Analysis of Freeway Operational Strategies Related to the Use of Managed Lanes by Trucks

Technical Memorandum #3: Strategy Development

TO: Andrea Hoff and Christina Casgar, SANDAG
FROM: CH2M HILL, IBI Group, Cheval Research
DATE: January 18, 2013; Revised June 3, 2013

This memorandum summarizes the preliminary set of potential truck management strategies for the San Diego region, and describes how this set of strategies was developed. The resulting strategies were developed considering findings from the literature review, the study team’s professional experience, feedback from SANDAG and the Project Study Team (PST), and comments from regional trucking industry and cross-border trade representatives. The strategies identified herein will be further refined and developed in future phases of this study and serve as a starting point for further analysis and review as the study proceeds.

Strategy Development Process

In December 2012, the study team prepared Technical Memorandum #1: State-of-the-Practice for Managing Trucks on Freeways and Managed Lanes and Applications for the San Diego Region. This memo contains a review of literature to identify truck management strategies that have been studied or applied in domestic and international locations. The review included:

- A brief overview of the SANDAG 2050 RTP Goods Movement Strategy (adopted in October 2011) as it relates to trucks.
- A summary of the current regulatory framework in California as it relates to the use of managed lanes by trucks.
- A description of types of truck management strategies that are being studied or have been implemented in other locations.
- Identification of dedicated truck facilities and truck lane projects that are existing, planned, or being studied.
- Findings from a review of 19 research documents and government reports as they relate to the use of trucks on managed lanes and truck management strategies.

Also in December, the study team prepared Technical Memorandum #2: Issue Identification which identified a list of issues associated with truck management and operational strategies. The memo included:
• The regional context for truck movements in San Diego and a problem statement for the study developed in close coordination with SANDAG.

• Potential issues to be considered and evaluated during the study, including issues related to planning, policy, safety, operations, user acceptance, engineering, and cost/funding.

• Classifications of trucks based on Gross Vehicle Weight Rating (light vehicles: up to 14,000 lbs; medium vehicles: 14,001 – 26,000 lbs; heavy vehicles: 26,001 lbs +)\(^1\).

• Categorization of truck trip types based on origin and destination (local, regional, long-haul).

PST meetings were held on November 28, 2012 and on January 9, 2013 to discuss the preliminary list of issues and truck management strategies:

• During the Nov. 28 meeting, the topics discussed included: Literature Review, Preliminary Data Review, Strengths-Weaknesses-Opportunities-Threats (SWOTs) Analysis, and Draft Problem Statement.

• During the Jan. 9 meeting, the topics discussed included: Summary of Potential Issues for Analysis, Categorization of Truck Types, and List of Truck Management Strategies.

A list of ten strategies were initially developed then narrowed down to seven broad truck management strategies, which are carried on to be further analyzed as the study proceeds. The following section describes these strategies.

**Strategy Descriptions**

Based on these efforts and the associated input from the PST, the study team defined and developed an initial set of ten potential truck management strategies. The strategies represent a rough hierarchy ranging from simple to more complex, as shown in Figure 1.

**FIGURE 1: HIERARCHY OF TRUCK MANAGEMENT STRATEGIES**

<table>
<thead>
<tr>
<th>Simple</th>
<th>Complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Demand-Side (Change Travel Patterns)</td>
<td>• Supply-Side (Change Infrastructure)</td>
</tr>
<tr>
<td>• Trucks and Autos Mixed</td>
<td>• Trucks and Autos Separated</td>
</tr>
<tr>
<td>• Near-Term (1-10 years)</td>
<td>• Long-Term (20+ years)</td>
</tr>
<tr>
<td>• Addresses light-moderate safety &amp; congestion conditions</td>
<td>• Addresses more extreme safety &amp; congestion conditions</td>
</tr>
</tbody>
</table>

Each of the ten potential strategies is summarized on the following pages. Each numbered item represents a strategy concept, with the additional information that follows representing

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\(^1\) Additional categories of truck classification, such as the number of axles and truck lengths, will also be considered as part of this study.
variations/options for that strategy and related thoughts and considerations. The unconstrained list of ten strategies was narrowed down to seven strategies after a fatal flaw review by the PST. Three strategies were found to either be redundant and could be included within other strategies, or found to be inadequate to improve truck mobility in the region. The remaining seven strategies will be refined for evaluation purposes later in the study in order to identify those strategies that are most applicable to the San Diego region. The initial ten strategies are described in the following section. After each strategy discussion, there is a brief summary of comments that were received from the PST and stakeholders.

The PST and stakeholder feedback is not meant to provide a comprehensive analysis of the strategies, but rather highlight some key ideas or concerns that surfaced during project meeting discussions.

1.) Base-Case Scenario (Do Nothing)

**Description:** Consider what the future looks like for goods mobility in the region if no new actions are taken to address truck mobility. The costs and benefits of all other strategies will be compared to the base case.

**Relative Cost:** No cost with respect to strategy implementation, but significant and growing costs to the trucking industry with respect to the impacts of congestion on travel mobility and reliability.

**Timeframe:** Not applicable.

**Potential Issues:** This strategy does not address the problem statement; current and future truck bottlenecks would remain.

**PST and Stakeholder Feedback:**
- It is useful to have the base case scenario included to understand what will happen if no new actions to improve truck mobility are taken.
- It will also be important to understand the problems that exist today. Fix those first, and then focus on planning to alleviate future anticipated problems.
- While this study should help to document future conditions, it can be unusual for the trucking industry and other stakeholders to try to think of planning 40 or so years in advance. It will be important to glean this information from the trucking industry stakeholder interviews.
- It will be important to ensure that the recommended strategies apply to the truck types and truck trip types most common in the San Diego region.

2.) Traffic Organizational Strategies at Freight Gateways & Distribution Hubs
Description: This strategy includes coordinated strategies to optimize truck traffic flow at key locations. The strategies implemented could range from simple to more complex and include:

- Intelligent Transportation Systems (ITS)/Communication strategies, such as the use of variable message signs and 511 announcements to provide real-time information to truckers to help them avoid congestion and bottlenecks.

- Infrastructure-based strategies, such as dedicated trucks lanes or facilities in key bottleneck locations.

Relative Cost: The communication-based strategies are comparatively low in cost, as the strategies are not as capital-intensive as some of the other strategies. System enhancements to upgrade the timeliness and accuracy of real-time traveler information in the San Diego region could be more expensive. Infrastructure-based strategies would be more expensive.

Timeframe: Short (0 to 10 years); Mid-term (11 to 20 years), and long-term (over 20 years)

- The communication-based components of this strategy could be implemented in the short-term. The infrastructure based components of this strategy would require longer planning windows and would be best implemented in the medium- to long-term.

Potential Issues: This strategy could include implementation on some local arterials (in addition to highways) where conditions merit.

PST and Stakeholder Feedback:

- The communication/ITS components of this strategy are an “easy win” (meaning high benefits for low cost) and would also likely have strong community acceptance. For example, in Barrio Logan residents are advocating for specific truck routes through their community and this strategy could assist with that goal.

- Using strategies on arterials will protect neighborhoods and would be a good transition to the broader issue of trucks on managed lanes and other freeway operational strategies.

- Consider developing a planning-level toolbox for local jurisdictions (designating truck routes, truck parking and loading zones for trucks, etc). Also consider the use of communication strategies and real-time information at key locations.

- This strategy is similar to Strategy #10: ITS/ATM (see page 13) and could potentially be combined.

3.) Travel Demand Management Strategies to be Developed with Truckers and Shippers/Receivers

Description: This strategy involves working with shippers/receivers to facilitate the shifting of trucks to off-peak travel times through travel demand management strategies, potentially based on pricing incentives and fees. The focus is on shifting travel patterns rather than on capital investments.
Relative Cost: Fairly low, as the strategy is not capital-intensive.

Timeframe: Can be implemented in the near term (0 to 10 years).

Potential Issues:

- Off-peak schedules may increase labor costs for receivers (overtime).
- The strategy may not be feasible for all goods/deliveries, based on operating time windows for both truckers and delivery points. Shippers may also already be doing this, where possible.

PST and Stakeholder Feedback:

- A good example of a project where costs are distributed is PierPass (Ports of Los Angeles and Long Beach). Facilities charge a $120 Pier Pass fee to the shippers (Beneficial Cargo Owners) instead of the trucker. This is preferred since truckers are not well suited to function as collection agencies for fees that should really be charged to the shipper, and ultimately passed on to the consumer.
- Driver safety is a component of this as well as the need for truck rest stops. San Diego is somewhat of a cul-de-sac, due to its geographical location. Could the addition of truck stops in San Diego help shift truck travel patterns by making it easier for truckers to take their break in San Diego to avoid peak congestion periods?

4.) Trucks on the Planned Network of High Occupancy Vehicle / High Occupancy Toll (HOV/HOT) Managed Lanes (Full-Shared Access)

Description: This strategy would allow full unrestricted access of trucks on HOV/HOT lanes. Tolling options could include non-tolled, a flat toll, or a variable toll (based on time-of-day or travel speeds, etc). If tolled, the use of the lanes could be made optional, thereby continuing to allow trucks non-tolled access to the general purpose lanes. Figure 2 shows the Revenue Constrained Highway Network from the SANDAG 2050 Regional Transportation Plan adopted in October 2011 and Table 1 lists the facilities that comprise the full build out of this managed lane network.

Relative Cost: Significant, as trucks on managed lanes would require: construction improvements to accommodate trucks, including pavement thickness, entry and exit points, and revised incident management practices.

Timeframe: Mid-term (11 to 20 years) to long-term (over 20 years).

Potential Issues: Access issues for trucks entering and exiting the managed lanes (weaving issues across multiple lanes).
FIGURE 2: 2050 REVENUE CONSTRAINED HIGHWAY NETWORK – PROPOSED MANAGED LANES LOCATIONS

Source: 2050 SANDAG RTP (adopted October 2011), Figure 1.2, page 1-9
TABLE 1: 2050 REVENUE CONSTRAINED HIGHWAY NETWORK – PROPOSED MANAGED LANES LOCATIONS (TABLE)

<table>
<thead>
<tr>
<th>Facility</th>
<th># of General Purpose Lanes per Direction</th>
<th># of Managed Lanes per Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-5 between Oceanside and I-805</td>
<td>Generally 4</td>
<td>2</td>
</tr>
<tr>
<td>I-5 between I-805 and I-8</td>
<td>4 to 5</td>
<td>1</td>
</tr>
<tr>
<td>I-5 between I-15 and SR 905</td>
<td>4 to 5</td>
<td>1</td>
</tr>
<tr>
<td>I-15, south of the existing Express Lanes to SR 52</td>
<td>5</td>
<td>2*</td>
</tr>
<tr>
<td>I-15 between SR 52 and I-5</td>
<td>4</td>
<td>1**</td>
</tr>
<tr>
<td>I-805 between I-5 and SR 905</td>
<td>4 to 5</td>
<td>2</td>
</tr>
<tr>
<td>SR 52 between I-805 and SR 125</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>SR 54 between I-5 and SR 125</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>SR 78 between I-5 and I-15</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>SR 94 between I-5 and SR 125</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>SR 125 between SR 54 and I-8</td>
<td>3 to 5</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: 2050 SANDAG RTP (adopted October 2011), Figure 1.2, page 1-9

* - Moveable barrier to facilitate peak period operations (up to 4 express lanes in the peak direction of travel)
** - Between I-8 and I-805, the I-15 managed lanes would function as transit lanes only. Only transit vehicles would be allowed to use the managed lanes.

- Safety issues related to lane access and incident management on the managed lanes (particularly where only one managed lane is present).
- Operational issues related to traffic congestion and speed differentials (with the shared use of managed lanes by both autos and trucks).
- Engineering issues related to the use of managed lanes by trucks (e.g. impacts to pavement, direct access ramps, etc).
- Legislative issues related to existing truck speed and lane restrictions in California.

PST and Stakeholder Feedback:
- Current legislation would need to be revised to allow trucks of more than two axles in the HOV/HOT lanes.
- It is unlikely that this strategy will be acceptable to HOV drivers (even in off peak hours) due to safety perceptions and speed differentials between autos and large trucks.
- Can the direct access ramps be designed to accommodate large trucks?
- How would continuous access (i.e., no barriers) to HOV lanes affect truck accessibility? Some lanes are planned to have barriers, while others are not.
- There would be safety issues related to weaving if trucks have to merge across the general purpose lanes to access/exit the managed lanes.
- Incident management would be an issue for managed lane facilities with only a single lane.
5.) Trucks on the Planned Network of HOV/HOT Managed Lanes (Restricted Access)

Description:
Similar to Strategy #4, this strategy would also allow trucks on HOV/HOT lanes. However, truck access would be restricted to off-peak periods, off-peak directions, assigned to certain lanes, or certain truck types. Options for restricting access include:

- Off-peak use only (restrict truck access to off-peak periods).
- Non-peak direction of travel only (such as northbound away from San Diego in the AM peak, or southbound towards San Diego in the PM peak).
- Lane restrictions (trucks restricted to certain lanes in the HOV/HOT system when more than one lane is available). This could potentially involve the use of moveable barriers (such as on I-15) to allow for the use of trucks to use managed lane facilities during peak periods in the peak direction of travel.
- Restrictions by type, size, or weight of truck. For example, certain light duty trucks could be allowed to use the lanes, while larger trucks remain restricted.

Tolling options could include non-tolled, a flat toll, or a variable toll.

Flexible managed lane facilities could be made available with a prioritized hierarchy that reflects regional, state, and/or federal policy. As examples:

- Designating managed lanes for exclusive use by trucks may be too limiting at certain times and in certain locations, where flexible applications would yield greater overall benefits.
- During off-peak or non-commuting periods, pricing policies might allow or encourage lane availability to trucks (possibly at no charge) to induce truck traffic away from less desirable routes.
- Fees for truck access could be charged if there is a travel time advantage over other travel lanes and there are no attractive alternate routes.

**Relative Cost:** Significant, as managed lanes would be constructed to accommodate trucks from the standpoint of factors including pavement thickness, entry and exit points, and incident management.

**Timeframe:** Mid-term (11 to 20 years) to long-term (over 20 years).

**Potential Issues:**

- Access issues for trucks entering and exiting the managed lanes (weaving issues across multiple lanes).
- Safety issues related to lane access and incident management on the managed lanes (particularly where only one managed lane is present).
- Engineering issues related to the use of managed lanes by trucks (e.g. impacts to pavement, direct access ramps, etc)
- Legislative issues related to existing truck speed and lane restrictions in California.
- Public acceptance (HOV)
- Safety issues related to use of managed lanes that are buffer separated.

**PST and Stakeholder Feedback:**

- This strategy would be very difficult unless punitive measures are implemented for trucks using the road infrastructure during other times. Truckers often need to work the same hours as their customers, 8 am - 5 pm pattern and customers expect most deliveries during “normal” business hours. The only exceptions include long haul truckers and deliverers of certain perishables that travel in the middle of the night to be ready for an early morning market (fresh fish, meat, or other perishables). Any strategy dealing with operating times would need to take into consideration changing hours of service rules for truckers.
- Both Strategy 4: Trucks on Managed Lanes (Full Access) and Strategy 5: Trucks on Managed Lanes (Restricted access), have elements that are very troubling. Strategy 5, while difficult, may be a bit more implementable.
- Consider a restriction by fuel type. Incentivize trucking companies to use clean fuels by allowing hybrid and electric trucks to access the managed lanes.
- Consider a restriction by truck type or size. Perhaps smaller trucks could benefit from use of the managed lanes.
- Are the direct access ramps being designed to accommodate large trucks?
- There would be safety issues related to weaving if trucks have to merge across the general purpose lanes to access the managed lanes.
- Incident management would be an issue for managed lane facilities with only a single lane.

6.) **Designated Truck Lanes (Conversion of General Purpose Lanes)**

**Description:** This strategy would designate lanes for trucks along key corridors and locations, through the conversion of existing general purpose lanes. Trucks would be required to use the designated lanes; autos could be either permitted or restricted from the lanes. Tolling options could include non-tolled, a flat toll, or a variable toll. If tolled, the use of the lanes could be made voluntary by continuing to allow trucks non-tolled access to the general purpose lanes.
Relative Cost: Potentially significant, based on considerations including pavement thickness, number and type of entry and exit points, and incident management concerns.

Timeframe: Near-term (0 to 10 years) to mid-term (11 to 20 years).

Potential Issues:
- Community acceptance (removing general purpose lane capacity would be controversial).
- Safety and traffic operations (auto weaving in and out of the designated truck lane to access freeway ramps).
- Legislative (existing MAP-21 requirements to maintain the same number of toll-free lanes, when adding new toll lanes).²

PST and Stakeholder Feedback:
- This option, if tolled, is not currently possible. According to MAP-21, a general purpose lane cannot be taken in order to toll it.
- A strategy that reduces capacity for autos by restricting them from a lane could be problematic and controversial, as it may worsen existing highway congestion conditions.
- Converting an existing general purpose lane to a truck-only lane would be challenging. Direct access ramp (DAR) access may be required on the left hand side and merging and weaving issues with passenger vehicles would occur on the right hand side (and would not provide much benefit over the current right lane restrictions in California).
- A potential beneficial component of this strategy is the option for varying truck lane access by time of day (dynamic lane assignment). This is similar to possibilities under the active lane management strategy (Strategy #10). This strategy could potentially be combined with Strategy #10.

7.) Designated Truck Lanes (Construction of New Lanes on Existing Facilities)

Description: This strategy is similar to #6, but instead of converting general purpose lanes, this strategy would include the construction of new lanes designated for trucks on an existing facility. Trucks would be required to use the designated lanes; autos could either be permitted or restricted from using the lanes. Tolling options could include non-tolled, a flat toll, or a variable toll. If tolled, the use of the lanes would be optional by continuing to allow trucks non-tolled access to the general purpose lanes.

² USC Section 129(a)(1)(B)
Designated truck lanes may be separated by barriers or rumble strips to improve safety, and can be built to withstand greater vehicle weights. The intent of designated truck lanes is to attract the trucking industry to use them because the value proposition for the tolls would more than offset safety and productivity gains from using the lanes (due to reduced travel times, increased travel time reliability, reduced accident risk, and the potential for more lenient weight and length restrictions).

**Relative Cost:** High due to the planning, design, and construction of new lanes.

**Timeframe:** Long-term (over 20 years).

**Potential Issues:**
- Capital cost requirements could be high.
- Adequate right-of-way may not be available in developed areas.
- Appropriate ingress/egress of trucks to the dedicated facility (may be difficult to serve all truck trip types).
- Community acceptance could be challenging (due to potential impacts to local residences and businesses and/or the controversy of spending the funds to build a new highway facility).
- Environmental (could have an air quality and greenhouse gas benefit if traffic flow improves).

**PST and Stakeholder Feedback:**
- Truckers overwhelmingly favor this option with caution expressed about the potential cost of such improvements. This strategy directly clashes with efforts to move away from capacity expansion in the era of SB 375 and in air quality non-attainment areas. Under federal air quality conformity regulations, any expansion of freeway lanes requires justification as to why a transit option was not selected.
- Additional research is needed to know why similar projects in the San Diego region have been constructed but are not operated as such (i.e. I-5/805 and 56 by-pass lanes).

**8.) Separate Dedicated Truck-Only Facilities (Construction of New Facilities)**

**Description:** Similar to strategy #7, this strategy would involve developing a system of dedicated truck-only facilities/roadways. However, this system would be separate facilities, as opposed as new lanes on existing facilities. Trucks would be required to use the facilities, and autos would not be permitted. There is
potential for the allowance of longer-combination vehicles (LCVs) with appropriate legislative changes. Tolling options could include non-tolled, a flat toll, or a variable toll. If tolled, the use of the lanes could be made voluntary by continuing to allow trucks non-tolled access to the general purpose lanes.

Dedicated truck lanes would separate trucks from other mixed-flow traffic to enhance safety and/or stabilize traffic flow. Priority and/or dedicated lanes for trucks can help to improve truck speeds and reduce truck/auto crashes as well as the associated long-term lane closures that can increase congestion-related greenhouse gas emissions. There are a few dedicated truck lanes in the United States, although they are rare (more are being studied). Of those that do exist, it is common to require trucks to use the dedicated truck lanes, while not expressly prohibiting their use by other vehicles as well.

**Relative Cost:** High due to the planning, design, and construction of new truck-only facilities.

**Timeframe:** Long-term (over 20 years).

**Potential Issues:**
- Capital cost requirements could be high.
- Adequate right-of-way may not be available in developed areas.
- Appropriate ingress/egress of trucks to the dedicated facility (may be difficult to serve all truck trip types).
- Community acceptance could be challenging (due to potential impacts to local residences and businesses and/or the controversy of spending the funds to build a new highway facility).
- Environmental (could have an air quality and greenhouse gas benefit if traffic flow improves).

**PST and Stakeholder Feedback:**
- Truckers typically strongly support this strategy; however, the concept clashes with regional efforts to move away from capacity expansion in the era of SB 375 and in air quality non-attainment areas.

9.) **Variable Tolling Strategies for Trucks in General Purpose Lanes (Based on Traffic Conditions or Time of Day)**

**Description:** This strategy would toll trucks on freeways based on traffic conditions or time of day, with the aim of shifting truck travel to off-peak periods. Tolling options include non-tolled, a flat toll, or variable tolls.
Relative Cost: Moderate – while this strategy does not require new physical infrastructure, it does require technology mechanisms (in-vehicle devices, toll transponders and overhead gantries) that toll trucks using existing freeway lanes. This strategy requires legislative changes which would be expensive due to litigation.

Timeframe: Mid-term (11 to 20 years) to long-term (over 20 years).

Potential Issues:

- Legislative issues (tolling existing general purpose lanes is currently not allowed under existing legislation).
- User acceptance (the toll would not offer the trucking industry any tangible benefits in the form of improved travel times or travel time reliability).
- Community acceptance (truck traffic would likely shift to parallel arterials that are not designed for trucks to avoid the toll, impacting neighborhoods).

PST and Stakeholder Feedback:

- This strategy would not be popular among the trucking industry and would not improve truck mobility.
- Any tolls charged to trucks will ultimately be passed on the consumer. If tolling is considered for this or any of the strategies, all trucks should be tolled, not just certain types of trucks. The trucking industry is generally not supportive of tolling concepts, and would legally challenge unless non-tolled options remain the same area.
- Tolls tend to shift trucks onto alternate facilities, for example 125 is not used very much by trucks because it is tolled. If the toll were removed, it would help shift some truck traffic off of I-805.
- Consider the inverse – what about tolling all passenger cars, but not trucks?
- Tolls on existing highways often force trucks to secondary roads and safety incidents can increase.

10.) Intelligent Transportation Systems (ITS)\(^3\)/Active Traffic Management (ATM)\(^4\) and Lane Assignment

Description: This strategy uses ITS and ATM technologies (both external and in-vehicle) to improve truck mobility and safety. ITS applications for

\(^3\) ITS is a term that refers to a broad array of strategies for advancing transportation safety, mobility, and environmental sustainability by integrating communication and information technology applications into the management and operation of the transportation system across all modes.

\(^4\) ATM refers to dynamically managing & controlling traffic based on prevailing conditions to improve safety, respond to recurring & non-recurring congestion, and increase throughput & reliability. ATM includes the management of traffic operations in real-time, distributing current roadway & traveler information, deploying a range of operational strategies, and using integrated systems & coordinated response mechanisms. Example ATM strategies include speed harmonization, lane control, advanced queue warnings, temporary shoulder usage, and dynamic signing and advisory traffic routing, among others.
commercial vehicle operations can also enhance communication between motor carriers and regulatory agencies.

Examples to improve truck mobility and safety include variable speed limits by lanes (to help reduce speed differentials), dynamic routing of trucks, and lane-keeping technologies (in-vehicle systems that help drivers stay in control behind the wheel). Examples to improve communications and efficiencies include electronic registration and permitting programs, electronic exchange of inspection data (i.e. instantaneous credential and safety-related electronic screenings that can allow some trucks to bypass weigh and inspection stations), and applications to assist operators with fleet operations and security.

**Relative Cost:** Modest (relative to alternatives that require new infrastructure).

**Timeframe:** Near-term (0 to 10 years) to mid-term (11 to 20 years).

**Potential Issues:**
- Legislative issues (existing truck lane restrictions in CA may be an issue for dynamic truck lane assignment).
- Telematics may change rapidly in the future; the innovation curve will be fast and steep.
- Strategy may be challenging to enforce.
- Implementation would likely occur in phases (benefits may be difficult to realize immediately).

**PST and Stakeholder Feedback:**
- In general, this strategy makes sense in concept and is technically feasible” since it would help to optimize the efficiency of the existing system, in a cost effective fashion, without adding capacity.
- In practicality, when should these types of strategies be implemented? Do they need to pencil out from a cost perspective? Do these strategies really assist in getting better person throughput?
- If you have a corridor where accidents are a concern, this strategy could assist with accident avoidance.
- This strategy would also benefit and fold into the concurrent Caltrans Managed Lanes Study, The study is looking at laying conduit, fiber optics, etc. to allow for the potential implementation of ITS/ATM and tolling technologies, even if it is not known exactly know what will be implemented yet.
- This strategy could provide value by monitoring speed, volume, and congestion on the existing network; provision of robust congestion data is necessary even if lanes are not actively managed.
Fatal Flaw Discussions and Review

The PST discussed and analyzed all ten strategies and it was determined that three strategies were either redundant as stand-alone strategies or inappropriate for further analysis at this time. These strategies are described below:

- **Strategy # 4: Trucks on the Planned Network of High Occupancy Vehicle / High Occupancy Toll (HOV/HOT) Managed Lanes (Full, Unrestricted Access).** The project team heard multiple concerns from both trucking industry and broader community stakeholders related to access, operations, and safety related to the allowance of full, unrestricted access for trucks on the planned network of HOV/HOT lanes. Additionally, current legislation would need to be revised to allow trucks of all sizes in the HOV/HOT lanes and there are no solid successful examples of this strategy operating elsewhere in the United States.

- **Strategy #6: Designated Truck Lanes (Conversion of General Purpose Lanes).** Converting an existing general purpose lane to a truck-only lane would be challenging. If lanes were designated truck-only on the left hand side of the freeway, direct access ramp (DAR) access may be required and if the lanes were on the right hand side, weaving issues with passenger vehicles could occur (and would not provide much benefit over the current right lane restrictions in California). Additionally, converting a general purpose lane from auto to truck is highly controversial and the potential to then manage the truck lane with tolls would additionally require a change in existing legislation. Also, designation for trucks in one particular lane could be accomplished under Strategy #10 (ITS/ATM) through dynamic lane assignment, simplifying the analysis.

- **Strategy #9 – Variable Tolling Strategies for Trucks in General Purpose Lanes (Based on Traffic Conditions or Time of Day).** Tolling strategies for trucks in general purpose lanes does little to meet the problem statement goal of enhancing truck mobility. While mobility for passenger vehicles may be somewhat improved by shifting truck traffic to alternate times of day or routes, the toll would be punitive in that it would not offer the trucking industry any tangible benefits in the form of improved travel times or travel time reliability, or a non-tolled option. Also, tolls can cause diversion of trucks to alternate routes that are not designed to accommodate trucks. Strong opposition and litigation would be expected from trucking industry, negative impacts could occur within local communities due the diversion of trucks onto local arterials, and it would also be legislatively difficult to implement as tolling existing general purpose lanes is currently not allowed under existing legislation.

Due to the reasons described above, the project team and PST agreed to narrow the strategy list to seven broad strategies as follows.

**Final Strategy List for Analysis**

1. **Base Case Scenario:** Consider what the future looks like for goods mobility in the region if no new actions are taken to address truck mobility.
2. **Traffic Organizational Strategies at Freight Gateways & Distribution Hubs:**
   Coordinated strategies to optimize truck traffic flow at key locations. The strategies implemented could range from simple to more complex and include ITS/Communication strategies (such as the use of variable message signs and 511 announcements to provide real-time information to truckers to help them avoid congestion and bottlenecks) and infrastructure-based strategies (such as dedicated trucks lanes or facilities in key bottleneck locations).

3. **Travel Demand Management Strategies with Truckers and Shippers/ Receivers:**
   Facilitate the shifting of trucks to off-peak travel times, based on pricing incentives and fees.

4. **Restricted Access for Trucks on the Planned Network of HOV/HOT Managed Lanes:**
   Allow restricted access to the network of managed lanes, for example during off-peak periods, for off-peak directions, and/or assign trucks to certain lanes.

5. **Designated Truck Lanes:** The construction of new lanes on existing facilities, such as truck bypass lanes, truck routes, or climbing lanes.

6. **Separate Dedicated Truck-only Facilities:** The construction of new facilities dedicated for trucks.

7. **Intelligent Transportation Systems/Active Traffic Management and Lane Assignment:**
   Use technologies (both external and in-vehicle) to improve truck mobility and safety. Optimize the operational flexibility of the freeway through lane assignment, active speed management, and/or dynamic signage.

These seven potential strategies will serve as a starting point for further analysis and review as the study proceeds.