Modernizing Mitigation: A Demand-Centered Approach

State Smart Transportation Initiative
Mayors Innovation Project

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(This is an excerpt. The complete, final report will be available in August.)

Preface

This is a guide for practice, with relevance for technically trained staff and non-technical elected officials and other stakeholders. It is intended to inform policy around mitigating the traffic impacts from land use changes, a major factor in transportation system funding and design. It argues that conventional practice, which focuses on funding increases to roadway capacity, has created many problems and suggests that entities involved in mitigations, whether state or local governments, consider demand-side measures before resorting to roadway capacity increases. The report is general enough that it should apply to practice in most U.S. places, and to state DOTs as well as local units of government, but the reader will need to consider how the program would work in specific settings.

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Project team

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Glossary of terms and acronyms

Exaction. A transportation improvement or in-lieu fee intended to mitigate impacts from land use intensification or other changes.

High-occupancy vehicle (HOV). A private motor vehicle carrying more than just the driver.

Impact fee. An exaction that comes in the form of a fee, usually based on a published rate.

Level of service (LOS). A mobility measure that can apply to all modes (in incompatible ways) but is usually measured for autos. Speeds at theoretical "free flow," which may be above the speed limit, and intersection wait times less than 10 seconds earn an A; slower times earn lower grades.

Mitigation. Measures taken to avoid negative impacts. In this report, mitigation refers to actions taken to address transportation impacts from land use changes.

Single-occupancy vehicle (SOV). A private motor vehicle carrying just the driver.

Transportation demand management (TDM). A subfield of transportation that focuses on methods to reduce the number or length of auto trips, sometimes focusing on peak periods (aka "rush hours") and on commuting. In this report we use TDM to refer to measures that reduce traffic regardless of the time of day.

Transportation management association (TMA). An organization, often made up of employers, that provides TDM services in a neighborhood or region.

Transportation network company (TNC). A firm that supplies ride-hailing apps to connect travelers with drivers, e.g., Uber and Lyft.

Vehicle-miles traveled (VMT). A measure of total auto miles traveled by a person, household, or the population in a place.

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Summary

Cities exist to provide people and firms with access to goods, services, employment, and other people. A mark of a city's success is the clustering of complementary land uses to residents' and businesses' mutual benefit; the more people and activities within reach of each other, the greater the benefit from this accessibility.

A problem arises, however, when cities try to address transportation impacts from such clustering. Conventionally, they estimate the motor vehicle trips from a proposed land use in a popular location—often exacerbating the number of trips through requirements for off-street parking—then require the new land use to "mitigate" the resultant traffic impact through roadway capacity increases, either directly or through in-lieu or impact fees.

The conventional approach has significant problems, including:

- Placing expensive burdens on desirable new land uses, possibly pushing them into less-accessible locations—often places that non-auto travelers reasonably cannot reach.
- Inducing more traffic and the resulting environmental, safety, livability, and personal cost problems.
- Reducing the ability of travelers to use non-auto modes because of impediments posed by wider, busier roadways.

In short, the conventional approach degrades the accessibility of cities, undermining their fundamental ability to function.

This report proposes a new approach to assessing and responding to land use-driven transportation impacts, called "modern mitigation." Instead of relying on auto capacity improvements as a first resort, this approach builds on practice around transportation demand management (TDM) to make traffic reduction the priority. Based on programs dating to the 1990s in several cities, a modern mitigation program requires certain new land uses to achieve TDM credits through such means as:

- Improving area walking, biking, and transit infrastructure and service.
- Providing complementary land uses that minimize the need for travel.
- Subsidizing transit, or bikeshare or carshare services.
- Providing first- and last-mile connections to high-capacity transit.
- Implementing monitored TDM measures of their own design.

The program as described here provides benefits to the community from reduced impacts of traffic and travel costs, as well as to such particular stakeholders as incumbent land uses, developers and building owners, and staff members administering programs.

The program is described as a function of local government, with requirements triggered by building permits and/or land-use permission changes. However, it may also be adapted by states for use in mitigation they require of land uses that affect the state highway system.

Introduction

For decades, local, regional and state governments have mostly treated transportation as an auto-infrastructure supply problem. When traffic slows down or backs up—or may do so in the future—roadway capacity should be increased. As a result, since 1990, urban lane-miles have grown by 62 percent while the most expensive form of highway capacity, urban Interstate lane-miles, have grown by 68 percent—both much faster than metropolitan population (Figure 1).

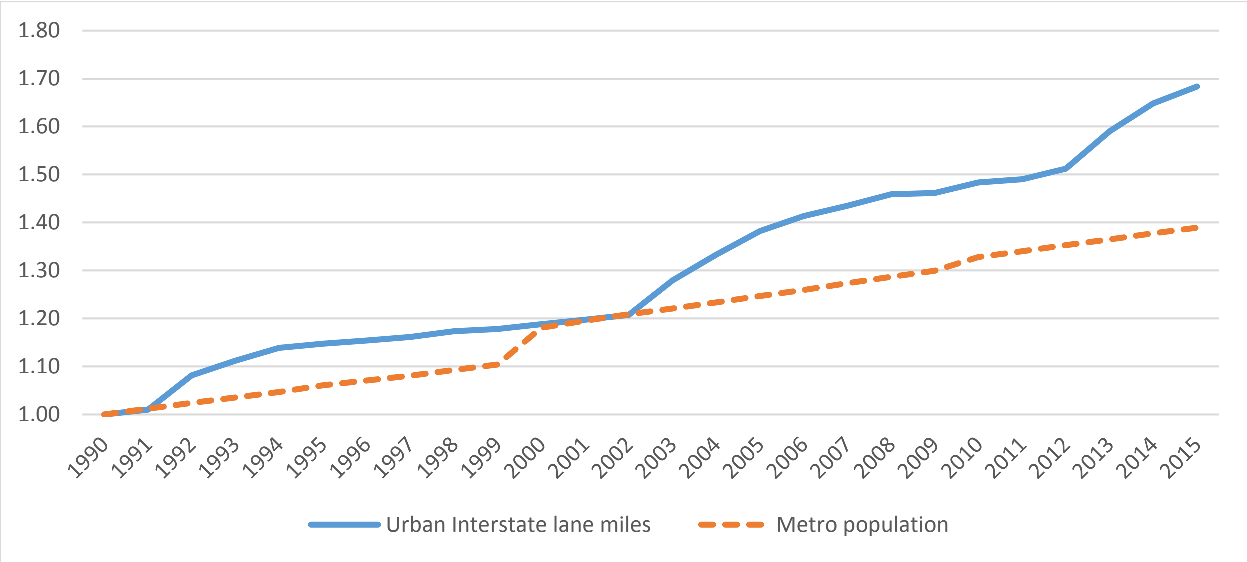

Figure 1. Trends in U.S. urban Interstate lane-miles and metropolitan population, 1990=0. Source, Bureau of Transportation Statistics.

But while we need streets and roads, oftentimes expansions come at great cost to taxpayers, travelers, neighborhoods, and the environment. This report is not intended to provide a lengthy critique of our strong focus on the supply of urban roadway infrastructure, as many authors have already done so. A summary example of the costs of autocentric development, many of them externalized to non-drivers, comes from Todd Litman[1]:

- Vehicle ownership: Fixed costs of owning a vehicle
- Vehicle operation: Variable vehicle costs, including fuel, oil, tires, tolls, and short-term parking fees
- Travel time: The value of time used for travel
- Crash: Crash costs borne directly by travelers, and costs a traveler imposes on others
- Parking: Off-street residential parking and long-term leased parking paid by users and others
- Congestion: Congestion costs imposed on other road users

[1] Summarized by Jeffrey Tumlin in "Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities," John Wiley & Sons, Incorporated, 2011, p. 142.

- Road facilities: Roadway facility construction and operating expenses not paid by user fees
- Land value: The value of land used in public road rights-of-way
- Traffic services: Costs of providing traffic services such as traffic policing, and emergency services
- Air pollution: Costs of vehicle air-pollutant emissions
- Greenhouse gas pollution: Life-cycle costs of greenhouse gases that contribute to climate change
- Noise: Costs of vehicle noise-pollution emissions
- Resource externalities: External costs of resource consumption, particularly petroleum
- Barrier effect: Delays and safety costs that roads and traffic cause to non-motorized travel
- Land-use impacts: Increased costs of sprawled, automobile-oriented land uses
- Water pollution: Water pollution and hydrologic impacts caused by transport facilities and vehicles
- Waste: External costs associated with disposal of vehicle wastes

Many of the burdens fall disproportionately on the poor, young, old, or disabled, for whom auto use—and thus access to many destinations—may be out of reach entirely, or at least a very large financial lift. And ironically, the focus on supply can be self-defeating, as it actually tends to induce more driving and traffic.[2] Despite growth in lane-miles that has outpaced population, congestion is worse than ever.[3]

If continually growing supply is problematic, then what about addressing demand instead? In fact, governments have thought of managing auto travel demand by, for example, charging variable tolls to discourage travel at congested periods. In some cases, cities have reduced roadway supply a bit through "road diets," which typically remove a travel lane and facilitate travel by pedestrians and cyclists.

This report proposes another demand-management approach that grows out of longstanding practice around "transportation demand management." TDM is most commonly known as an employer-based program that, for example, provides subsidies for employees who take transit to work. In this report we look at some promising examples of the application of TDM strategies by

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[2] Duranton, G., & Turner, M. A. "The Fundamental Law of Road Congestion: Evidence From US Cities." *American Economic Review*, 101 (6) (2011): 2616-2652. Http://dx.doi.org/10.1257/aer.101.6.2616.

[3] Texas A&M Transportation Institute and Inrix. *Urban Mobility Scorecard*. August 2015. https://static.tti.tamu.edu/tti.tamu.edu/documents/mobility-scorecard-2015.pdf.

local governments as part of their regulation of land use—bringing together the two elements of the built environment that too often are considered separately.

In a demand-centered approach a local government instead pursues mitigation by reducing traffic rather than accommodating or even inducing it by requiring parking, adding road capacity, and separating land uses. In this approach, the local government makes it easier for developers to build in a more compact way, generating less sprawl and car travel, through requiring building owners to apply demand-reduction measures. The demand-centered approach allows travelers to meet their needs with fewer and/or shorter car trips at less cost to themselves, to government, to communities, and to the environment. We call this new practice "modern mitigation."

While it is tailored to the local level, where building permit and zoning power generally reside, the method can also apply to states. Even though they do not issue building permits or make zoning decisions, states do impose mitigation requirements in many cases, e.g., driveways on state highways or major land uses in state-highway corridors, and so state DOTs also can shift their approach to the demand side.

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Mitigation in context

Many governments have recognized the drawbacks of autocentric investment and have adopted high-level policy goals around sustainable transportation. Yet in transportation—with myriad decisions about what to build and operate, how to design facilities, how to charge for and pay for facilities, how to relate transportation and land use decision, and many more—frequently policy and decision making are not always in sync. This guide drills down into a particular type of decision-making, the mitigation of transportation impacts from land use projects, to help bring it into alignment with such policy goals.

First, though, for context and to inform the design of modern mitigation practice, it's useful to consider at a high level what types of transportation-related policy levers exist and how they relate to a goal of reducing traffic, or allowing people to meet their needs with fewer and/or shorter car trips. Here are several policy levers, greatly simplified, with their likely general effect on traffic volumes:

1. **Adding roadway capacity:** As noted, adding more roadway capacity tends to lead to more driving, and can also crowd out other modes, for example by making walking harder and spreading out destinations. Often capacity additions are achieved through mitigation. *Likely effect: More driving.*

2. **Adding non-auto capacity:** The nature of transit, bike, and pedestrian infrastructure is to encourage more compact development and shorter travel distances, and to take some pressure off of highways through mode-shifting. *Likely effect: Less driving.*
3. **Changing roadway operations:** This lever would include a variety of roadway operations, from tolls to signal-timing. These may be undertaken for several reasons not directly related to supply and demand. For example, signals may be timed to keep traffic flowing at a reasonable speed in order to reduce crashes. Raising the price of driving, as through tolls, would generally be expected to lower the amount of driving. However, in some cases tolls are imposed simply to reduce driving at peak hours, with minimal effect on overall demand. *Likely effect: Depends.*
4. **Transportation demand management:** This lever has traditionally been used by employers in congested areas to reduce peak-hour auto travel. Some measures, such as staggered work hours, simply shift travel and don't reduce the overall level, while others, such as subsidized transit and carpool incentives, reduce demand. *Likely effect: Neutral to less driving.*
5. **Land use regulation, conventional:** Conventional "Euclidean" U.S. land use regulation, with separated uses and requirements for lot sizes and off-street parking, tend to spread out uses and orient travel around the auto. *Likely effect: More driving.*
6. **Land use regulation, modernized:** Partly in order to reduce the travel-inducing effects of conventional zoning, some local governments have instituted form-based and other mixed-use-friendly forms of zoning, as well as relaxed off-street parking requirements and setback rules. *Likely effect: Less driving.*
7. **Subdivision ordinances:** Rules about street widths, intersection density, presence of sidewalks, connectivity, and the like are, along with land use requirements, the DNA of greenfield development. As with land use, they can either induce driving or make non-auto trips desirable. Likely effect: *Depends.*
8. **Pricing:** The most powerful pricing tools, such as gas taxes, VMT charges, and highway tolls, are generally outside the purview of local government. However, local government does control some prices, such as transportation-network company fees and on-street parking. They also may impose fees on development, which, if structured correctly, may serve to rein in high-travel development—or may induce traffic if the fees are flat and used for new autocentric facilities. *Likely effect: Depends.*

For the public and many decision makers, the conversation around many of these transportation decisions typically occurs when new or expanded roads are debated, designed, and programmed by local governments, Metropolitan Planning Organizations, or state Departments of Transportation. While these processes have flaws, they at least occur out in the open and require public votes. The best of them include consideration of various modes and long-term maintenance needs, rather than simply roadway capacity. Yet when these conversations address the potential levers for improving transportation, they typically take place within conventional boundaries. Even cities with excellent policy aspirations will induce more vehicle travel and attendant costs if their decision rules prioritize vehicle speeds, require separated land uses and wide local roads, and force developers to mitigate impact by adding supply.

These same rules similarly constrain the myriad other decisions made out of the public eye, by city staff, developers and other participants in constructing the built environment, as, for example, when long lists of potential transportation projects are vetted, when relatively routine land use projects are reviewed, or when transportation impacts of land use changes are negotiated.

Fortunately, leaders do step up to reform these decision-making rules. The aim of this guide is to make change easier by providing learning from previous experiences around demand management through mitigation, addressing most of the policy levers above. The remainder of this report describes the basics of mitigation, provides some historical antecedents for the program developed here, gives the outline of that program, and addresses some strategies for getting a program adopted.

The basics of mitigation

Mitigation, as considered in this report, is the practice of requiring contributions—in dollars or in-kind—from developers in order to address transportation impacts anticipated from a new or changed land use. It is used by both local and state governments, and while some of the processes and outcomes are similar, the program described here is tailored for local government, with its land use authority that states generally lack.[4] Mitigation, which can apply to non-auto modes as well as roads, may take the form of a negotiated "exaction" or a formulaic "impact fee." Because mitigation proceeds are often in-kind and never from tax revenues, they are frequently ignored in legislative budget discussions, and it is probably impossible to accurately estimate their annual value across the country. But that value is undoubtedly very high, as individual projects sometimes trigger mitigation projects that run into the many millions of dollars. For example, an exaction agreement with the Potomac Yards project in Northern Virginia is projected to produce $49 million—mainly for transit.[5]

Mitigation for roadway capacity is far more common than for transit, as nearly every building has a driveway and the potential to generate auto trips. For example, since 1961 Los Angeles has enforced a compulsory road-widening process on developers, which has provided roadway right-of-way parcel-by-parcel.

This approach to mitigation has some benefits, at least in theory. It is often considered fair that new development pays its own way rather than relying on general revenues. There are established standards that can be relied on to determine trip generation and effect on level of service. And this kind of mitigation often addresses neighboring residents' and businesses' concerns about maintaining mobility in the area.

However, conventional mitigation has significant drawbacks as well, including:

- While standards exist, estimates of trip generation are based on limited numbers of cases that may not be good indicators of the project under consideration, and hence the projected change in level of service may not be accurate. Projections are only infrequently checked after the fact for validity.
- Except in the case where impact fees are used, the process tends to apply costs unevenly. The first several developments along a road have little effect on LOS, but at some point the road reaches a tipping point where delays begin to occur. The project that comes along at that point may be saddled with the responsibility for paying for capacity improvements for which it is only marginally responsible.

[4] That is not to say that state governments could not enact a similar program that improves outcomes from their own developer exactions.
[5] U.S. DOT FHWA Center for Innovative Finance Support. *Project Profile: Potomac Yards Metrorail Station*. Accessed at https://www.fhwa.dot.gov/ipd/project_profiles/va_potomac_metrorail_station.aspx.

- Developers may avoid infill, where they may have to mitigate for traffic impacts, in favor of greenfields, where there is currently little traffic. Greenfield development tends to increase the amount of driving across the area or region.
- Because conventional mitigation usually affects a small part of the system near a development, it may speed up traffic locally but create a bottleneck down the road.
- Conventional mitigation that is focused on auto speeds and roadway capacity can make non-auto travel more difficult, for example by increasing crossing distances and pedestrians' exposure to traffic hazards when intersections are widened or traffic speeds increased.
- Roadway expansions can induce more traffic, making them unreliable in maintaining auto mobility and adding emissions and other disamenities mentioned above.

Michael Manville of UCLA reviewed the Los Angeles mitigation policy in a 2017 paper. He found that results were quite poor, but that the policy has persisted in part because it is an entrenched standard[6]:

> Parcel-level traffic mitigation has the trappings of science. Cities use predictions and manuals purporting to show how much traffic a given development will create, or how much traffic a given street will carry, and then apply formulas that translate these predictions into the various increases in road capacity necessary to offset those vehicle trips. In this way, developers are held responsible for the traffic they create.
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> There is, however, little reason to believe developers "create" traffic, and little reason to think planners can accurately predict it at the parcel level. Cities adopted parcel-level mitigations not because they were shown to work, but because other ways to address congestion were politically or fiscally unfeasible.
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> In the case of Los Angeles' highway dedication law, the law's proponents conceded from the outset that it was unlikely to work. The evidence I present here suggests that the standards underlying the law are often in error, and in some cases simply unverifiable. Such immunity to measurement is antithetical to sound policy, but—perversely—the pursuit of a largely unmeasurable goal ensures the law's persistence, because it leads planners to largely ignore the law's nominal purpose and instead emphasize its measurable process. The law, in short, is all tree and no forest; while its intent may be to alter outcomes on the network of streets, all of its stakeholders are focused on individual parcels.
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> Possibly the implementation troubles I have documented are unique to Los Angeles. But to the extent they are not, they add new evidence to the existing case against parcel-level mitigation. The evidence presented here gives little reason to think parcel-level mitigation is doing good, and good reason to think it is doing harm. An optimist might argue that

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[6] Manville, Michael. "Automatic Street Widening: Evidence From A Highway Dedication Law." *Journal of Transport and Land Use* Vol. 10, No.1 (2011). http://dx.doi.org/10.5198/jtlu.2016.834.

> mitigation, despite its flaws, can be a placeholder for more direct approaches to manage congestion, such as higher gasoline taxes, tolls on larger streets, and direct and accurate prices for street parking. But it is also possible that mitigation, by creating an illusion of sophisticated technical standards deployed to battle congestion, actually deters the adoption of simpler and more effective but politically less palatable policies. If mitigation lets cities and voters dodge the reality that solving congestion will likely involve making driving more expensive, and if it impedes housing development as well, then planners may wish to consider abandoning the practice, rather than attempting incrementally to improve it.

Typically, when a developer seeks land use approval for a project, a traffic study based on the proposed use and size will estimate “trip generation” from the site and with that, the effect of new trips on the nearby roads and intersections, as measured by “level of service” standards. If the projected trips are considered likely to degrade LOS beyond a certain point, the local government will request roadway improvements be constructed or funds be provided for such improvements. (In cases where impact fees are charged rather than exactions negotiated, the fees may be used to cover such improvements.)

By modernizing the approach to mitigation, focusing on reducing traffic rather than haphazardly accommodating and inducing new trips, we can reduce the downsides and foster the more efficient, equitable, lower-travel outcomes. The modern mitigation approach is both more multimodal, more attuned to system-wide outcomes, and more tailored to specific development attributes than is conventional practice. It has emerged, in large part, out of work by pioneering local governments in TDM programs, as described in the next section.