Connected Corridors:
Integrated Corridor Management (ICM)
Site Selection Summary

LA Metro / Caltrans Meeting

Feb 19, 2013

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Outline

- ICM Objectives
- Potential Corridors
- I-710 Corridor Evaluation

ICM Objectives

Integrated Corridor Management

- **A key ICM objective is to achieve operational improvements along transportation corridors through:**
  - Operational integration of available transportation systems
    - Freeways
    - Arterials
    - Transit services
    - Bikeways/pathways (were relevant)
  - Enhanced coordination among corridor stakeholders
    - Caltrans
    - Local transportation jurisdictions
    - Transit agencies
    - California Highway Patrol / Local law enforcement / First responders
    - Information service providers

Corridor Selection Parameters

Key Corridor Selection Criteria

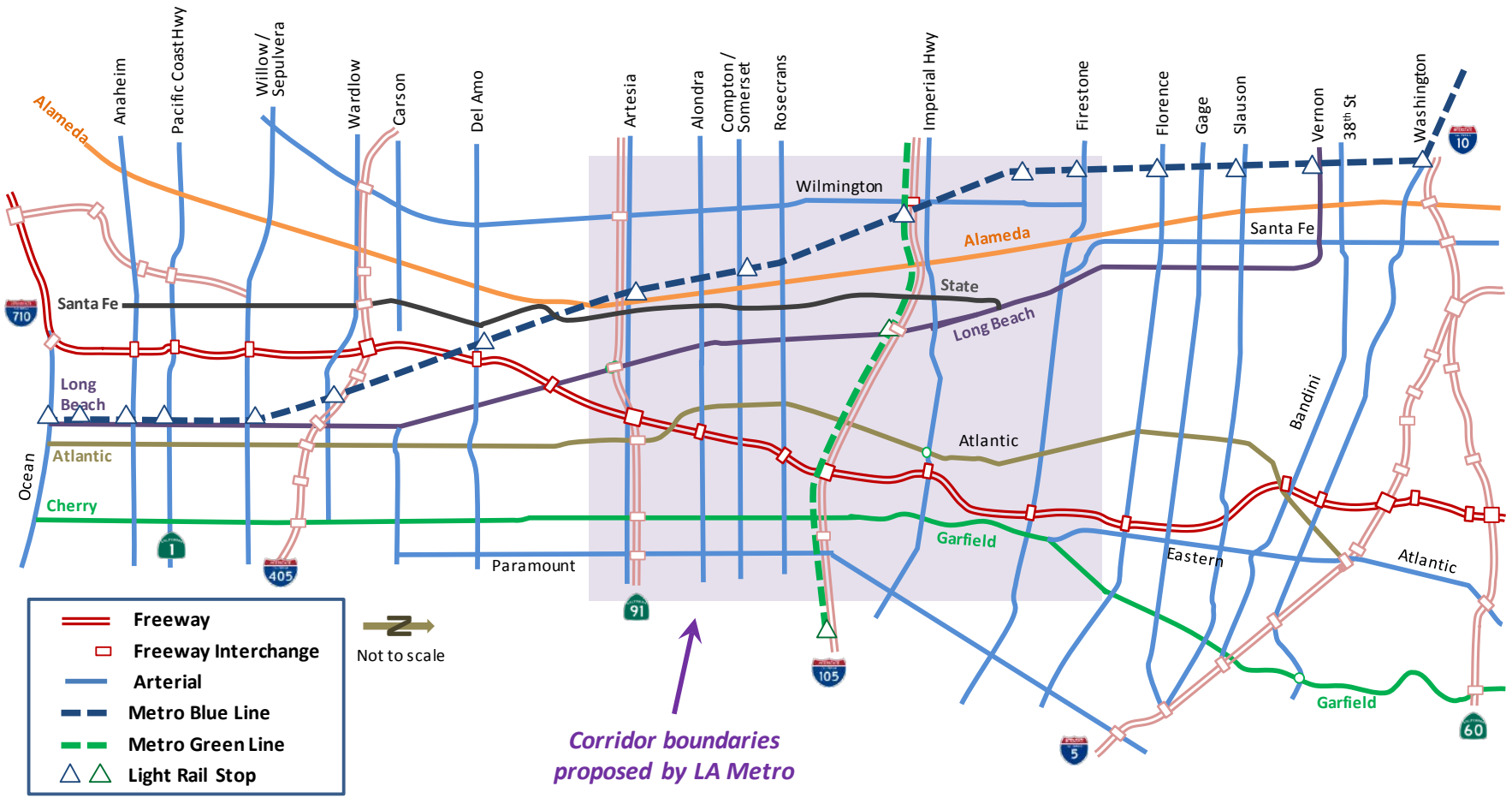
- **Traffic Detection**
  - Real-time traffic data from freeway mainline?
  - Real-time traffic data from on/off ramps?
  - Real-time traffic data from surrounding arterials?
- **Freeway control capabilities**
  - Ability to dynamically change ramp metering rate?
- **Arterial control capabilities**
  - Ability to control signal timing plan in effect or to dynamically adjust signal timing parameters?

Key Corridor Selection Criteria

- **Rerouting opportunities**
  - Ability to use CMS message to influence routing decisions?
  - Ability to use transit as an alternate transportation mode? (available carrying capacity? Parking availability?)
  - Ability to use parallel arterials as diversion routes? (available spare capacity?)
- **Collaboration opportunities**
  - Number of jurisdictions involved?
  - Potential for collaboration among corridor stakeholders?

I-710 Corridor Analysis

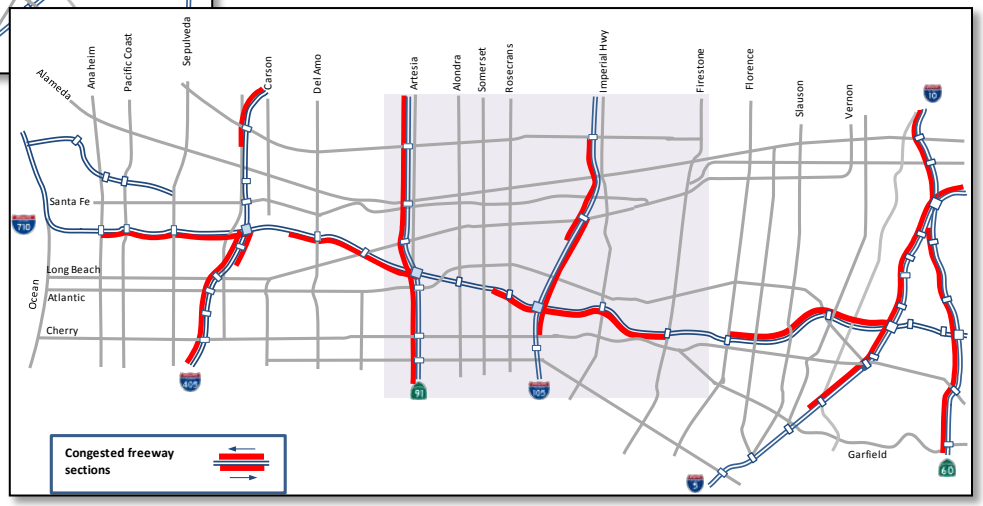
Corridor Geometry



I-710 – Congested Sections

AM Peak

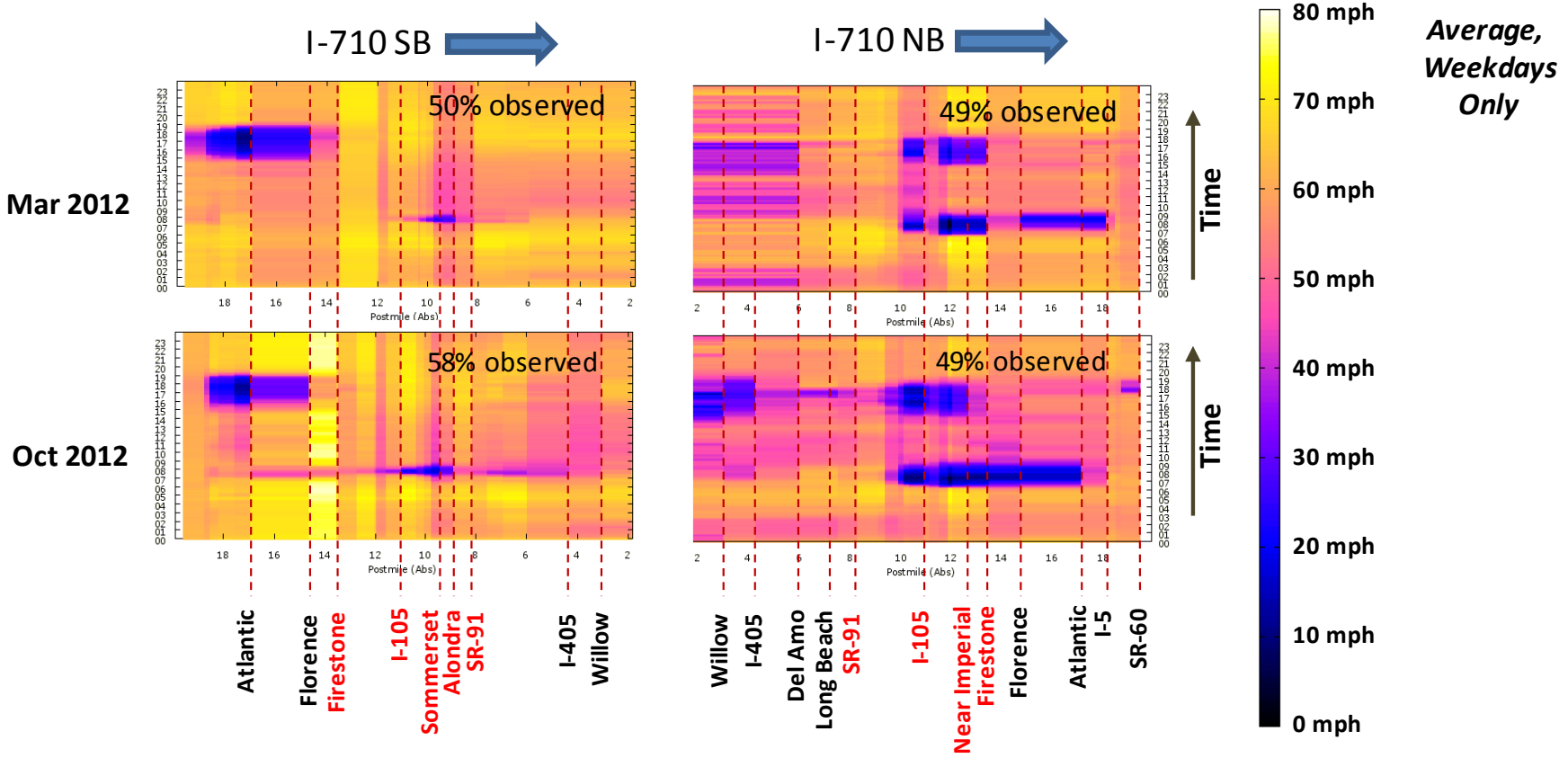
PM Peak



Caltrans

CALIFORNIA PATH

I-710 – Speed Contours

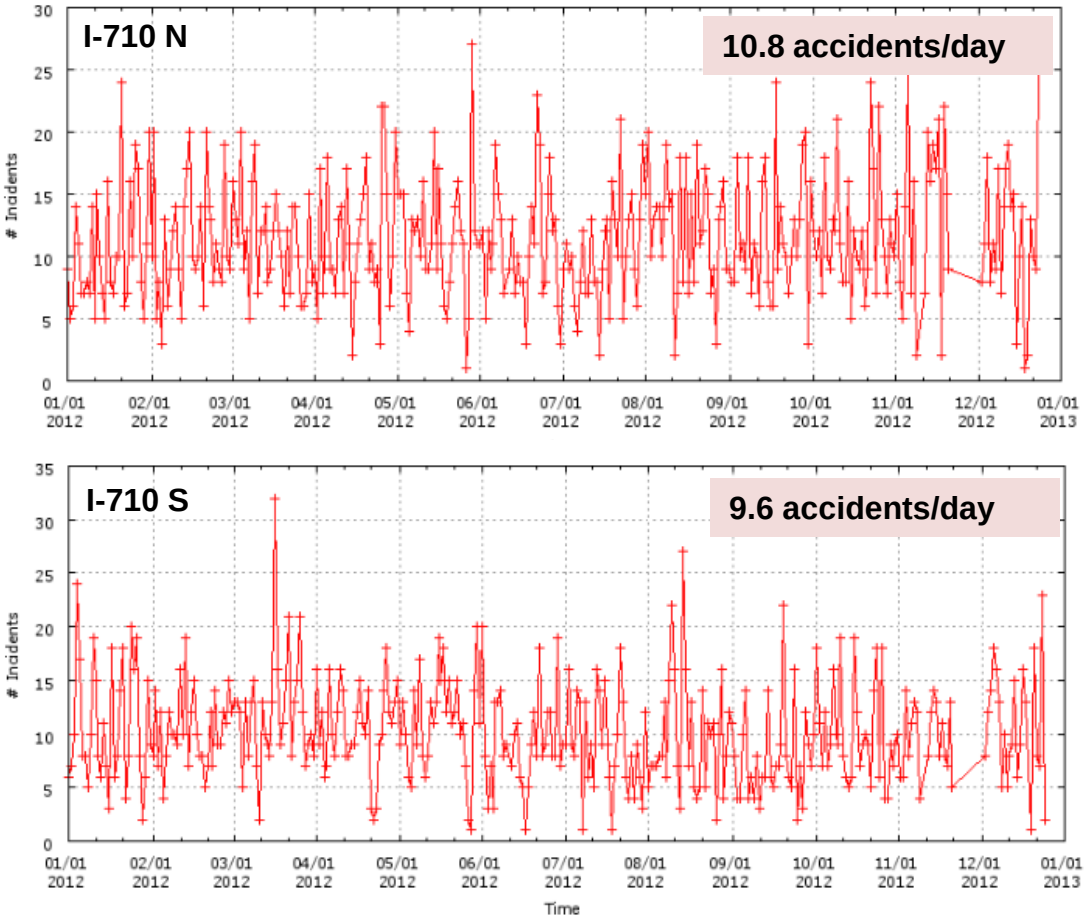


I-710 – Bottleneck at Atlantic On-Ramp

- **Major bottleneck created by truck traffic from Atlantic on-ramp on I-710 North**
  - Need for trucks to change 3 lanes in less than 1 mile to access I-5 North
  - Ramp grade and tight curves result in low truck entry speeds
- **Likely difficult to change truck traffic pattern**

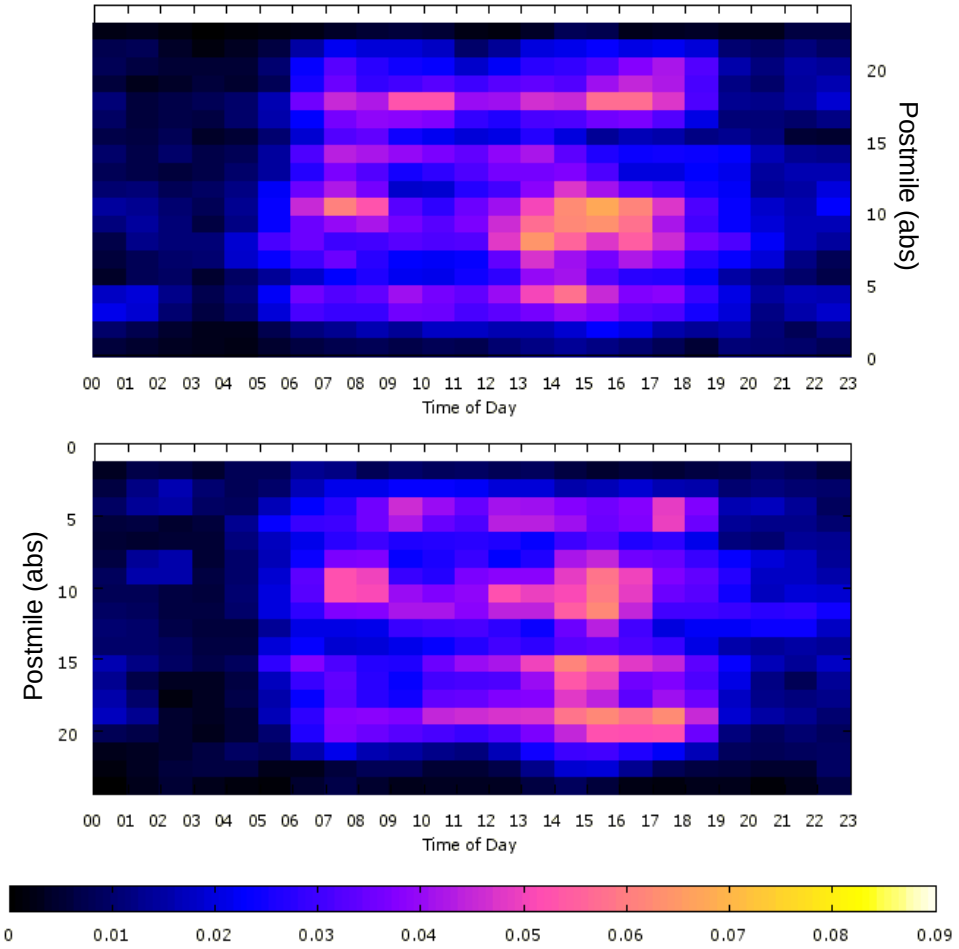
I-710 – Accident Statistics

- **Average number of accidents per day**
  - All days in 2012
  - Long Beach to I-5



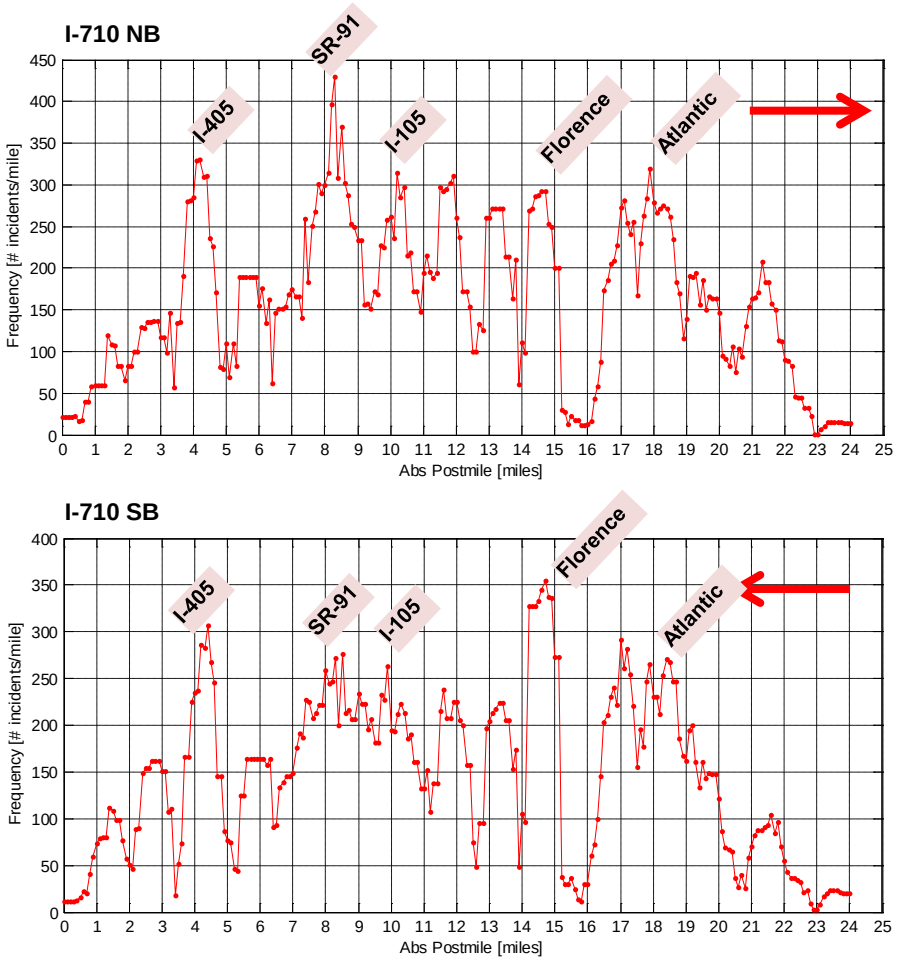
I-710 – Accident Statistics

- **Time of occurrence**
  - Predominantly during the afternoon peak hour (1 PM to 6 PM)



I-710 – Accident Statistics

- **Predominant locations**
  - Between SR-91 and Florence
  - Around Atlantic on-ramp

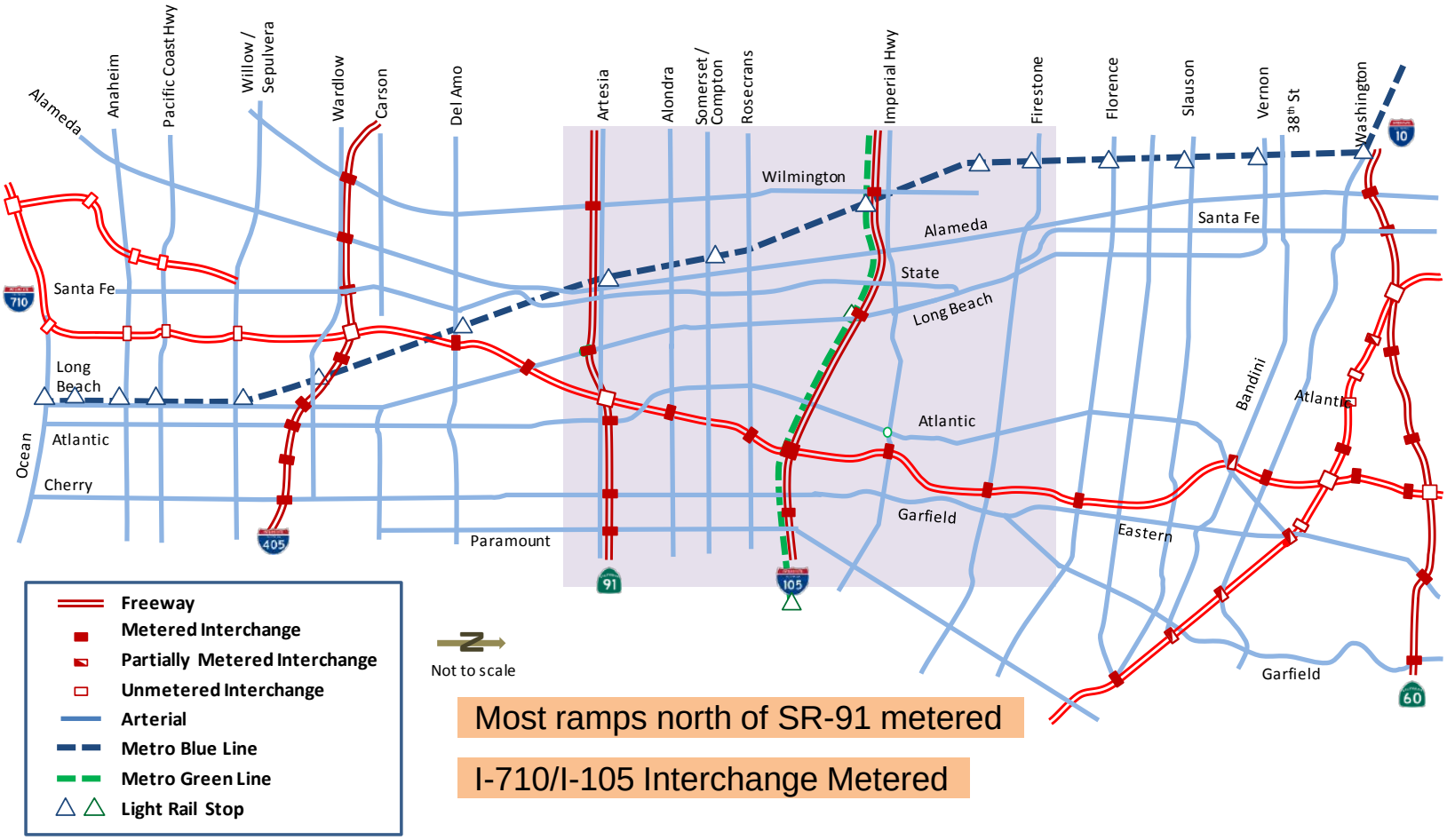


I-710 – Surrounding Congestion

60+ 55-59 50-54 45-49 40-44 35-39 ≤ 35

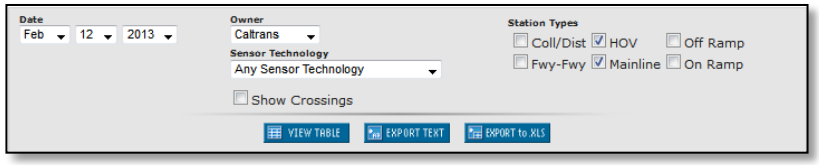
Current Speed (mph)

I-710 – Ramp Metering



I-710 –Mainline Detector Health

North



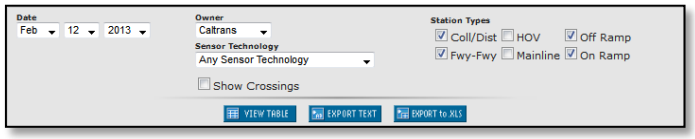
Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6
I710-S	772701	6.8	1.84	3085	E/B ANAHEIM - S/B710	Mainline						
I710-S	772711	6.8	1.84	3072	W/B ANAHEIM - S/B710	Mainline						
I710-S	774389	8.01	3.05	3711	WILLOW STREET	Mainline						
I710-S	774445	9.25	4.29	2315	SO OF 405	Mainline						
I710-S	717960	10.95	5.99	3084	DEL AMO 1	Mainline						
I710-S	717963	11.89	6.93	3088	LONG BEACH	Mainline						
I710-S	774372	12.5	7.54	2702	NORTH OF LONG BEACH	Mainline						
I710-S	716847	13.11	8.15	2313	N OF 91	Mainline						
I710-S	717970	13.83	8.87	3461	ALONDRA	Mainline						
I710-S	761851	14.38	9.42	2209	COMPTON	Mainline						
I710-S	717975	14.73	9.77	3460	ROSECRANS 1	Mainline						
I710-S	717972	15.01	10.05	3459	ROSECRANS 2	Mainline						
I710-S	761761	R15.25	10.29	2901	FM RTE 105	Mainline						
I710-S	718493	R15.3	10.34	2647	S OF 105	Mainline						
I710-S	717978	R15.9	10.94	3458	KING 1	Mainline						
I710-S	716857	R16.5	11.54	2210	KING 2	Mainline						
I710-S	717980	16.92	11.927	3483	IMPERIAL 1	Mainline						
I710-S	761776	16.98	11.987	3482	IMPERIAL 2	Mainline						
I710-S	774358	17.7	12.707	2212	NORTH OF MILLER WAY	Mainline						
I710-S	717986	18.42	13.427	3481	FIRESTONE 1	Mainline						
I710-S	717989	18.51	13.517	3480	FIRESTONE 2	Mainline						
I710-S	718002	19.59	14.597	3478	FLORENCE 2	Mainline						
I710-S	718008	21.88	16.887	3476	ATLANTIC 2	Mainline						
I710-S	718012	22.53	17.537	3475	WASHINGTON	Mainline						
I710-S	716891	23.16	18.167	2312	S OF 5	Mainline						

Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6
I710-N	772689	6.8	1.84	3086	E/B ANAHEIM - N/B710	Mainline						
I710-N	772980	6.8	1.84	3089	W/B ANAHEIM- N/B 710	Mainline						
I710-N	774411	8.01	3.05	3693	WILLOW STREET	Mainline						
I710-N	774444	9.25	4.29	2315	SO OF 405	Mainline						
I710-N	717962	11	6.04	3452	DEL AMO 2	Mainline						
I710-N	717966	12.13	7.17	3453	LONG BEACH	Mainline						
I710-N	774373	12.5	7.54	2702	NORTH OF LONG BEACH	Mainline						
I710-N	717968	13.29	8.33	3454	ATLANTIC	Mainline						
I710-N	761734	14.1	9.14	3455	ALONDRA	Mainline						
I710-N	718488	14.38	9.42	2209	COMPTON	Mainline						
I710-N	717770	14.9	9.94	3456	ROSECRANS 1	Mainline						
I710-N	718102	R15.1	10.14	3457	ROSECRANS 2	Mainline						
I710-N	718492	R15.3	10.34	2647	S OF 105	Mainline						
I710-N	717977	R15.9	10.94	3458	KING 1	Mainline						
I710-N	717660	R16.1	11.14	2902	FM RT 105	Mainline						
I710-N	768984	R16.5	11.54	2210	KING 2	Mainline						
I710-N	718151	16.9	11.907	3462	IMPERIAL 1	Mainline						
I710-N	717983	17.05	12.057	3463	IMPERIAL 2	Mainline						
I710-N	774359	17.7	12.707	2212	NORTH OF MILLER WAY	Mainline						
I710-N	717992	18.42	13.427	3464	FIRESTONE 1	Mainline						
I710-N	717995	18.51	13.517	3465	FIRESTONE 2	Mainline						
I710-N	718147	19.76	14.767	3467	FLORENCE 2	Mainline						
I710-N	718320	22.14	17.147	3695	ATLANTIC 2	Mainline						
I710-N	718010	22.15	17.157	3468	WASHINGTON	Mainline						
I710-N	763468	23.16	18.167	2312	S OF 5	Mainline						

Good | Line Down | Ctlr Down | No Data | Insufficient Data | Card Off | High Val | Intermittent | Constant | Feed Unstable

I-710 – Ramp Detector Health

North

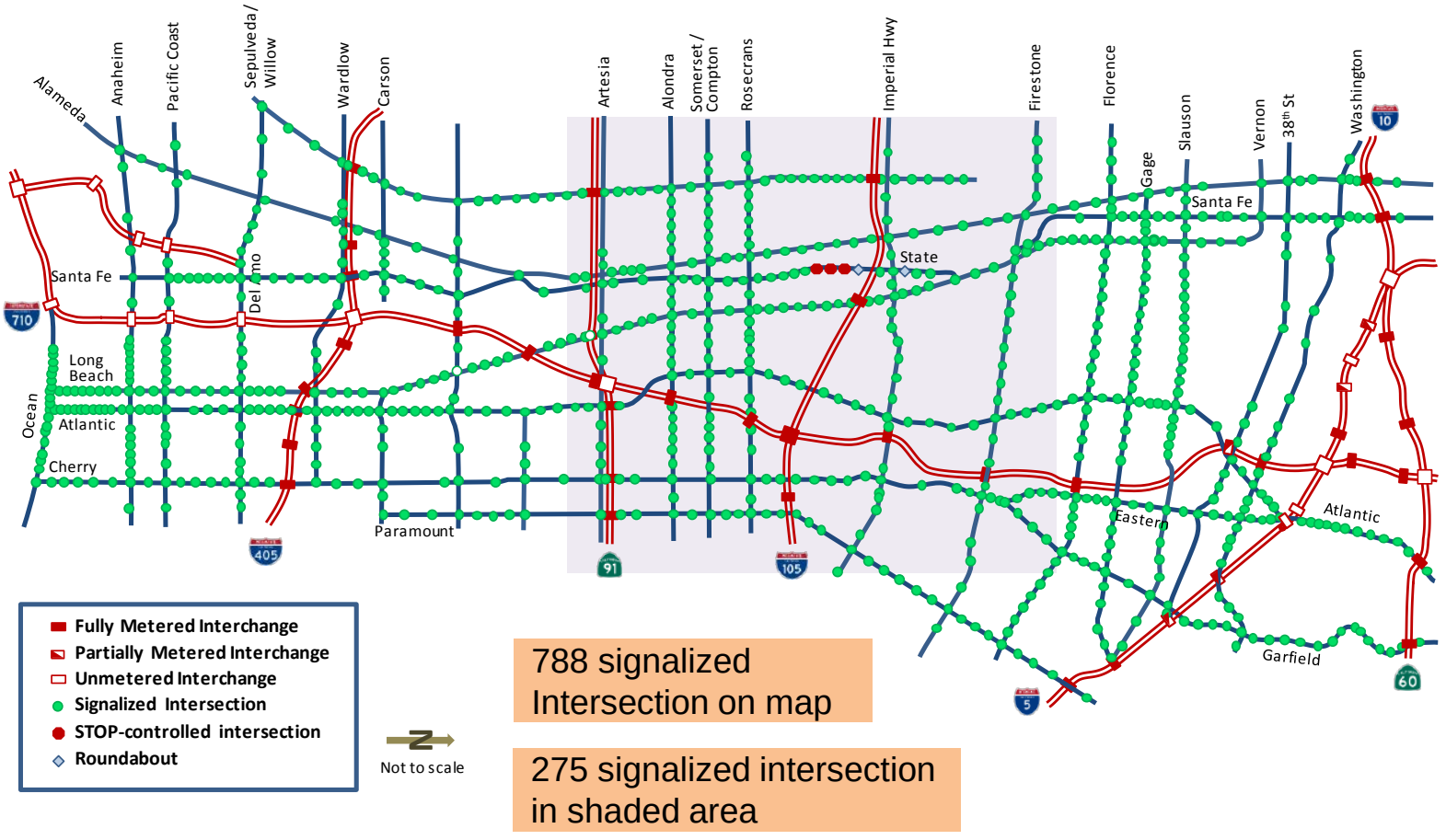


Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1	Lane 2
I710-S	772702	6.8	1.84	3085	E/B ANAHEIM - S/B710	On Ramp		
I710-S	772703	6.8	1.84	3085	E/B ANAHEIM - S/B710	Off Ramp		
I710-S	772712	6.8	1.84	3072	W/B ANAHEIM - S/B710	On Ramp		
I710-S	772713	6.8	1.84	3072	W/B ANAHEIM - S/B710	Off Ramp		
I710-S	774390	8.01	3.05	3711	WILLOW STREET	On Ramp		
I710-S	774391	8.01	3.05	3711	WILLOW STREET	Off Ramp		
I710-S	774460	9.25	4.29	2315	SB 710 TO SB 405	Fwy-Fwy		
I710-S	774461	9.25	4.29	2315	NB 405 TO SB 710	Fwy-Fwy		
I710-S	716843	10.95	5.99	3084	DEL AMO WB	On Ramp		
I710-S	763771	10.95	5.99	3084	DEL AMO 1	Off Ramp		
I710-S	716845	11.89	6.93	3088	LONG BEACH	On Ramp		
I710-S	717959	11.89	6.93	3088	LONG BEACH SB	Off Ramp		
I710-S	774150	12.8	7.84	3491	ARTESIA	On Ramp		
I710-S	774151	12.8	7.84	3491	ARTESIA	Fwy-Fwy		
I710-S	716849	13.83	8.87	3461	ALONDRA	On Ramp		
I710-S	717969	13.89	8.93	3461	ALONDRA	Off Ramp		
I710-S	716851	14.9	9.94	3460	ROSECRANS EB	On Ramp		
I710-S	761757	14.9	9.94	3460	ROSECRANS EB	Off Ramp		
I710-S	716853	R15.1	10.14	3459	ROSECRANS WB	On Ramp		
I710-S	718152	R15.25	10.29	2901	EB/WB 105 TO SB 710	Fwy-Fwy		
I710-S	761767	R15.25	10.29	2901	FM RTE 105	On Ramp		
I710-S	716855	R15.9	10.94	3458	KING 1	On Ramp		
I710-S	717976	R15.9	10.94	3458	KING 1	Off Ramp		
I710-S	716882	R16.5	11.54	2210	KING 2	Off Ramp		
I710-S	716859	16.92	11.92	7483	IMPERIAL EB	On Ramp		
I710-S	717979	16.92	11.92	7483	IMPERIAL EB	Coll/Dist		
I710-S	761778	16.92	11.92	7482	IMPERIAL EB	Off Ramp		
I710-S	716860	16.98	11.98	7482	IMPERIAL WB	On Ramp		
I710-S	716863	18.42	13.42	7481	FIRESTONE EB	On Ramp		
I710-S	717985	18.42	13.42	7481	FIRESTONE EB	Off Ramp		
I710-S	716865	18.51	13.51	7480	FIRESTONE WB	On Ramp		
I710-S	717988	18.51	13.51	7480	FIRESTONE WB	Off Ramp		
I710-S	717997	19.3	14.30	7479	FLORENCE EB	On Ramp		
I710-S	717998	19.5	14.50	7479	FLORENCE EB	Off Ramp		
I710-S	716867	19.76	14.76	7478	FLORENCE WB	On Ramp		
I710-S	718001	19.76	14.76	7478	FLORENCE WB	Off Ramp		
I710-S	761790	21.68	16.68	7477	ATLANTIC NB	On Ramp		
I710-S	716868	21.95	16.95	7476	ATLANTIC SB	On Ramp		
I710-S	718007	21.95	16.95	7476	ATLANTIC SB	Off Ramp		
I710-S	716870	22.53	17.53	7475	WASHINGTON	On Ramp		
I710-S	718011	22.53	17.53	7475	WASHINGTON	Off Ramp		

Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1	Lane 2
I710-N	772690	6.8	1.84	3086	E/B ANAHEIM - N/B710	On Ramp		
I710-N	772691	6.8	1.84	3086	E/B ANAHEIM - N/B710	Off Ramp		
I710-N	772981	6.8	1.84	3089	W/B ANAHEIM- N/B 710	Off Ramp		
I710-N	772982	6.8	1.84	3089	W/B ANAHEIM- N/B 710	On Ramp		
I710-N	774412	8.01	3.05	3693	WILLOW STREET	On Ramp		
I710-N	774413	8.01	3.05	3693	WILLOW STREET	Off Ramp		
I710-N	774458	9.25	4.29	2315	NB 710 CONN	Coll/Dist		
I710-N	774459	9.25	4.29	2315	NB 710 TO SB 405	Fwy-Fwy		
I710-N	737211	9.72	4.76	3450	PACIFIC	On Ramp		
I710-N	774193	9.72	4.76	3450	PACIFIC	Fwy-Fwy		
I710-N	718318	10.69	5.73	3451	DEL AMO EB	On Ramp		
I710-N	718319	10.69	5.73	3451	DEL AMO EB	Off Ramp		
I710-N	716844	11	6.04	3452	DEL AMO WB	On Ramp		
I710-N	717961	11	6.04	3452	DEL AMO WB	Off Ramp		
I710-N	716846	12.13	7.17	3453	LONG BEACH NB	On Ramp		
I710-N	717965	12.13	7.17	3453	LONG BEACH NB	Off Ramp		
I710-N	716850	14.1	9.14	3455	ALONDRA	On Ramp		
I710-N	761735	14.1	9.14	3455	ALONDRA	Off Ramp		
I710-N	716852	14.9	9.94	3456	ROSECRANS EB	On Ramp		
I710-N	717974	14.9	9.94	3456	ROSECRANS EB	Off Ramp		
I710-N	716854	R15.1	10.14	3457	ROSECRANS WB	On Ramp		
I710-N	716856	R16.1	11.14	2902	EB/WB 105 TO NB 710	Fwy-Fwy		
I710-N	718043	R16.1	11.14	2902	FM RT 105	On Ramp		
I710-N	716858	16.9	11.90	7462	IMPERIAL EB	On Ramp		
I710-N	718477	16.9	11.90	7462	IMPERIAL EB	Off Ramp		
I710-N	716861	17.05	12.05	7463	IMPERIAL WB	On Ramp		
I710-N	717982	17.05	12.05	7463	IMPERIAL WB	Off Ramp		
I710-N	716862	18.42	13.42	7464	FIRESTONE EB	On Ramp		
I710-N	717991	18.42	13.42	7464	FIRESTONE EB	Off Ramp		
I710-N	716864	18.51	13.51	7465	FIRESTONE WB	On Ramp		
I710-N	717994	18.51	13.51	7465	FIRESTONE WB	Off Ramp		
I710-N	716866	19.5	14.50	7466	FLORENCE EB	On Ramp		
I710-N	717999	19.5	14.50	7466	FLORENCE EB	Off Ramp		
I710-N	718004	19.76	14.76	7467	FLORENCE WB	On Ramp		
I710-N	718005	19.76	14.76	7467	FLORENCE WB	Off Ramp		
I710-N	718494	22.06	17.06	7695	ATLANTIC NB	Off Ramp		
I710-N	716869	22.14	17.14	7695	ATLANTIC NB	On Ramp		
I710-N	716871	22.54	17.54	7468	WASHINGTON	On Ramp		
I710-N	718009	22.54	17.54	7468	WASHINGTON	Off Ramp		

Good | Line Down | Ctlr Down | No Data | Insufficient Data | Card Off | High Val | Intermittent | Constant | Feed Unstable

Arterials – Signalized Intersections



Arterials – Traffic Signal Controllers

- **Atlantic Avenue**

South Gate	ASC/2 at Salt Lake, Michigan, Firestone ASC/3 at Tweedy ASC-8000 at Southern
Lynwood	LACO-4E (Pending)
Compton	ASC/3
LA County	LACO-4E

- **Long Beach Boulevard**

South Gate	LACO-4E at Tweedy ASC/3 at Willow Place, Liberty St, Firestone ASC/2 at others
Lynwood	LACO-4E (Pending)
Compton	ASC/3

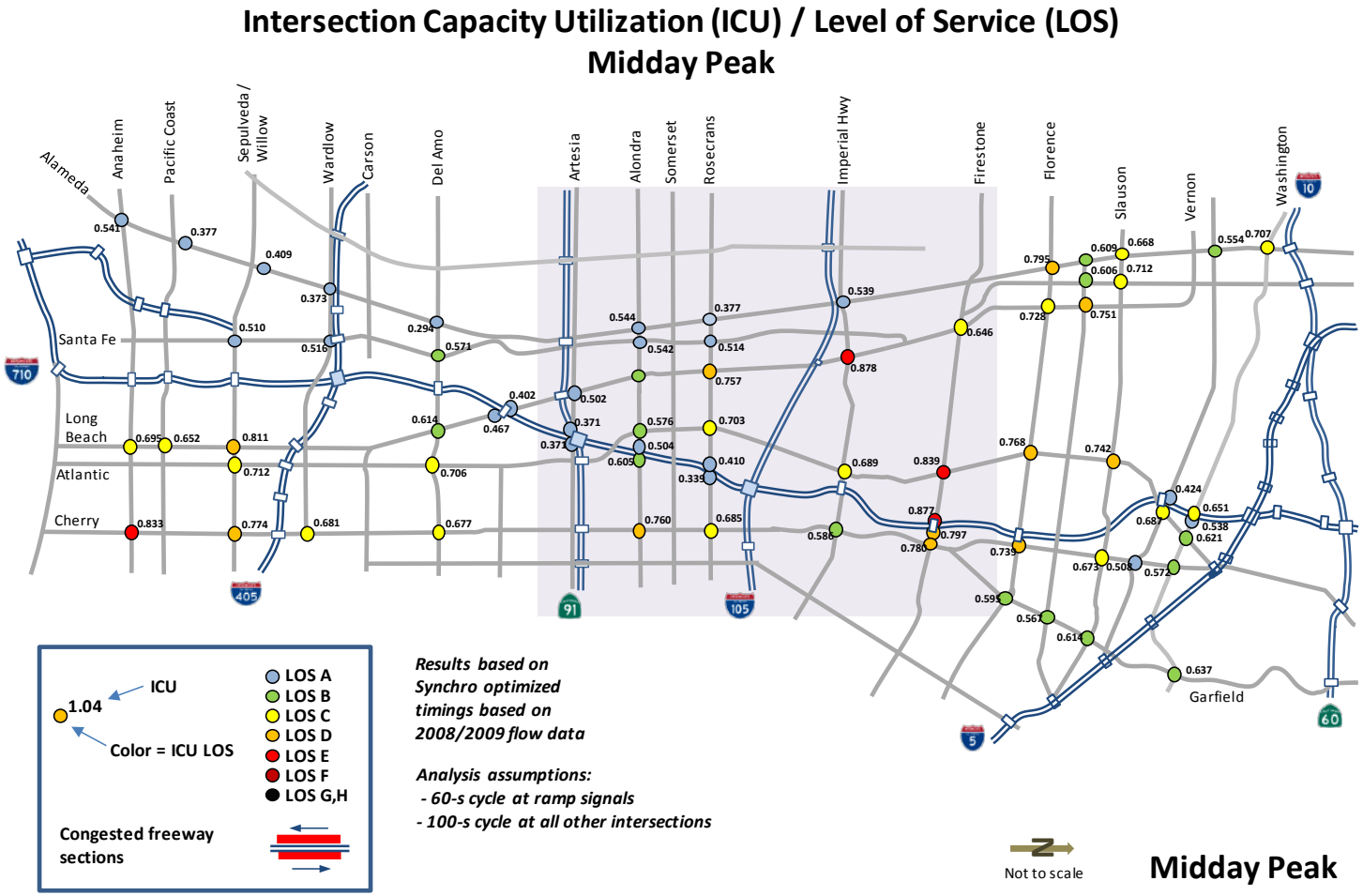
- **Garfield Avenue**

South Gate	ASC/3 at Firestone Blvd, Firestone Place, Target Store ASC/2 at others

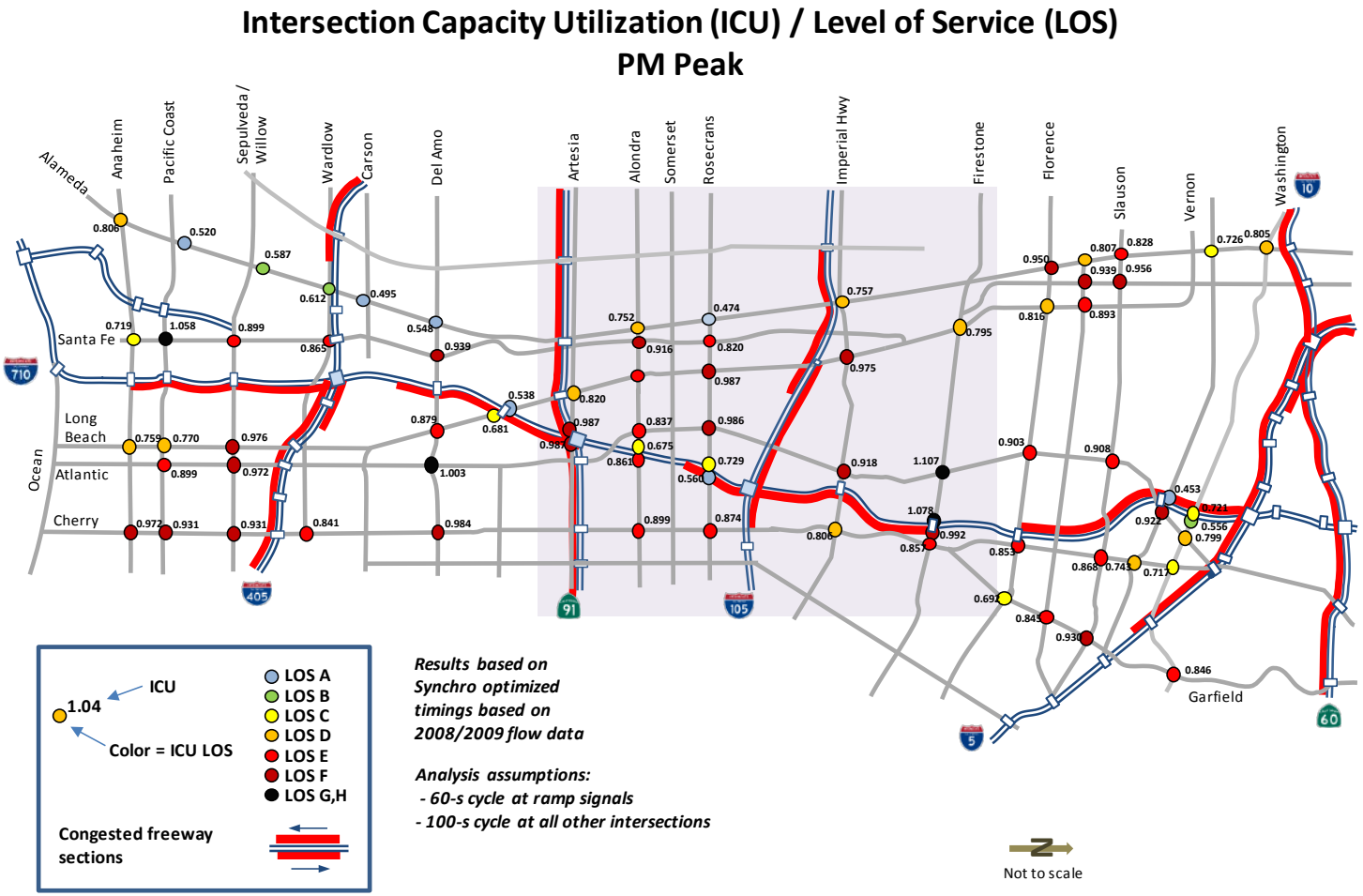
Arterial – Congestion Assessment

Intersection Capacity Utilization (ICU) / Level of Service (LOS)
AM Peak

Arterial – Congestion Assessment

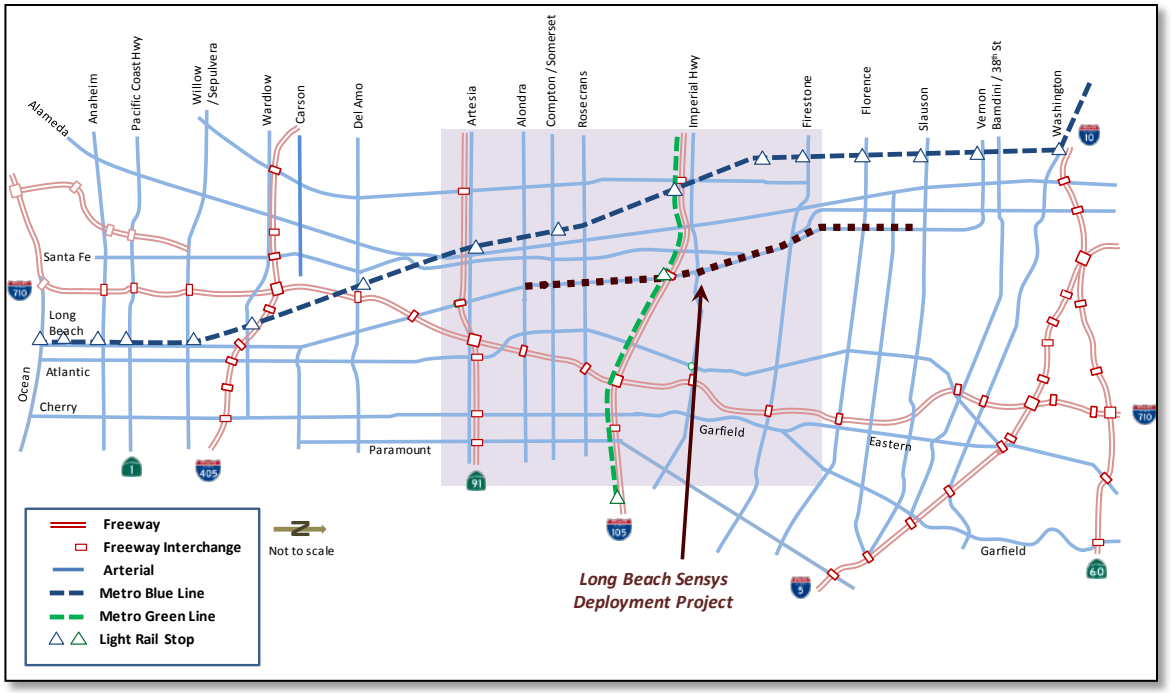


Arterial – Congestion Assessment



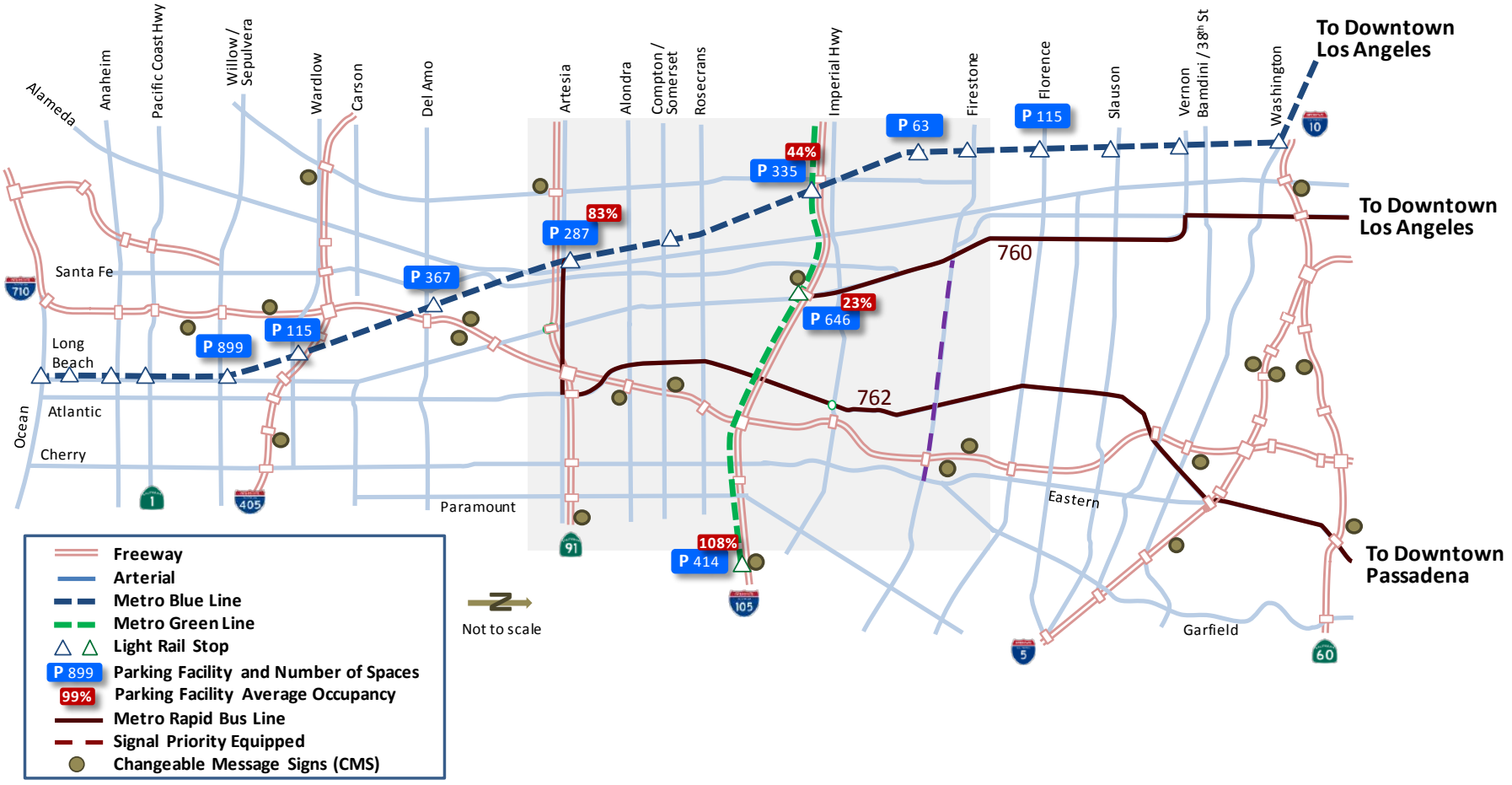
Traffic Detection - Arterials

- **Limited traffic detection on arterials within central section of corridor**
- **Sensys sensors being deployed along Long Beach Blvd**



Light Rail and Rapid Bus Services

Park and Ride / Information Services



Positive Aspects

- **Corridor of national/regional significance**
- **Traffic sensors**
  - Presence of multiple PeMS stations along freeway mainline
  - PeMS stations already installed on most on/off ramps
- **Ramp metering**
  - Ramp meters on almost all interchanges north of I-405
  - Fully metered freeway-freeway interchange (I-105), with potential of metering two additional freeway-freeway interchanges (SR-91 and I-405)
- **Arterial Traffic signal control**
  - Existing Traffic Management Centers in the cities of Southgate and Compton
  - Efforts under way to implement centralized traffic signal status monitoring within local jurisdictions (expected completion sometime in 2014)
  - Sensys traffic sensors currently being deployed along a section of Long Beach Boulevard (anticipated completion in summer 2013)

Positive Aspects

- **Transit**
  - Corridor parallel to Metro Blue Line and crossed by Metro Green Line
  - Two Metro Rapid bus lines within 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
- **Other**
  - Significant sections of the I-710 freeway have recently been rehabilitated

Negative Aspects

- **Freeway traffic sensing**
  - PeMS stations health along ramps (based on February 2012 data)
- **Freeway congestion**
  - Congestion on surrounding freeways makes it difficult to develop effective alternate routes
  - 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
  - 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)
  - Portion of congestion likely attributable to the high frequency of accidents along I-710
- **Arterial traffic control**
  - Limited real-time traffic detection along arterials within the central portion of the corridor
  - Not all cities may have the ability to centrally monitor and control traffic signal operations
  - Cities to the north of the corridor may not have the necessary resources to support the deployment and operation of an ICM system

Negative Aspects

- **Rerouting opportunities**
  - Lack of available capacity at many key intersections, particularly close to the freeway, may create significant difficulty in using the arterials as detour routes
  - High density of traffic signals along surrounding arterials (typically, 4 to 5 signals per mile) may impose long travel times and reduce their attractiveness
  - Motorists may not be willing to travel 2 to 4 miles along congested arterials to reach a light-rail station along the Metro Blue line
  - Political difficulty of rerouting truck traffic through residential areas
- **Transit**
  - Limited parking availability at most light-rail stations along the corridor (particularly along the Blue Line) will limit mode transfer opportunities
- **Jurisdictional environment**
  - Implementation of traffic management strategies on arterials surrounding the corridor will require coordination of activities among multiple local jurisdictions

Negative Aspects

- **Uniqueness of corridor**
  - 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.

Remaining Questions

- **Traffic detection and control capabilities**
  - Traffic signal control and detection in City of Long Beach?
  - Ability to communicate will all controllers along an arterial?
  - Availability of real-time traffic counts (when? where?)
- **Accuracy of URS intersection capacity analysis**
  - 2008/09 data
  - Analysis based on single-day traffic flow counts
  - Changes in signal timing/controller since analysis?
  - Intersection geometrical changes since analysis?

Alternate Corridor Options

Potential Alternate Corridors