

I-710 Site Evaluation Summary

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1. INTRODUCTION

This memo outlines the key results of the evaluation of the I-710 freeway corridor in Los Angeles as a potential pilot ICM deployment site. Elements described or assessed below include:

- Corridor boundaries
- Political environment
- Freeway operations
- Arterial operations
- Transit services
- Park-and-ride opportunities
- Real-time data collection capabilities
- Real-time information dissemination capabilities
- Safety issues
- Air quality issues
- Overall evaluation

2. CORRIDOR BOUNDARIES

Figure 1 illustrates the corridor under consideration. The study that was initially proposed by LA Metro is shown by the shaded area in the middle of the figure. This proposed area is roughly delimited by the SR-91 freeway to the south, Firestone Boulevard to the north, Paramount Avenue to the east, and Wilmington Avenue to the west. While significant attention is given to the study area proposed by LA Metro, the evaluation also considers elements to the south and north of the area. At its limit, the evaluation considers elements up to the Port of Long Beach to the south and to the SR-60 freeway to the north.

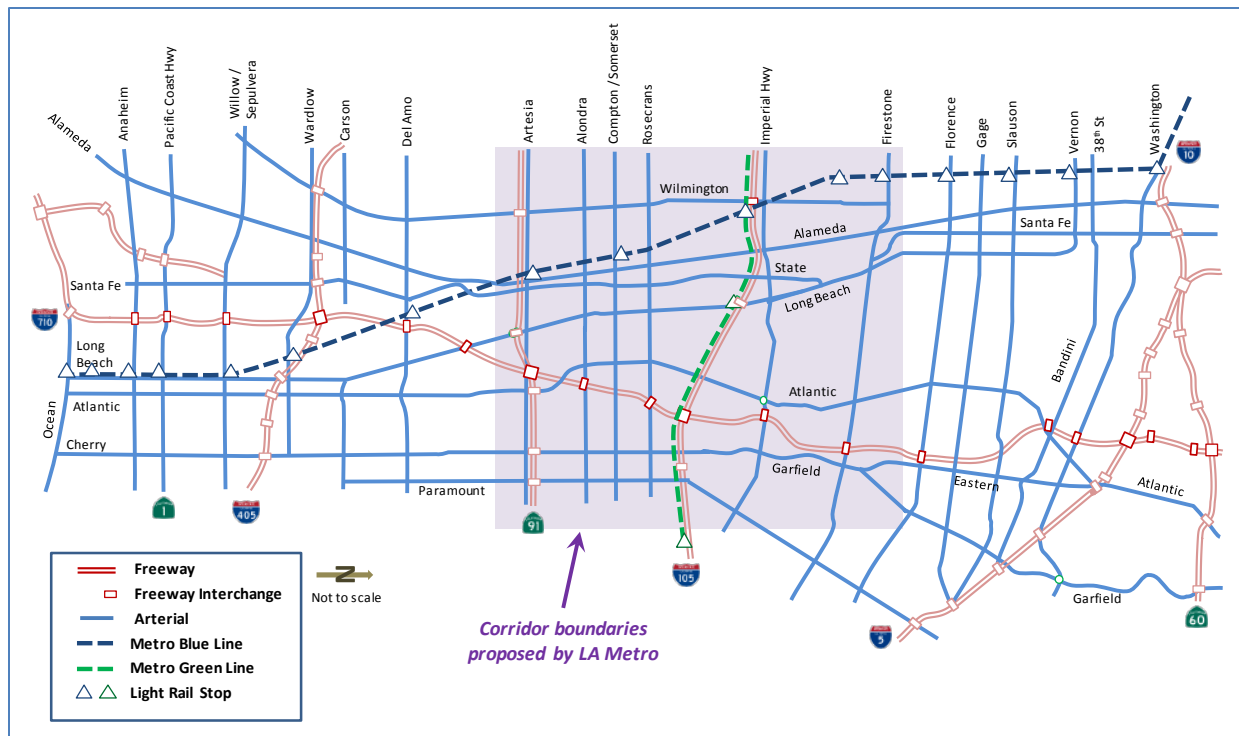


Figure 1 – I-710 Corridor Geometry

3. POLITICAL ENVIRONMENT

Figure 2, adapted from existing I-710 Corridor Project documents, illustrates the jurisdictional environment of I-710 freeway corridor. Key findings regarding the assessment of the corridor's political environment are summarized below:

- Implementing ICM within the corridor would, at a minimum, require collaboration from the following entities:
 - Caltrans District 7
 - California Highway Patrol
 - LA Metro
 - City of South Gate
 - City of Lynwood
 - City of Compton
 - City of Paramount
 - City of Downey
 - City of Long Beach
 - Gateway Cities Council of Governments
- Extending the corridor to the coast would require the additional collaboration of the following entities:
 - City of Carson
 - City of Wilmington

- City of Cudahy
- City of Bell Gardens
- City of Haywood
- City of Commerce
- City of Vernon



Figure 2 – Corridor Jurisdictional Environment

- The number of political entities that would need to be involved creates a challenging environment for a pilot ICM project. While one of the goals of an ICM system is to facilitate and promote coordination, the inability to reach consensus among all jurisdictions involved in the operation of a corridor may create significant barriers to the success of a project. For instance, the implementation of strategies involving diverting/rerouting freeway traffic to arterial streets would require participation of all the cities controlling traffic along the selected diversion routes. A single city refusing to participate could effectively prevent the implementation of rerouting or traffic management strategies along parallel arterials.
- Early discussions with LA Metro suggest that there is good cooperation between the agency and the cities mentioned above, with the potential exception of the City of Compton due to staffing issues. The existing relationships may help the project team obtain the necessary buy-ins. However, there is no guarantee at this stage that all the cities will agree to deploy all of the ICM strategies considered.

4. FREEWAY OPERATIONS

Figure 3 illustrates the current ramp metering operations along the I-710 freeway and other crossing freeways. The following is a summary of the key findings:

- Most of the on-ramps along I-710 north of the I-405 interchange have been equipped with ramp meters.
- One freeway-to-freeway interchange, with the I-105, is currently fully metered.

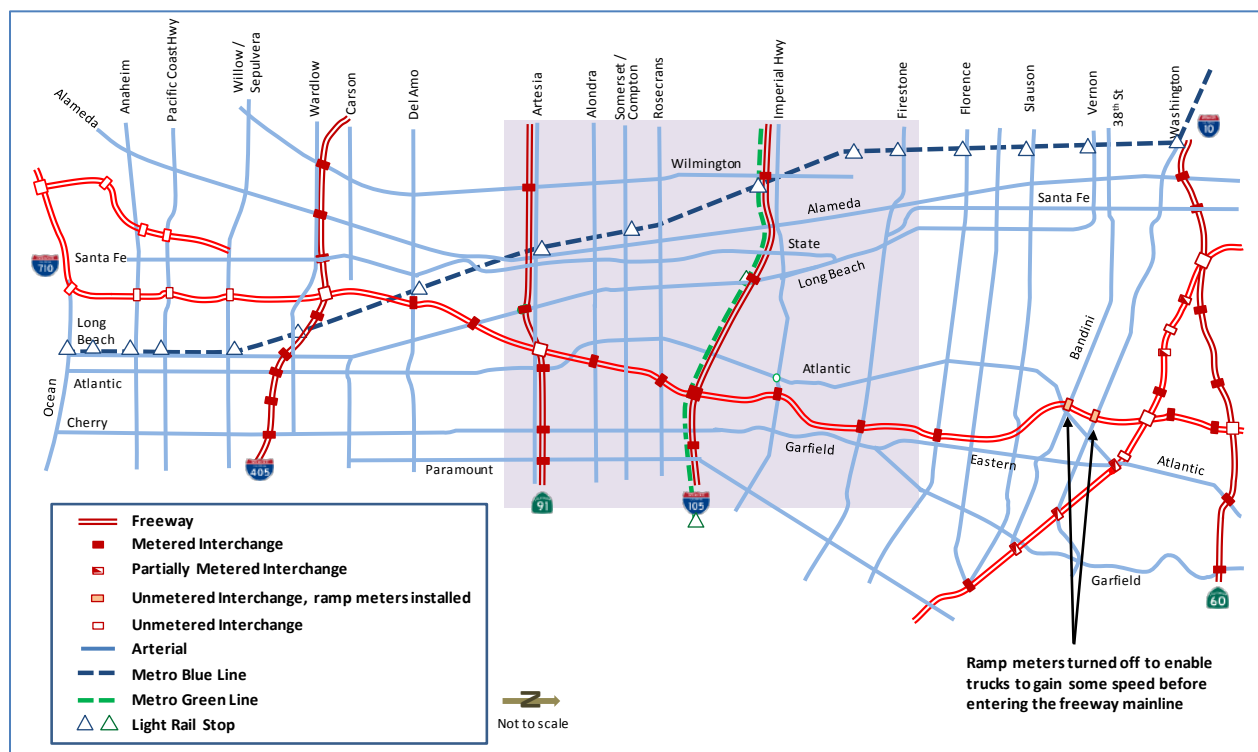


Figure 3 – Freeway Ramp Metering

- At the north end of the corridor, ramp meters at the Atlantic Blvd. and Washington Blvd. interchanges have been turned off to address operational problems along the freeway mainline caused by slow-moving trucks entering the freeway from these ramps. When ramp metering was active, many trucks could not accelerate to a freeway speed before entering the mainline due to the short ramp lengths, tight curves, and/or grades along the ramps. These slow-moving trucks not only slowed traffic along the mainline but were also a safety hazard.
- Ramps on the interchanges with the I-405 and SR-91 freeways are not currently metered. For the I-405 interchange, ramp metering cannot be implemented due to the very short lengths of the ramps within the old-style cloverleaf design. Installing ramp meters within this interchange would likely result in queues of vehicles impeding the operation of various movements within the interchange, and in queues likely spilling onto the freeway mainline.
- All on-ramps along the I-405, SR-91, and I-105 freeways are fully metered within the illustrated corridor boundaries.

General observations regarding traffic demand and traffic congestion along the I-710 corridor:

- Figure 4 illustrates the freeway sections regularly experiencing congestion during the AM, Midday, and PM peak periods. Figure 5 further illustrates the AM and PM peak speed contours extracted from PeMS for the all the weekdays in four different months.
- Recurring congestion typically only occurs during the AM and PM peak. During the morning peak period, congestion in the northbound direction occurs in the northern section of the corridor, between I-105 and I-5. In the afternoon, congestion in the northbound direction is mainly observed in the southern part of the corridor. For the southbound direction, congestion in the morning peak is found primarily between I-405 and I-105. In the afternoon, congestion typically occurs in the northern section of the corridor, downstream of I-5.
- Trucks transporting cargo to and from the Port of Long Beach generally use Ocean Boulevard, I-710, SR-47/SR-103 (Terminal Island Freeway), and I-110.
- Daily truck traffic on I-710 is expected to increase from 38,000 to approximately 90,000 trucks a day by the year 2035.
- Truck traffic on SR-91 east of I-710 is expected to increase from 34,000 daily trips to 40,000 daily trips in 2030.

Assessment of the potential to address the observed congestion along I-710 North during the AM peak period:

- During the morning peak period, traffic entering I-710 from the Atlantic Boulevard on-ramp appears to be responsible for the congestion in the northbound travel direction. The problematic on-ramp is illustrated in Figure 6. As can be observed, the ramp features an uphill grade and two successive tight curves. These geometric characteristics may explain why it is the only unmetered ramp north of I-105. It is also observed that this ramp carries a high proportion of truck traffic due to its proximity to a large intermodal rail yard. In this case, the grade and

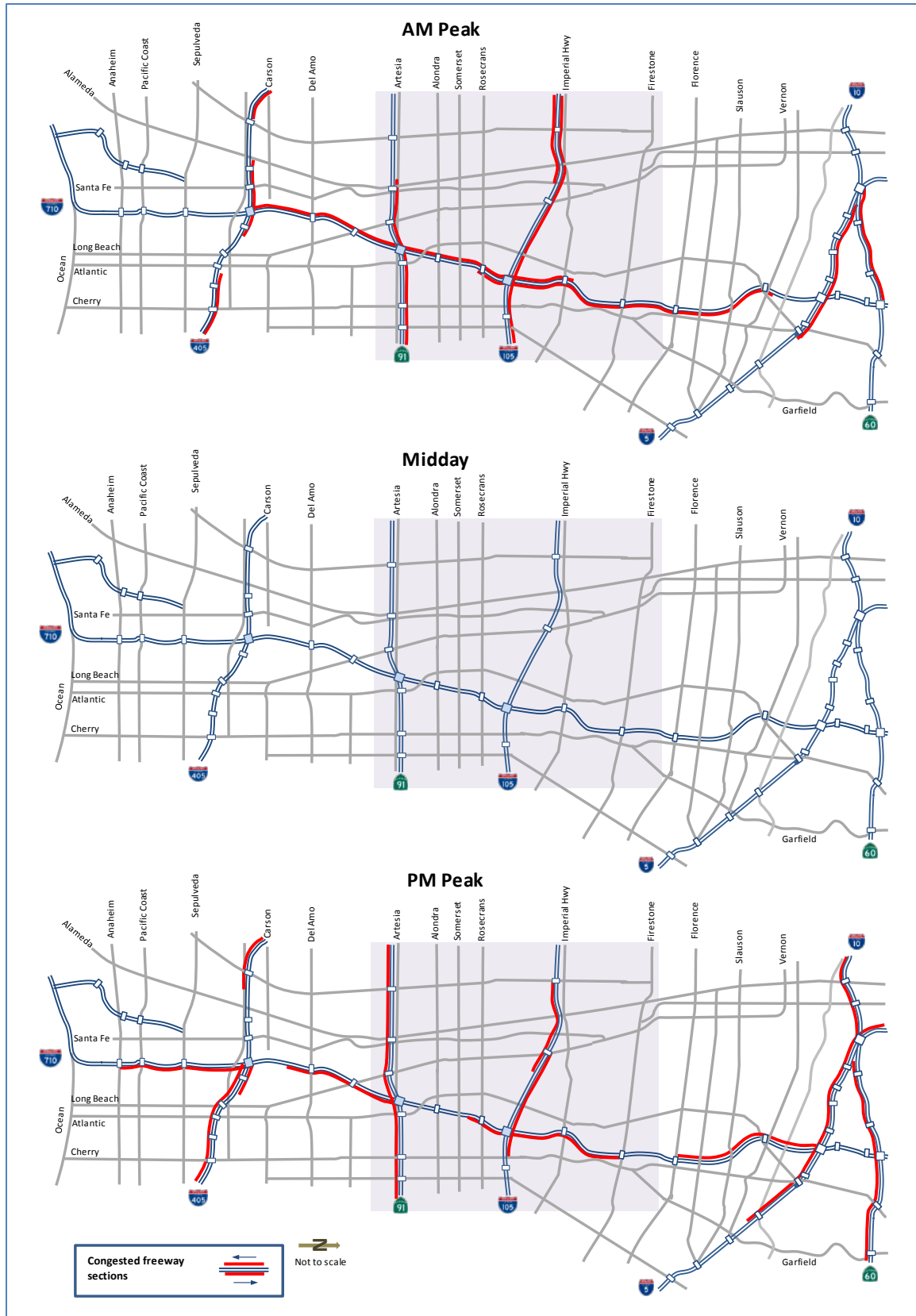


Figure 4 – Congested Freeway Segments by Time of Day

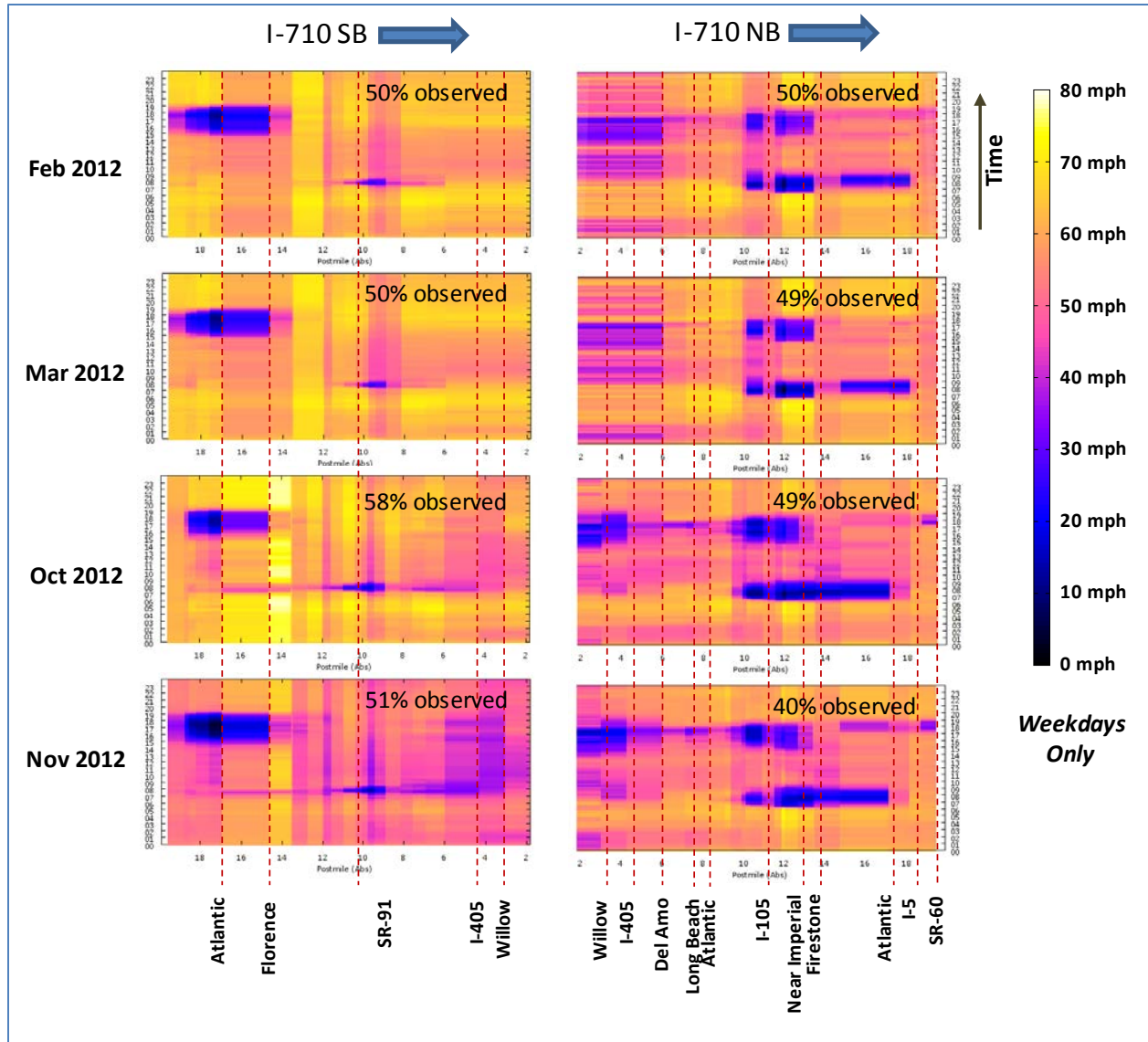


Figure 5 – PeMS Estimated Speed Contours for I-710 Freeway



Figure 6 – Atlantic Boulevard I-710 North On-Ramp

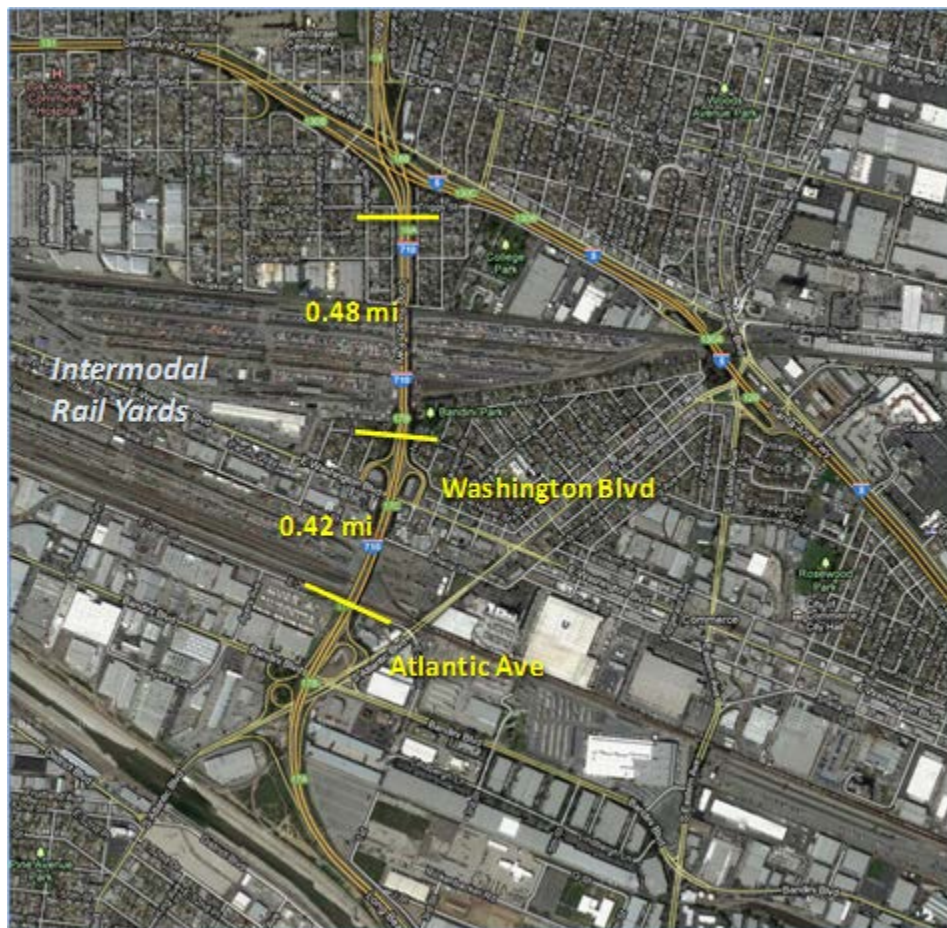


Figure 7 – Area Surrounding the Atlantic Boulevard and Washington Boulevard Interchanges

tight curves on the ramp likely force trucks to enter the freeway mainline at a reduced speed. As shown in Figure 7, trucks entering the freeway from this location and seeking to use I-5 North also have less than one mile to make three lane changes in relatively heavy traffic. Trucks entering the freeway from the Washington Boulevard interchange one-half mile downstream only have less than 1/2 mile to make the same number of lane changes. The frictions created by these lane changes are thus likely primary contributors to the observed congestion.

- There appear to be few options for rerouting trucks away from this onramp. One option may be to redirect trucks to the Washington Boulevard ramp one-half mile downstream through the local streets. However, this option may not work for trucks seeking to access I-5 North, as it would force them to make three lane changes in less than one-half mile in heavy traffic. The other option may be to redirect trucks to use the I-5 / Atlantic Boulevard interchange. However, this would force the trucks to enter I-5 on another congested section and may worsen traffic conditions on I-5. Thus, the only alternative may be to develop unconventional truck metering schemes, such as regulating trucks exiting from a nearby depot. However, this may prove to be politically difficult. Such a solution may also not be applicable to other corridors.
- If it is assumed that the on-ramp that creates the AM peak bottleneck cannot be metered, an attempt to develop a coordinated ramp metering strategy with variable speed limit along I-710 upstream of the Atlantic Boulevard and Washington Boulevard interchanges could be considered. However, without some further simulation, it is not clear whether this will be fruitful. Strategies leading to more trucks using the local arterials may also not get the support of local cities, as they are already concerned about too many trucks using the arterials. Because of the heavy truck flow and the political reluctance in the area for aggressive truck rerouting or metering, these solutions are likely not possible.
- While not always apparent in the congestion diagrams, traffic operations around Firestone Boulevard also contribute to the congestion along I-710 North. Data compiled by URS Corporation for the I-710 Corridor Project Environmental Impact Study indicate that this on-ramp may carry 1,200 to 1,300 veh/hr in the AM peak period. Friction resulting from lane changes made by the entering traffic may explain why PeMS data often reports a speed drop at this location. There is no lane drop in the area that could cause the congestion.
- Congestion along the freeways crossing I-710 (I-405, SR-91, I-105, and I-5) makes diversion/rerouting difficult. Diversion routes against the peak direction of travel are possible and likely to be acceptable to motorists. However, motorists may not be willing to follow recommended detours requiring them to travel along a congested section of freeway.
- While the ramps from I-105 to I-710 are metered, it appears unlikely that adjusting the metering rates on these ramps will help alleviate the congestion along the northern section of I-710. This assessment is based upon comments made by Caltrans District 7 employees at the November meeting. It should also be considered that I-105 is also experiencing congestion in the morning and that a more restrictive metering policy for the traffic entering I-710 may have notable negative impacts on the I-105 traffic.

Assessment of the potential to address the observed congestion along I-710 North during the PM peak period:

- During the PM peak period, congestion along I-710 appears to be the result of bottlenecks associated with the I-405 freeway, SR-91 freeway, and Firestone Boulevard interchange. The problems associated with the Atlantic Boulevard on-ramp during the AM peak period are not existent during the PM peak period. While the PM peak mainline vehicular traffic is roughly the same on this section of I-710 as in the morning peak period, a lower volume of trucks may contribute to a reduction in friction and thus to a better freeway operational performance. However, there is no available data to confirm this assumption.
- The bottleneck at the Firestone interchange is due to the high volume of traffic exiting the freeway at this ramp in the afternoon. There is no significant geometric change at this location to explain the observed bottleneck. Freeway operational evaluations in the I-710 Corridor Project indicate an assessed freeway exiting volume of 1,605 veh/hr during the PM peak, versus 716 in the morning. If the exiting traffic is the source of the congestion, freeway operations could potentially be improved by inducing traffic to use alternate exits.
- The two other northbound bottlenecks appear to be associated with unmetered freeway-to-freeway interchanges. To reduce these problems, metering of the freeway-to-freeway interchange may be considered.
- Similar to the AM peak period, congestion along the crossing freeways restricts the possibility of using these freeways as alternate routes for the I-710 traffic in some directions.

Assessment of the potential to address the observed congestion along I-710 South during the AM peak period:

- During the morning peak period, congestion along I-710 South appears to develop primarily from the SR-91 and I-405 freeway interchanges. As indicated above, these two freeway-to-freeway interchanges are not metered. Metering strategies should be explored as potential solutions to the observed congestion.
- It should be noted that the southbound congestion during the morning peak appears to be much less significant than in the afternoon peak period or both the morning and afternoon peak periods in the northbound direction.

Assessment of the potential to address the observed congestion along I-710 South during the PM peak period:

- During the afternoon peak period, congestion along I-710 South appears to be contained upstream of the Florence interchange. A high volume of entering and exiting traffic at both the Florence and Firestone interchanges, combined with a high mainline volume during the afternoon peak period, may explain why congestion develops at this location.

5. ARTERIAL OPERATIONS

Key findings regarding arterial operations along the I-710 corridor are summarized below:

- Various arterials were identified as potential rerouting/diversion routes from I-710:
 - Cherry Avenue / Garfield Avenue
 - Atlantic Avenue
 - Long Beach Boulevard
 - Santa Fe Avenue
 - Alameda Street
- Of the five identified arterials, Atlantic Avenue and Cherry Avenue are the most likely candidates for rerouting due to their proximity to I-710. Long Beach Boulevard also appears as a viable alternative south of I-105. Other arterials have a diminished interest due to the distance that would need to be traveled on crossing arterials to reach them, particularly when considering the density of traffic signals along many of the arterials.
- Figure 8 illustrates the location of signalized intersections within the study corridor. Within the study area proposed by LA Metro, there are 276 signalized intersections. Within the greater corridor boundaries, there are 788 signalized intersections.
- According to comments from LA Metro staff, the type of traffic signal control along the corridor is primarily time-of-day control. Adaptive signal control is used only in the city of Long Beach, and possibly within the City of Lakewood, just outside the study area on the east side near Cherry Avenue.

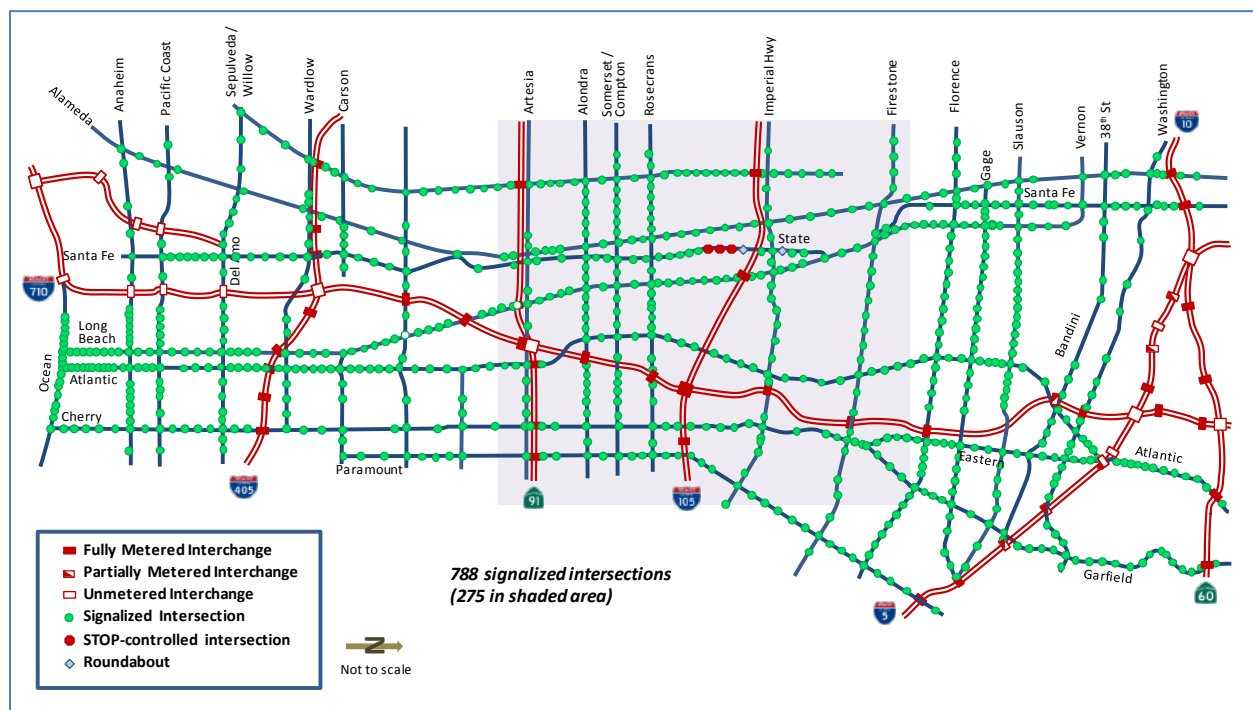


Figure 8 –Signalized Intersections

- The adaptive signal control system used in Long Beach is similar in nature to the system used by the City of Los Angeles.
- The type of traffic signal controllers used varies from city to city. Reinland Jones, from LA Metro, provided the following summary:
 - A majority of the cities within the corridor operate **Econolite ASC/2S-2100**, with some operating the more advanced **ASC/3** controllers (such as the City of Compton).
 - Other cities are typically running **Type 170** or **Type 170E** controllers (older generation controllers), with a form of LACO firmware or BiTran firmware.
- The cities of Southgate and Compton, in the central section of the corridor, currently have their own traffic management centers.
- Figure 9, Figure 10, and Figure 11 map the results of an intersection operational analysis that was conducted by URS using 2008/2009 data and the Synchro optimization software. Each figure illustrates the evaluated Intersection Capacity Utilization (ICU) factor and the estimated Level of Service (LOS) based on incurred delays for key intersections along the corridor. The ICU factor indicates the percentage of the cycle length that would be used assuming that traffic from every movement flows at saturation, i.e., at the highest possible rate. For instance, a rate of 0.900 indicates that 90% of the cycle capacity is used, and that only 10% remains available. As can be observed, the intersections with the least available capacity appear to be those closest to the freeway, and thus those most likely to be involved in the development of rerouting/diversion strategies. For both the AM and PM peak periods, a number of key intersections along Cherry Avenue, Atlantic Avenue, and Long Beach Boulevard have ICU factors above 0.900, indicating very limited available capacity. Some intersections also show ICU above 1.000 during the PM peak. It can also be observed that a few key intersections in the midday along Firestone have high estimated ICUs. As can be observed, a lack of available capacity at key intersections along the parallel arterials may make it difficult to effectively use the arterials as diversion routes and to effectively deploy ICM control strategies.
- Another problem facing the consideration of parallel arterials for the implementation of ICM strategies is a lack of real-time traffic monitoring along most of the arterials. Comments made by LA Metro staff suggest that most of the traffic information on arterials along the corridor comes from manual traffic counts. While there may be loops installed on some arterials, the loop health is highly questionable.
- There is currently an effort to install Sensys sensors along Long Beach Boulevard (scheduled to be completed in summer 2013). This effort will still leave the two arterials closest to the I-710 without instrumentation. Instrumenting these two arterials would be key to a successful ICM deployment.
- In the November 2012 meeting, LA Metro staff indicated that efforts were currently underway to deploy arterial traffic management centers within the corridor. These efforts would seek only to enable city traffic engineers to view signal status from a central location. Anticipated completion would be sometime in 2014. However, the exact nature of these deployments, the cities involved, and the projected timelines would all need to be confirmed.



Figure 9 – Intersection Capacity Utilization (ICU) and Level of Service (LOS) for the AM Peak Period

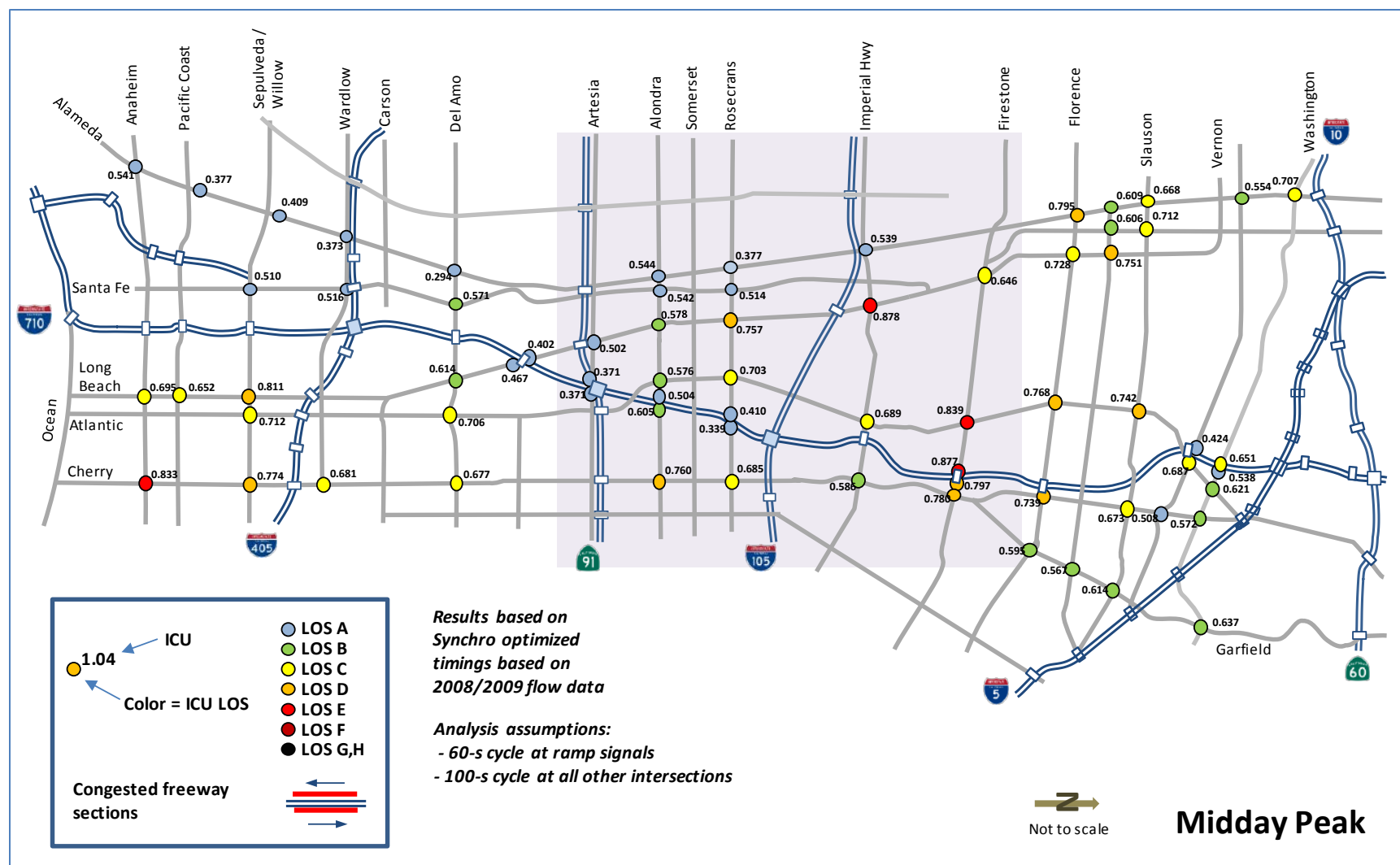


Figure 10 – Intersection Capacity Utilization (ICU) and Level of Service (LOS) for the PM Peak Period

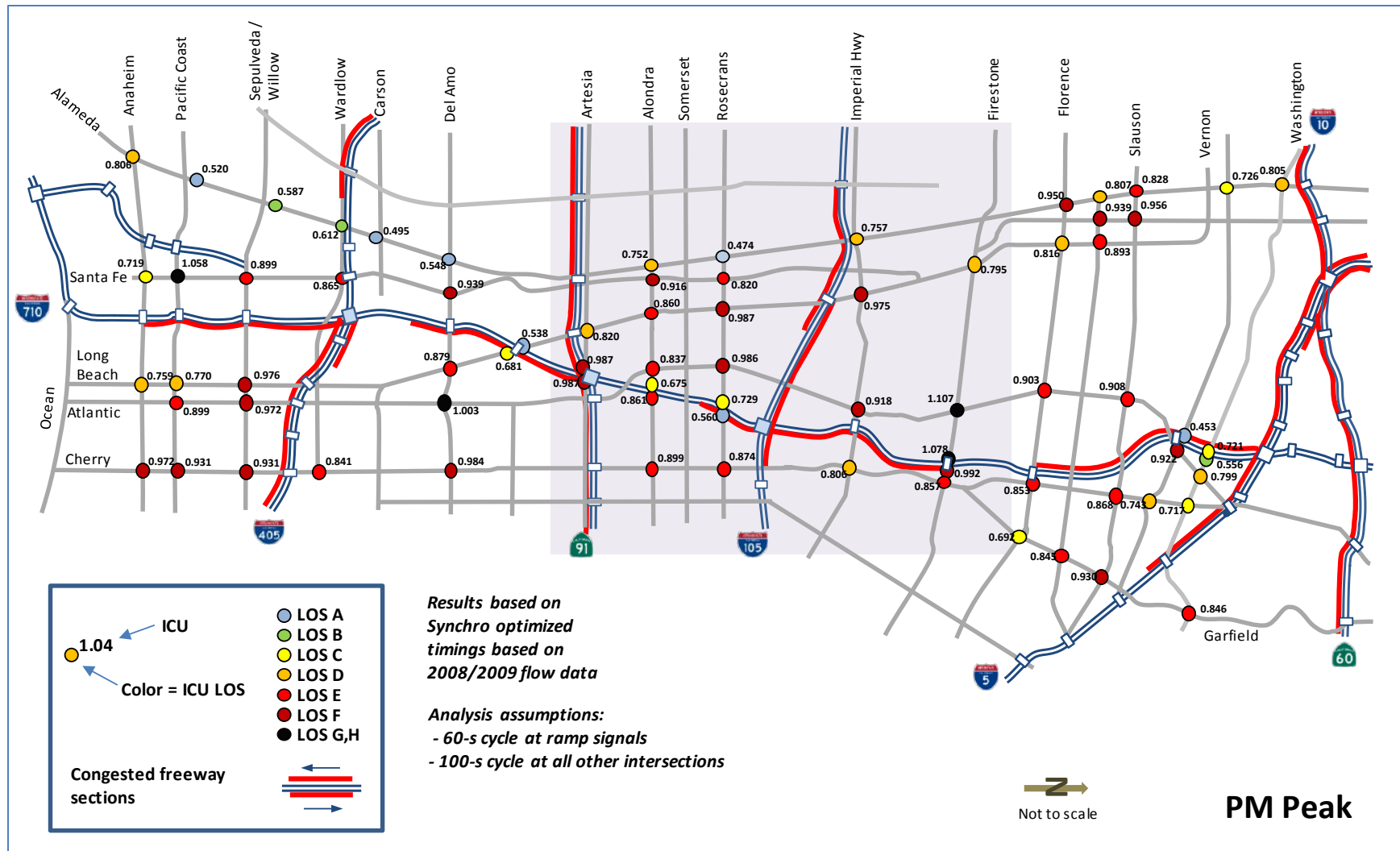


Figure 11 – Intersection Capacity Utilization (ICU) and Level of Service (LOS) for the PM Peak Period

- The Metro Blue Line operates at street level and has absolute priority over the vehicular traffic. This can create problems in establishing effective traffic signal coordination schemes on sections of arterials close to light-rail crossings.
- Residents of cities along the corridor are already complaining about trucks using the arterials parallel to I-710 as diversion routes. Buy-in of local cities may be tied up with the development of strategies seeking to keep the truck traffic on the freeways.

6. TRANSIT OPERATIONS

Key findings regarding the possibility of integrating transit into the corridor management strategies are summarized below:

- A number of transit routes may provide travel alternatives to I-710 motorists along the corridor (see Figure 12):
 - **Metro Blue Line:** Light-rail line generally running parallel to I-710 within the study corridor and providing service from the Transit Mall in the City of Long Beach to the Metro Center in downtown Los Angeles.
 - **Metro Green Line:** Light-rail line running parallel to I-105 within the study corridor and providing additional connection opportunities with the Metro Blue Line.
 - **Metro Rapid Route 762:** Bus route providing fast and frequent service along Atlantic Avenue, from Artesia Boulevard near SR-91 to downtown Los Angeles.

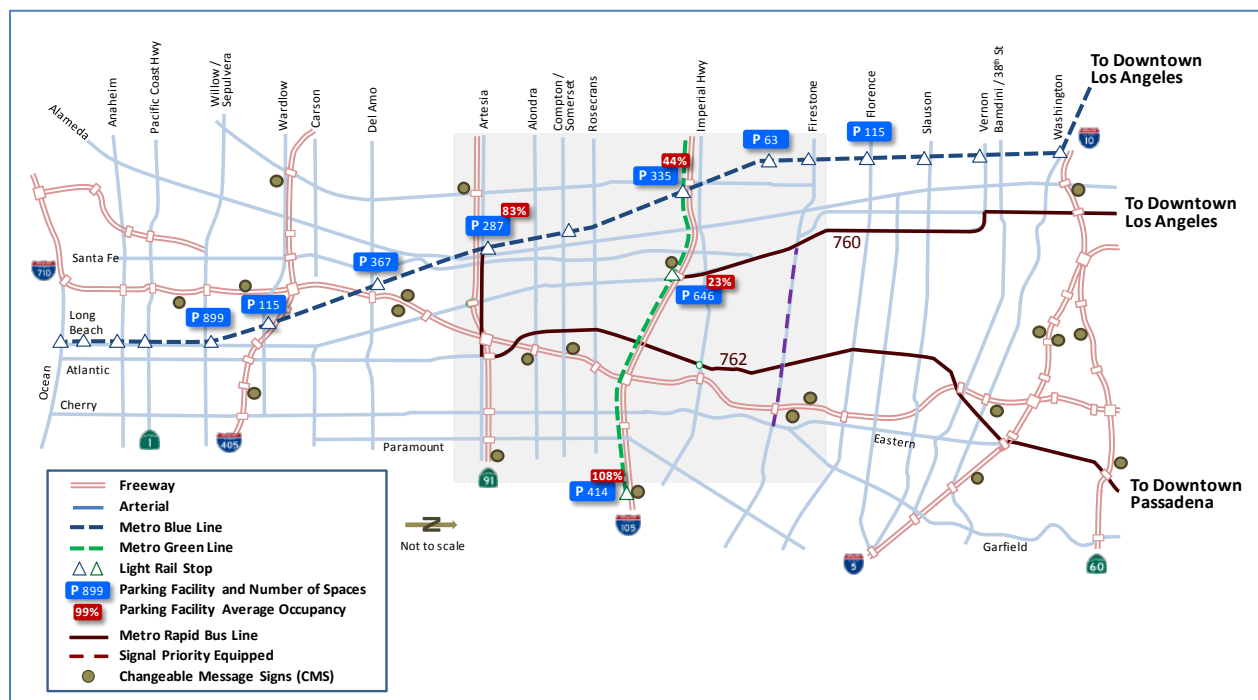


Figure 12 – Transit and Information Services along I-710 Corridor

- **Metro Rapid Route 760:** Bus route providing fast and frequent service along Long Beach Boulevard and Santa Fe Avenue, from the Long Beach Green Line station near I-105 to downtown Pasadena.
- The **Metro Rapid Route 715** used to run along Firestone Boulevard but was discontinued due to low ridership in December 2012. This route ran from the Los Angeles Airport to the Downey Transportation Depot at the intersection of Firestone Boulevard and Old River School Road, east of I-710. If needed, this route could be reinstated. However, there would need to be a clear understanding of why the route had low ridership, as well as funding to support reinstating it.
- Additional transit elements available to develop corridor management strategies:
 - **Transit signal priority along Firestone Boulevard:** Equipment was installed along this arterial to support the discontinued Metro Rapid Route 715. While the rapid bus route has been terminated, the priority equipment has remained in place. It could be reactivated to support new transit services along the arterial.
 - **Transit signal priority along Atlantic Avenue:** Equipment is to be installed along Atlantic Avenue in the first quarter of 2013, followed by a signal retiming.
- Key attributes of Metro Rapid bus lines include:
 - Simple route layout.
 - Frequent service during peak period (buses arriving as often as 3-10 minutes).
 - Fewer stops, typically spaced at about ¾ of a mile apart at major transfer points.
 - Low-floor buses to speed dwell times.
 - Bus priority at traffic signals.
 - Enhanced transit information at stations, such as “Next Bus” displays.
- The value of using the Metro Rapid and Metro Light-Rail lanes running through the corridor will depend on the origin and destination of individual travelers:
 - Individuals traveling towards downtown Los Angeles may use either the Metro Rapid Route 760 or the Metro Blue Line. The time to reach downtown Los Angeles from the Long Beach Transit Mall using the Metro Blue Line is typically 58 minutes. From the Willowbrook station, where the Blue Line and Green Line meet, travel time is typically 28 minutes. Travel from the Long Beach Station along the Metro Green Line, via transfer to the Blue Line at the Willowbrook station is typically 40 minutes. Using the Metro Route 760, travel time typically varies between 51 and 55 minutes in the absence of traffic problems.
 - Individuals traveling towards Pasadena may use the Metro Rapid Route 762 running along Atlantic Avenue. Buses along this line typically take 75 to 80 minutes to reach downtown Pasadena from the intersection of Atlantic Avenue and Imperial Highway.
- The presence of relatively small parking facilities at most Metro rail stations along the I-710 corridor may be a strong impediment to enticing motorists to switch their mode of travel to transit. If the existing facilities fill up quickly in the morning, and continuously have high occupancy rates during the day, motorists responding to a travel advisory may have difficulty finding parking at light-rail stations. Such a situation would significantly undermine the viability of using transit as an alternative transportation mode.

- The attractiveness to I-710 motorists of using the Metro Blue Line trains in response to unusual congestion is potentially reduced by the location of the line relative to I-710. Along SR-91, the line is two miles west of I-710. Along I-105 and further north, the line is approximately four miles away from I-710. In this case, the attractiveness of using Metro Blue Line trains as an alternative to avoid congestion along I-710 will depend on the time it would take to reach a destination station using local arterials or I-5. During peak periods, I-5 also often experiences congestion. Along the arterial, travel may be influenced by the number of signalized intersections to cross (for instance, 18 along Firestone), the quality of the traffic signal coordination, and the level of traffic flow along the arterial.
- Currently the evaluation team does not have origin and destination data from travelers in the corridor. Without this data, it will be difficult to determine whether transit service can be recommended as an ICM strategy.

7. PARK-AND-RIDE OPPORTUNITIES

Key findings regarding park-and-ride opportunities are summarized below:

- As shown in Figure 12, there are park-and-ride facilities at 9 of the 19 Metro light-rail stations found within the study area. Most of the key stations along the Blue and Green lines within the corridor have a park-and-ride facility.
- The three largest parking lots have 899, 646, and 414 spaces respectively. The capacity of other lots range from 63 to 367 spaces.
- Parking occupancy data provided by LA Metro for park-and-ride lots within the central portion of the study area indicates that parking availability may be an issue at some stations. Average occupancy at the Artesia station parking facility is 83%. At the Artesia Transit Center, along the Green Line, occupancy typically reaches 108% of the nominal capacity (meaning that some vehicles park where they should normally not do so).
- The other stations along the Green Line show occupancies of 23% and 44%, respectively. This indicates that some parking may be available in the middle of the corridor. Based on the information provided, up to 700 spaces may be available. However, the accuracy of the data still needs to be confirmed, as two lots exhibited a 0% occupancy, which may be the result of missing data.
- Aside from the two park-and-ride lots along the Green Line showing low occupancy (assuming that the data supplied is correct), it is likely that parking may not be available at most stations along the Blue Line for supporting traffic diversion during the peak periods.
- Parking opportunities around some stations may be increased by considering privately operated facilities nearby. However, these facilities are likely to impose higher parking fees and may be viewed as less attractive by travelers.

8. REAL-TIME DATA COLLECTION CAPABILITIES

Key findings regarding the ability to monitor traffic operations along the corridor are summarized below:

- While there appears to be an extensive deployment of freeway traffic sensors, detector health data from PeMS indicates that many detection stations are not operating properly. Figure 13 illustrates the proportion of detectors working as of mid-December 2012. As can be observed, large gaps exist. This results in a significant proportion of imputed traffic data being generated along the corridor. To develop effective control strategies along the corridor, Caltrans District 7 would be required to improve the status of detection along the corridor (either temporarily or permanently), as the current data collection capabilities are inadequate.
- There is some capability to obtain signal status information, as many cities have their traffic signals connected to the county traffic management center. LA Metro currently has plans to bring all the arterial data to a central location, through RIITS and into PeMS.
- The cities of Southgate and Compton have their own traffic management centers.
- Many of the cities to the north of the corridor are believed not to have the resources available to support an ICM deployment. For instance, some cities still have dial timers for signal control.
- While there is some possibility of collecting signal status information, the corridor features very limited arterial traffic detection. None of the arterials of interest currently has active traffic detection. However, one deployment project currently underway will result in the installation of Sensys sensors along Long Beach Boulevard, from Alondra Avenue to the intersection between Pacific Boulevard and Slauson Avenue by the summer of 2013. Figure 14 illustrates the geographic scope of this project.

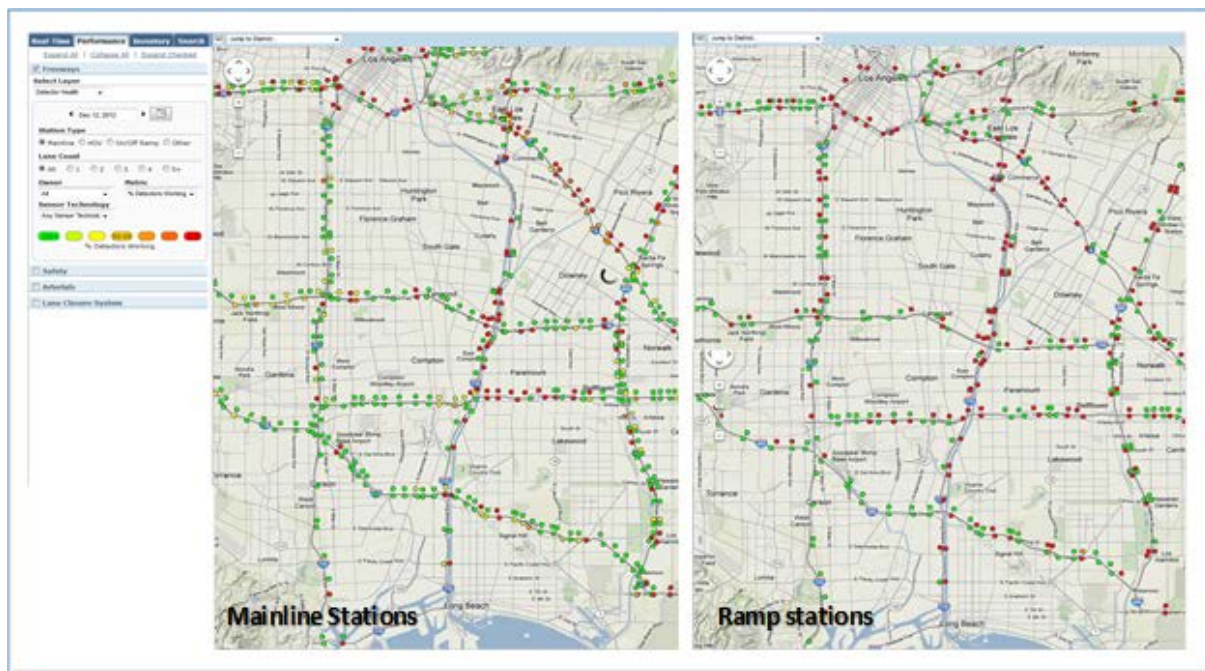


Figure 13 – Status of Traffic Detection Stations along I-710 Corridor

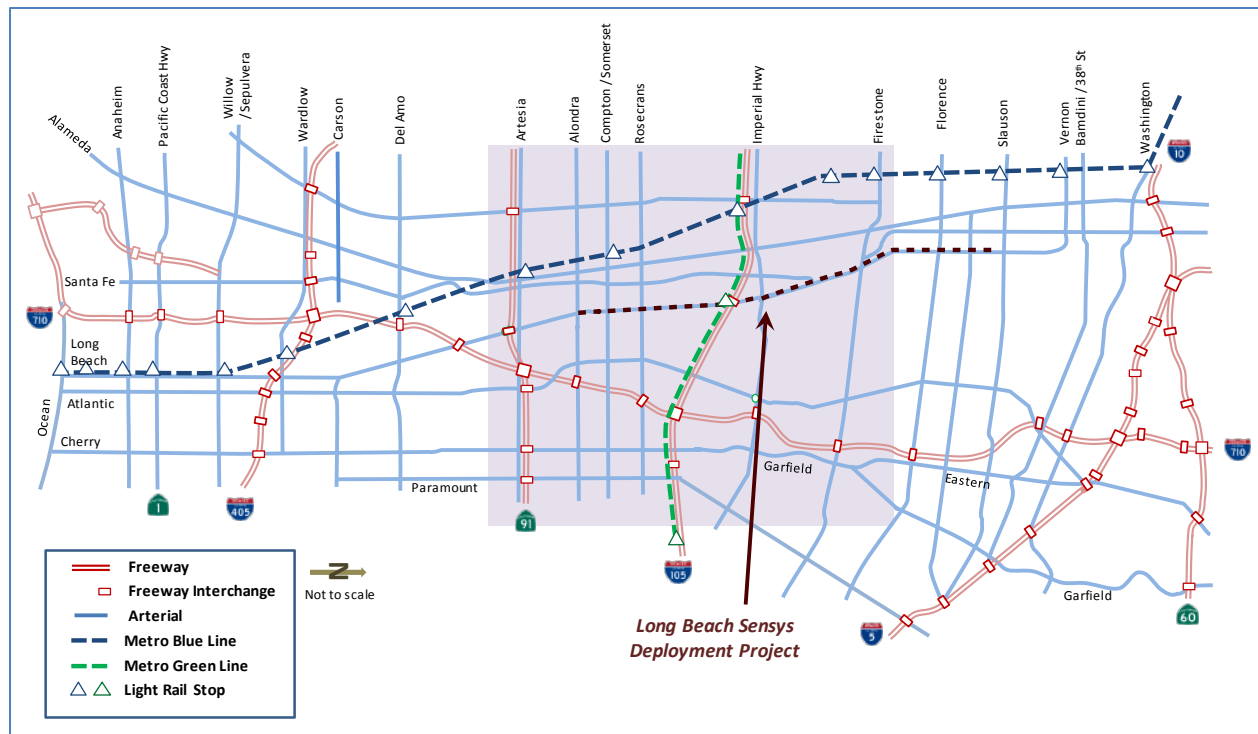


Figure 14 – Planned Deployment of Sensys Sensors along the I-710 Corridor

9. REAL-TIME INFORMATION DISSEMINATION CAPABILITIES

Key findings regarding the existing capabilities to disseminate information to motorists are summarized below:

- As was shown in Figure 12, there appears to be an adequate deployment of changeable message signs along I-710 and surrounding freeways to support a variety of information dissemination.
- To promote transit as a viable travel alternative, real-time parking availability must be considered. It would be counterproductive to send motorists to a transit station where parking may be difficult. Unfortunately, no real-time parking availability information appears to be presently collected from parking facilities along the corridor. If not addressed, this situation will impose limitations on the types of strategies that an ICM system may consider and implement.
- A regional 511 traveler information system already exists.
- LA Metro is starting an effort to develop traveler phone apps.
- Caltrans D7 staff noted that radio stations currently provide very good traffic information through their use of traffic helicopters. The stations already make recommendations for rerouting that appear to be followed by a portion of the traveling public. Any ICM system will have to be justified against the benefits already provided by the media.

10. SAFETY ISSUES

Key findings regarding safety problems along the I-710 corridor are summarized below:

- Safety is cited as an issue along the corridor in LA Metro’s 2009 Long Range Regional Transportation Plan. Safety concerns were due to aging and inadequate design of transportation infrastructure that require trucks to weave across multiple lanes in short distances, especially at major freeway interchanges. While some sections of the freeway have been rehabilitated since the long-range plan was developed, the issues surrounding the need for trucks to weave across multiple lanes in short distances remain.
- According to CHP Incident data available within PeMS and shown in Figure 15, there were on average 11.4 accidents per day in the northbound direction of I-710, and 10.2 accidents per day in the southbound direction. The data further shows no trend of increasing or decreasing accidents.
- As shown in Figure 16, accidents along the corridor tend to happen more frequently in the afternoon peak than in the morning peak.

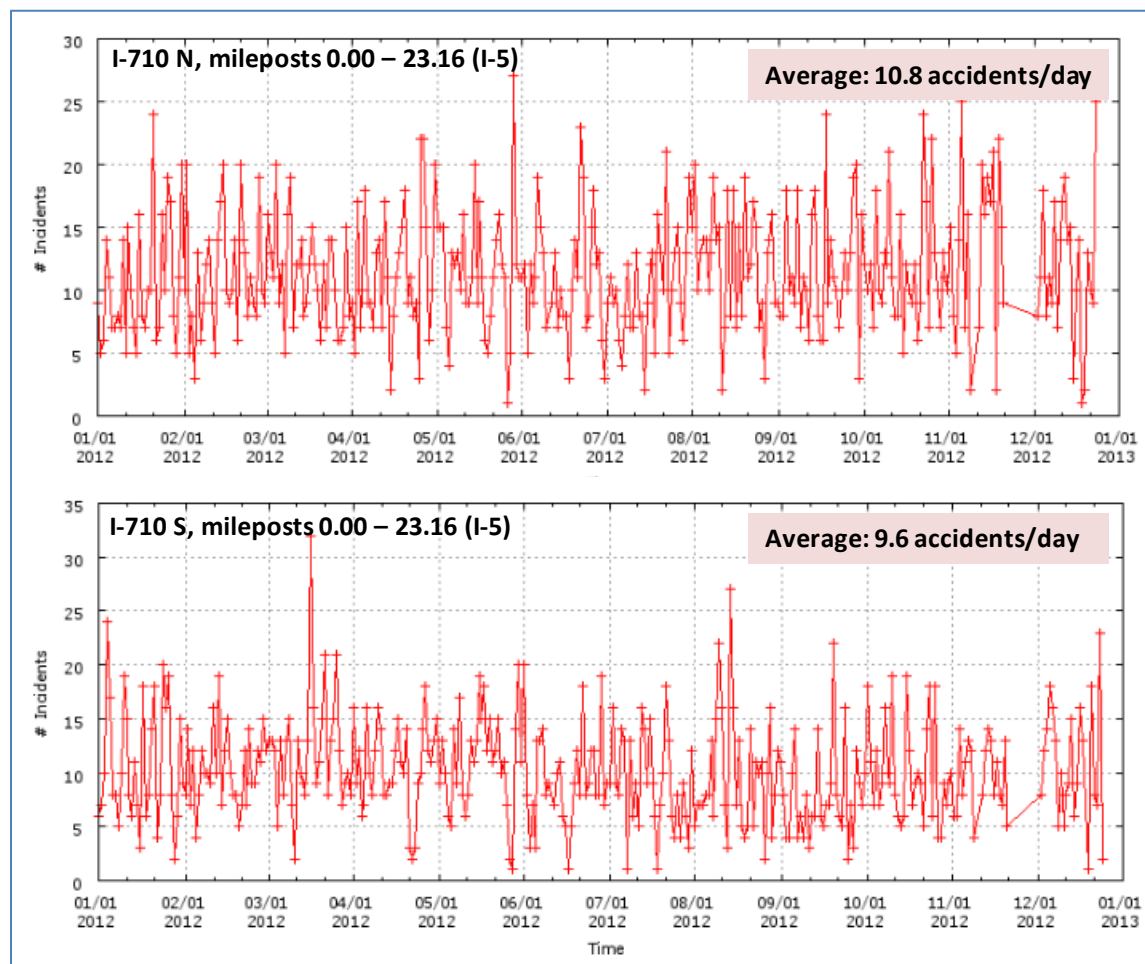


Figure 15 – Number of Incidents per Day, 2012

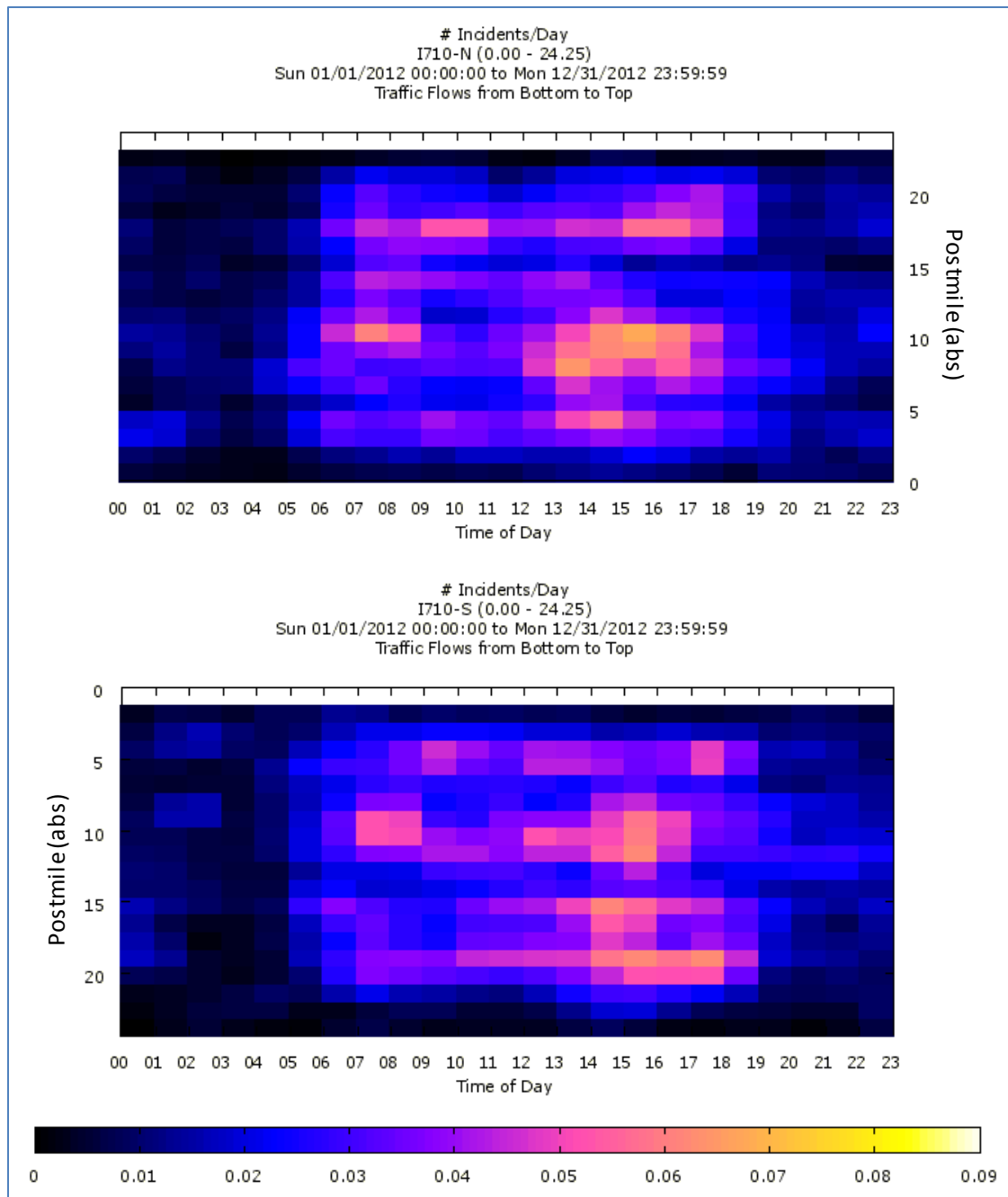
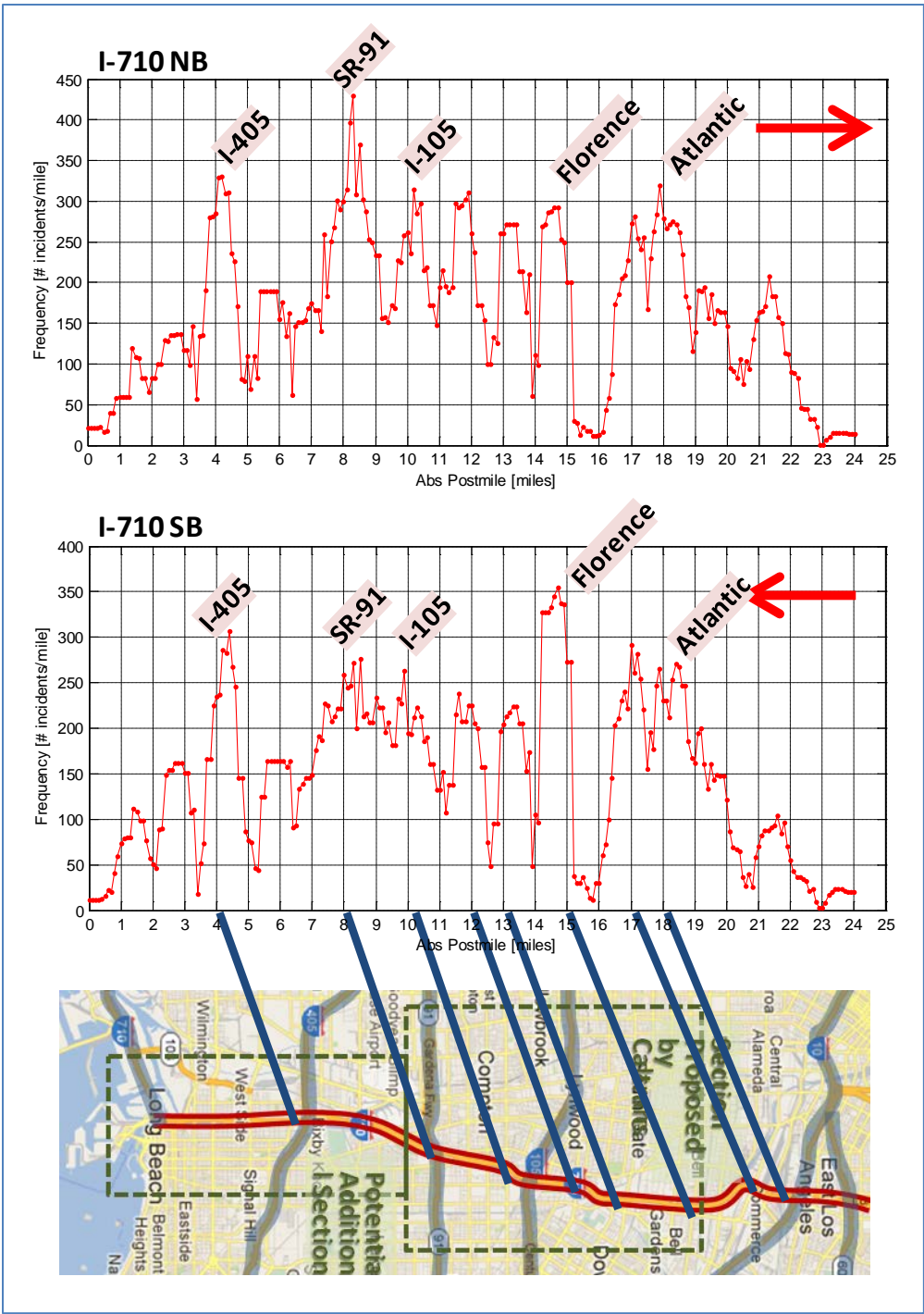


Figure 16 – Average Number of Incidents per Time of Day, 2012



- As shown in Figure 17, accidents seem to occur more frequently at some locations than others. High accident rates are found between SR-91 (pm 8.10) and Firestone (pm 13.4), particularly around the I-405, SR-91 interchange, Rosecrans, Imperial, Florence, and Firestone interchanges.
- Because accidents occurring along I-710 often involve heavy trucks, the accident clearance times along the freeway are often longer than on other freeways.
- Since truckers are typically paid by trips, time is very valuable to them. Truckers thus often try to beat the clock to pick up goods from the Port of LA/Long Beach and deliver them to their destination within a reasonable time window. This can lead some truckers to drive more aggressively, thus creating safety concerns.
- The behavior of passenger car drivers around trucks is also a source of problems. Some accidents are caused by drivers attempting to maneuver around trucks. Other accidents are caused by drivers cutting in front of trucks, ignoring the fact that trucks usually require longer distances to stop.
- Since many of the safety issues along I-710 are related to driving behavior, many of these issues may only be addressed by enforcement efforts and public education. According to Caltrans, this is a sensitive issue with the California Highway Patrol.
- In the past, traffic safety had to deal with median barrier issues on I-710. Median barriers were often penetrated by errant trucks, even fully-loaded vehicles, causing serious incidents involving fatalities and injuries. This issue is less of a problem now, as a significant portion of the barrier has been replaced by a newer design.
- New legislation allowing truck loads to increase up to 95,000 lbs is further compounding the safety issues along I-710.
- Caltrans maintenance staff has been struggling to maintain the lane line striping (Botts' Dots) due to heavy weaving truck volumes.

11. AIR QUALITY ISSUES

Key findings regarding environmental issues along the I-710 corridor are summarized below:

- Air quality degradation is a critical issue along the corridor, as maritime, railroad, and port-related truck traffic results in significant diesel emissions, including diesel particulate matter pollution.
- Higher rates of cancer are reported for the population along the corridor.

12. OVERALL EVALUATION

The evaluation that was conducted of the I-710 corridor indicates that this corridor may not be ideal for the deployment of a pilot ICM system. Below are the key positive and negative aspects of the corridor:

- Positive aspects:
 - Priority corridor for LA Metro.
 - Corridor of national significance identified by the US DOT due to its connection to the Port of Long Beach and its proximity to Los Angeles.
 - Presence of ramp meters on almost all interchanges north of I-405.
 - Presence of a fully metered freeway-to-freeway interchange (I-105).
 - The cities of Southgate and Compton have established traffic management centers.
 - Sensys traffic sensors are currently being deployed along a section of Long Beach Boulevard in the center of the corridor (anticipated completion in summer 2013).
 - Efforts are underway to implement centralized traffic signal status monitoring within local jurisdictions (expected completion sometime in 2014).
 - Corridor parallel to Metro Blue Line and crossed by Metro Green Line.
 - Presence of two Metro Rapid bus lines within the corridor, one going to downtown Los Angeles and the other to Pasadena.
 - Transit signal priority currently active or available on some arterials within the corridor.
 - Significant sections of the I-710 freeway have recently been rehabilitated.
- Negative aspects:
 - The presence of congestion on all the surrounding freeways makes it difficult to develop effective alternate routes using the freeways.
 - Truck traffic is currently growing faster than the general traffic and is expected to nearly triple by 2035. This creates an environment in which the ideal traffic management strategies are likely to change over time.
 - Short ramp lengths within the I-405 interchange make it very difficult to meter the I-710/I-405 freeway-to-freeway interchange.
 - There is limited real-time traffic detection along arterials within the corridor; the only arterial currently projected to be instrumented is a section of Long Beach Boulevard.
 - Not all cities may have the ability to monitor and control traffic signal operation from a central location.
 - Cities in the north of the corridor may not have the necessary resources to support the deployment and operation of an ICM system (for instance, some still use dial signal controllers).
 - Lack of available capacity at many key intersections along the corridor, particularly intersections close to the freeway; this may create significant difficulty in using the arterials as detours.
 - The high density of traffic signals along arterials surrounding I-710 (typically, four to five signals per mile) may impose long travel times along the arterials and reduce their attractiveness as potential diversion routes.
 - Some of the bottlenecks are due to causes that may be difficult to address (for instance, congestion along I-710 North in the AM peak due to the need for trucks to make multiple lane changes in high-density traffic to take to I-5 North exit on the left).

- Motorists traveling along I-710 may not be willing to travel two to four miles to reach a light-rail station along the Metro Blue line, particularly if they must travel along a congested arterial.
- Limited parking availability at most Blue Line light-rail stations along the corridor; this may make it difficult for motorists to consider using the light-rail lines as a viable travel alternative.
- There are currently two other major projects underway on I-710: the I-710 Corridor Project currently under environmental review and the gap closure project at the far north end of the corridor. Adding an additional ICM pilot project may create confusion as to the scope and timing of the projects, particularly among the corridor constituents and residents. In particular, the I-710 Corridor Project may eventually render some of the proposed ICM strategies obsolete.
- The high volume of trucks and high number of accidents involving trucks make the I-710 an atypical corridor. As a result, an ICM deployment on I-710 may have limited replication capability elsewhere.
- Local jurisdictions will likely oppose rerouting trucks to streets in residential areas.

The following are additional elements that must be considered regarding the evaluation summary presented in this document:

- Data used in the analysis is from 2008/2009. At a minimum, Caltrans and the local jurisdictions would need to confirm that conditions in 2013 remain essentially the same.