

Transportation Planning for Livable Communities

MEASURING WHAT MATTERS

by Hannah Twaddell and Gary Toth

Let's pay a visit to the imaginary planet HemoGlobe. The people of this world have bodies just like ours, but they measure their physical health by only one indicator: the speed at which their blood moves. If blood is traveling too slowly through a certain area, a surgeon widens the problematic vein. Or if a patient is starting to gain weight, the surgeon expands more veins to make room for anticipated fat deposits.

This practice has gone on so long that few doctors ever "think outside the vein." No one questions the assumption that faster blood flow is always better, or considers the adverse impacts of widening the veins on other bodily functions. Alternative treatments, such as losing weight, are considered by only a few "radical fringe" practitioners.

Most of us on Earth would probably agree that the single-minded, HemoGlobian approach to managing health makes little sense. Yet in our world, to draw an analogy, transportation planners tend to rely on a similar method to manage the "health" of our transportation systems. We put a great deal of emphasis on a single indicator of travel speed – roadway Level of Service (LOS) – and our strategies to deal with congestion usually involve widening highways.

This narrowly focused approach doesn't help us address the really important question: Is our collective life-blood (people and goods) flowing properly in ways that nourish our vital organs: the places where we live, work, learn, and play?

In order to get a more complete picture of how well our transportation systems are really serving us, we need to assess their impacts and performance from several perspectives. In this article, we'll explore ways to measure four aspects of community life that depend



TRANSPORTATION SAFETY IS A CRITICAL LIVABILITY FACTOR. NO ONE SHOULD DIE BECAUSE OF POORLY DESIGNED TRANSPORTATION NETWORKS.

upon well-functioning transportation systems:

- (1) mobility – our need to drive;
- (2) accessibility – our need to arrive;
- (3) livability – our need to thrive; and
- (4) sustainability – our need to survive.

MOBILITY – OUR NEED TO DRIVE

Can people and goods move quickly and safely along our corridors, in any type of vehicle – cars, buses, bikes, wheelchairs – and on foot?

Mobility is, quite simply, the ability to move. We measure it by calculating the speed at which people can travel along a given route. Level of Service (LOS) indicators for highway mobility are the most commonly used measures in transportation planning. If drivers can travel as fast as they desire along a given corridor during the most congested time of day (the "peak hour"), the LOS score is an "A." The slower the traffic moves, the lower the grade. An "F" means gridlock.¹

The thresholds for acceptable LOS are, in most communities, based upon long-held transportation agency rules of thumb – such as maintaining a minimum LOS level of C for all suburban arterials and D for all city streets, regardless of urban context or local land use policies. Agency traffic forecasts for future LOS usually assume the highest possible level of potential development over a 20- or 30-year period.

Relying heavily on highway LOS as the dominant indicator for transportation planning tends to encourage ham-fisted solutions to complex problems. As the old saying goes, "to a man with only a hammer, everything looks like a nail."

Roadways with poor LOS show up on traffic model maps as red lines. The easiest way to deal with them in the model is to keep adding roadway links and lanes until you "get the red out." But LOS models don't help us consider the adverse impacts that can result from

¹ Intersection LOS is determined by estimating the speed at which motorized vehicles can pass through intersections during the most congested time of day. For roadway segments between intersections, LOS is calculated by dividing the projected traffic volume by the theoretical capacity of the highway lanes (e.g. 2,000 vehicles per hour for a freeway lane). If the combined speed through intersections and along segments matches the speed deemed appropriate, the LOS score ranges from "A to C." If delay at intersections becomes too significant, or if the volume on a segment of roadway exceeds the pre-assigned capacity, the roadway is assigned a grade of E or F.

roadway expansion, such as destroying natural areas, bisecting neighborhoods, or discouraging pedestrians, bicyclists, and transit riders.²

In many communities, major arterials have been widened extensively in order to maintain the highest possible LOS at rush hour. But they may sit unused much of the time. Those wide, empty lanes tempt drivers to zoom well above posted speeds most of the day and night. The resulting conditions are dangerous for motorists and downright hostile to bicyclists, pedestrians, and transit riders.

Congestion problems can often be solved by simpler, less expensive, and more environmentally sound methods than highway expansion. For example, instead of widening a single congested artery, a community can make the existing system more efficient. Operational improvements such as turning lanes and coordinated signal timing can go a long way towards clearing up rush hour bottlenecks. Networks of connector streets around major arterials can provide alternative routes for local traffic, allowing for more pedestrian, bicycle, and transit options.

Local community leaders can – and should – engage with transportation agencies to customize LOS expectations for different contexts along a given corridor. More importantly, communities need to expand the types of indicators and tools they use for transportation planning.

**ACCESSIBILITY –
OUR NEED TO ARRIVE**

Can people and goods arrive at their final destinations within a reasonable amount of travel time?

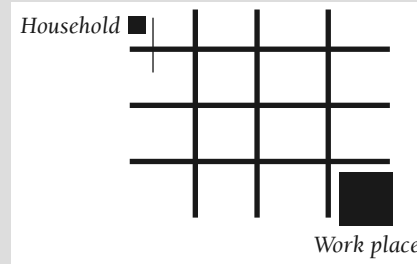
The concept of accessibility goes beyond simple mobility. It's one thing to be able to move quickly along a corridor.

continued on next page

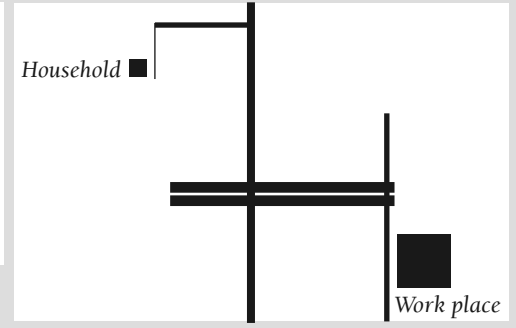
² There has been growing interest in bicycle and pedestrian LOS standards. In part, this has been to counterbalance the over-reliance on highway LOS. A good resource on developing bicycle and pedestrian LOS is the Transportation Research Board's "Multimodal Level of Service Analysis for Urban Streets" (NCHRP Report 616; published 2008).

Commute Trip Comparison

Proximity & Connectivity



Distance & Mobility

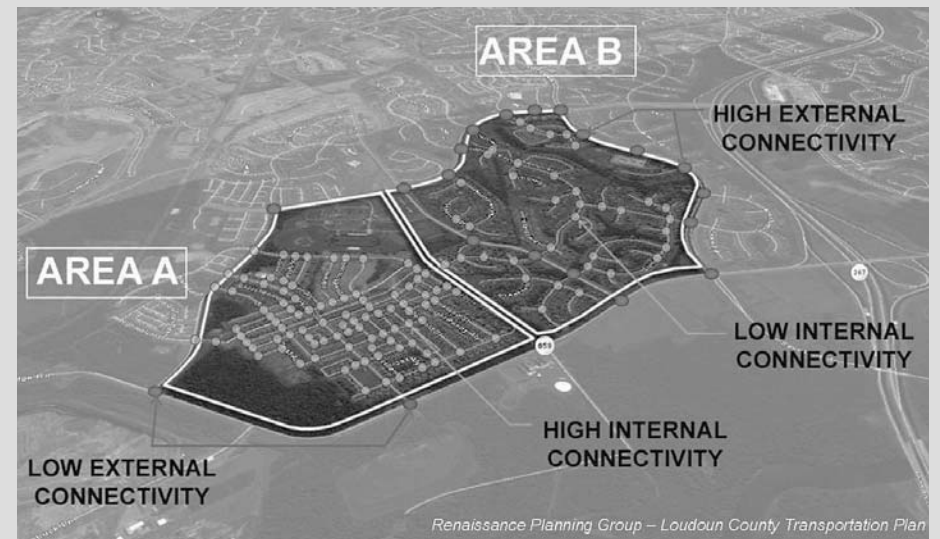


- LOCAL
- COLLECTOR
- ARTERIAL
- EXPRESSWAY

Same travel time, different speed (mobility) & distance (proximity)

FACILITY	RATE (MPH)	TIME (MIN)	DISTANCE (MI)	FACILITY	RATE (MPH)	TIME (MIN)	DISTANCE (MI)
LOCAL	15	1.2	0.3	LOCAL	15	2	.5
COLLECTOR	20	24	8	COLLECTOR	20	1.5	0.5
ARTERIAL	25	0	0	ARTERIAL	25	14.4	6
EXPRESSWAY	50	0	0	EXPRESSWAY	50	7.2	6
	20	25.2	8.3		31	25.1	13

A person who lives eight miles from work could get there in about 25 minutes using a local street network at an average speed of 20 miles per hour. If one street is closed or congested, the commuter could use a number of alternative routes. Or, given the network's relatively compact block size and low-speed streets, the commuter may also be able to bike or use transit to get to work. Another person might live 13 miles from his or her workplace, but could also get to work in 25 minutes by using a higher-speed street network that allows for an average speed of 31 miles per hour.



Connectivity refers to the internal networks within a given community, as well as external connections between the community and the larger regional network. The benefits of regional accessibility are strongest in communities with strong internal and external connections.

From VTrans 2035, Virginia's Long-Range Multimodal Transportation Plan, 2007-2035, Regional Accessibility White Paper (October 2009); graphic by Renaissance Planning Group.

Transportation Planning ...

continued from previous page

Accessibility focuses on the bigger question of how successfully people can traverse the entire network.

Accessibility is most often measured by calculating the total amount of travel time between Point A and Point B. The mobility (LOS) of the corridors within the network has an impact on overall accessibility, but so do other elements, such as the variety of travel routes and mode choices, the connectivity of travel networks, and the distance between places.

For example, building a new rail station in a central city could greatly enhance regional mobility. But if it takes suburban commuters longer to get from the station to their downtown jobs than it does to make the journey from home to the station, the overall regional accessibility hasn't really improved much.

In this scenario, the station may be located too far from the city center, or the pedestrian and transit connections to key destinations may be inadequate. Whatever the reason, the return-on-investment for a new transportation facility will be greatly diminished if it is not connected to well-designed local networks.

"Connectivity indices" that measure the density of streets, paths, and intersections in a given area can help us map out plans for regional networks that provide robust access to higher density centers and ensure mobility for trucks, cars, pedestrians, bicyclists, and transit riders.⁴

Pedestrian connectivity in town and village centers can be improved by defining pedestrian paths more clearly and creating shorter blocks (typically 300-600 feet long). Simple transportation enhancements like these will boost the effectiveness of revitalization efforts such as redeveloping vacant parcels, empty buildings, and surface parking lots that

⁴ An excellent explanation of how connectivity indices work can be found in the Victoria Transport Policy Institute's *Online TDM* [Transportation Demand Management] *Encyclopedia* at: www.vtpi.org/tdm/tm116.htm. I also discussed the importance of connectivity in "Making the Connection," in *PCJ* #58 (Spring 2005).

break up the continuity of downtown streets. The more places people can reach on foot, the greater your community's pedestrian accessibility, urban vitality, and overall livability.



LIVABILITY – OUR NEED TO THRIVE

Can people accomplish the purposes of their daily travel: getting to work, connecting with each other, and buying and selling goods, while also traveling safely and promoting public health?

Livability focuses on the ways in which transportation systems help us thrive, individually and collectively. Livability indicators that are strongly affected by transportation systems include public health, safety, economic prosperity, and the quality of the natural and built environment.

Organizations focusing on public health, such as the Centers for Disease Control (CDC) and the Robert Wood Johnson Foundation, have recognized

⁵ See, e.g., the "CDC Transportation Recommendations" (www.cdc.gov/transportation/recommendation.htm) and the Robert Wood Johnson Foundation's "Active Living Research" program (<http://activelivingresearch.org>).

⁶ See, e.g., Eric Dumbaugh & J. L. Gattis, "Safe Streets, Livable Streets," *Journal of the American Planning Association* (Vol. 71, Sept. 2005), and Reid Ewing & Eric Dumbaugh, "The Built Environment and Traffic Safety: A Review of Empirical Evidence," *Journal of Planning Literature* (Vol. 23, May 2009).

the strong relationship between public health and transportation policy.⁵

Public health advocates are encouraging communities to counter rising obesity and asthma rates, especially among children, by providing pedestrian networks that allow for walking and biking to everyday destinations such as school, work, social visits, or shopping. At the same time, better pedestrian links (along with improved transit services) make it possible for older adults who don't drive to stay engaged in community life, which plays a big part in sustaining mental and physical well-being.

Transportation safety is a critical livability factor. No one should die because of poorly designed transportation networks. Over the past 50 years, many in the engineering profession have held fast to a practice of improving highway safety by applying freeway design principles (wider, straighter, faster) to urban arterials. But research shows that these well-intentioned improvements can actually decrease driver and pedestrian safety.⁶

Crash data can help you identify hot spots that may benefit from strategies such as medians, pedestrian refuges, roundabouts, bike lanes, or improved access management. These strategies have the added benefit of making traffic flow more smoothly, especially at congested intersections. Thus, the overall accessibility (travel time) on a network can be maintained or improved even if mobility (speeds) in some locations is reduced.

Crime statistics, walkability audits, and transit rider surveys can help you assess the safety (real and perceived) of people who walk, cycle, or take the bus or train.

Another key livability factor is the impact of transportation systems on the

⁷ A valuable resource for information on these kinds of indicators is *Livable Streets*, by Donald Appleyard, Sue Gerson, and Mark Lintell (University of California Press, 1981). This book has served for almost 30 years a fundamental reference for transportation planners and complete street advocates.

⁸ These three clusters are often referred to as the "triple bottom line," a phrase coined by John Elkington in his 1998 book, *Cannibals with Forks: the Triple Bottom Line of 21st Century Business*.

natural and built environment. The “footprint” of roadways and transit systems should complement the natural landscape and foster community vitality. Indicators along these lines could include roadway design characteristics such as lane width and grade; traffic noise and pollution levels; and economic performance measures such as the numbers of pedestrians who shop in local business districts and congregate in public spaces such as outdoor cafes.⁷

SUSTAINABILITY – OUR NEED TO SURVIVE

Can we achieve desired levels of mobility, accessibility, and livability without undermining the ability of future generations to meet their needs?

Sustainability is the mark of how well one generation preserves livability for future generations. Sustainability indicators are similar to livability indicators, but focus more on long-term environmental, economic, and social equity issues.⁸

There are a wide range of transportation-related indicators that can help with planning for community sustainability. For example, *environmental indicators* could include factors such as:

- the amount of land area covered by roads and parking lots (asphalt paving can increase temperatures, leading to “urban heat island” effects, while large amounts of paved surface make it harder to provide a compact pattern of land development);
- the levels of toxic chemicals generated by roadway runoff into streams and groundwater; and
- the amount of air pollution and greenhouse gases emitted by the transportation sector (cars and trucks

⁹ The Transportation & Climate Change Clearinghouse of the U.S. Dept. of Transportation is an excellent resource, and includes information (and links) on what several states and regions have done to assess the climate change and greenhouse gas impacts of their transportation systems. Go to: <http://climate.dot.gov/state-local/integration/case-studies.html>.

¹⁰ A very useful, and visually engaging, online resource is the Center for Neighborhood Technology’s “Housing + Transportation Affordability Index.” Go to: <http://htaindex.cnt.org/>.

traveling long distances, at high speeds, and/or idling in traffic jams can be especially large contributors).⁹

Economic indicators of sustainable transportation systems could include factors such as:

- the long-term resilience of transportation infrastructure to changing conditions such as sea level rise;
- the financial wherewithal to pay for ongoing system maintenance as well as new facilities; and
- options for local industries to move freight by more energy-efficient means.

Social equity indicators might include:

- the conditions created by the combined effects of land use patterns and transportation networks, such as the amount of affordable housing that is close to transit routes;¹⁰
- accessibility to jobs and shopping among low-income households; and
- the variety of travel options available to people of all ages, abilities, and income groups.

SUMMING UP:

Changing our collective beliefs and practices is not an easy or quick process. But there is growing recognition that we must balance accessibility and mobility to create more livable, sustainable communities. It’s time to widen our focus and measure what matters. ♦

*Hannah Twaddell is a Principal Planner in the Charlottesville, Virginia, office of Renaissance Planning Group (www.citiesthatwork.com). Her articles on transportation planning topics appear regularly in the *Planning Commissioners Journal*.*



Gary Toth worked for 34 years with the New Jersey Department of Transportation, where he spearheaded many innovative projects and programs. He now serves as the Senior Director of Transportation Initiatives for the Project for Public Spaces (www.pps.org).



Get in gear! with our publications on transportation planning



Put your hands on the best articles we’ve published on transportation planning – set out in two attractively bound booklets.

1st Transportation: Getting Started

Communities are coming to a better understanding of the critical relationship between land use and transportation planning. *Transportation: Getting Started* will provide you with an introduction to the transportation planning process and basic issues related to street and sidewalk design.

2nd Transportation: New Directions

From context sensitive roadway design to creative connections between neighborhoods, communities are seeking new and improved ways to plan for pedestrians, bicycles, and motor vehicles. *Transportation: New Directions* features articles exploring these new approaches.

For details, go to:
plannersweb.com/transportation.html

Why Getting Good Grades Isn't Always the Answer



Note from PCJ Editor Wayne Senville: my reports on the next two pages were originally posted on our *PlannersWeb* blog. They draw on some of what I learned during a Project for Public Spaces' "Streets as Places" workshop.

It's a constant source of amazement to me how much we're addicted to report cards. Many of us strove in elementary school, high school, and then in college to get those A's (OK, sometimes a B or C was acceptable). But the idea of receiving an F for flunking/failure, or even a D, was something to dread.

I think – and I'm not kidding about this – this is part of what imbues highway "Levels of Service" ratings with such power. Most local elected officials and citizens I've encountered seem to view good LOS grades as a sign of success, and D's (or even C's) as evidence of failure. Our built-in aversion to receiving a "failing" LOS report card is reinforced by the fact that there is *some* truth to the ratings: D does indicate congestion problems, while A or B means we can zip along our roadways with nary a stop.

You noticed that I highlighted the word "some." The problem, according to transportation engineer Gary Toth, is that LOS ratings tell you only part of the story – and sometimes not the most important part.¹ As Toth explains, "design decisions based on LOS performance measures end up serving only the

through motorist at the expense of the very communities that the road is also supposed to serve."

How's that? According to Toth, LOS simply does not take into account other considerations – such as impacts on

pedestrians, on businesses served by the roadway, or on other community or neighborhood interests. It simply focuses on the motor vehicle. "The fact is," Toth said, "improving levels of service for cars can degrade it for pedestrians, shops, and others."

What's more, Toth adds, LOS calculations are typically made "using peak hour travel projections, generally 20 years into the future." This means our roads are intentionally "over designed" to handle capacity that only occurs at the very heaviest travel period. The problem with over-designed roadways, Toth notes, is that they can "take major bites out of the community's fabric," while – especially during off peak hours – turning the roadway into a speedway.

Are we bound by Level of Service standards contained in the Transportation Research Board's *Highway Capacity Manual* and AASHTO's *Green Book*? No, we're not, says Toth. As he points out, "while often used as a bible by traffic modelers, in

¹ Gary Toth is also co-author of the article on page 6 of this issue. Toth, who is now Senior Director of Transportation Initiatives for the Project for Public Spaces (www.pps.org), worked for 34 years for the New Jersey Dept. of Transportation, where he served as Director of Project Planning & Development. He has been one of the leading national advocates for integrating land use and community considerations into transportation planning.

reality the *Highway Capacity Manual* neither constitutes nor attempts to establish legal standards for highway construction."

As Toth explains, "the *Green Book* and most DOTs provide guidelines for selection of LOS, but these are guidelines only ... selection of a target LOS is a policy decision and is based on a particular jurisdiction's philosophy on whether or not to accept congestion." Indeed, the Federal Highway Administration notes that "while the *Highway Capacity Manual* provides the analytical basis for design calculations and decisions, judgment must be used in the selection of the appropriate level of service for the facility under study."

That was my key take away from Gary Toth's remarks: communities have a choice – and these choices have major ramifications. They can decide on wider, straighter roadways to eliminate congestion (and receive better grades on their LOS report card), or they can balance traffic needs against other community goals, such as encouraging more pedestrian activity and street life.



Gary Toth

A community, if it wants to, can actually aim for having drivers slow down so they can smell the coffee – and pull over to stop at that tempting coffee house. For a growing number of cities and towns, living with some congestion is a trade-off worth making.

It's also worth noting that major highway planning organizations such as AASHTO and the Institute for Transportation Engineers have been moving towards more flexible guidelines that take a roadway's surrounding context into account.²

Toth calls level of service standards one of the "deadly duo" – the other being traffic



projections. He calls them the “deadly duo,” because unthinking reliance on them can kill efforts to build strong, vibrant communities.

The Misuse of Traffic Projections

Travel projections – and the models that generate them – are of critical importance because they set the table for how we plan and design our roadways ... and our communities.

We all know the expression, “garbage in,” “garbage out,” that shorthand reminder that the quality of the results we get from using data depends on the quality of the data we’re relying on. That’s also true when thinking about traffic models. So what are some of the warning signs?

For Gary Toth, the first thing to watch out for is growth projections, both for population (which he says often result in overestimations) and for traffic. As he explains: “Most traffic models ignore changing demographics such as the aging of our population, rising energy prices ... and societal changes. Most assume that our economy will continue to grow at the same rate as it has over the last 30 years.”

But there’s an even more important thing to watch out for, Toth warns: models have a built-in bias towards continuation of the status quo. “Without direction or a reason to do otherwise, modelers will likely assume that future growth will continue to occur in segregated



“On the computer model the only side effect was a dry mouth.”

and spread out patterns.”

Why is this critical? “Because research shows that compact mixed use development can reduce travel by 25 percent or more.” Traffic models, Toth says, don’t consider how we can reshape the direction our communities are heading.

Moreover, by relying on the projections of traffic models that overestimate our need for more or wider roadways, we’re making it more difficult to achieve the goal of more walkable, less auto-dependent, communities.

In an article for the *Planning Commissioners Journal* (“K is for Knowledge”), noted planning

historian Laurence C. Gerckens, FAICP, wrote about the tyranny of projections driven by over-reliance on past trends:

“[A] ‘flaw’ – or built in bias – in the ‘classic’ planning process lay in the fact that it was premised on the projection or continuation of past trends. In other words, past trends became the policy-bases for the comprehensive plan. As a result, plans rarely reflected any vision for positive change. Instead, they reinforced historic patterns.”³

“Modern’ planning processes,” Gerckens continues, “began not with the acquisition of immense amounts of data, but with the creative visioning of

alternative futures – establishing community goals, alternative patterns of development, and the means of their attainment ... Responsible planning is a creative art using data from the past and knowledge of interrelationships to create new and better communities for the future.”

But what can you as a planner or local official do when faced with traffic projections you believe overestimate future travel demand and fail to take into account the community’s vision of its future? Ask hard questions, is Toth’s reply. “Challenge growth and build out numbers, and ask if they adjust for walkability and for increased mixed-use ... listen to the answers, and then ask more questions.”

“Don’t let the model tell you how wide your streets should be,” Toth continues, “you tell modelers how wide you want your streets to be, and then have them tell you what that will mean in terms of congestion.” In other words, remember that you are the policy makers, and the traffic modelers are there to help you understand the impacts of what you want. It’s up to you then “to decide what you want to do about any projected congestion” given your community’s vision and goals.

What’s more, Toth concludes, “if the model is cheap or faulty, just don’t use it.” ♦

PLANNING COMMISSIONERS JOURNAL

PlannersWeb

City & Regional Planning Resources www.plannersweb.com

On the PlannersWeb, you’ll also:

- find great savings with our monthly special offers
- access our online resource pages on a range of topics
- get additional insights about many articles we publish
- hear about web sites of special value to citizen planners

300+ PCJ Articles

You can easily locate, order, and download your choice of over 300 articles published in the *Planning Commissioners Journal*. Simply go to our PlannersWeb site: www.plannersweb.com.

² For more on this, see Hannah Twaddell’s article, “Fitting Roadways to Community Needs: A Look at the ITE Urban Thoroughfares Report,” *PCJ* #67, Summer 2007; included in our reprint collection, *Transportation: New Directions* (for details: www.plannersweb.com/transportation.html).

³ From *Planning ABC’s* (Champlain Planning Press, 2003); available to order & download at: www.plannersweb.com/abc.html.