Evaluating Two Key Concepts behind Complete Streets:
Viability of TSM and TDM to Complete Los Angeles’ Streets

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Executive Summary

While increasing the available supply of roadways has been the traditional response to growing travel demand, there are alternative methods to utilize available capacity more efficiently. The Los Angeles Department of Transportation has prepared this white paper on the ability of Transportation Systems Management and Transportation Demand Management to provide a cost-effective alternative to costly capital projects (Judycki &Berman, 1992). Furthermore, this paper provides guidelines for the MTA to expand Los Angeles’ Complete Streets programs using TSM and TDM based on review of relevant literature and case studies.

Freeway supply-side TSM strategies include HOV lanes, real-time traffic information for motorists, and meter signalization at on-ramps (Judycki &Berman, 1992). TDM is a refinement of TSM strategies that are demand-side projects which aim to decrease automobile demand typically by shifting demand to other times of the day or by increasing vehicle occupancy (Judycki &Berman, 1992; SCAG, 2011). Research shows that TSM/TDM projects can reduce travel demand by 10-20% (Ferguson, 2000). The concept of Complete Streets provides critical support to implementing successful TDM and TSM strategies. Complete Streets programs emphasize the incorporation of multi-modal streets that are safe and accommodating for pedestrians, bicyclists and pedestrians.

Guidelines for the MTA to utilize when implementing TSM/TDM as a part of a complete street program for LA include: creating a Multi-Modal Level of Service, defining goals that are local in nature, engaging the private sector early, collecting data on pedestrians and bicycles, and conducting surveys of users of the TDM/TSM program to refine the program.
Introduction

As cities face budget constraints and demand for travel continues to increase, it is critical to examine more efficient methods to use existing roadway capacity. Traditional methods of transportation engineering and planning focused on increasing the supply of roadways to accommodate more travel and improve mobility. This overemphasis on capacity leads to an inefficient distribution of resources, fails to address the transportation needs of vulnerable populations, and is not responsive to demand (Ferguson, 2000). Managing travel demand and seeking efficiencies in the current roadway system is an alternative strategy that provides a more cost-effective method to accommodate growth in travel. The City of Los Angeles can expand their Complete Streets program through Transportation System Management (TSM) and Transportation Demand Management (TDM) tools that can be leveraged to reduce vehicle trips and prioritize alternative modes of transportation.

Complete streets programs “ensures that all transportation planners and engineers consistently design and operate the entire roadway with all users in mind” (National Complete Streets Coalition, 2010). Complete Streets offers a policy framework to implement cost-effective TDM and TSM programs that reduce vehicle trips without investing in capital-intensive capacity improvements. TDM/TSM can act in conjunction with Los Angeles’ Complete Streets agenda to achieve the goals of creating a unique design for each street that provides safer streets for all modes. In the following paper I will outline how the City of Los Angeles can use TSM and TDM programs to manage increasing travel demand cost-effectively without increasing roadway supply, as well as leveraging these tools to expand the City’s Complete Streets program.
TSM and TDM

Transportation System Management

TSM actions are typically supply-side projects that aim to increase capacity on facilities (Judycki & Berman, 1992). TDM is a subsection of TSM, in which travel demand is managed by influencing travel behavior (Ferguson, 2000). TSM and TDM provide a cost-effective alternative to costly capital projects. With the projected growth in travel in urban areas, it is critical to ensure that present capacity is being maximized (Judycki & Berman, 1992). TSM originated as a method to develop capital-intensive projects in a short period of time (Ferguson, 2000). TSM focuses on the transportation facility (such as signalization). The primary function is to improve the management and operation of automobiles and roadways to ensure a more efficient use of existing facilities (Choudhury, n.d.). Supply-side TSM strategies include High Occupancy Vehicle (HOV) lanes, real-time traffic information for motorists, and meter signalization at on-ramps (Judycki & Berman, 1992). TSM strategies have been met with varying success depending on the social and political climate. Each project should be tailored to suit the needs of the transportation corridor or facility in question.

Another TSM strategy, High Occupancy Vehicle (HOV) lanes, promotes ridesharing and transit. For HOV lanes to be successful, the freeway corridor must be congested and already be used by travelers in high-occupancy vehicles (Dahlgren, 1995). While HOV lanes have shown to increase capacity, they must be undergone with caution since they are not equally effective along all freeway corridors and can be politically infeasible (Dahlgren, 1995). HOV lanes can only be cost-effective if they are well utilized, and can be a source of social and political contention if they are underutilized.
Traffic engineering TSM such as signalization, reversible traffic lanes, and one-way streets have reported benefits of reducing automobile accidents and improves capacity (Judycki & Berman, 1992). Traffic signal optimization is implemented to reduce congestion along the roadway, is among the most cost-effective strategies to manage capacity, and also has widespread support (Ferguson, 2000; Judycki & Berman, 1992). While each of these TSM strategies have fluctuating costs, both monetarily and politically, it is widely held that the benefits of these improvements outweigh the costs (Judycki & Berman, 1992).

Transportation Demand Management

Supply side TSM activities aim to increase capacity on the facility whereas TDM is a refinement of TSM strategies (Judycki & Berman, 1992). TDM’s primary goal is to reduce congestion and air pollution (Ferguson, 2000). TDM projects are demand-side projects which aim to decrease automobile demand typically by shifting demand to other times of the day or by increasing vehicle occupancy (Judycki & Berman, 1992; SCAG, 2011). To do so, TDM attempts to influence the behavior of people traveling (i.e. through road pricing or carpooling) (Choudhury, n.d.).

One common and cost-effective TDM strategy is a rideshare program. Ridesharing programs may be implemented in a variety of ways such as providing carpool-matching services online, or vanpools provided by local governments and employers (Choudhury, n.d.). In addition, a ridesharing program can support the success of HOV lanes and reduce vehicle trips (Judycki & Berman, 1992). Incentives often strengthen TDM programs as a means to encourage behavior change. To incentivize the
use of ridesharing programs, preferential parking could be provided at businesses, HOV lanes could be made available on congested freeways, or the city could sponsor vanpools.

Parking management is another TDM strategy. Actions that would curb the demand for parking include restricting on-street parking, proliferation of parking meters, and priority HOV parking (Judycki & Berman, 1992). In conjunction with a rideshare program and HOV lanes, managing parking demand can be an effective measure to reduce vehicle trips. It can also provide monetary benefits to the city through increased parking revenue from on-street parking meters. For example, the Los Angeles Department of Transportation has a recent initiative, LA Express Park, that is an innovative approach to pricing parking in Downtown Los Angeles. This demonstration project aims to decrease congestion and pollution by using technology to price parking based on demand (LA Express Park, 2012).

Other TDM projects do not have as successful of a track record as ridesharing and parking management. TDM does not function well on a regional scale because of their localized impact, thus TDM actions such as flexible work hours and regulatory initiatives are unlikely to be successful in reducing congestion or SOV use (Ferguson, 2000). In fact, flexible work hour programs may not result in significant congestion reduction because many workers who currently have flexible hours still choose to commute during peak hours in order to participate in non-work, personal activities (Picado, 2000).

TDM is most fruitful at the activity site scale, reasonably effective along a corridor, and seldom successful on a regional scale (Ferguson, 2000). Thus, TDM addresses congestion better than air emissions because congestion is more concentrated along specific corridors and intersections than is air pollution (Ferguson, 2000). TDM
may be successful in reducing congestion; however reducing congestion increases the available capacity on the system. This may cause latent demand for travel and thus air quality benefits may not be achieved as more trips are taken due to the increased capacity (Ferguson, 2000).

TDM is frequently cheaper than TSM projects because they do not require capital costs, yet they are more difficult to implement because benefits and costs are harder to measure and they are less politically palatable because they involve pricing and behavior changes (Ferguson, 2000). Also, while TDM does not have capital costs, costs include labor, time, and political will (Ferguson, 2000). TDM frequently requires the participation and funding of private agencies in order for programs such as carpooling, parking management to thrive (Ferguson, 2000). However, private sector involvement in TDM programs that target the transportation system (i.e. origins and destinations) are often ineffective, yet there could be a place for public private partnerships in TDM programs that focus on an activity system (i.e. social and economic patterns) (Ferguson, 2000; Manheim, 1979).

Benefits of TDM and TSM Strategies

According to the literature, TDM programs can cause travel demand patterns to change up to 10-20% (Ferguson, pg. 298, 2000). However, compared to capital-intensive capacity improvement projects, quantifying the costs and benefits for TDM/TSM is more difficult (Ferguson, 2000). These programs are often linked to other policies, such as Complete Streets, making evaluation of its effectiveness difficult to tease out from the
overarching policy goals (Ferguson, 2000). This uncertainty represents a great barrier to successful implementation of TDM/TSM strategies.

The most cost-effective programs in an urban area include a blend of both TDM and TSM though signalization, HOV lanes and ridesharing (Ferguson, 2000). In combination with an aggressive TDM public outreach campaign, employee participation in ridesharing, and resources to connect with carpools, TSM projects like HOV lanes can lead to much greater benefits (Mid-Ohio Regional Planning Commission, 2012). Ridesharing programs are a critical component to the success of TSM strategies such as HOV lanes and parking regulations. A 5-10 percent shift in mode choice can be achieved solely through marketing endeavors and the benefits can far outweigh the costs 12 to 1 while reducing trip making by 20 percent (Ferguson, 2000).

However, while signalization has been widely accepted, HOV lanes and ridesharing programs have received mixed reviews (Ferguson, 2000). The success of TSM and TDM strategies depends on the viability of alternative modes of transportation. It is critical to invest in transit, pedestrian, and bicycle improvement projects so that mobility is not sacrificed in order to decrease travel demand. Thus, expanding the City’s Complete Streets program to understand priority locations to implement certain TDM and TSM projects will achieve the goals of Complete Streets.

**Complete Streets, TSM and TDM**

Traditional roadway design has emphasized providing mobility to the automobile, while neglecting other modes of mobility such as walking, biking, or transit (LePlante & McCann, 2012). The planning process has relied on measures of effectiveness such as Level of Service (LOS) to assess a project’s success, which does not measure mobility
for alternative modes (LePlante & McCann, 2012). However, Complete Streets programs aim to change the way roadways are designed to better accommodate alternative modes and create safer environments.

As cities decide how to provide for increasing travel demand and shift focus from auto-oriented streets to multi-modal streets, Complete Streets programs can provide a policy framework to promote multi-modal, safe streets. Cities are increasingly turning toward TSM and TDM as cost-effective tools that reduce Single Occupancy Vehicle (SOV) use and offer safer streets to provide more “complete” streets.

TDM and TSM encourage alternative transportation options such as walking, biking, and transit to reduce vehicle trips and increase roadway capacity. Safety is another central goal of Complete Streets programs. One of the primary methods of increasing safety in transportation facilities is to decrease speeds (LePlante & McCann, 2012). Decreasing speeds reduces traffic accidents while also making the environment more pedestrian and bicycle friendly. Decreasing speeds can be achieved through various TSM strategies. Traffic calming can be attained through removing free flow right turn lanes or implementing road diets—which decreases the number of available lanes and can provide space for a bike lane or landscaping (LePlante & McCann, 2012).

Recent Examples of Complete Streets and TSM/TDM

Arlington County, Virginia leveraged TDM and TSM strategies to improve their communities through a Complete Streets program (Arlington County, 2007). Arlington County realized that in order to make their Complete Streets initiative successful, they had to encourage a greater commuter mode-split (Arlington County, 2007). Thus, Arlington’s TDM measures included reduced parking requirements for development,
travel surveys and evaluations of TDM to improve the programs, and extensive promotion of rideshare programs (Arlington County, 2007). TSM actions included traffic signalization, transit signal preemption, and providing real-time traffic information (Arlington County, 2007). To measure the performance of these projects, the County moved away from the traditional LOS model that emphasized SOV mobility, and developed a Multi-Modal Level of Service (MMLOS) that took into account the quality of service for alternative modes of transportation (Arlington Master Plan Streets Element, 2011). First, data on pedestrian and bicycle amenities and behavior had to be collected. Through a sidewalk inventory, documenting pedestrian and bicycle behavior, and studying the safety of the roadways, they were able to create a MMLOS to measure the performance of their streets for alternative modes.

In another example, the Mid-Ohio Regional Planning Commission also began to place importance on their Complete Streets programs as a policy for safer, more walkable and bikeable communities (Mid-Ohio Regional Planning Commission, 2012). The Planning Commission worked early to form partnerships with employers and private companies (such as Hertz) to fund vanpool programs (MORPC, 2012). They then created a website that matched people traveling to similar destinations in order to facilitate carpools. To overcome the initial unpopularity of carpool programs, the County offered a Guaranteed Ride Home Program to allow for more flexibility (Mid-Ohio Regional Planning Commission, 2012). Also, the Commission led an aggressive marketing campaign of their TDM strategies to inform the public of the alternative modes of transportation available.
Success in TDM programs is often a moving target, thus, they do continual efforts to improve their programs by conducting user and employer surveys and the input is used to fine-tune their strategies (Mid-Ohio Regional Planning Commission, 2012). Their efforts paid off as they achieved a five percent reduction in SOVs during the peak hour (Mid-Ohio Regional Planning Commission, 2012).

These case studies highlight successful TDM and TSM programs that reduce SOV use while promoting the application of Complete Streets programs to make streets safer and multi-modal friendly. After consideration of the literature that describe successful TDM/TSM and evaluation of these case studies, the City of Los Angeles can use these insights to expand their programs.

**What this Means for Los Angeles- Context Sensitive Guidelines for the MTA**

Goals of the Complete Streets program must be clearly defined in order to target which TDM/TSM projects to implement. Furthermore, since TDM/TSM projects work best at a more localized level because of their local effects, projects should be tailored to each environment. In order to determine which strategies to implement and where, the MTA should undergo a data collection effort to inventory for the system’s safety, walkability and bikeability. Data collected can be used to expand project evaluation from LOS to include standards for pedestrians, biking, and transit by creating a Multi-Modal Level of Service (MMLOS) (LePlante & McCann, 2012).

TSM programs such as road diets and traffic calming have proven to be successful in achieving the safety goals of Complete Streets. HOV lanes, while politically controversial, can be effective in reducing SOV trips along certain corridors that are congested and have existing HOV users. In conjunction with carpooling programs, HOV
lanes can reduce trip making by 20 percent and should be implemented along congested corridors with pre-existing HOV users (Ferguson, 2000). Also, signalization should be adopted where possible because it is widely held as a popular method to reduce congestion at a low-cost. Additionally, the MTA should engage the private sector early on for successful implementation of TDM strategies such as carpooling and parking management (Ferguson, 2000).

In order to reduce vehicle trips, alternative options, such as carpools must be made available, but driving must also be made more difficult (Taylor, 2012). Increasing the price of parking and adding more on-street parking meters is another successful TDM strategy to reduce congestion. TDM programs evolve over time and change the nature of travel behavior. Therefore, they require constant monitoring and altering as more is learned about traffic behavior and as the available capacity of the roadway changes throughout the lifetime of the project. Thus, the MTA should devote a portion of time and resources to conducting surveys and outreach to users of the programs.

**Concluding Remarks**

Key factors in successful implementation of a Complete Streets program is to engage the private sector early, expand project evaluation from LOS to a MMLOS, revise TDM programs based on survey results, and tailor each TDM/TSM strategy to the corridor or area in question. Not every street in Los Angeles is a candidate for a Complete Streets project, and not every TDM/TSM strategy will be successful along every corridor. An HOV lane along a corridor that is not already congested and does not have a large proportion of HOV users will not be a successful TSM project (Dahlgren, 1995). TDM programs such as flexible work hours, e-commuting, or carpooling must
be implemented on a local level in conjunction with specific employers (Ferguson, 2000). Each TDM/TSM strategy must be evaluated on a street-by-street basis in order to evaluate its capacity to “complete” the corridor and reduce SOV trips or improve safety. The capability of a Complete Streets program to successfully use TSM and TDM strategies depends on the viability of alternative modes of transportation. It is critical to invest in projects that encourage and provide attractive alternative modes of transportation so that mobility is not sacrificed in order to decrease SOV travel demand. Investing in TDM/TSM projects can accommodate an increase in travel demand without major capital investments and help to complete certain streets in Los Angeles’ roadway network.
Bibliography


