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# Level of service: the politics of reconfiguring urban streets in San Francisco, CA

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ABSTRACT

Intersection level of service (LOS) is a traffic engineering concept which measures how streets handle automobile traffic. It is widely used in transportation planning as an indicator of delay at intersections. The use of LOS is often criticized for its bias towards automobiles at the expense of bicycling, transit, and walking, and it complicates smart growth or compact development. In San Francisco, California, there is a political movement to eliminate the use of LOS in planning. But this movement has met significant obstacles and debate. In this paper I explore how the debate in San Francisco is unfolding and suggest implications for broader efforts to reconfigure urban streets and urban space in the United States and globally.



## 1. Introduction

Many scholars, planners, and transportation activists emphasize that reducing vehicle miles travelled (VMT) must be part of urban sustainability (Ewing et al., 2008). In the United States President Obama's administration has even stressed the need to reduce driving (United States House of Representatives, 2010). Policies reducing VMT include reconfiguring urban space into denser, transit-oriented and walkable patterns broadly labeled "smart growth" or "livable cities" in North America, and "compact cities" globally. A subset of this movement, "complete streets," seeks to make streets welcome to bicyclists, pedestrians, and transit (McCann and Rynne, 2010).

In the US the movement to reconfigure urban space and streets can be dampened by stringent zoning and traffic engineering regulations (Duany et al., 2000; McCann and Rynne, 2010). For example, Shoup (2005) has outlined how local zoning laws requiring excessive off-street parking can impede the production of compact development. Misguided parking policy has encouraged more car-use and sprawl. Similarly, proposals to re-allocate street space for bicycle lanes, exclusive bus lanes, and traffic calming are often stymied by policies that privilege "intersection level of service" (from now on simply 'LOS'), a traffic engineering metric that assesses the delay motorists experience at street intersections.[1] The use of LOS often prioritizes motorist convenience in ways that discourage rethinking street space (Patton, 2007).

Complicating matters, in San Francisco, as elsewhere in California, LOS is not only used in traffic engineering, but also in the environmental review process for new development and transportation projects. Reducing VMT through street reconfiguration is problematic because increased delay to automobiles is considered a significant negative environmental impact. Ironically, if compact development or non-automobile modes might cause increased delay for motorists, an expensive and lengthy traffic analysis is necessary. This is despite the city's "transit first" policy which prioritizes transit, bicycling and walkability. This situation has made it difficult to consider reallocating street space in San Francisco for sustainable transportation goals despite popular support.

In this paper I expand on why LOS matters to those interested in how contemporary urban streets are configured and organized in US cities. I then provide a case study of how politically progressive transportation advocates, planners, and politicians in San Francisco have begun to rethink LOS. This rethinking parallels a national effort to revise conventional LOS by incrementally including "multimodal LOS," which considers walking, bicycling, and transit. But in San Francisco many progressives believe that government should actively discourage driving and that LOS should be eliminated from the city's planning process. San Francisco's progressives have found potential allies in the city's neoliberal development industry, which views the expensive and time-consuming LOS analysis to be a burden.

Progressives have proposed replacing LOS with a "green" metric called automobile trips generated (ATG). The idea is that additional car trips generated are a significant environmental impact, and this metric would replace the convention of considering delay to cars. Yet while neoliberals also support eliminating LOS, there are

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[1] There are two ways of measuring LOS for automobiles. Intersection LOS evaluates vehicle-delay at intersections on city streets. Vehicle/capacity LOS measures the throughput of vehicles per/hour and per/lane on a particular roadway segment or on a freeway. For the purposes of this paper, only intersection LOS – the measure of delay – is considered because it is the metric that is challenged in this case study of San Francisco.

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differences between progressives and neoliberal developers about how to implement the replacement metric. Moreover, there remains a strong inertia among some traffic engineers and automobile interests to preserve LOS. This paper outlines these differences and discusses their implications on urban transportation policy.

The paper is based on a critical reading of literature on traffic engineering and LOS, including relevant government documents, reports, and scholarly analysis of the history and politics of US traffic engineering and the development of LOS. It is also informed by 20-in depth interviews with key stakeholders in San Francisco's LOS debate, including planners, politicians and activists. These interviews were conducted in 2008 and 2009, and interviewees were selected after direct observation of public meetings and debates about street space in San Francisco.

## 2. LOS and urban space

defined in terms of vehicle waiting time [cars]

Intersection LOS is one of the most widely-used traffic analysis tools in the US and has a profound impact on how street space is allocated in US cities. In simplified terms LOS is calculated by measuring the average delay in seconds for vehicles at intersections. Delay is defined as the actual time it takes for a vehicle to move through an intersection compared to the theoretical "optimum" time it would take with no interference from other vehicles or impediments. The optimal conditions for "good" LOS are 12-foot wide travel lanes at level-grade, with no curb parking on approaches, no pedestrians or bicycles, no buses stopping in lanes, and only passenger cars in the vehicle mix (Transportation Research Board, 2000).

Table 1 illustrates the six-letter grading scale, or ranges, of LOS, which is similar to an American school report card. With minimum delay, LOS 'A' is the optimum condition, LOS 'B' and 'C' indicate reasonable traffic flow but with steadily increasing delay, and LOS 'D' is considered a point where an intersection is approaching 'capacity' and should be expanded or modified to avoid "bad" LOS 'E' or 'F' conditions, where 'F' is extreme delay of 80 s or more.

LOS is widely accepted professionally because it is easy to access the data required to calculate LOS and because delay can be easily measured (Mitchell and Milam, 2006; San Francisco County Transportation Authority, 2003). Data are usually collected at peak commute hours using counting devices and then running the data through computers that generate estimates of delay. The average delay is calculated for the peak 15 min of the peak hour. It is then extrapolated into the future with the incorporation of trip generation data and other travel behavior models.

In San Francisco, as elsewhere in California, LOS "D" is considered a threshold of significance in environmental review. That means that when new infill housing or a reallocation of street space for a bicycle or transit lane are predicted to increase motorist delay to over 35 s (LOS 'D'), a lengthy and expensive traffic analysis is required. If the results of that traffic analysis show that the housing or bike lane contributes to pushing an intersection to LOS "D" or worse, this is a significant negative environmental impact that should be mitigated.

**Table 1**
LOS ranges and description of motorist perception, from the 2000 Highway Capacity Manual (TRB, 2000).

| LOS | Average delay in seconds per vehicle | Description of motorist perception |
|---|---|---|
| A | <10 | Free-flow traffic: "Good" LOS |
| B | 10.1–20 | Reasonable free-flow |
| C | 20.1–35 | Stable but unreasonable delay begins to occur |
| D | 35.1–55 | Borderline "bad" LOS |
| E | 55.1–80 | "Bad" LOS: long queues |
| F | >80 | Unacceptable: very high delay, congestion |

One of the frustrations in San Francisco is LOS's incumbency bias. Like many older, built-out cities transit, bicycle, and pedestrian improvements in San Francisco require re-allocating street space (SFCTA, 2003; Hiatt, 2006). There is no other practical way to accommodate these modes in the city. With upwards of 9000 registered vehicles per square mile, change (such as adding bike lanes) that increases delay for automobiles is taken as problematic and complicates planning (San Francisco Municipal Transportation Agency, 2009).[2] For example there are instances in the city where new crosswalks are needed, but introducing them would add delay to cars, and so city traffic engineers have discouraged reintroducing them. There are other instances where introducing an exclusive bus lane might compel future car traffic to divert to other streets, causing a decline in LOS on local side streets and dampening enthusiasm for bus lanes.

There is no comprehensive list of proposed projects and planning ideas that have been rejected in San Francisco due to LOS, but in numerous interviews with stakeholders, it is apparent that concern over LOS has trumped many bicycle lane proposals in the past two decades despite significant popular support for them.[3] LOS steered bicycle planning away from challenging projects because they required removal of car lanes. Instead planners in San Francisco focused on projects that did not require lane removal or that were on low-traffic streets where LOS would not deteriorate. The former director of San Francisco's bicycle program acknowledged that since the early 1990s, bicycle planning in San Francisco focused on the "low-hanging fruit," or bike lanes that did not significantly impact automobile LOS. The city avoided consideration of any bike lane on a street where it was assumed LOS would be a problem, even if it was obvious that it was a flat route with destinations desired by, or already widely used, by bicyclists. Hence a significant psychological impact of LOS is that it has a chilling effect on thinking about possibilities of how urban streets can be used, and it dampens enthusiasm among decision-makers.

This chilling effect is not limited to San Francisco. For example, in two of the nation's top bicycling cities, Davis, California, and Boulder Colorado, LOS also complicates the development of a comprehensive bicycle network.[4] In Davis, with 17% of commute trips by bicycling, a key arterial in the denser downtown area must undergo an extensive traffic analysis using LOS in order to install bike lanes and reduce car travel lanes, despite the overwhelming local support for bicycling. Davis will likely get the anticipated bike lanes, but not after delay (and expense) to complete the LOS studies and add special turn pockets and new signalization for automobiles. In Boulder, with 12% of commute trips by bicycle, a similar situation has resulted in bike lanes being absent on some key arterials that have significant utility for bicycling, especially in the denser downtown. For example Broadway Street is a main north–south thoroughfare and commercial spine where many bicyclists seek more access. Adding bike lanes would have deteriorated LOS and so instead of installing bike lanes the city widened a sidewalk on one side of the street and allowed bicycle access there. Other key crosstown arterials in Boulder, such as Arapahoe Avenue, do not include bicycle infrastructure because this would impact automobile LOS. Boulder

[2] San Francisco has one of the highest densities of automobiles in the world, despite 30% of households not owning a car.

[3] A poll in November 2009 suggested that 67% of residents thought the city government should encourage bicycling, and 77% thought bicyclists helped ease traffic congestion (Binder Research, 2009).

[4] Background on how bicycle planning is complicated by LOS in Davis and Boulder was gathered in early April 2011 by phone interviews with the lead bicycle coordinator in each city.

does not codify LOS, but city traffic engineers still determine which streets are applicable for bicycle facilities based on LOS analysis.

Davis and Boulder have had success in implementing extensive bicycle plans, but not without having to first accommodate and circumvent LOS. Like San Francisco these cities have large young, health-conscious populations and a green political discourse that encourages bicycling. However, Davis and Boulder have much lower population and traffic densities when compared to San Francisco, and much more room on streets to insert bike lanes without coming up against LOS. Even with that these bicycle-friendly cities still face complications from LOS at key locations with high demand for cycling, such as the denser downtowns. Additionally, if one were to consider that these cities, along with the broader smart growth movement, seek to densify in the urban cores and around transit stations, then localized conflicts between bicycling and LOS will continue to arise as long as the metric is privileged.

Moreover 'good' localized LOS can be incongruent with regional clean-air and climate change goals. It is obvious that concentrations of delayed, idling vehicles at intersections emit very localized pollutants, although in the Bay Area local climatic factors, cleaner reformulated gasoline, and a high propensity for fuel efficient cars has minimized that somewhat. Yet if the localized emphasis is on less delay and maintaining high carrying capacity of localized roads, this actually induces more air pollution at the regional scale because it facilitates increased VMT overall. Instead of encouraging dense compact urban infill that reduces VMT, the cumulative impact of localities using LOS in environmental and traffic analysis is to encourage dispersal. The geographic impact of adhering to a goal of not exceeding LOS 'D' resembles what Whitelegg (1993) identified as the insatiable demand for higher mobility that is really an artificially created demand due to spatial configuration. People want access, but if things are further apart, they drive greater distances to have access. If it takes a lot of time to drive that distance, motorists will demand higher speeds and less delay at intersections. Yet higher speeds require more space consumption, and thus a cycle of sprawling automobile-oriented landscapes is the default configuration. More cars require more space forcing further low -density spreading of activities and destinations. This configuration then requires streets designed for maximizing traffic flow of cars, and that coupled with the lower densities, makes walking and cycling dangerous, and transit impractical. This in turn increases VMT, energy consumption and pollution, which occurs locally, nationally, and globally. LOS is a key metric that perpetuates this vicious cycle.

The urban and environmental impacts of LOS are more peculiar when considering the methodology of LOS. The elementary grading system 'A–F' is questionable because it feeds into a culture of fear of failure. Decision-makers and the public (who are usually not traffic engineers well-versed in the nuances and subtleties of LOS) don't consider the delay in seconds but simply think in terms of letter grades. They desire a mobility grade of 'A' just like a student would want an 'A' and not a 'D' or 'F.' Yet the LOS ranges are inexact, and as one transportation advocate put it, "LOS is a high degree of precision with a low degree of accuracy" (Radulovich, 2008). The ranges are an approximate representation, and are subjective, not absolute. A small change in a few seconds of delay could change a letter grade from 'D' to 'E', while bigger changes in delay might actually stay within a range level and go unnoticed. But often the message conveyed is that 5, 10, or 20 years in the future, a change could result in LOS 'F' for cars, and thus that change should not be allowed.

Another methodological problem is that LOS is an estimate of motorists' delay at peak travel periods. An intersection that has LOS 'F' for 15-min out of the day may actually have an acceptable LOS range for the remaining 23 h and 45 min of that day. Peak-period LOS also impacts the spatial form of the city even if it does not predict LOS F until decades in the future. This is similar to the way parking lots are designed for a few holiday weekends but then sit empty the rest of the year (Shoup, 2005). Future peak period LOS becomes the design threshold for roads and the results are bigger, wider, roads with minimal crosswalks, and no bike lanes (Mitchell and Milam, 2006).

As suggested above, the use of LOS to allocate urban space is remarkably similar to the ways in which traditional parking policies make it difficult to produce compact transit-oriented development. Shoup (2005) outlines how parking standards seem to have been pulled out of thin air, based on poorly conceived studies that were perpetuated from one city to the next without much critical thinking. Parking standards such as that of the Institute of Transportation Engineers (ITE) *Parking Generation Handbook,* were based on observations of peak parking occupancy in suburban locations without public transit service but with ample free parking. This inflated the perceived demand, especially in areas where there was existing transit, walking, or bicycling options. Precise, off-the-shelf numbers look scientifically derived, but are actually flawed and statistically insignificant.

Similarly, LOS ranges were not determined from exhaustive empirical investigation of drivers' perceptions (Kittelson, 2000 and Kittelson and Roess, 2001; TRB, 2008). Most LOS studies were hypothetical simulations at best, invented by the Federally-sponsored Highway Capacity and Quality of Service Committee of the Highway Research Board in the early 1960s, and modified over time by a small group of traffic engineering consultants. Recent empirical studies of driver perception and LOS have attempted to correct for the lack of user survey data but have found extreme levels of variability and inconsistency. Surveys or focus groups, video-based experiments, and in-vehicle field studies (whereby drivers were asked to speak aloud about their perceptions of the experience) have concluded that LOS estimates computed by traffic engineers are different from public opinion (Flannery et al., 2006). One study found that motorists did not perceive six-scales of delay (A–F), but instead thought in terms of three: "good," "marginal," and "poor" (Fang et al., 2003). Other studies conclude that motorist perception of the quality of an intersection is highly variable and influenced by trees, aesthetics of the surroundings, the size of other vehicles such as SUVs and pick-up trucks, pavement quality, and aggressive driving (Flannery et al., 2006; Ko et al., 2006; Lee et al., 2007; Pecheux et al., 2004).

In sum, and in comparison to parking standards, LOS can hinder long-range goals of sustainable transport policies that center on transit, walking, and bicycling and that aim to reduce VMT. In built-out cities like San Francisco, adherence to LOS conflicts with other spatial planning goals such as the transit first policy which states that decisions about the city's streets should prioritize buses and light rail, and the city's bicycle plan, which calls for bike lanes and other facilities to replace automobile lanes on many streets. In the remainder of this paper I examine efforts to reform LOS and the politics surrounding those efforts in San Francisco, which is a city poised to be at the leading-edge of the movement to rethink urban space and the automobile.

## 3. Reforming LOS

In recent years a national "complete streets" movement has emerged to rethink traffic engineering and automobility in the United States.[5] The complete streets concept includes providing

[5] The National Complete Streets Coalition is made up of an array of professional societies and national advocacy organizations ranging from the America Association of Retired Persons (AARP), to the Institute of Transportation Engineers and Smart Growth America (see http://www.completestreets.org/who-we-are/).

wider sidewalks and bicycle lanes, improving transit stops with seating and aesthetic accoutrements, minimizing curb cuts and driveways, reducing turning radii at intersections, introduce bulb-outs and raised crosswalks, and including street trees, street furniture, and pervious surfaces for managing stormwater runoff. These are precisely the kinds of physical and geometric features that traffic engineers sought to remove from streets in order to have optimal LOS.

To provide a counterweight to the metric of automobile LOS, complete streets advocates urge the deployment of "multimodal LOS" metrics, such as measuring the quality of the pedestrian environment (sidewalk width, connectivity, curb cuts) or the transit system (frequency, crowding, service hours, dwell times) (McCann and Rynne, 2010). Recognizing this, the Transportation Research Board (TRB) (2008 and 2010) has proposed a new multimodal LOS for urban arterials and collector streets which will be included in the forthcoming fifth edition of the *Highway Capacity Manual* (*HCM*). It is hoped that the new multimodal LOS metrics will be quickly disseminated and adopted throughout the country.

Still using the six-letter grade schematic, the new multimodal approach allows planners to quantify the interaction between modes that share the same street and to test tradeoffs against one another. For example, the TRB (2008) envisions practical application for evaluating "road diets," or the conversion of a 4-lane arterial into a new configuration that reduces the motorized lanes, adds bicycle lanes and wider sidewalks, and a center turn lane – the bedrock of the complete streets movement. Multimodal analysis lets the planner model the re-allocation of lanes on a cross section profile of the street to compare different configurations and how they impact different modes.

A scan of the literature on multimodal LOS reveals little discussion about how to weigh automobile LOS against LOS metrics for other modes. The ITE (2006) offers a vague suggestion on how to balance different modes through consideration of geographic "context" such as whether the street is in a rural, suburban, or urban core setting. More recently, the TRB (2010) studied how the new multimodal LOS metrics would be received by local transportation agencies. Workshops were held in ten metropolitan areas and the results showed that local planning agencies were in need of strong guidance on how to deploy and interpret multimodal LOS comparisons. Many planning agencies were put-off by the expansion of more data collection to adequately evaluate each mode. The TRB study also revealed that many agencies, including bicycle-friendly Portland, preferred to keep the traditional automobile LOS standard as part of their milieu of planning tools.

The new multimodal LOS metrics will not revolutionize urban transportation planning. Hope that agencies adopting multimodal LOS standards will reform their use of automobile level of service standards is debatable given the impetus in traffic engineering to focus primarily on moving cars. Some agencies may decide that in some circumstances lower automobile LOS is acceptable in order to reach a satisfactory LOS for bicyclists, pedestrians, or transit. Places like Seattle, Washington, and Charlotte, North Carolina, have exhibited this possibility through relaxing, but not eliminating automobile LOS in very specific locations. Yet multimodal LOS does not explicitly call for the other modes to trump automobility in the decision-making process. The fifth edition of the *HCM* is not going to recommend dispensing with automobile LOS altogether, nor will it describe how to weight the various LOS metrics against one another. This will be left to the local political process. As discussed below, if San Francisco's local debate on reforming LOS is any indication, this will be a contentious undertaking.

## 4. The politics of rethinking LOS

Unlike the multimodal approach promoted by TRB and other national transportation organizations, in San Francisco transportation advocates steeped in a progressive political ideology have nudged planners and politicians to discontinue using LOS in both environmental review and routine traffic analysis. To some extent San Francisco seeks to leapfrog the multimodal approach outlined above. In San Francisco many political progressives believe in using government to discourage automobile use, in part by way of discontinuing the use of LOS. In deference to progressives, the city has proposed replacing LOS with an alternative metric, 'auto trip generation' (ATG) coupled with a schedule of impact fees on all new projects that produce additional car trips (from here on called ATG + 1).

The ATG + 1 proposal would change the environmental review process to evaluate any new development, such as housing or retail, in terms of the number of car trips it generates. A mitigation fee would be linked to every car trip produced. That fee would go into a citywide fund for all approved transportation plans, for such projects as bicycle lanes, bus rapid transit, or improvements to the existing street system. Still forthcoming (as of October 2010) is a nexus study, required by state law, to calculate the amount of the impact fee for each new car trip (and this will no doubt draw considerable debate, as described below). Critically, ATG + 1 would not penalize bicycle lanes or transit-only lanes because these would not generate car trips (Hiatt, 2006).

The proposal of ATG + 1 is consistent with progressive ideology in San Francisco, and it is important to note that the entire contestation of LOS, both in San Francisco and in the National Complete Streets movement, is mostly the consequence of progressive political activity. LOS is incongruent with the urban spaces progressive would like to see produced. Progressives believe that "we can choose how much traffic we have," as one executive director of a non-profit organization put it. Unlike conventional traffic engineers, sustainable transportation advocates in San Francisco are decidedly non-positivist. They believe that simply observing car movements and then extrapolating into the future is insufficient in an era of complexity and diversity. Instead progressives articulate wide, outside-of-the-box visions of planning centered on place-making, diversity, social justice, and sustainable transportation – sometimes called the 'livability agenda.' Progressives see streets as vital to democracy, inclusiveness and community building and not just for moving automobiles. Often their articulation is motivated by a moral discourse that links things like bicycling and walkable streets to good health, less pollution, and less dependency on oil.

Drawing from progressive ranks, San Francisco bicyclists have taken particular issue with LOS and have been at the forefront of advocating for its abolition. Their experience and frustration provides proponents of multimodal LOS with caution. As noted above, new multimodal LOS may allow tradeoffs to be analyzed, but ultimately the decision of which mode trumps is political. If moving cars is still the local priority, then the other multimodal LOS metrics will just be interesting data points. Beginning in the early 2000s San Francisco's bicycle advocates challenged LOS because of repeated frustration with the planning process for bike lanes, which were frequently blocked by LOS analysis (Snyder, 2008). As suggested earlier, removing a car travel lane and replacing it with a bicycle lane negatively impacts automobile LOS. Since the city defines this as a significant environmental impact, and the State requires that anything significant undergo environmental review, an expensive and time-consuming analysis must be undertaken anytime a bicycle lane might impact car space. Ironically

the environmental review process can end up costing more than the relatively inexpensive bike lane.

Technically the city may decide to approve the bike lane with a 'statement of overriding considerations' once the time-consuming analysis is complete. Historically however, few bike lanes actually made it to the environmental review phase because city planners quietly decided, with little public input or comment, that adverse impacts on automobile LOS were undesirable. In the meantime the city went for the low-hanging fruit mentioned earlier. Frustrated, bicycle advocates initiated their own investigation of the planning process and found that LOS was not borne out of a rigid state law. Nowhere did the law require automobile LOS to trump other street users or that the city even use LOS.

California does not mandate that delay be analyzed by localities as part of environmental review (Barbour and Teitz, 2005; California Resources Agency, 2005; Letunic and Ferrel, 2007, 2008). Localities must provide substantial evidence regarding what types of environmental analysis tools they use, but do not need to use LOS as a metric. San Francisco just quietly adopted LOS in the 1970s, as did most jurisdictions around the state and nation, without public input or discussion. The adoption was largely instigated by the State of California Office of Planning and Research, which provided guidelines to localities about how to conduct environmental review in the 1970s. Those guidelines virtually codified that delay at intersections was a significant environmental impact that must be analyzed and minimized. Since then, few had ever publicly questioned that LOS should be part of San Francisco's environmental review process until bicycle advocates bumped into it while seeking bicycle lanes in the late 1990s.[6]

By 2002 bicycle advocates were exasperated at the unwillingness of city officials to implement bike lanes on many streets, and they convinced some of their progressive allies on the San Francisco Board of Supervisors to direct the San Francisco County Transportation Authority (SFCTA) to conduct a review of LOS and make recommendations on how to reform or replace it. The directive resulted in a report in late 2003 that stated that San Francisco's use of LOS was in direct contradiction to the City's official transit first policies (SFCTA, 2003). However, planners were dubious about simply abolishing LOS without a suitable replacement, and so 7 years went by with little movement on the issue (It should be noted that at this point there was no guidance from the TRB, which published its multimodal LOS approach in 2008 as a preview for the 2010 *HCM*).

To be clear, San Francisco can discontinue using LOS because California environmental law allows local governments to define the metrics of analysis for the environmental impacts of traffic.[7] Instead of dictating a one-size-fits-all approach, the State authorizes local governments to adopt by "ordinance, resolution, rule or regulation" their own "objectives, criteria, and procedures for the evaluation of projects" (California Governor's Office of Planning and Research, 1994, Section 21082). Furthermore the San Francisco Administrative Code delegates the defining of environmental impacts to the San Francisco Planning Department staff. Historically the San Francisco Planning Department opted to use the LOS metric in the aforementioned *Highway Capacity Manual*, by way of State advice, and did not come up with its own location-specific metric.

To make a formal change, the planning staff within the Planning Department's environmental review unit officially puts forward new or revised metrics. Technically the initial adoption of metrics can be done internally, but to make a significant change that overturns decades of precedence – as is the case with replacing LOS – the new metrics must be approved by the City Planning Commission, a seven-member body made up of three appointees from the San Francisco Board of Supervisors, and four appointees from the Mayor. The new metric must have data showing how it addresses environmental impacts and thus must have data-driven justification. Other city agencies such as the Department of Health, Department of the Environment, and the two city transportation agencies can comment on proposed changes.[8] Agencies beyond the city, such as the California Department of Transportation, may also comment. The public is provided opportunity to comment through formal hearings or by mail. The new metrics are approved or denied by the Planning Commission and any decision can still be appealed to the State Superior Court. Regardless, the mechanics of replacing LOS begins locally, and, as conveyed here, the local political process includes deep ideological conflict over how street space should be organized and configured.

Space does not allow a play-by-play narrative as to why it has taken so long to reform LOS in San Francisco despite momentum, but several salient points should be made. First, bureaucratic inertia is a point argued by many of the interviewees for this research, most of whom wish to remain anonymous. They stress that lack of interdepartmental coordination, competing objectives, bureaucratic fiefdoms, and inconsistent priorities as barriers. For example, 'old guard' traffic engineers, tenured with civil service and having allies in political decision-making positions, believe their mission is to move cars swiftly and efficiently, and cling to LOS. Others point out that traffic engineers defend LOS because it is also an indicator of transit delay. That is, intersections with poor LOS are going to impact buses [this however, would be remedied by exclusive bus lanes and other transit priorities that are often themselves thwarted by LOS]. Other transportation planners, empathetic to the desires of progressives, believe that there is no legally defensible evidence to replace LOS because of a 30-years precedent in existing environmental decisions. The inertia is too strong to change. Rounding out the bureaucratic inertia is what many interviewees called 'laziness' within the transportation planning bureaucracy. That is, as one anonymous interviewee put it, "It is not that other metrics aren't available, it is that planners and consultants are lazy and want to minimize their work." This last statement was a surprisingly common sentiment. Regardless, bureaucratic inertia sustains the use of LOS as of late 2010, despite an 11,000 member, politically potent local bicycle coalition and a progressive majority on the local Board of Supervisors.

The confusion over reform intensified when the San Francisco Board of Supervisors, San Francisco's legislative body, unanimously adopted the city's bicycle plan in June of 2005, only to be met with a stiff injunction against the plan 1 year later. The board, not versed in the nuances of LOS or the broader environmental review process, assumed that bicycles were environmentally benign and assumed that no judge would throw out a bicycle plan on environmental grounds. Moreover, the litigant in the case, a widely known disgruntled conservative gadfly who berated bicycling, was not taken seriously at the time (Dvorak, 2008). The California Superior Court, however, agreed with the litigant that an adequate environmental review including LOS was not undertaken. The court compared the bike plan to a clear-cutting strategy in logging, alluding that timber companies often propose to cut clusters of trees in isolation to minimize environmental harm, but cumulatively they end up logging an entire forest. In the case of the bicycle plan, each

[6] Ironically, in the early 1980s progressives actually used LOS to contest new office towers in downtown San Francisco. In this instance LOS was used as evidence to help establish impact fees on new office towers (Hestor, 2008).

[7] This applies only to city-owned streets. State-owned streets are subject to State analysis.

[8] This is a simplified breakdown of the process. It should be reminded that the original impetus for LOS reform came from bicycle advocates, who lobbied the San Francisco Board of Supervisors, which then directed the San Francisco County Transportation Authority to study new ways of measuring traffic. That study was then sent to the planning department for the formal revision process which continues.

bicycle lane might seem benign, but cumulatively the plan could cause extensive delay to motorists – a potentially significant environmental impact against existing automobile traffic conditions.

San Francisco's bicycle plan was enjoined against "any signs, pavement markings, or making any other change to any street, traffic signal, building, sidewalk, or other land use or other physical feature in San Francisco to implement the plan or any part of it" (Superior Court of California, 2006). All parties (except the litigant) felt that the Superior Court Judge was too harsh but political paralysis and finger-pointing ensued. Instead of aggressively replacing LOS, extreme caution and reluctance to redefine possibilities became the norm. One local politician concluded that the fear surrounding LOS made "San Francisco a city that has perfected inaction" (Radulovich, 2008).

In August 2010, the injunction against the bicycle plan was lifted after the court accepted the environmental impact report's analysis of LOS, but LOS reform has not occurred. Fear of litigation against proposed changes from LOS to ATG + 1 remains high despite strong evidence that ATG + 1 is a reasonable replacement metric. What is most significant is that, while there is a progressive majority on the San Francisco Board of supervisors, and progressive planners in the key agencies that oversee land use and transportation, sustainable transportation advocates and the broader progressive movement in San Francisco have not been able to muster their political capital to change how street space is allocated.

What may tip the political momentum towards progressive rethinking of LOS is San Francisco's neoliberal developer class, which is cognizant of the role mobility has in maintaining the exchange value of the city. Empathetic to the regional sustainability goals of reducing VMT through urban infill and compact development, San Francisco's neoliberal developers are poised to construct thousands of new housing units in downtown and in the inner neighborhoods surrounding downtown. Neoliberal developers have long been frustrated with the burden of environmental review, and particularly LOS analysis. As the City enables upwards of 120,000 new housing units in the next several decades, LOS will complicate planning. If developers are to maximize profits it behooves them to support abandoning LOS, otherwise the environmental review process will be lengthy and expensive. For example, the environmental review for one plan that included proposals for 6000 new housing units took almost 4 years and was largely delayed because of LOS (Karlinsky, 2008). Neoliberal developers also have an interest in avoiding adoption of multimodal LOS, since in San Francisco they will be billed for the extensive studies for each mode.

As progressives continue to lobby for changes in how San Francisco analyzes streets, neoliberals in San Francisco's development industry have taken notice, and this might be the key to finally abolishing LOS and adopting ATG + 1 in the environmental review process. An indication of the developer industry's support for abolishing LOS is the position of the San Francisco Planning and Urban Research Association (SPUR), a prominent think tank made up of developers, attorneys, architects and planners, as well as an assortment of transportation industry experts. The official position of SPUR is to rethink LOS (SPUR, 2004).

This tacit alignment of neoliberalism and progressivism reflects a broader trend whereby sustainable transport organizations have had to be innovative and work within the parameters of a neoliberal political economy in order to produce socially good outcomes. Aside from a possible alignment on abolishing LOS, many progressive are aligned with neoliberals on other transportation measures such as reduced parking standards and improved mass transit. This echoes the politics of mobility in London and New York, where progressives have promoted the neoliberal concept of congestion pricing and reducing car space (In San Francisco, many progressives endorse the concept of congestion pricing as well.)

To be sure, among San Francisco progressives there is deep suspicion of the wider neoliberal agenda, particularly regarding gentrification and developers paying for the impacts of new growth. Therefore, a critical juncture for abolishing LOS and replacing it with ATG + 1 will be the debate about the amount of the impact fee per automobile trip generated, and over what number of new automobile trips merits an environmental review. If neoliberals believe the proposed fee is too high, or that the threshold of automobile trips is too low, they could abandon support for LOS reform or at least attempt to block adoption of ATG. Meanwhile if progressives believe the fee is too low, or the threshold of automobile trips is too high, the tenuous progressive-neoliberal détente on mobility could also become frayed. Already there is worry that a fee on each car trip could be construed as anti-car and that many motorists will oppose the measure. For neoliberals the issue is how much the ATG + 1 fee puts a dent into their profits. The last point has been affected by the ongoing financial crisis which has resulted in limited new housing construction in the city. Neoliberal developers who accepted exactions and impact fees during economic boom years have turned hostile to more fees.

The proposed range of ATG + 1 fee rates will not be known until the San Francisco Planning Department conducts a comprehensive study of parking and trip generation impacts in the city, as required by state law, and which is currently in its early stages and might be several years from completion. But it should be assumed that progressive and neoliberals will continue to engage in a politics of mobility over the next few years as this fee is studied, and then debated, as part of the wider rethinking of how street space is analyzed and configured in order to accommodate new growth. In the meantime the state has adopted a new climate change law, Senate Bill 375, *California's Sustainable Communities and Climate Protection Act*, which explicitly calls for reducing VMT by redirecting residential growth to compact urban centers. The bill's passage was the result of a political alignment between developers and progressives in the statewide environmental movement, and gives incentives to builders of compact developments. One incentive is a waiver for environmental review of traffic, including LOS. However the waiver is contingent upon a regional transportation plan that shows reduced regional VMT and greenhouse gas emissions, and the specifics of this strategy are just being finalized. Moreover, it does not eliminate LOS, it just waives using LOS in certain locations and only if the locality actually accepts that not using LOS is reasonable.

## 5. Conclusion

Despite the lack of finality, there is much to be gleaned from how San Francisco's debate about LOS is unfolding and it is probably safe to anticipate that some sort of change in how streets are analyzed and configured is forthcoming. San Francisco is on the vanguard for a new politics of street space. If progressive advocates, bolstered by neoliberal reurbanization of capital, are successful in abolishing LOS in environmental review it will be a critical precedent that leapfrogs the more incremental multimodal LOS approach proposed nationally by TRB and the complete streets movement. SB 375 shows there is statewide recognition that LOS impedes strategies to reduce VMT through compact growth and attempts have been made to revise the environmental review process pertaining to traffic analysis.

More broadly San Francisco also provides a poignant example for scholars, activists, and policy makers interested in how the challenges to the automobile have unfolded, and it provides an example for others to consider to situate their own struggles. Significantly, the San Francisco case study shows the power of bureaucratic inertia and the endurance of automobility. This has

implications for places that adopt a multimodal LOS with the hope that it leads to true reform. Will transportation agencies accept a much lower automobile LOS in order to reach an acceptable level of service for bicyclists, pedestrians, or transit or will the provision of more data lead to more studies but no real rethinking of streets? Local politics will determine that outcome.

San Francisco's dense development patterns, which resemble the configurations of smart growth, and the city's sophisticated transportation advocacy, with an 11,000 member bicycle advocacy organization, suggest that San Francisco is at the forefront of efforts to reallocate street space. However, the commitment in the city's transportation engineering profession to LOS results in reconfiguration efforts fraught with obstacles and contradictions. Despite an official transit first policy in San Francisco that states that street space should be prioritized for buses, bicycles, and pedestrians, cars continue to dominate most of the city's streets, and LOS is a key metric used to rationalize street space. The struggle to rethink that arrangement has been long and requires persistence and political will. And even as San Francisco is likely to replace LOS with ATG, it is anticipated that a second protracted political conflict will emerge between progressives and neoliberal developers over the fair exaction from the ATG + 1 metric. How this debate is negotiated will also be precedent-setting with respect to those interested in the broader objectives of reducing VMT and encouraging compact development.

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