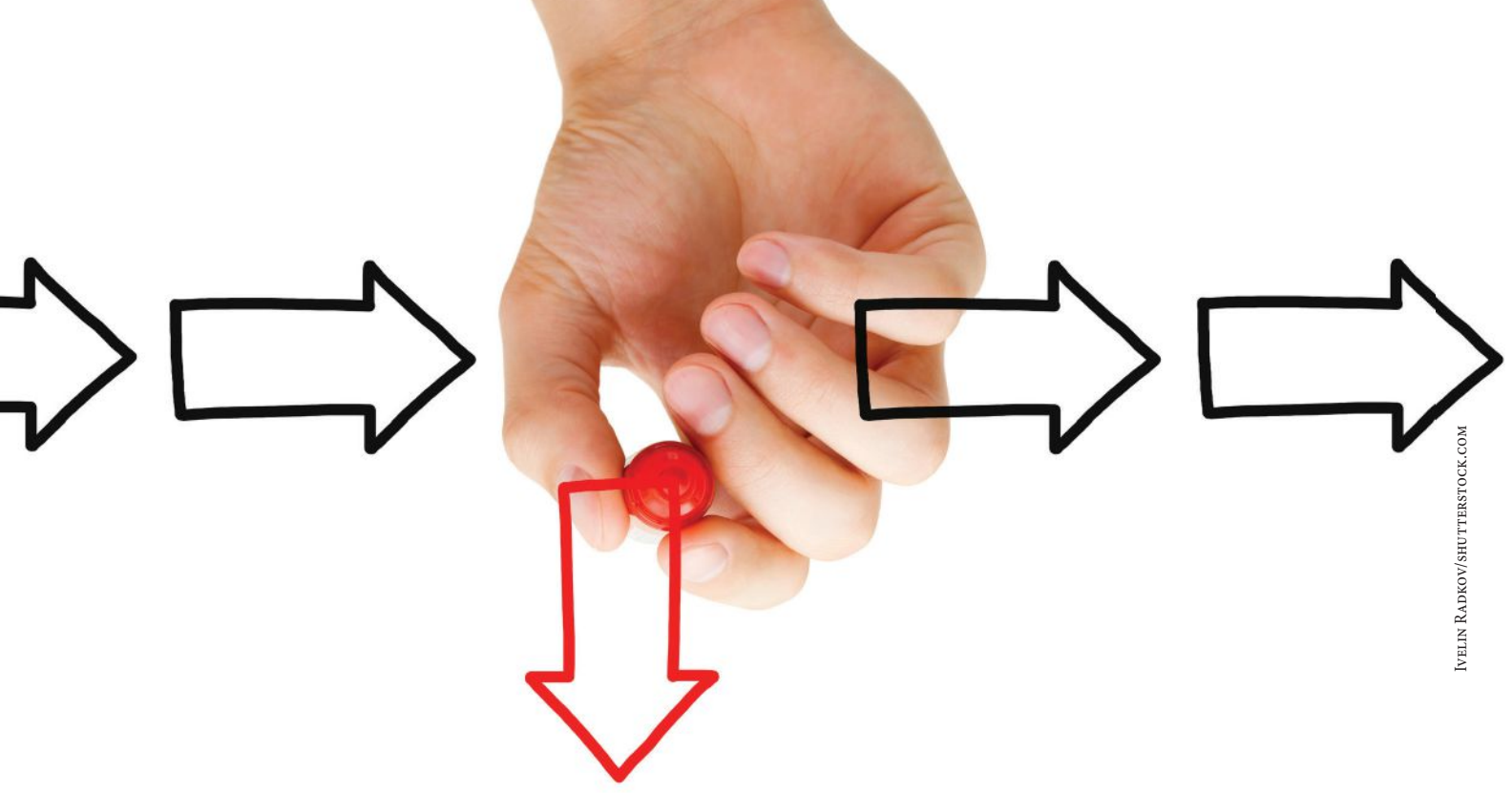

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Changing the Paradigm of Traffic Impact Studies:

How Typical Traffic Studies Inhibit Sustainable Transportation

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The practice of focusing on automobile level of service (LOS) and traffic flow as part of environmental clearance has, ironically, actually inhibited sustainable transportation, that is, transit, bicycling, and walking. This paper describes the problems with current practices and suggests how transportation studies should be used to improve mobility and livability for all.

From the very first environmental document required by the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) in 1970, transportation studies have been one of the required elements. Even before transportation studies were required by these laws, public agencies conducted studies to plan for future major transportation investments and to serve new land uses.

However, the role of traffic impact studies (TISs) in the environmental review process has become distorted. Instead of focusing on how traffic impacts the environment, including human beings, most studies consider an impact on *traffic* and *traffic flow* as an *environmental* impact.[1] The consequence of this fundamental switch is that any project that affects traffic flow or increases traffic delay is considered an adverse environmental impact. Moreover, measures that might help reduce automobile traffic, such as providing facilities for other modes—that is, biking, walking, and transit—must be analyzed for their adverse "impact" on traffic flow.

Even when not part of a NEPA/CEQA analysis, for the last five decades, the singular focus on preserving traffic level of service (LOS) for automobiles has inhibited the implementation of sustainable transportation projects. This paper describes why certain assumptions of typical TISs may be problematic; it then describes promising trends and suggests improvements for transportation studies.

The Evolution of Traffic Impact Studies

The post-World War II (WWII) baby boom combined with higher auto ownership resulted in a population explosion in suburban areas. For many reasons, including separated land uses, low-density development with little or no transit service, and increased car ownership, biking, walking, and transit use declined. The methodology for conducting transportation studies was being developed in this car-centric period. The first national guide was issued in 1950, and the 1965 *Highway Capacity Manual* (HCM) first introduced intersection LOS.[2] Although each new edition since 1980 gave increased attention to pedestrian, bicycle, and transit modes, transportation studies in most of the country continued to be almost exclusively automobile LOS studies. Meanwhile, traffic studies became subsumed into the environmental review process that was mandated by NEPA and CEQA.

The confluence of post-WWII auto-dependent land development, the evolution of the traffic study methodology, and the requirement for environmental analysis combined to create the "state of the art of TIS" having the "primary objective of moving rubber-tired vehicles."[3] However, the authors feel it is time to revisit four practices of a TIS:

1. Trip generation rates are based on auto-dependent land uses, and TISs assume that future land development will generate auto traffic at the same rates as past land uses.[4] This practice, among other things, does not account for improvements in the transit and bicycle infrastructure and other factors that might lead to lower vehicle trip rates.
2. The goal of many TISs is to accommodate every auto trip that is forecasted. But many auto trips are discretionary, and others are dependent on the alternatives available. In addition, policies such as free, abundant parking encourage driving when those same trips could have been on foot, such as the quarter-mile drive to the corner store or children's journeys to school.
3. The goal of many TISs is to mitigate "unacceptable" automobile LOS. The recommended mitigation measures almost always increase roadway capacity, which encourages more driving, which in turn requires more roadway capacity. An escalating and unsustainable cycle is created.
4. The impact of new vehicle trips on pedestrian, bike, and public transit mobility is not addressed, and the safety of these modes is often ignored. Two examples are:

   Public Transit: One typical way of considering transit is to focus on possible delays to auto traffic. Mitigation measures often include bus turnouts and other designs to keep buses from inconveniencing auto traffic. (See Figure 1.) Signal preemption for transit is considered an adverse impact on traffic.[5]

Figure 1. Auto-focused traffic studies recommend bus turnouts; transit-focused studies recommend bus bulb-outs.

Figure 2. Double standard: Proposed bus-only lanes must be analyzed for their impact on traffic, but the impact of increased traffic on bus transit is not analyzed.

Pedestrians: Pedestrians are often considered an impediment to traffic flow. The classic result is the ubiquitous pedestrian push-button, even in downtown locations that could reasonably expect pedestrians crossing during every signal cycle. But a default pedestrian phase in such circumstances is often discouraged because it would increase delay to motor vehicles. The delay for pedestrians is not considered as important as delay for motorists.

In sum, traffic studies since the 1960s have focused on recommendations that make driving easier and faster, which makes biking, walking, and taking transit more difficult and less safe. These studies have helped create a self-fulfilling prophesy of more and more automobile traffic. If the same attention had been given to facilitating transit trips as to facilitating driving for the last 50 years, our cities and suburbs would have been built much differently.

Resistance to the Status Quo Growing but Double Standard Remains

As is often the case when systems become too skewed in one direction, there is a backlash to the auto-centric planning across the country. Freeway-building revolts began in the 1960s whereby communities blocked (and in some cases removed) freeways from their neighborhoods. By the 1980s, many agencies required transportation demand management measures as part of TISs when they realized that even with 8-lane arterials and 16-lane freeways, they could not build their way out of congestion.

But traffic impact studies in environmental documents still continued under the premise that anything that increases traffic delay is an adverse impact on the environment. Moreover, measures that might help reduce traffic, such as providing facilities for bicycling, pedestrians, and transit, must be analyzed for their adverse "impact" on traffic rather than for the benefits and travel options they would create.[6] Communities that want to level the playing field by making it easier to bike, walk, and take transit must deal with this double standard: removing a traffic lane for bicycle and/or transit-only lanes must be analyzed for adverse impacts on automobile traffic, while projects that generate car traffic are not required to assess how newly generated automobile traffic inhibits the use of transit, walking, and biking.[7] (See Figure 2.) The irony that nonmotorized modes are more benign for the physical environment is not lost on bicycle and pedestrian advocates.

Another ironic aspect of auto LOS being considered an adverse impact on the environment is that it can be mitigated by widening roadways (e.g., a triple right-turn lane that the city of Menlo Park, CA, USA, is requiring funding from Facebook as mitigation for its expansion). However, widening roadways directly damages the environment physically and biologically and, by encouraging more driving, increases air pollution and other impacts.

A secondary adverse impact of such "mitigation measures" is that wide swaths of asphalt are provided that are unneeded for 22 hours of the day in order to accommodate peak period traffic. The adverse environmental consequences of all this impervious pavement plus loss of public space for better public use are rarely addressed, let alone mitigated. (See Figure 3.)

Promising Trends

However, the momentum toward a more balanced approach may finally be building on several fronts. In 2005, bicycling, pedestrian,

and transit advocates combined forces to create the National Complete Streets Coalition. More and more communities are concerned about livability and recognize that biking and walking are essential barometers. Infill development is recognized as more resource-efficient than sprawl, even though auto LOS may worsen. Addressing greenhouse gases is now official policy in several states; reducing vehicle miles of travel must be a critical strategy to decrease carbon emissions. Nevertheless, auto LOS remains the main focus of TISs.

There has been progress on both national and state levels. More resources are available to help cities plan for livable, sustainable communities including alternative metrics to automobile LOS.[8] The 2010 HCM includes methodologies for determining bicycle, pedestrian, and transit LOS. In 1999, Maine removed transportation analysis from their environmental regulations, and now traffic studies are regulated by the Department of Transportation.

California has also made important strides. In 2010, three questions on the CEQA Initial Study checklist were changed from being solely auto-focused to multimodal. Specifically, the criterion for analyzing traffic capacity was replaced by "performance of the circulation system taking into account all modes"; and the auto LOS criterion was expanded to include "travel demand measures or other standards." Four years later, the authors have yet to find an agency that is fully addressing these new questions or that has stopped using auto LOS as the primary significance threshold; cities are reluctant to change because of the fear of lawsuits.

It is promising that many cities are studying options for new transportation thresholds: The city of San Francisco, CA, USA recognizes that auto LOS is not an appropriate measure of an environmental impact in urban areas and has been studying a vehicle trips–generated performance measure since 2006; in 2005, the city of San Jose adopted a "protected intersection" policy whereby no auto capacity increasing mitigation measures are considered in designated areas of the city.[9,10]

Figure 3. Mitigating auto LOS to D has created vast amounts of asphalt that are unused for most of the day, as shown by this eight-lane arterial.

A second significant change in California was Assembly Bill 2245 (2012), which added bike lanes in an urbanized area as a statutory exemption under CEQA. This has two caveats, however: 1) a traffic study is still required and traffic impacts must be mitigated before qualifying for an exemption, and 2) it only applies to bike lanes; transit lanes that affect auto LOS are not addressed.

Most recently, California Senate Bill 743 (2013) specifically addresses transportation studies in transit priority areas. This law 1) directs the State Office of Planning and Research (OPR) to develop new criteria for determining the significance of transportation impacts of projects; 2) once these criteria are certified, prohibits automobile delay from being considered a significant environmental impact; and 3) allows OPR to establish alternatives to auto LOS outside transit priority areas. OPR is scheduled to publish these new guidelines in 2014. This may finally be the game changer needed to extricate auto LOS from environmental impact analysis, at least in California. OPR recently released alternative metrics for public comment, which include vehicle miles of travel, vehicle trips generated, and HCM's multimodal LOS.[11]

Suggestions for Transportation Studies

In terms of sustainable transportation¸ U.S. traffic impact analysis practice lags far behind that of the United Kingdom, where transport assessment "identifies what measures will be taken to deal with the anticipated transport impacts of the scheme and to improve accessibility and safety for all modes of travel, particularly for alternatives to the car such as walking, cycling and public transport." A key objective in transport assessment is reducing the need to travel, especially by car.[12]

Traffic studies do need to be conducted, but they need to be rethought and repurposed.[13]

- Traffic studies should be broadened to be multimodal transportation studies or, better, multimodal transportation needs studies. Transportation capacity studies that focus only on one mode would have a different but limited role.
- Transportation impact studies as part of environmental clearance should be distinguished from multimodal transportation needs studies and transportation capacity studies.
- In environmental studies, performance metrics should be used that measure the environmental, social, and transportation benefits of pedestrian, bicycle, and transit projects, instead of focusing on their impacts on auto delay.
- Traffic studies can and should be used as a basis for collecting transportation impact fees (TIFs), and local agencies should use such fees to fund projects other than road widening. In

2007, the city of Palo Alto, CA, USA, passed a TIF ordinance that has no auto capacity increasing projects; instead the fee funds the traffic signal system, citywide shuttle bus service, and bicycle/pedestrian projects.[14] In 2006, the city of Pasadena passed a mobility impact fee, 50 percent of which funds transit operations and capital improvements; they are considering bike and pedestrian projects for the 2014 update.[15]

- Another approach is used in Italy: If a project fits within the current land use zoning, a development fee is paid and there is no project-specific TIS.[16] Development fees for transportation are not determined based on the project's traffic impacts, but on formulas developed by the city and state for all developments.[17] A project-specific study might analyze the local access and site perimeter issues.
- An actual "traffic impact" study should be recast from accommodating newly generated traffic to analyzing the impact of this traffic on other modes.[18] Consider a hypothetical land development project that will generate 10,000 vehicle trips per day, adding hundreds of trips per hour to an arterial. Instead of focusing only on how to accommodate this traffic, impacts on transit and pedestrians should be analyzed and mitigated.
- For example, if the additional traffic in the mixed flow lanes will slow down transit schedules, reducing the average speed of buses from 12 mph to 9 mph, an appropriate mitigation measure under the new paradigm would be to provide a bus-only lane. The average bus speed would now increase, creating new demand for transit, which could increase service, increasing ridership: an upward spiral. Contrast that with today's scenario, where this additional traffic will decrease transit travel speeds, which decreases transit ridership, resulting in reduced transit service: a downward spiral.
- Impact on pedestrians should also be precisely described and resolved; for example, if a project will increase the number of right-turning vehicles at an intersection from 100 to 400 vehicles per hour, the current auto-focused analysis will recommend a right-turn lane, and possibly a right-turn arrow or a channelized island not subject to signal control. All three of these measures make crossing the street more difficult for pedestrians. The analysis instead should be this: How would those right-turning vehicles affect pedestrians? What is the volume of conflicting vehicles that turn into the crosswalk?[19] At what speed are they turning? Does the curb return radius need to be reduced? Would a curb extension (bulb-out) help? Does the signal timing provide adequate time for pedestrians? Does pedestrian delay increase?

Conclusion and Recommendations for Going Forward

Transportation impact studies have their place, but preserving auto LOS should not be their only goal. The primary focus should no longer be on making it easier to drive, but on how to create a transportation system that offers real choices. Then those who want to take transit or bicycle can freely choose to do so. A local bus averaging 10 mph at 30-minute headways during peak hours and 60-minute headways during nonpeak periods hardly counts as a choice. Riding a bicycle on an eight-lane arterial in a 12-foot-wide lane is hardly a fair choice. Corridor by corridor, we must end the practice of increasing capacity for one mode, automobiles, until there is at least a minimum amount of safe capacity for transit, bicycling, and walking on that same arterial.[20]

Furthermore, with the Interstate Highway System completed, it is timely to address public transit seriously for the first time in the United States. Communities should plan their "build-out" transit network, just as the U.S. Interstate network and the state of California sketched out ultimate freeway networks back in the 1960s. These plans were not financially constrained to a 25-year funding horizon but were a bold vision of a complete interstate system.[21] A build-out/50-plus year transit network plan is needed for every metropolitan area and should include intercity commuter rail, metros/subways, and light rail/bus rapid transit. Federal, state, and local money and TIFs can fund the construction of new public transit lines, not just ever wider mega-arterials and freeways.[22]

The corollary benefit will be better land use decisions. Because transportation investment is inexorably linked to land use, agencies will now be able to zone for increased density along these planned yet unbuilt transit lines.[23] Transit-oriented development would indeed be located next to mass transit stations. **itej**

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