valuation

Another important congestion costing factor is the value of delay. This can vary widely. Some travel, such as urgent errands or business travel, has high time value, but for most trips a few minutes of delay has modest costs. Surveys find that many people want a 10- to 20-minute commute as time to relax and separate their personal and work lives (Jaffe 2014). Travellers often choose slower modes that are cheaper, less stressful, more productive (travellers can rest or work), healthier or more enjoyable. Improving travel comfort, for example, improving pedestrian safety or reducing transit crowding, can reduce travel time unit costs, equivalent to increasing traffic speed.

When faced with optional tolls to drive on uncongested lanes drivers usually choose to save money rather than time (Bain and Cimon 2025). Motorists are typically willing to pay 35-60% of wages for time savings, with higher values for urgent errands and commercial travels (EC 2020; DfT 2024; Waka Kotahi 2025; Wardman 2022). The USDOT recommends valuing personal travel time at 50% of median wages (USDOT 2016).

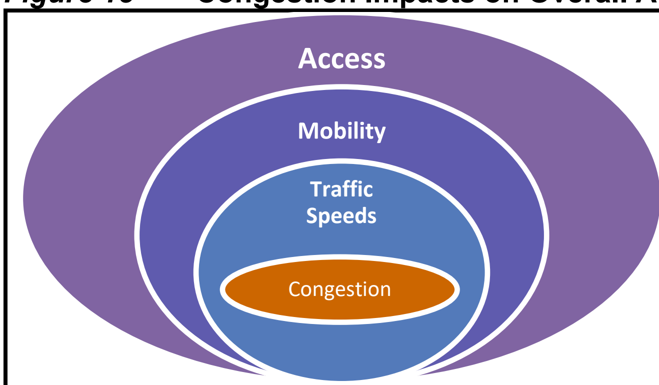
Accessibility Analysis

Planning is changing from a *mobility-based* analysis that evaluates transportation system performance based primarily on traffic speeds, to *accessibility-based* analysis which evaluates performance based on the time and money costs required to access services and activities such as shops, schools, jobs and recreation (Levinson and King 2022; Sundquist, McCahill and Brenneis 2021). As one expert explains:

> Instead of measuring and monetising the fairy dust of `travel time savings', a transport facility should be assessed on how much access it produces per unit of investment. Access is the ease of reaching destinations. E.g. you might measure how many jobs (or restaurants or hospitals, etc.) can be reached in 30 minutes and/or $5. A transport facility that increases access to destinations for a cost effectively is good. (Levinson 2021)

Mobility-based planning considers congestion a major problem, but accessibility-based planning recognizes that congestion is just one of many factor affecting overall accessibility, as illustrated below.

Figure 18 **Congestion Impacts on Overall Accessibility**



The goal of most travel is access to services and activities such as shops and jobs. Many factors affect urban accessibility including proximity (travel distances and therefore density and mix), transport network connectivity (connections between paths, roads, and other modes), and mobility (travel speed by various modes) and affordability. Traffic congestion has relatively minor impacts on overall accessibility.

This is important because planning often involves trade-offs between traffic speeds other accessibility factors (Levine, et al. 2012). For example, wider roads, longer blocks and higher design speeds reduce walkability and network connectivity, and stimulate sprawl (Anciaes, et al. 2022). Comprehensive analysis must consider these factors to avoid implementing congestion reduction strategies that by reducing non-auto mobility, network connectivity and development density reduce transport system efficiency or are unfair to non-drivers.

Central area workers have shorter commute durations despite more intense congestion, as illustrated below.

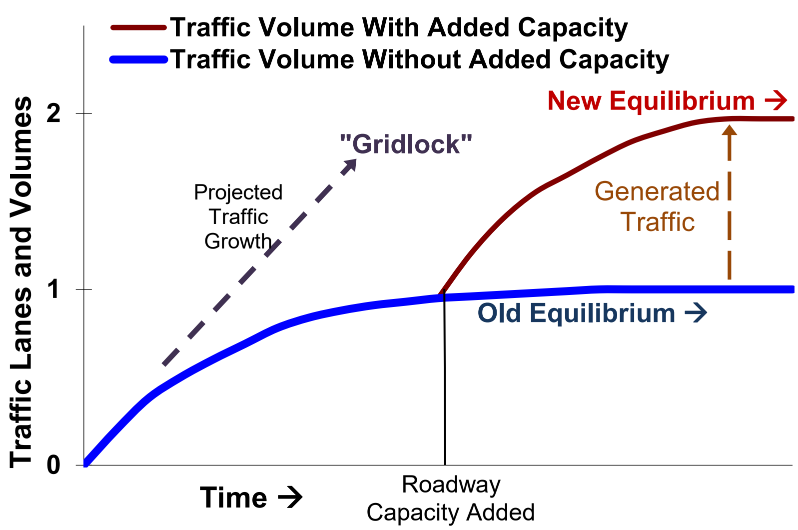
Figure 19 **Nashville Commute Duration** (SJSU 2025)

This map shows average minutes per commute for Nashville, Tennessee, a typical U.S. city. Although central city neighborhoods tend to have more intense congestion, lower traffic speeds and more trips by slower modes (walking, bicycling and transit), they tend to have lower commute durations than in urban fringe areas due to shorter travel distances. This indicates that other factors affect accessibility more than traffic congestion.

Congestion Dynamics

Traffic is often modelled as a fluid that flows through a road system, but experts now recognize that it often behaves like a gas that fills available space and can be condensed with appropriate incentives. Congestion tends to self-limit: it increases until delays cause some travellers to avoid potential peak-period vehicle trips, resulting in equilibrium, as illustrated below.

Figure 20 **Traffic Growth and Congestion Equilibrium** (Litman 2025)



Traffic grows when roads are uncongested but growth rates decline as delays limit peak-period trips, creating a self-limiting equilibrium (indicated by the curve becoming horizontal). Extrapolating past trends without considering this effect exaggerates future congestion problems ("Gridlock"). If capacity increases, traffic grows until congestion returns, resulting in a new equilibrium with larger traffic volumes. This equilibrium depends on the quality of alternatives, such as public transit comfort, speed and affordability, and TDM incentives such as road and parking pricing, flextime and telework.

Congestion equilibrium levels depend on the quality of options and incentives: if alternatives are attractive and convenient, travellers can reduce more peak period vehicle trips, reducing congestion. This has important implications. First, future congestion cannot be accurately predicted by extrapolating past growth without accounting for self-limiting effects. Second, expanding urban roadways usually does little to reduce long-term congestion because the added capacity soon fills with latent demands. Third, this induces more total vehicle travel and associated costs (Goodwin 2026).

Additional Impacts: Walkability, Fuel, Risk, Emissions and Productivity

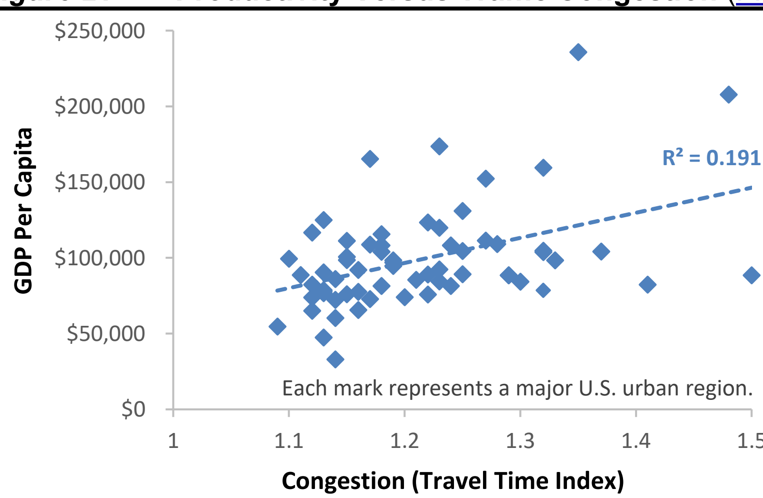
Wider roads and faster traffic increase walking and bicycling delay and risk, called the *barrier effect* or *severance* (Anciaes, et al. 2022). This is particularly significant in urban neighborhoods with high non-auto mode shares. This creates a trade-off between auto and non-auto accessibility.

As previously discussed, fuel consumption, crashes, and emissions tend to increase with faster traffic, particularly over 50 mph, so moderate congestion (LOS B-D) tends to reduce, fuel and emission costs (Bigazzi and Figliozzi 2012; TØI 2009). Barth and Boriboonsomin (2009) explain, "If moderate congestion brings average speeds down from a free-flow speed over 70 mph to a slower speed of 45 to 55 mph, this moderate congestion can *reduce* CO_2 emissions. If congestion mitigation raises average traffic speed to above about 65 miles per hour, it can *increase* CO_2 emissions. And, of course, speeds above 65 or 70 also make the roadway more dangerous."

Higher traffic speeds increase crash risk by reducing drivers' ability to react to dangers and increasing crash severity; an additional km/h typically increases casualty rates 3% (ITF 2018). Total crash rates tend to be lowest on moderately congested roads (V/C=0.6), and fatality rates often increase when congestion is reduced (Potts, et al. 2014). Per capita traffic casualties tend to increase with induced vehicle travel (Luoma and Sivak 2012; SSTI 2018). Congestion reductions that cause high traffic speeds are found to increase traffic casualties (Marchesini and Weijermars 2010). One study estimated increased crash costs typically offset 5-10% of congestion reduction benefits (Wallis and Lupton 2013).

Advocates often claim that roadway expansions are economically beneficial, but this is often untrue. The first paved roads serving an area tends to increase its productivity, but adding urban road capacity provides declining marginal benefits and increases many costs (Guerra 2025; Metz 2021). Congestion reduction strategies are most likely to increase productivity if they reflect economic principles including efficient pricing (prices reflect marginal costs) and consumer sovereignty (markets respond to user demands), so multimodal planning and TDM incentives tend to support economic development while unpriced urban highway expansions tend to reduce productivity (Melo, Graham and Canavan 2012). US data indicates that productivity tends to decline with urban vehicle travel and lane-miles, and increases with density, transit ridership, and congestion (Dumbaugh 2012; Litman 2024), as illustrated below.

Figure 21 **Productivity Versus Traffic Congestion** (FHWA 2024 PS1, and TTI 2023)



Economic productivity (per capita Gross Domestic Product or GDP) tends to increase with urban traffic congestion. The 0.191 R^2 value indicates a moderate relationship. This contradicts claims that congestion reduces productivity and urban highway expansions are always economically beneficial. It suggests that other types of accessibility improvements, such as multimodal planning and TDM, can do more to improve prosperity.

Research Standards

High quality research includes literature reviews, transparent data sources and methods to allow replication, clear references, discussion of possible omissions and biases, plus peer review.

Best Practices Summary

The table below summarizes best congestion evaluation practices, based on previously described analysis and guidance documents. These practices help ensure that evaluations of congestion costs and congestion reduction benefits accurately reflect motorists' and community values.

Table 4 **Congestion Evaluation Best Practices** (Aftabuzzaman 2007; ATAP 2020; DfT 2025; EC 2020; Grant-Muller and Laird 2007; Litman 2014; Waka Kotahi 2025; Wallis and Lupton 2013)

Evaluation Factor	Recommended Best Practices
Congestion metrics – how congestion is measured.	For planning, pricing and equity analysis, measure internal and external impacts on all modes and all trips, not just auto commuter delays.
Baseline speeds – Traffic speeds considered optimal	Use economically optimal baseline speeds that maximize efficiency and reflect users' willingness to pay for faster travel.
Congestion exposure – the amount of travel that experiences congestion.	Use realistic estimates of congestion delays. Measure congestion costs per capita or commuter, not just per motorist.
Peak to off-peak speed trends – how speed differentials are calculated and interpreted.	Recognize that faster off-peak traffic increases estimated congestion delay hours. Account for that when evaluating long-term trends.
Travel time valuation – monetary costs assigned to delay.	Use realistic values of time that reflect travellers' willingness-to-pay, such as 30-50% of median wages.
Congestion dynamics – the tendency of congestion to affect traffic and travel.	Recognize that congestion is self-limiting, equilibrium levels are affected by non-auto options, and roadway expansions induce more vehicle travel.
Additional impacts – impacts on other benefits and costs.	Use best current models to analyze impacts on accessibility, walkability, fuel, risk, emissions and productivity.
Equity analysis – the distribution of impacts and whether that is considered fair.	Determine how costs and benefits affect different groups, particularly people with disabilities, low incomes or other special needs.
Research standards – whether results are credible, understandable and replicable.	Maintain professional standards including transparent methods and data to allow replication, comprehensive references, plus peer review.

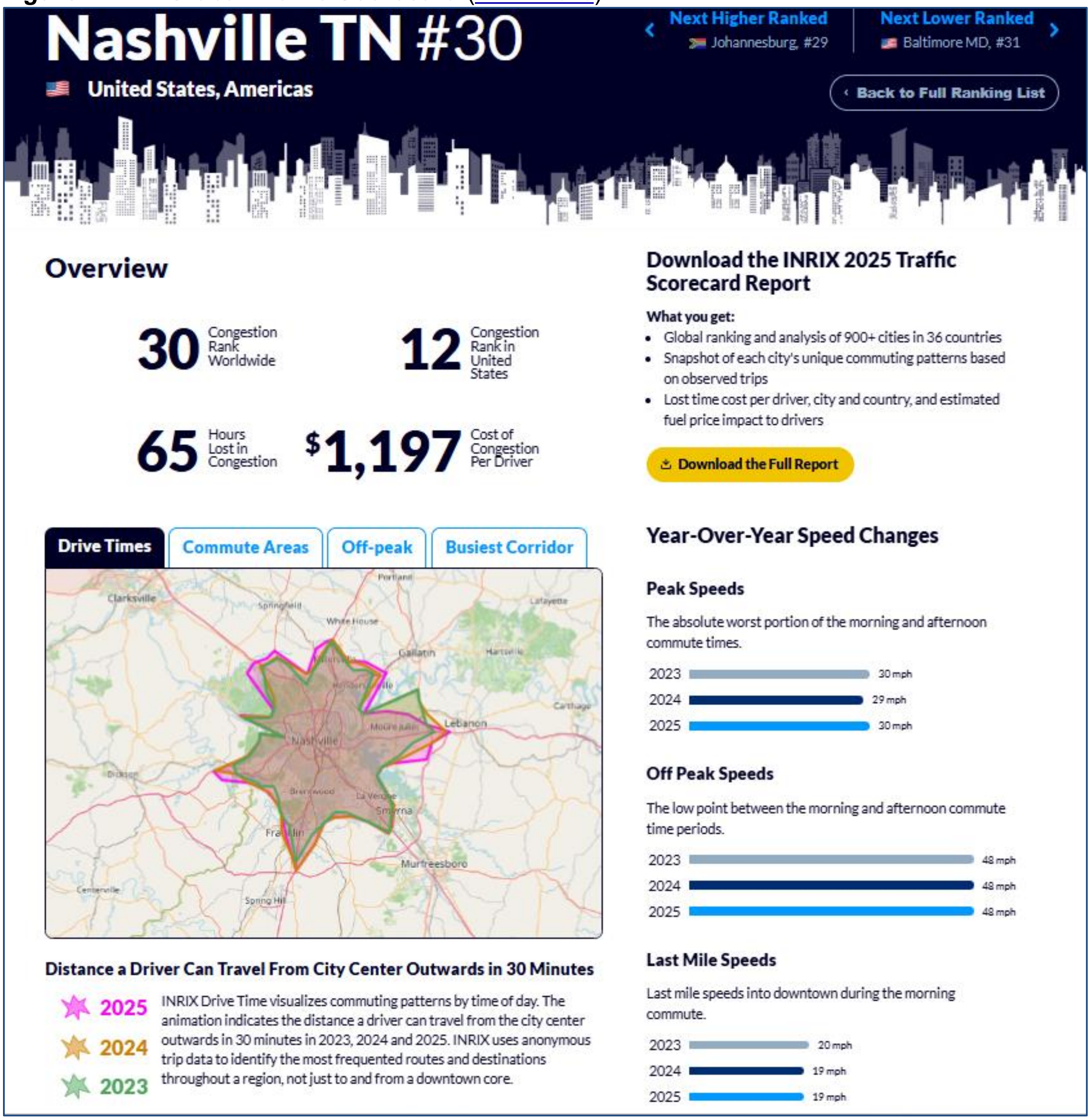
This table summarizes factors to consider in congestion costing, and their best practices.

The following section examines how well specific congestion costing studies reflect these principles.

Congestion Cost Study Evaluations
This section analyzes major congestion costing studies.

The INRIX Global Traffic Scorecard
The INRIX *Global Traffic Scorecard (GTS)* uses numerous data sources to provide various information on travel conditions and trends including traffic speed and volumes, congestion delay intensity and costs, crash rates, speeding and enforcement, and other factors for 942 cities. The figure below shows Nashville results.

Figure 22 **Global Traffic Scorecard** (INRIX 2025)



The INRIX Global Traffic Scorecard estimates congestion delay, costs and trends for 942 cities. This figure shows results for Nashville, Tennessee, a typical U.S. urban region.

This information is useful for many types of logistical and travel planning, such as how to optimize travel through a region, but it exaggerates congestion costs by using freeflow baseline speeds and overestimating exposure. It claims that in 2025 traffic congestion caused 49 average delay hours costing $894 for 95 million urban-peak motorists, which applies maximum delay values to many who seldom drive in congested conditions including those in small cities and suburbs, and those with reverse and short commutes. Its results are inconsistent and often contradictory; the cities it ranks as having the worst congestion delays do not necessarily have the lowest traffic speeds or longest duration commutes. Because it only considers impacts on motorists it is not useful for multimodal planning, efficient pricing or equity analysis. For example, its methodology does not recognize the delay avoided when travellers shift from driving to other modes, or the delay and risk that wider roads with higher traffic speeds impose on pedestrians and bicyclists.

The table below evaluates the GTS relative to best congestion evaluation practices.

Table 5 **Global Traffic Scorecard Evaluated on Best Practices**

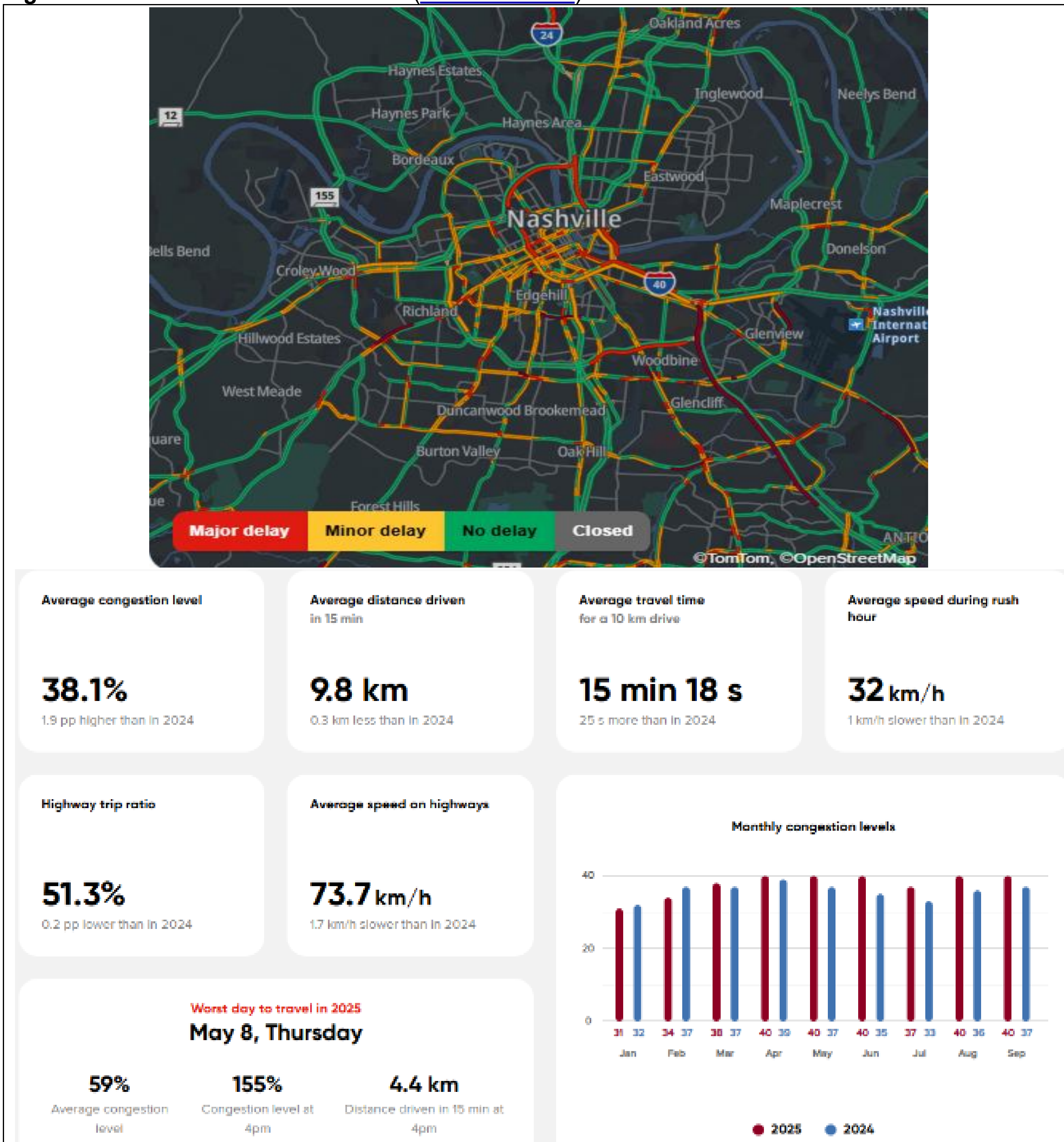
Factor	This Study's Practices	Impacts
Congestion metrics	Only calculates delay costs. Does not consider external costs or deadweight losses.	Overestimates costs compared with optimal. Unsuitable for pricing and equity analysis.
Baseline speeds	Uses freeflow speeds. Does not consider other baselines.	Overestimates costs compared with optimal. Much of delays are speed limit compliance.
Congestion exposure	Applies high delay values to all urban auto travel, including small city, reverse and short commutes.	Overestimates delays and the amount of vehicle travel that experiences congestion.
Peak to off-peak speed trends	Does not adjust delay values to account for higher off-peak traffic speeds.	Overestimates congestion cost growth when off-peak speeds increase.
Travel time valuation	Values personal travel time at 50% of median wages.	Overestimates congestion costs compared with many motorists' willingness to pay.
Congestion dynamics	Includes no discussion of traffic congestion equilibrium or induced vehicle travel.	May exaggerate future congestion problems and roadway expansion benefits.
Additional impacts	Provides information on crash trends, safety strategies and disaster traffic impacts.	Recognizes a variety of impacts in addition to congestion.
Research standards	Includes information on methods, but not enough to replicate analysis.	Relatively good but could improve by making key information .

This table summarizes the degree that the Global Traffic Scorecard reflects best congestion evaluation practices.

TomTom Traffic Index

The TomTom *Traffic Index* uses proprietary data to provide real-time and summary data on traffic conditions, average speeds, congestion intensity, annual delays and long-term trends for 492 cities and metropolitan regions. The figure below shows Nashville's results.

Figure 23 **TomTom Traffic Index** (TomTom 2026)



Time lost due to traffic in rush hour in 2025: 92 hours = $1,426 at 50% of $31/hr average wages.

This illustrates TomTom Traffic Index data for Nashville, Tennessee, a typical U.S. city.

The TomTom Traffic Index provides information that is useful for making short-term decisions, but because it uses freeflow baseline speeds, overestimates exposure and only reports motorist delays, it exaggerates congestion costs and is unsuitable for multimodal planning, efficient pricing and equity analysis.

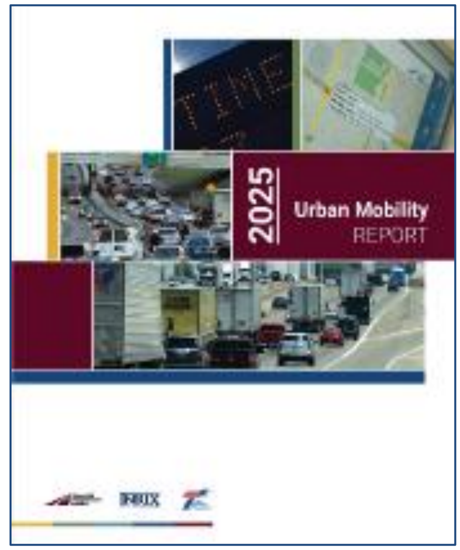
The table below evaluates the *Traffic Index* relative to best congestion evaluation practices.

Table 6 ***TomTom Traffic Index*** **Evaluated on Best Practices**

Factor	This Study's Practices	Impacts
Congestion metrics	Only calculates motorists delays. Does not consider external costs or deadweight losses.	Overestimates costs compared with optimal. Unsuitable for multimodal planning, pricing and equity analysis.
Baseline speeds	Uses freeflow baseline speeds. Does not discuss alternative baselines.	Overestimates costs compared with optimal. Much of delays are speed limit compliance.
Congestion exposure	Applies high delay values to all urban auto travel, including off-peak, reverse and short commutes.	Overestimates delays and the amount of vehicle travel that experiences congestion.
Peak to off-peak speed trends	Does not adjust delay values to account for higher off-peak traffic speeds.	Overestimates congestion cost growth when off-peak speeds increase.
Travel time valuation	Does not monetize travel time.	No impact.
Congestion dynamics	Includes no discussion of traffic congestion equilibrium or induced vehicle travel.	No impact.
Additional impacts	Ignores the additional fuel, crash and emission costs caused by higher speed traffic.	Overlooks possible benefits of moderate congestion (LOS B-C) that reduces speeds.
Research standards	Includes information on methods, but not enough to replicate analysis.	Relatively good but could improve.

This table summarizes the degree that the TomTom Traffic Index reflects best congestion evaluation practices.

The Urban Mobility Report



The Texas Transportation Institute's *Urban Mobility Report* (UMR) has been published periodically since 1987. Over that time, it expanded from 101 to 494 urban regions and added more indicators which now include the travel time index, total and per motorist delay hours, commuter stress and planning time indices, wasted fuel and time of congestion profiles. Older editions compared estimated peak period traffic speeds with speed limits, but since 2015 it has used INRIX traffic data.

These reports are widely promoted and widely cited. The 2025 press release states, "Traffic hits record high as commuters rewrite the rush hour. Americans lost an average of 63 hours sitting in traffic in 2024 — the highest level ever measured... That's the equivalent of nearly eight full workdays lost to traffic and marks a 16 percent increase in national congestion costs over the last five years, now totaling $269 billion annually." That exaggerates.

Below is the report's summary table. The $269 billion total cost estimate includes $35.8 billion for trucking leaving $233.2 for commuting. Dividing this by unit costs ($233.2 billion/$1,480) indicates the UMR assumes 158 million motorists experience significant congestion. This apparently applies region's maximum delay values to *all* urban auto commuters including off-peak, small town, suburb-to-suburb, reverse and short commutes. That overestimates congestion exposure: the 63 annual delay hours should only apply to less than 15% of Americans who most days drive longer distances in large cities during peak periods.

Figure 24 **Urban Mobility Report (UMR) Summary Table**

Texas A&M Transportation Institute

Exhibit 1. Major Findings of the 2025 UMR (494 U.S. Urban Areas)

Measures of…	1982	2000	2019	2023	2024	5-Yr Change
…Individual Congestion						
Yearly delay per auto commuter (hours)	20	38	54	61	63	+17%
Travel Time Index	1.10	1.19	1.23	1.24	1.26	+3 points
Planning Time Index (freeway only)	–	–	1.62	1.61	1.70	+8 points
"Wasted" fuel per auto commuter (gallons)[a] *(see footnote)*	5	15	21	18	18	-14%
Congestion cost per auto commuter (in 2024 $)	$763	$1,148	$1,260	$1,419	$1,480	+18%
…The Nation's Congestion Problem						
Travel delay (billion hours)	1.8	5.1	8.9	9.2	9.8	+10%
"Wasted" fuel (billion gallons)[a] *(see footnote)*	0.8	2.4	3.4	2.7	2.8	-18%
Truck congestion cost (billions of 2024 $)	$2.2	$8.3	$25.1	$33.2	$35.8	+43%
Congestion cost (billions of 2024 $)	$19	$92	$233	$257	$269	+16%
Travel volume (billion miles traveled)	670	1,160	1,600	1,595	1,665	+4%

Note:

Yearly Delay per Auto Commuter—The extra time spent during the year traveling at congested speeds rather than free-flow speeds by private vehicle drivers and passengers who typically travel in the peak periods.

Travel Time Index—The ratio of travel time in the peak period to travel time at free-flow conditions. A travel time index of 1.30 indicates a 20-minute free-flow trip takes 26 minutes in the peak period.

Planning Time Index (freeway only)—The ratio of travel time on the worst day of the month to travel time in free-flow conditions.

Excess Fuel—The amount beyond what would have been expected at free-flow speeds.

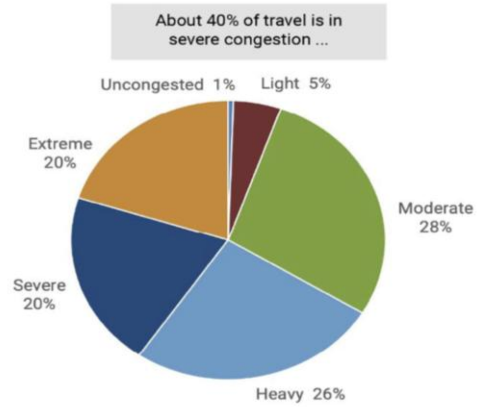
Congestion Cost—The yearly value of delay time and wasted fuel by all vehicles.

Travel Volume—Miles traveled by all vehicles during the year.

This table summarizes UMR results. It claims that 158 million auto commuters experience 63 average annual delay hours worth $1,480, and congestion costs are increasing, but it exaggerates by including many motorists who seldom drive under urban-peak conditions, much of what it calls "congestion costs" are traffic law compliance – drivers reducing speeds to what is legal and efficient – and much of the long-term delay growth reflects faster off-peak travel rather than increased congestion. Its cost values should be considered upper-bound estimates.

The UMR only reports congestion costs per motorist which ignores impacts on non-drivers and the congestion costs reduced by shifts to non-auto modes. As a result, it overestimates per capita congestion costs in compact, multimodal communities where residents can minimize urban-peak driving, and undervalues the benefits of multimodal planning and Smart Growth policies that reduce urban-peak driving by improving non-auto modes and reducing travel distances.

***Figure 25* Urban-Peak Travel** (UMR 2025)

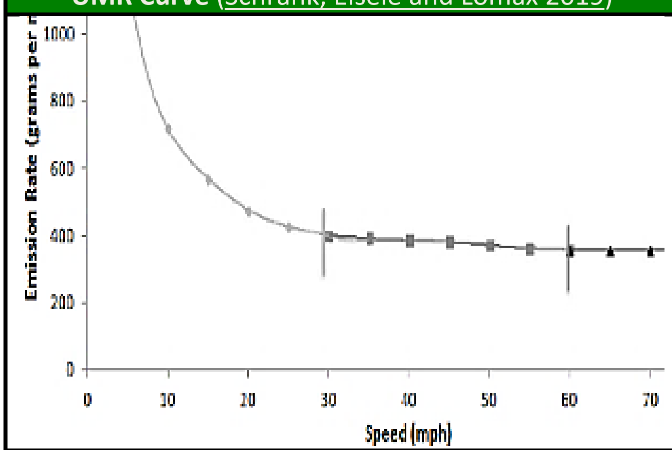


The UMR claims that 40% of urban peak travel occurs in severe or extreme congestion and only 1% is uncongested, but this is inconsistent with other sources. This reflects the tendency of traffic apps to oversample congestion delay.

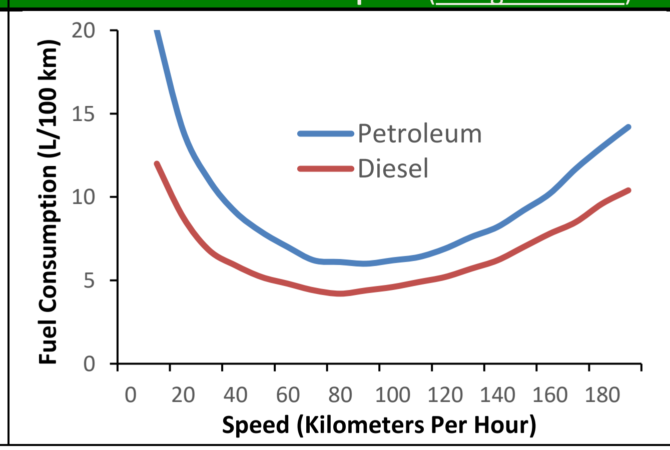
The UMR claims that 40% of urban-peak travel experiences severe congestion and only 1% is uncongested, as illustrated to the right, although other sources indicate that only a small portion of urban roadways experience significant delays, as previously discussed. It also overestimates congestion costs by using freeflow baseline speeds that exceed what is legal, efficient and safe, overvalues delay (it values personal time at 100% of median wages, which is two or three times what most experts recommend), and overestimates vehicle occupancy (it assumes 1.5 average occupants, which is higher than the 1.08 average for commute trips). It ignores research showing that higher traffic speeds tend to increase fuel, crash and emission costs, as illustrated in the figure below. Its Appendix A acknowledges the possibility that reducing congestion could increase fuel cost by increasing traffic speeds and inducing more vehicle travel (Schrank, Eisele and Lomax 2025, p. 27), but the UMR analysis ignores these effects.

***Figure 26* Speed-Fuel Efficiency Curves**

UMR Curve (Schrank, Eisele and Lomax 2019)



Real World Fuel Consumption (X-Engineer.com)

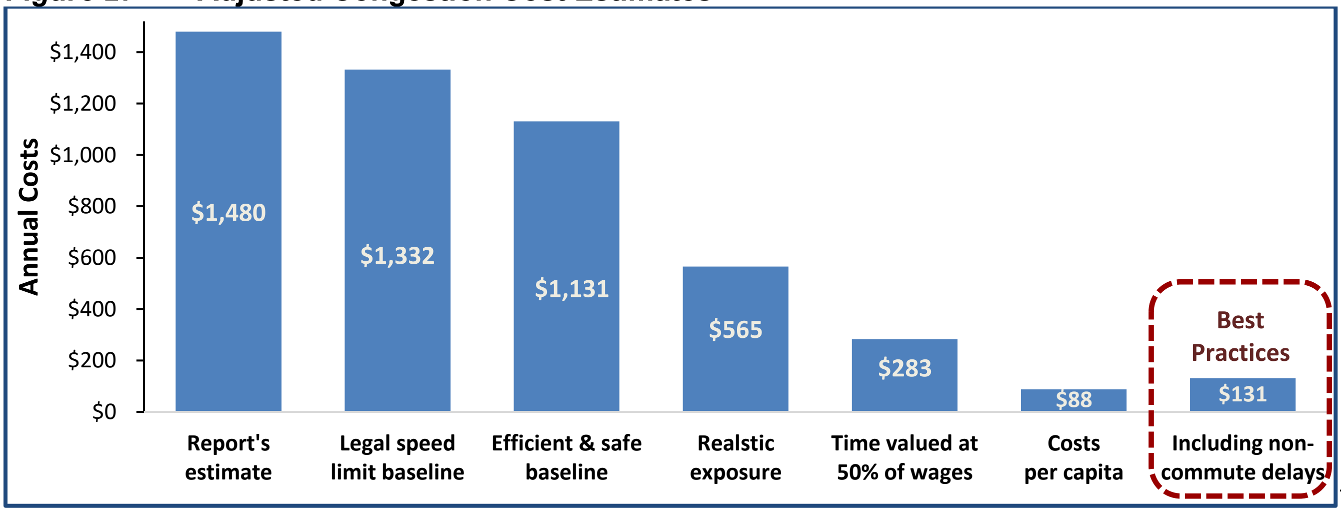


The UMR speed-efficiency curve (left) assumes that higher traffic speeds reduce fuel consumption and emissions, but other studies indicates that increase at speeds over about 100 kph (60 mph).

The UMR claim that per commuter congestion delays tripled between 1982 and 2024 is not supported by previously described data indicating that commute speeds increased during that period, which indicates that the estimated delay growth actually reflects faster off-peak speeds rather than more congestion.

The following graph adjusts the UMR's cost estimates to reflect best analysis practices. This indicates that realistic congestion cost estimates are an order of magnitude lower than what the UMR claims.

Figure 27 **Adjusted Congestion Cost Estimates**



The UMR estimates that congestion costs average $1,480 annually per auto commuter, but that is based on freeflow baseline speeds, exaggerated congestion exposure, overvaluing delay, and ignoring non-commute impacts. Applying best evaluation practices and adding non-commute delays reduces estimated costs by an order of magnitude.

Transportation planning is shifting from *mobility-based* to *accessibility-based* analysis which measures the time and money required to reach desired services and activities (Levinson and King 2020; Sundquist, McCahill and Brenneis 2021). In response the UMR added a section, *Observed Destination Access*, that introduces Total Urban Coverage (TUC), which measures the portion of a region reachable by driving in 30 minutes. This is not multimodal and does not account for the concentration of services and activities in urban centers. As a result, it underestimates accessibility in compact, multimodal regions and overestimates it in smaller, auto dependent regions; for example, Denver has a high TUC although New York provides far better accessibility. It is therefore not useful for accessibility planning.

Figure 28 **Large Region Total Urban Coverage (TUC)**

Rank	Urban Area	TUC$_0$	Range (Miles)	Area (Miles^2)
1	Denver-Aurora CO	25.3%	4.1	656
2	San Diego CA	17.9%	4.2	689
3	Phoenix-Mesa AZ	16.5%	4.4	1,114
4	San Francisco-Oakland CA	16.2%	3.7	526
5	Minneapolis-St. Paul MN-WI	13.0%	4.5	1,082
6	Detroit MI	12.8%	4.7	1,318
7	Miami FL	12.2%	3.9	1,332
8	Tampa-St. Petersburg FL	11.3%	3.9	1,049
9	Los Angeles-Long Beach-Anaheim CA	11.1%	3.9	1,655
10	Dallas-Fort Worth-Arlington TX	11.0%	4.4	1,772
11	Houston TX	10.7%	4.2	1,778
12	Seattle WA	9.1%	4.1	1,041
13	Washington DC-VA-MD	8.8%	4.0	1,321
14	Chicago IL-IN	5.9%	4.0	2,377
15	Philadelphia PA-NJ-DE-MD	5.6%	3.9	1,950
16	Boston MA-NH-RI	5.1%	4.0	1,728
17	Atlanta GA	4.2%	4.3	2,592
18	New York-Newark NY-NJ-CT	3.8%	3.9	3,460

The TUC measures the portion of a region that motorists can reach in 30 minutes. It does not effectively measure access to services and activities, is not multimodal, and it arbitrarily rates smaller, sprawled regions like Denver and San Diego higher than large multimodal regions like New York and Atlanta that provide far better accessibility, particularly for non-drivers. This provides no useful guidance for accessibility planning. It appears intended to justify urban highway expansions and undervalue multimodal planning and Smart Growth.

Because the UMR only measures auto traffic at a regional scale it provides little useful guidance to help individuals reduce their congestion exposure when choosing home locations, or for analyzing how planning decisions affect per capita congestion costs; that requires multimodal, neighborhood-scale analysis. It links to a *Mobility Improvement Strategies* website that identifies 98 potential decongestion strategies; although many of these expand urban roadway capacity, it exaggerates their benefits by ignoring induced travel impacts. It only recommends road user fees to finance new highways, overlooking the success of decongestion tolls in cities such as New York, London and Stockholm. Most Smart Growth strategies listed link to blank pages.

The UMR ignores basic research standards such as comprehensive literature reviews, replicable analysis, discussion of possible omissions and biases, or peer review. For example, Appendix A (Methodology), includes no review of current congestion costing literature, no discussion of possible biases or sensitivity analysis. It acknowledges (p. 27) that roadway expansions can induce more vehicle travel and increase fuel consumption, but the report ignores these factors. Appendix B (Vehicle Occupancy) justifies a 1.5 average vehicle occupancy rate to congested driving rather than the more realistic 1.08 value for commute trips. Appendix C (Value of Delay Time) includes no review of current travel time valuation literature; its key reference is a forty-year-old TTI study. Appendix D (Observed Access) includes no review of accessibility analysis literature or discussion of possible omissions and biases.

The table below evaluates the *Urban Mobility Report* relative to best congestion costing practices. It violates many of these practices in ways that exaggerate congestion costs and highway expansion benefits. As a result, its cost values should be considered upper-bound estimates.

Table 7 ***Urban Mobility Report* Evaluated on Best Practices**

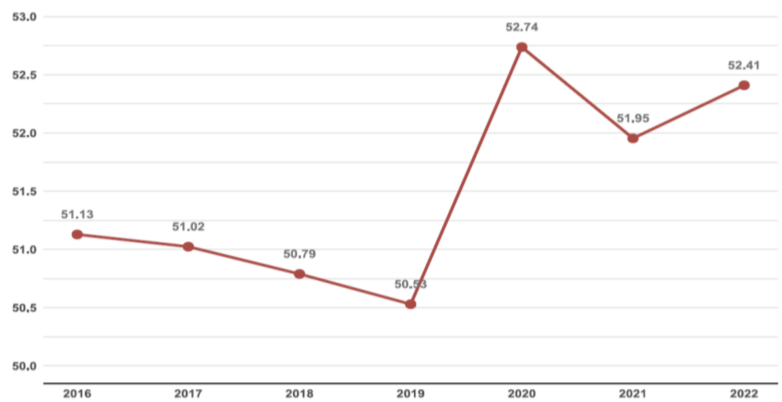
Factor	This Study's Practices	Impacts
Congestion metrics	Only calculates auto commuter delays. Does not discuss external costs or deadweight losses.	Overestimates costs. Unsuitable for strategic planning, pricing or equity analysis.
Baseline speeds	Uses freeflow speeds, capped at 65 mph. Does not discuss alternative baselines.	Overestimates congestion costs. Much of its estimated delays are traffic law compliance.
Congestion exposure	Applies delay values to 158 million motorists including off-peak, reverse and short commutes.	Overestimates the amount of vehicle travel that experiences severe congestion.
Peak to off-peak speed trends	Does not account for the effects of higher off-peak traffic speeds when calculating delays.	Overestimates long-term congestion cost growth.
Travel time valuation	Values personal travel time at 100% of wages and assumes 1.5 average vehicle occupancy.	Overestimates delay costs compared with standard recommendations.
Congestion dynamics	Ignores congestion equilibrium and induced vehicle travel impacts.	Exaggerates future congestion problems and roadway expansion benefits.
Additional impacts	Ignores increased fuel, crash and emission costs caused by high traffic speeds and induced travel.	Exaggerates moderate congestion (LOS B-D) costs and roadway expansion benefits.
Research standards	Ignores academic standards such as literature reviews, transparent data and peer review.	Lacks quality control and provides untrustworthy results.

This table summarizes the degree that the Urban Mobility Report reflects best congestion evaluation practices.

Trucking Industry Congestion Costs

The *Cost of Congestion to the Trucking Industry*, estimates that U.S. large truck congestion costs totalled $108.8 billion in 2022, nearly three times the UMR's estimate (ATRI 2024). Although truck speeds increased between 2016 and 2022, as illustrated below, the study estimates that congestion costs increased due to higher operating costs.

Figure 29 **Major Highway Truck Speeds 2016-2022** (ATRI 2024)



Between 2016 and 2022 freight truck average speeds on major highways increased, but so did their estimated congestion costs due to higher operating costs including fuel and operator wages.

The table below summarizes the degree the ATRI report reflects best practices.

Table 8 ***Cost of Congestion to the Trucking Industry*** **Evaluated on Best Practices**

Factor	This Study's Practices	Impacts
Congestion metrics	Only calculates trucking delay costs. Does not discuss external costs or deadweight losses.	Overestimates costs compared with what is economically optimal.
Baseline speeds	Uses freeflow speeds. Does not discuss alternative baselines.	Overestimates costs compared with optimal speeds.
Congestion exposure	Appears to apply high delay values to all truck travel.	May overestimate delays and the amount of truck travel that experiences congestion.
Peak to off-peak speed trends	Does not adjust delay values to account for higher off-peak traffic speeds.	Overestimate congestion growth when off-peak speeds increase.
Travel time valuation	Applies high values of travel time.	May overestimate congestion costs.
Congestion dynamics	Includes no discussion of traffic congestion equilibrium or induced vehicle travel.	No impacts.
Additional impacts	Ignores the additional fuel, crash and emission costs caused by higher speed traffic.	Exaggerates moderate congestion costs by ignoring benefits of lower speeds.
Research standards	Fails to reflect academic research standards such as replicable analysis and peer review.	Includes insufficient information to understand or replicate analysis.

This table summarizes the degree The Costs of Congestion to the Trucking Industry reflects best evaluation practices.

Handbook on External Costs of Transport

This European Commission's *Handbook on External Costs of Transport* (EC 2020) provides comprehensive guidance for project evaluation including a detailed literature review, discussion of costing theory and methods, plus recommendations for optimizing investments, prices and equity analysis. It calculates social marginal congestion costs using both delay and deadweight methods for various vehicle types and travel conditions, as summarized below.

Table 9 **European Road Vehicle Congestion Cost Estimates, 2019** (EU 2020)

Passenger Transport (pkm = passenger-kms; vkm = vehicle-kms)							
		Delay Costs			**Deadweight Loss Costs**		
		Total [Billion €]	€-cent/ pkm	€-cent/ vkm	Total [Billion €]	€-cent/ pkm	€-cent/ vkm
Passenger car	Total	206.2	4.37	7.03	35.6	0.75	1.21
Passenger car	urban	172.6	11.82	19.03	30.0	2.06	3.31
Passenger car	inter-urban	33.6	1.03	1.66	5.5	0.17	0.27
Coach bus	inter-urban	2.1	0.74	14.49	0.2	0.08	1.50
Total Passenger		***208.3***			***35.8***		
Freight Transport (tkm = tonne-kms)							
		Total [Billion €]	€-cent/ tkm	€-cent/ vkm	Total [Billion €]	€-cent/ tkm	€-cent/ vkm
Light commercial vehicles	urban	32.6	27.75	19.21	5.6	4.78	3.31
Heavy Goods Vehicle	urban	17.6	3.81	51.94	3.1	0.67	9.11
Total Freight	all	*62.3*			*10.4*		
Total Road Transport	all	**270.6**			**46.2**		

This table summarizes estimated congestion costs for various vehicles, conditions and metrics. Delay cost are typically 4-8 times deadweight costs, highlighted in red (For example, 208.3/35.8=5.8, 62.3/10.4 = 6.0, and 270.6/46.2 = 5.7).

It emphasizes the importance of basing pricing and equity analysis on the external costs imposed, and provides examples for various vehicle types and road conditions, such as the example below.

Table 10 **Congestion Costs Imposed by Passenger Cars** (EU 2020)

Social Marginal Congestion Costs Imposed per Car-Kilometer				
	Urban (€-cent/vkm)		**Interurban** (€-cent/vkm)	
	Trunk Roads (Arterials)	*Other Roads*	*Motorways*	*Other Roads*
Over capacity	19.9	41.2	18.2	28.8
Congested	15.4	36.1	14.1	24.6
Near capacity	10.8	29.3	9.9	19.4
Well below capacity	0.0	0.0	0.0	0.0

The external congestion costs that urban motorists impose on other road users are often much higher than average costs. Efficient road pricing and equity analysis should be based on these external costs.

This indicates that 23% of total traffic congestion costs are for freight and 77% are for personal travel, 84% of passenger congestion costs are on urban rather than inter-urban roads, and delay costs are typically 4-8 times higher than deadweight costs. This indicates that marginal external congestion costs are much higher than average costs, which indicates inefficiency; motorists are likely to drive more than what is economically optimal and equitable due to the large external costs they impose.

The table below evaluates the *External Costs of Transport* relative to best congestion evaluation practices.

Table 11 ***External Costs of Transport*** **Evaluated on Best Practices**

Factor	This Study's Practices	Impacts
Congestion metrics	Provides estimates of internal and external costs, based on delay and deadweight loss methods.	Reflects best practices.
Baseline speeds	Provides both delay costs, based on freeflow baseline speeds, and deadweight losses that reflect optimal peak-period speeds.	Provides guidance for determining economically-efficient congestion costs and road pricing.
Congestion exposure	Does not specify assumptions concerning the portion of total vehicle travel delayed.	Overestimates delays unless adjusted to reflect a realistic portion of traffic delayed.
Peak to off-peak speed trends	Does not report congestion trends.	No impact.
Travel time valuation	Includes travel time valuation literature review and guidance (Appendix F.2.2).	Reflects best practices.
Congestion dynamics	Does not discuss congestion equilibrium or induced vehicle travel.	May overestimate future congestion costs and roadway expansion benefits.
Additional impacts	Includes detailed guidance for evaluating other traffic impacts including crash risk and emissions.	Reflects best practices.
Research standards	Includes detailed technical discussions and literature reviews.	Reflects best practices.

This table summarizes the degree the External Costs of Transport Handbook reflects best practices. It is one of the best.

This Handbook reflects most best practices. It provides guidance that can be applied to other congestion costing studies.

Australian, New Zealand and UK Transport Planning Guidance

The *Australian Transport Assessment and Planning Guidelines* (ATAP 2020), New Zealand's *Monetized Benefits and Costs Manual* (Waka Kotahi 2025), and the UK Department for Transport's *Transport Analysis Guidance* provide detailed guidance to transport agencies for transportation planning economic evaluations. They are based on extensive research performed by leading experts and organizations.

These guides include discussion of economic principles concerning efficient pricing, and indirect and external impacts and induced vehicle travel. They apply multimodal analysis which recognizes impacts on non-auto modes, including travel time savings to transit passengers, and the barrier effect delay that wider roads and increased traffic imposes on pedestrians and bicyclists. They also include discussion of long-term land use impacts and potential accessibility improvements from more compact development. These guides reflect most best practices.

Table 12 **Australian, NZ and UK Transport Guides Evaluated on Best Practices**

Factor	This Study's Practices	Impacts
Congestion metrics	Provide estimates of internal and external costs suitable for optimal planning and pricing.	Reflects best practices.
Baseline speeds	Provide some guidance for determining optimal peak-period speeds.	Provides guidance for determining economically-efficient costs and road pricing.
Congestion exposure	Does not specify assumptions concerning the portion of total vehicle travel delayed.	Overestimates delays unless adjusted to reflect a realistic portion of traffic delayed.
Peak to off-peak speed trends	Generally do not report congestion trends.	No impact.
Travel time valuation	Include travel time valuation literature reviews and guidance.	Reflects best practices.
Congestion dynamics	Do not discuss congestion equilibrium but do discuss induced vehicle travel impacts.	May overestimate future congestion costs and roadway expansion benefits.
Additional impacts	Include detailed guidance for evaluating other traffic impacts including crash risk and emissions.	Reflects best practices.
Research standards	Include detailed technical discussions and literature reviews.	Reflects best practices.

This table summarizes the degree that Australian, New Zealand and UK transport planning guides reflect best practices. They are generally very good.

Transportation Models

Transportation models are used to predict future travel and the impacts of system changes. Current models tend to overvalue urban roadway expansions and undervalue other congestion reduction strategies, particularly integrated programs that include multimodal planning, TDM incentives and Smart Growth policies (Schneider, Handy and Shafizadeh 2014). For example, they rely on data sets that undercount travel demands by active modes (walking and bicycling) and by lower-income and central city residents, which underestimates the benefits of non-auto mode improvements (Wang, et al. 2025); they use short-term rather than long-term values price elasticity coefficients that underestimate the ability of TDM incentives to reduce traffic congestion (Bain and Cimon 2025); are insensitive to qualitative factors such as active and public transport convenience, comfort and perceived safety, which underestimates multimodal planning; and they underestimate long-term induced travel effects (Volker, Lee and Handy 2020). These biases are often opaque and poorly documented. The table below lists current practices, describes their impacts, and recommends reforms.

Table 13 **Regional Traffic Model Congestion Costing Reforms**

Factor	Current Practices	Impacts	Reforms
Congestion metrics	Only calculates delays to motorists.	Unsuitable for strategic planning, pricing or equity analysis.	Measure marginal delay costs imposed by vehicle type.
Data accuracy	Input data undercounts non-auto and lower-income travel.	Undervalues multimodal planning and Smart Growth policies.	Identify and adjust for input biases.
Baseline speeds	Use freeflow baseline speeds.	Overestimates costs compared with optimal.	Define and apply optimal baseline speeds.
Congestion exposure	May overestimate the amount of travel delayed.	May overestimate congestion costs.	Use realistic estimates of congestion exposure.
Peak to off-peak speeds	Fails to adjust delay values for faster off-peak travel.	Overestimate congestion growth when off-peak speeds increase.	Correct for delay trends caused by faster off-peak traffic.
Travel time valuation	Overvalues small travel time savings.	Overestimates congestion costs.	Use realistic travel time values.
Congestion dynamics	Overlooks or underestimates congestion equilibrium and induced traffic impacts.	Overestimates future congestion costs and roadway expansion benefits.	Account for congestion dynamics including induced vehicle travel impacts.
Additional impacts	Ignores additional delay, fuel, crash and emission costs caused by high traffic speeds.	Exaggerates roadway expansion benefits.	Account for costs caused by higher speeds and induced vehicle travel.
Research standards	Fails to reflect transparency and peer review.	Allows biased results.	Ensure analysis is documented, transparent and peer reviewed.

This table summarizes reforms for improving regional transportation models to reflect best evaluation practices.

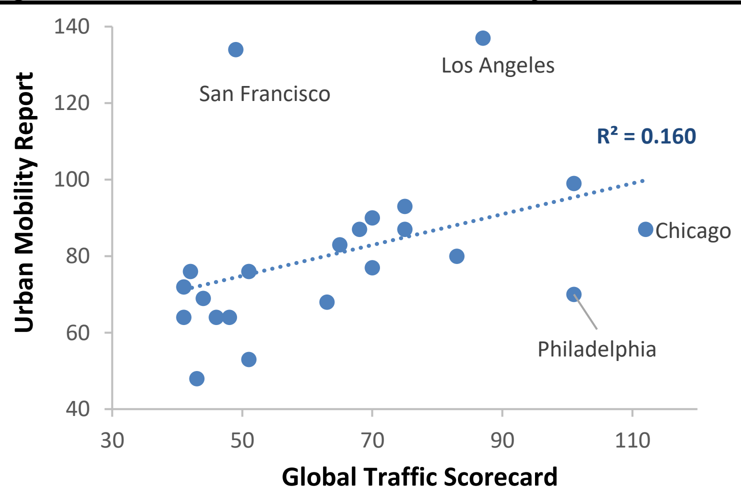
In addition, transportation economic evaluation models tend to undervalue multimodal planning, TDM incentives and Smart Growth policies. For example, conventional analysis ignores parking costs and therefore the parking facility savings from reductions in vehicle ownership and trips; undervalues safety and health benefits from automobile to active mode travel shifts, and overlooks sprawl-related costs such as increased stormwater management and heat island effects of increased pavement, and increased transportation costs from dispersed development. New guidance can help improve impact modelling (LCI 2026).

Summary

Various studies with various purposes estimate congestion costs. The INRIX *Global Traffic Scorecard* and the *TomTom Traffic Index* are intended to promote commercial services that can help identify the best time, mode and route for travelling through cities, and evaluate roadway conditions for planning purposes. The *Urban Mobility Report* and *Cost of Congestion to the Trucking Industry* reports are designed to promote urban highway expansions. Australian, European Commission, New Zealand and the UK guidance documents are designed to help transportation agencies optimize transport planning and investment decisions.

This review indicates that some of these studies ignore best practices by overestimating congestion exposure, using excessive baseline speeds, overvaluing delay time, and ignoring additional costs caused by higher traffic speeds and induced vehicle travel. Much of what they call congestion costs are traffic law compliance, and much of their estimated long-term delay growth results from faster off-speed traffic speeds rather than increased congestion delays. Their results are inconsistent. For example, although the UMR and GTS use the same data and methods, their results vary widely, as illustrated below. There is no obvious pattern to these differences: the UMR reports higher delay hours in Los Angeles (136) than Philadelphia (70), but the GTS reports more delay hours in Philadelphia (101) than Los Angeles (87). Similarly, the UMR estimates truck congestion costs $36 billion annually, which is much smaller than the ATRI's $109 billion estimate. This suggests that these studies' results are unreliable and unsuitable for planning analysis.

Figure 30 **UMR vs GTS Annual Delay Hour Estimates**



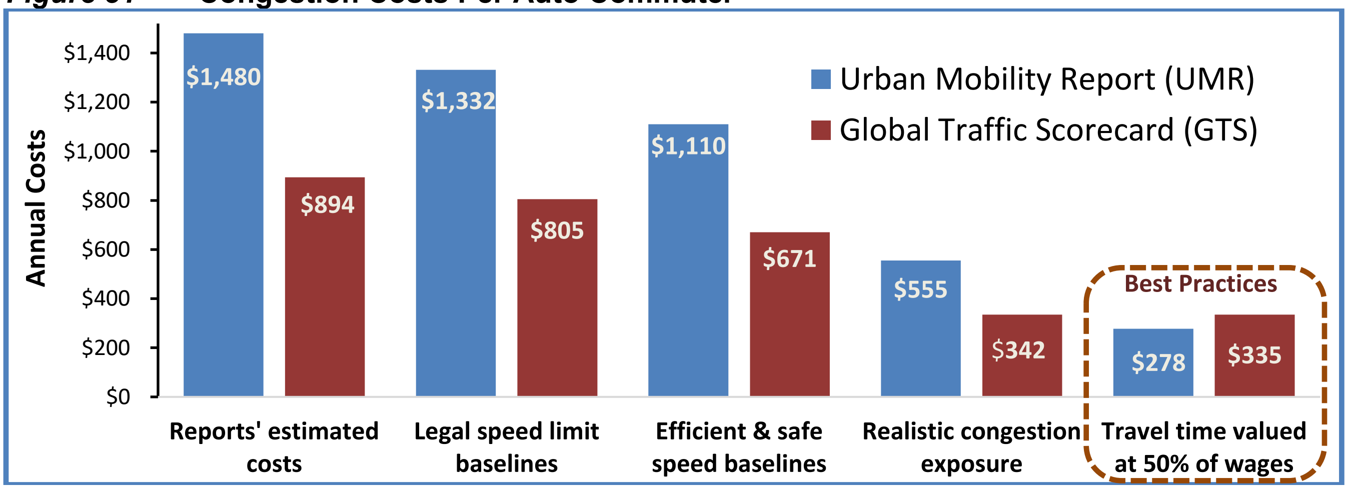
Congestion cost studies are inconsistent and unreliable. Although the Urban Mobility Report and the Global Traffic Scorecard use the same methods and INRIX traffic data, their delay estimates are very different, indicated by a low 0.160 R^2 value. There is no obvious explanation to these discrepancies. This indicates that their results are unsuitable for most planning applications.

Most studies only consider impacts on motorists, they report congestion delays per urban driver or commuter, which ignores the congestion costs avoided when travellers shift from driving to other modes, the benefits of public transit priority strategies such as bus lanes, and the barrier effect delays that wider roads with higher traffic speeds impose on pedestrians and bicyclists, and therefore on transit passengers who use these modes for local access.

These studies compare congestion costs between urban regions, which has little practical utility since people and businesses seldom choose regions based on their congestion costs. It would be more useful to compare costs between neighborhoods to help households choose where to locate within a region, and to better understand how transportation and land use planning decisions affect congestion costs.

The graph below adjusts *Urban Mobility Report* and *Global Traffic Scorecard* cost estimates to reflect best practices. It assumes that their estimated costs would decline 10% using legal speed limits and 25% using efficient and safe speeds instead of freeflow baselines, the portion of travel that experiences significant delay is half what they assume, and applies recommended travel time values to UMR analysis. This reduces the UMR estimate about 80% and the GTS estimate 63%. These results are consistent with the *Handbook on External Costs of Transport*'s analysis which shows that delay costs are typically 4-8 times deadweight loss estimates.

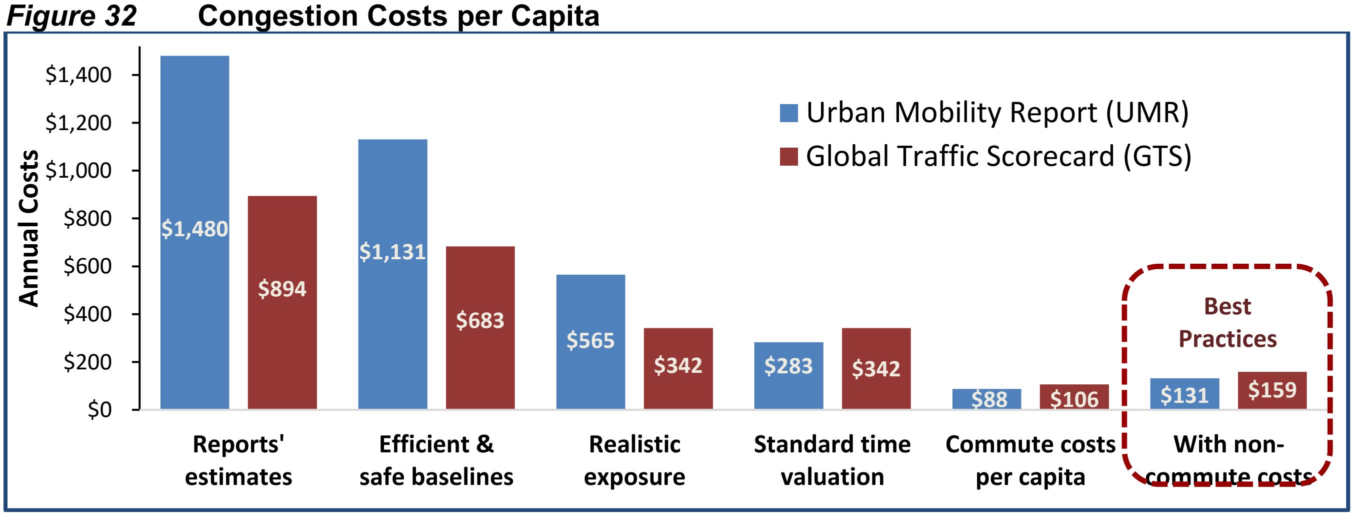
Figure 31 **Congestion Costs Per Auto Commuter**



Estimated costs are much lower using legal or efficient baseline speeds, realistic exposure estimates, and recommended values of travel time. Applying best practices reduces estimated costs 63% to 80%

By only measuring costs per auto commuter these studies ignore impacts on other travellers and non-commute trips. The following figure shows estimated congestion costs measured per capita and increased to include non-commute congestion costs which are assumed to equal 50% of commute delays. This indicates that total U.S. congestion costs probably average $100 to $200 annually per capita.

Figure 32 **Congestion Costs per Capita**



This figure adjusts UMR and GST cost estimates to reflect realistic baseline speeds, exposure and travel time values averaged per capita rather than per motorist, and adds non-commute delays. This indicates that congestion costs are probably an order of magnitude less than what these studies claim.

These studies compare congestion costs *between urban regions*, which has little practical utility since people and businesses seldom choose regions based on their congestion costs. It would be more useful to compare costs between *neighborhoods* to help households choose where to locate within a region, and to better understand how local planning decisions affect residents' congestion costs.

This research indicates that urban density slightly increases congestion *intensity* but significantly reduces total *per capita congestion costs* because residents have better non-auto options and shorter trips which improves overall accessibility and reduces total travel time and money costs. People who dislike congestion should locate in compact, multimodal neighborhoods where they can minimize their need for urban-peak driving. Public policies can reduce overall congestion costs by improving space-efficient modes, providing TDM incentives to reduce urban-peak driving, and supporting affordable infill in accessible neighborhoods.

Many congestion cost studies reflect poor research standards: they lack comprehensive literature reviews, lack transparency to allow analysis to be replicated, do not discuss potential uncertainties and biases, are inadequately referenced, and lack peer review.

The table below summarizes common congestion costing biases and their corrections.

Table 14 **Summary of Common Congestion Costing Biases and Corrections**

Factor	Common Omissions and Biases	Recommended Corrections
Congestion metrics	Only measures motorists' delays. Ignores impacts on other travellers.	Consider all impacts on all modes, including indirect and long-term effects.
Baseline speeds	Use freeflow baselines that exceed what is legal, efficient and safe.	Use baselines that optimize efficiency (e.g. LOS C) or reflect travellers' willingness-to-pay.
Congestion exposure	Apply maximum delay values to all urban motorists.	Use realistic exposure values. Measure delay per capita or commuter, not per motorist.
Peak to off-peak speeds	Allows faster off-peak speeds to increase estimated congestion delays.	Account for higher off-peak traffic speeds when calculating congestion delay trends.
Travel time valuation	Overvalues small delays. Applies higher values than motorists are usually willing to pay.	Use realistic values of time that reflect users' actual willingness-to-pay for small travel time savings.
Additional impacts	Ignores cost increases caused by faster traffic and induced vehicle travel.	Use best practices to estimate pedestrian delay, fuel, crash and emission impacts.
Congestion dynamics	Ignores congestion equilibrium and induced vehicle travel effects.	Recognize that congestion is self-limiting and roadway expansions often induce more vehicle travel.
Research standards	Fails to include literature reviews, transparent and reproducible methods, and peer reviews.	Maintain professional research standards.

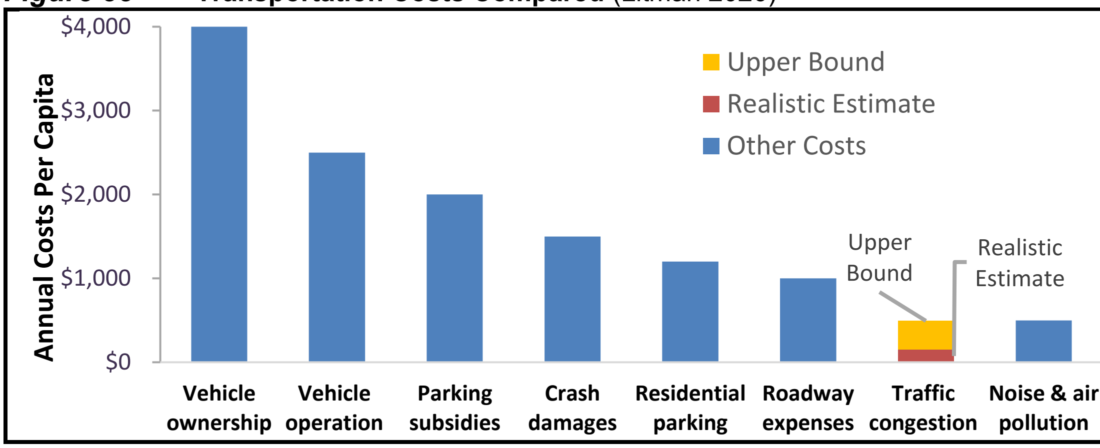
This table summarizes common congestion cost study biases and corrections for best evaluation practices.

Harms from Overestimating Congestion Costs

Planning decisions often involve trade-offs between congestion reduction and other goals such as affordability, safety, non-drivers' accessibility and environmental quality. Urban road expansions are expensive and tend to degrade non-auto travel, and by inducing more vehicle travel increase downstream congestion, fuel, crash and emission costs. Decision-makers need comprehensive information about these impacts.

The graph below compares various transportation costs. Congestion is relatively modest overall, so congestion reduction strategies are generally not cost effective if they increase other costs but are far more beneficial if they reduce other costs. For example, a strategy that reduces congestion by 20% but increases vehicle, crash and pollution costs by 5% is probably not cost effective, but a strategy that reduces congestion costs 10% but also reduces vehicle, crash and pollution costs by 5% is worth far more because those other impacts are larger in magnitude.

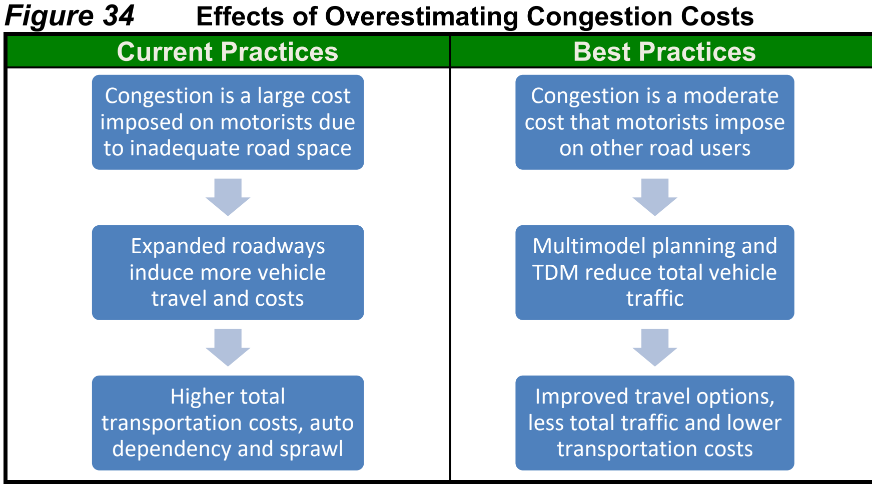
Figure 33 **Transportation Costs Compared** (Litman 2026)



Congestion cost estimates range from about $150 (realistic estimate) to $500 (upper bound estimate) annually per capita. Even the higher estimate is modest compared with other costs.

Highway advocates exaggerate congestion costs to lobby for more roadway subsidies (Linovski, et al. 2026) which result in urban roadway oversupply (Guerra 2025). The figure below shows how best evaluation practices supports more multimodal planning and TDM solutions that provide better outcomes.

Figure 34 **Effects of Overestimating Congestion Costs**



Current practices that overvalue congestion costs encourage roadway expansions that tend to reduce non-auto accessibility, increase vehicle travel and associated costs. This contributes to automobile dependency and sprawl. Best practices justify more multimodal planning and TDM incentives that increase transportation system efficiency.

Conclusions

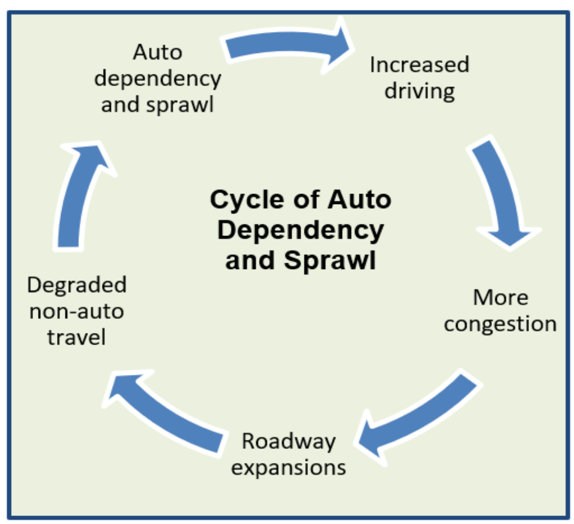
Traffic congestion is frustrating and wasteful, and planning often involves trade-offs between congestion and other impacts, so decision-makers accurate information on congestion costs and solutions. This research identifies best practices and analyzes the degree they are applied in congestion cost studies.

To be accurate and useful congestion evaluations should be comprehensive, considering all significant impacts on all travellers, not just delay to motorists. Widely cited studies such as the *Urban Mobility Report*, the INRIX *Global Traffic Scorecard,* the *TomTom Traffic Index* violate these practices. They use freeflow baseline speeds that are higher than what is legal, efficient and safe; overestimate congestion exposure; overvalue delay costs compare with motorists' willingness to pay; and ignore various costs caused by high traffic speeds and induced vehicle travel. Much of what they call congestion costs is actually traffic law compliance, drivers slowing to legal speeds, and much of their claimed long-term delay growth reflects faster off-peak traffic rather than increased congestion. They overlook ways that new technologies and services are reducing congestion costs. Traffic apps such as INRIX, TomTom and Wayz provide information to optimize urban travel, and mobility substitutes such as telework and delivery services reduce the need for urban-peak vehicle trips. They represent upper-bound cost values, more realistic estimates are much lower.

These studies only measure impacts on motorists which ignores the congestion avoided by non-auto travel and the delays that drivers impose on other travellers. They compare congestion impacts *between* urban regions, which has little practical use, rather than *within* regions which could help households and businesses to choose less congested locations and researchers identify understand factors that affect congestion. In fact, residents of compact, multimodal neighborhoods have lower congestion costs because they drive less and make shorter trips than in sprawled, auto-dependent areas; benefits ignored in many congestion cost studies.

Of course, congestion costs vary widely depending on individuals and trips. Motorists are sometimes willing to pay significant amounts to avoid congestion but those are exceptions, motorists usually prefer to save money rather than small amounts of travel time.

Misvaluing congestion is harmful. Planning decisions often involve trade-offs between traffic speeds and other accessibility factors. For example, wider roads with faster traffic create delay and risk to walking and bicycling, which also reduces transit accessibility. Faster traffic requires longer blocks with fewer crosswalks and hierarchical road networks with less connectivity, and encourages sprawled development. As a result, exaggerating congestion costs and roadway expansion benefits undervalues many quick, cost-effective and beneficial solutions such as multimodal planning, TDM incentives, Smart Growth and targetted programs. It contributes to the cycle of automobile dependency and sprawl illustrated to the right.



Better congestion costing practices can help guide better policy and planning decisions.

References

Paulo Anciaes, et al. (2022), "The Cost of the Wider Impacts of Road Traffic on Local Communities," *Transportation Research Part A*, Vo. 163, pp. 266-287 (doi.org/10.1016/j.tra.2022.05.016).

ATAP (2020), *Australian Transport Assessment and Planning Guidelines*, Australian Transport Assessment and Planning (www.atap.gov.au); at www.atap.gov.au/user-guide.

Emily Badger and Ben Blatt (2024), Traffic Enforcement Dwindled in the Pandemic. In Many Places, It Hasn't Come Back," New York Times (www.nytimes.com); at https://bit.ly/3QfHlmF.

Robert Bain and Benjamin Cimon (2025), *Toll Price Elasticity of Demand: A Guide for Practitioners*, CSRB Group (csrbgroup.com); at https://tinyurl.com/2nufx2fw.

Matthew Barth and Kanok Boriboonsomin (2009), "Traffic Congestion and Greenhouse Gases," *Access 35*, University of California Transportation Center (www.uctc.net), pp. 2-9; at https://bit.ly/3wd1wlB.

Alexander York Bigazzi and Miguel Figliozzi (2012), "Congestion and Emissions Mitigation," *Transportation Research Part D*, Vo. 17, pp. 538-547 (dx.doi.org/10.1016/j.trd.2012.06.008).

Werner Brilon and Jan Lohoff (2011), "Speed-flow Models for Freeways," *Procedia Social and Behavioral Sciences 16* (doi.org/10.1016/j.sbspro.2011.04.426); at https://tinyurl.com/bpyn3wax.

BTRE (2007), *Estimating Urban Traffic and Congestion Costs for Australian Cities*, Bureau of Transport and Regional Economics (www.bitre.gov.au); at www.bitre.gov.au/sites/default/files/wp_071.pdf.

Ralph Buehler and Andrea Hamre (2015), "The Multimodal Majority? Driving, Walking, Cycling, and Public Transportation Use Among American Adults," *Transportation* 42 (doi.org/10.1007/s11116-014-9556-z).

Yu Sang Chang, et al. (2021), "Population Density or Populations Size. Which Factor Determines Urban Traffic Congestion?" *Sustainability* 13/8 (doi.org/10.3390/su13084280).

Joe Cortright (2023), *A Reporter's Guide to Congestion Cost Studies*, City Observatory (https://cityobservatory.org); at https://cityobservatory.org/reporters_guide_congestion_cost.

DfT (2024), *Transport Analysis Guidance*, UK Department for Transport (www.dft.gov.uk); at www.gov.uk/guidance/transport-analysis-guidance-webtag.

Eric Dumbaugh (2012), *Rethinking the Economics of Traffic Congestion*, Atlantic Cities (tinyurl.com/2pehtwkt).

EC (2020), *Handbook on External Costs of Transport*, CE Delft (www.cedelft.eu) for the European Commission (ec.europa.eu); at https://data.europa.eu/doi/10.2832/51388.

FHWA (2004), *Signalized Intersections: Informational Guide*, Federal Highway Administration (www.fhwa.dot.gov); at www.fhwa.dot.gov/publications/research/safety/04091/07.cfm.

FHWA (annual reports), *Urban Congestion Trends*, FHWA (www.ops.fhwa.dot.gov); at https://ops.fhwa.dot.gov/perf_measurement/reliability_reports.htm.

Phil Goodwin (2003), *The Economic Cost of Congestion when Road Capacity is Constrained*, 6th Intl. Symposium on Theory and Practice in Transport Economics (www.internationaltransportforum.org).

Phil Goodwin (2026), *Impact of Induced Demand on Benefits*, UK Department for Transport (https://assets.publishing.service.gov.uk); at https://tinyurl.com/3b58j762.

Susan Grant-Muller and James Laird (2007), *International Literature Review of the Costs of Road Traffic Congestion*, Scottish Executive (www.scotland.gov.uk); at https://tinyurl.com/yc8hyd8u.

Erick Guerra (2025), *Overbuilt: The High Costs and Low Rewards of US Highway Construction*, Island Press (https://islandpress.org); at https://islandpress.org/books/overbuilt.

INRIX (various years), *Global Traffic Scorecard*, (http://inrix.com/scorecard); technical details at https://docs.inrix.com/ra/datanetworkandxdtraffic.

ITF (2018), *Speed and Crash Risk*, International Transport Forum (www.itf-oecd.org); at www.itf-oecd.org/sites/default/files/docs/speed-crash-risk.pdf.

Eric Jaffe (2014), *The Ideal Commute is Not Actually No Commute*, Bloomberg CityLab (www.bloomberg.com); at https://bloom.bg/3LHEdbv.

J. Richard Kuzmyak (2012), *Land Use and Traffic Congestion*, Arizona Department of Transportation (www.azdot.gov); at https://rosap.ntl.bts.gov/view/dot/24022.

LCI (2026), *Statewide Vehicle Miles Traveled Mitigation Program Guidance*, California Governor's Office of Land Use and Climate Innovation (https://lci.ca.gov); at https://tinyurl.com/2th557ns.

Jonathan Levine, et al. (2012), "Does Accessibility Require Density or Speed?" *Journal of the American Planning Association*, Vo. 78/2 (dx.doi.org/10.1080/01944363.2012.677119); at tinyurl.com/muhkc4mt.

David Levinson (2021), *How to Value Transport Projects*, The Transportist (transportist.org); at https://transportist.org/2021/10/04/transportist-october-2021-2.

David Levinson and David King (2020), *Transport Access Manual*, Committee of the Transport Access Manual, University of Sydney (https://ses.library.usyd.edu.au); at https://hdl.handle.net/2123/23733.

Orly Linovski, et al. (2026), *Trade Associations and Lobbying for Roads: Funding, Strategies, and Discourses*, Working Paper, Center for Open Science (doi.org/10.31235/osf.io/n8v3m_v1).

Todd Litman (2001), "Generated Traffic; Implications for Transport Planning," *ITE Journal*, Vol. 71, No. 4, Institute of Transportation Engineers (www.ite.org), April, pp. 38-47; at www.vtpi.org/gentraf.pdf.

Todd Litman (2014), *Congestion Evaluation Best Practices*, International Transportation Economic Development Conference (https://bit.ly/40J2g19); at www.vtpi.org/ITED_congestion.pdf.

Todd Litman (2015), *Urban Mobility Report Point-Counter-Point,* Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/UMR_pcp.pdf.

Todd Litman (2021), *Not So Fast: Better Speed Valuation for Transportation Planning,* Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/nsf.pdf.

Todd Litman (2023), *Smart Congestion Relief,* Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/cong_relief.pdf.

Todd Litman (2024), *The Mobility-Productivity Paradox,* Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/ITED_paradox.pdf.

Todd Litman (2025), *Traffic Speed Versus Roadway Capacity,* Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/tsrc.pdf.

Todd Litman (2026), *Transportation Cost and Benefit Analysis; Techniques, Estimates and Implications*, Victoria Transport Policy Institute (www.vtpi.org/tca).

Tim Lomax (2013), *Congestion Measurement in the Urban Mobility Report: Response to Critique by Mr. Todd Litman*, Texas Transportation Institute (www.tti.tamu.edu); at https://bit.ly/3qCBfvO.

Juha Luoma and Michael Sivak (2012), *Why Is Road Safety in the U.S. Not on Par With Sweden, the U.K., and the Netherlands?*, Transportation Research Institute (www.umtri.umich.edu); at https://bit.ly/2Jlzkt8.

Paula Marchesini and Wendy Weijermars (2010), *Relationship Between Road Safety and Congestion on Motorways*, SWOV Institute for Road Safety Research (swov.nl); at www.swov.nl/rapport/R-2010-12.pdf.

Patricia C. Melo, Daniel J. Graham and Shane Canavan (2012), "Effects of Road Investments on Economic Output and Induced Travel Demand," *Transport. Res. Rec. 2297*, TRB (www.trb.org), (doi.org/10.3141/229).

David Metz (2021), "Economic Benefits of Road Widening: Discrepancy Between Outturn and Forecast," *Transportation Research Part A*, Vo. 147, pp. 312-319 (https://doi.org/10.1016/j.tra.2021.03.023).

Adam Millard-Ball and Michael Rosen (2025), *Road Capacity as a Fundamental Determinant of Vehicle Travel*, UC Institute of Transportation Studies (doi.org/10.7922/G2Q52N05); at escholarship.org/uc/item/180452jz.

Alan Pisarski (2006), *Commuting in America III*, Transp. Res. Board (www.trb.org); at tinyurl.com/3zaymx4t.

Ingrid B. Potts, et al. (2014), *Further Development of the Safety and Congestion Relationship for Urban Freeways*, SHRP Project L07, Transportation Research Board (www.trb.org); at https://tinyurl.com/2m3syr2s.

Ikmal Salleh, M. Z. Md zain and Raja Raja (2013), "Evaluation of Annoyance and Suitability of a Back-Up Warning Sound for Electric Vehicles," *Int. Jnl. of Auto. and Mech. Eng.* (DOI 10.15282/ijame.8.2013.16.0104)

Robert J. Schneider, Susan L. Handy and Kevan Shafizadeh (2014), "Trip Generation for Smart Growth Projects," *ACCESS 45* (tinyurl.com/oye8aqj); and *Smart Growth Trip-Generation Adjustment Tool* (tinyurl.com/mtuhz4j8).

David Schrank, Bill Eisele and Tim Lomax (2025), *Urban Mobility Report Appendix A: Methodology*, Texas Transportation Institute (https://static.tti.tamu.edu); at https://tinyurl.com/mrx6a8a9.

SJSU (2025), *Commute Duration Dashboard*, Mineta Transportation Institute (https://sjsu-urbp.maps.arcgis.com); at https://sjsu-urbp.maps.arcgis.com/apps/dashboards.

SSTI (2018), *Modernizing Mitigation: A Demand-Centered Approach*, State Smart Transportation Initiative (www.ssti.us) and the Mayors Innovation Project; at https://bit.ly/3hqEzoi.

Eric Sundquist, Chris McCahill and Michael Brenneis (2021), *Measuring Accessibility*, State Smart Transportation Initiative (https://ssti.us); at https://ssti.us/accessibility-analysis.

TC (2006), *The Cost of Urban Congestion in Canada*, Transport Canada (www.tc.gc.ca).

TomTom (2026), *TomTom Congestion Index* TomTom Int. (www.tomtom.com); at www.tomtom.com/traffic-index.

TØI (2009), *Does Road Improvement Decrease Greenhouse Gas Emissions?*, Norwegian Centre for Transport Research (www.toi.no); English summary at https://tinyurl.com/383vc8y5.

TRB (2022), *Highway Capacity Manual*, Transportation Research Board (www.trb.org); at www.trb.org/Main/Blurbs/Highway_Capacity_Manual_2010_164718.aspx.

TTI (various years), *Urban Mobility Report*, Texas Transportation Institute (mobility.tamu.edu); at https://mobility.tamu.edu/umr.

US Census (various years), *Commuting in the United States* (www.census.gov); at https://tinyurl.com/25e5f9uj.

USDOT (2016), *The Value of Travel Time Savings: Departmental Guidance for Conducting Economic Evaluations*, U.S. Department of Transportation (www.usdot.gov); at https://bit.ly/2PaxZsf.

USDOT (2019), *Assessing the Full Costs of Congestion on Surface Transportation Systems and Reducing Them through Pricing*, USDOT (www.transportation.gov); at https://bit.ly/3JinkTs.

Jamey M. B. Volker, Amy E. Lee and Susan Handy (2020), "Induced Vehicle Travel in the Environmental Review Process," *Transportation Research Record* (doi.org/10.1177/0361198120923365).

Waka Kotahi (2025), *Monetised Benefits and Costs Manual*, New Zealand Transport Agency Waka Kotahi (www.nzta.govt.nz); at www.nzta.govt.nz/resources/monetised-benefits-and-costs-manual.

Ian Wallis and David Lupton (2013), *The Costs of Congestion Reappraised*, Report 489, New Zealand Transport Agency (www.nzta.govt.nz); at www.nzta.govt.nz/resources/research/reports/489.

Yanchao Wang, et al. (2025), Exploring biases in travel behavior patterns in big passively generated mobile data from 11 U.S. cities," *Journal of Transport Geography*, Vo 123 (doi.org/10.1016/j.jtrangeo.2024.104108).

Mark R. Wardman (2022), "Meta-Analysis of British Travel-Related Demand Elasticity Evidence: An Update," *Transportation Research Part A*, Vol. 157, pp. 198-214 (doi.org/10.1016/j.tra.2022.02.001).

WPR (2026), *Speed Limit Map by State*, World Pop. Rev. (worldpopulationreview.com); at tinyurl.com/3jp7k4un.

X-Engineer (2025), *Real World Fuel Consumption*, (x-engineer.org); at x-engineer.org/real-world-fuel-consumption.

Min Zhou and Virginia Sisiopiku (1997), "On the Relationship Between Volume to Capacity Ratios in Accident Rates," *Transportation Research Record 1581* (doi.org/10.3141/1581-06), TRB (www.trb.org).