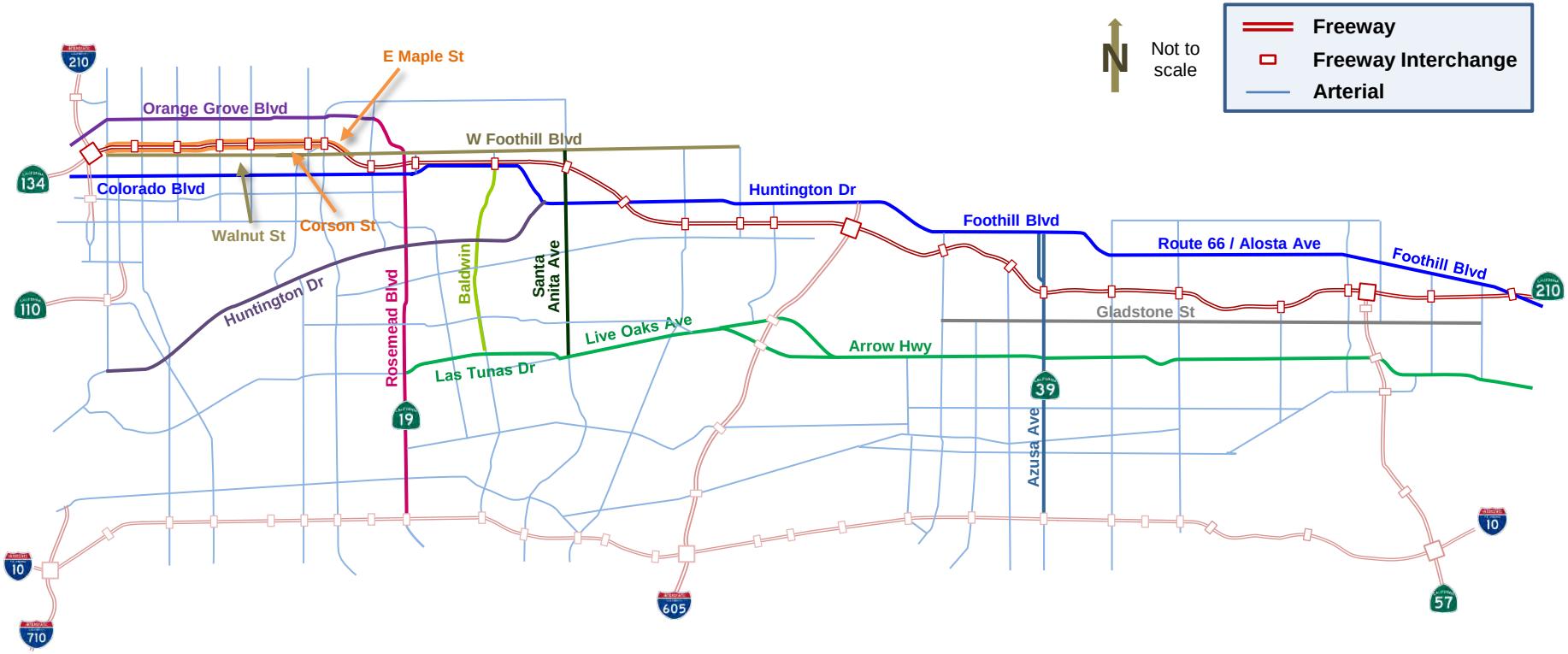
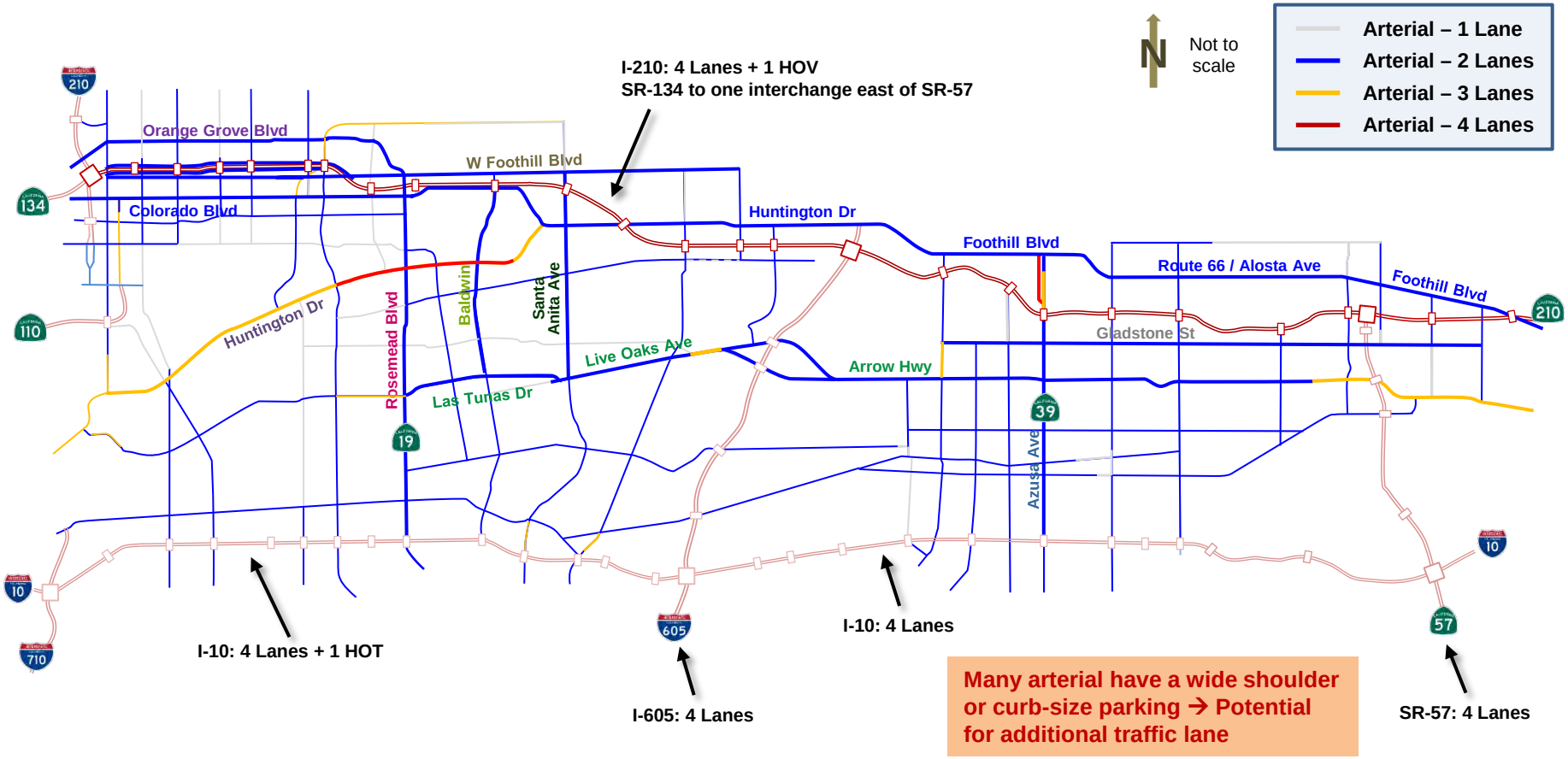
I-210 Corridor Analysis

Corridor Geometry – Roadways



Corridor Geometry – Number of Lanes



Many arterial have a wide shoulder or curb-size parking → Potential for additional traffic lane

Jurisdictional Environment

Jurisdictional Environment

Area 1

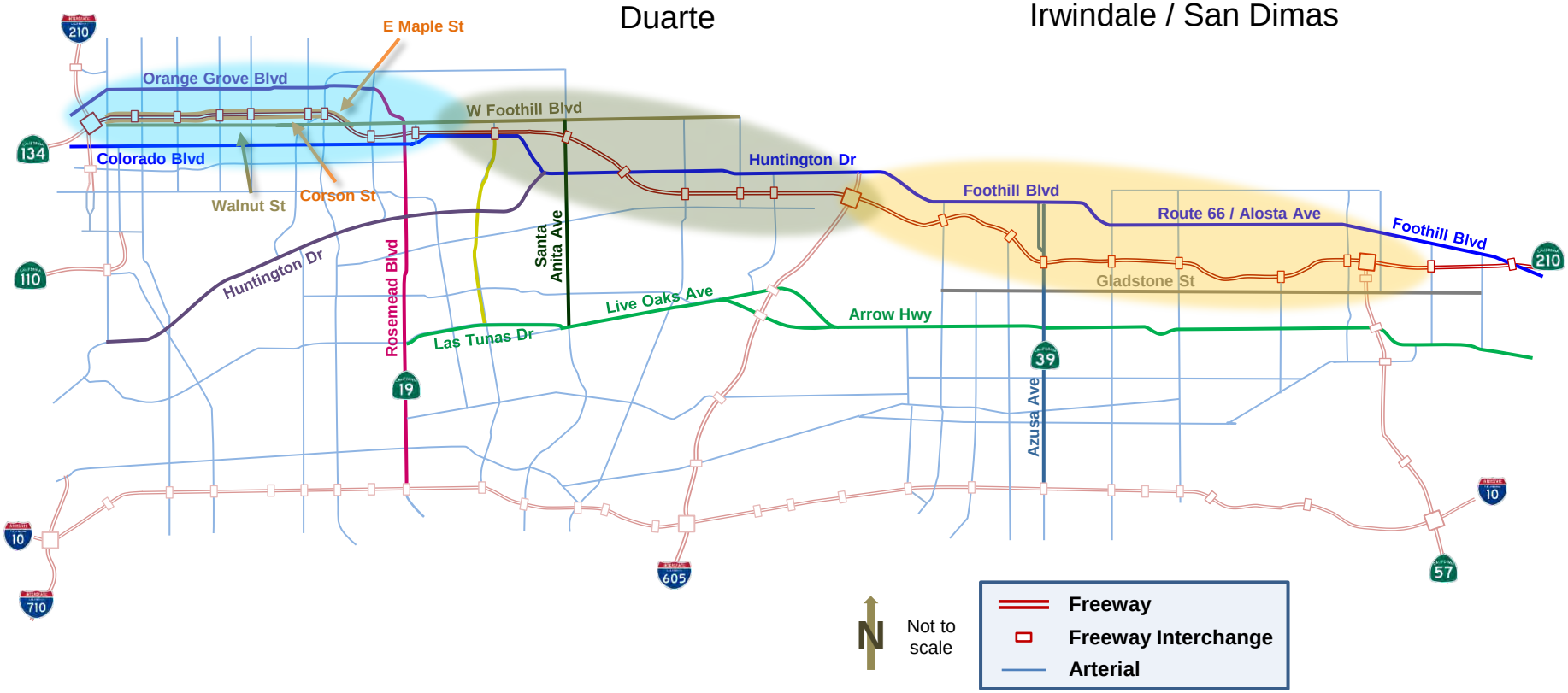
Pasadena

Area 2

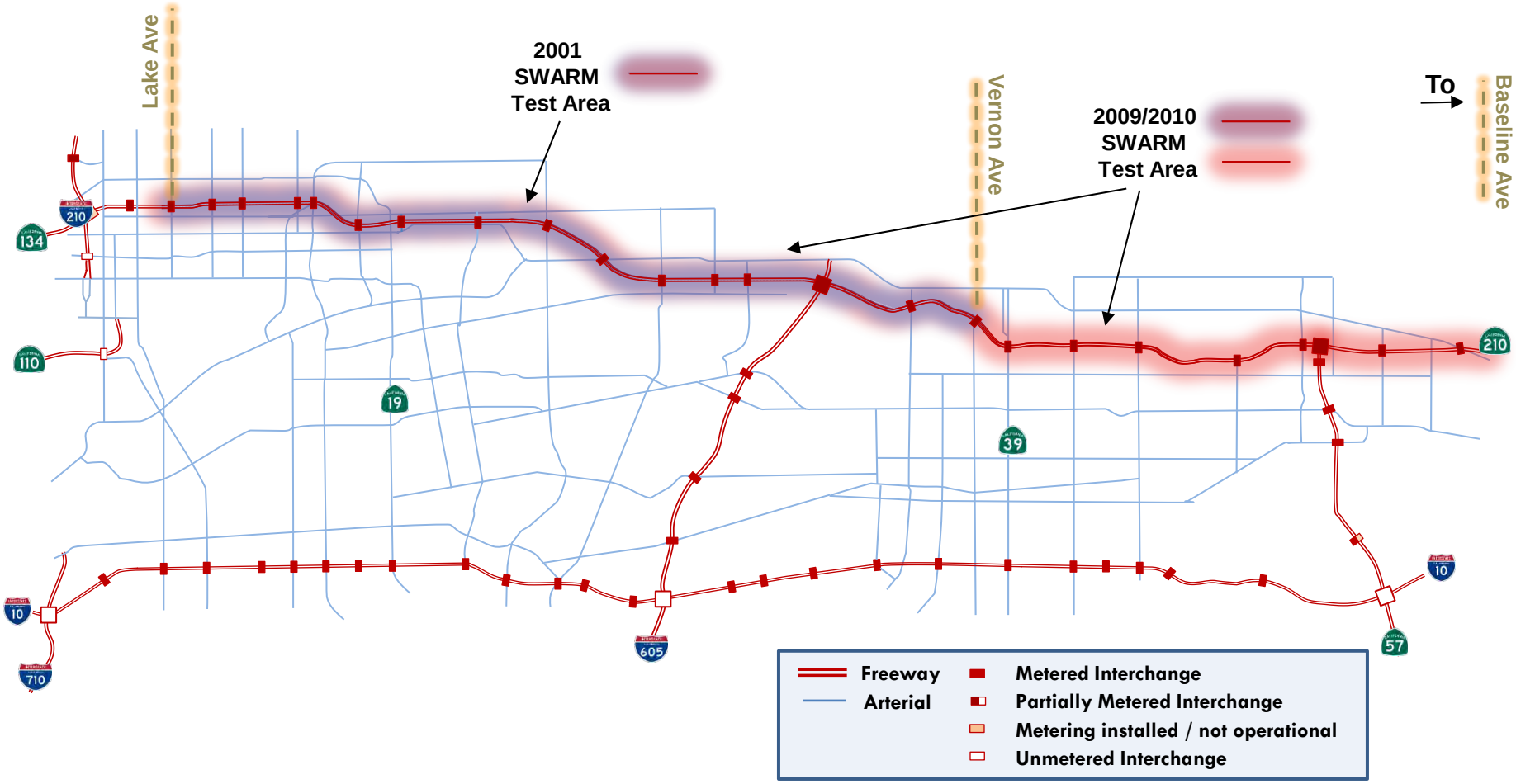
Arcadia / Monrovia
Duarte

Area 3

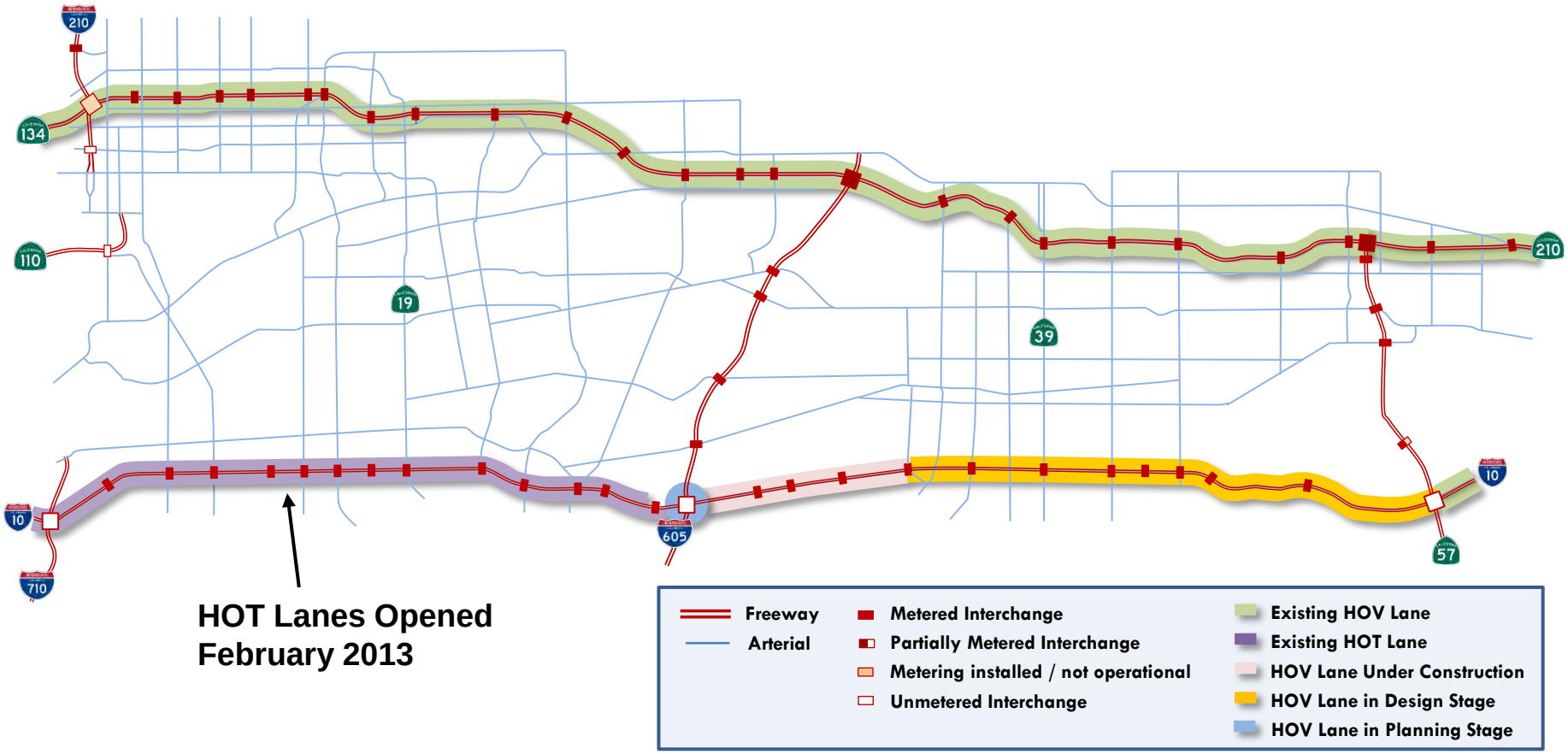
Azusa / Glendora / Citrus
Irwindale / San Dimas



Freeway Control – Ramp Metering



Freeway Control – HOV/HOT Lanes



Arterial Control – Signal Density

Area 1

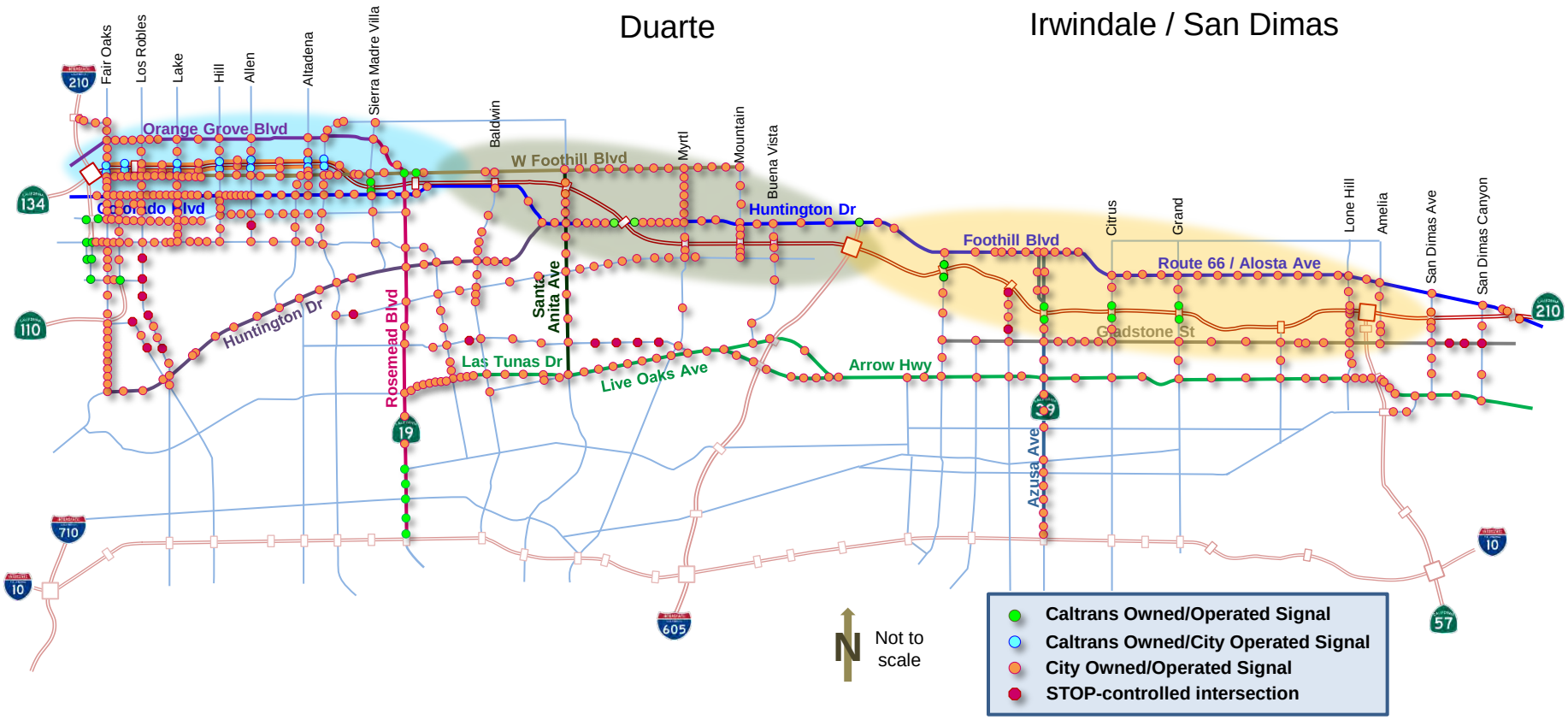
Pasadena

Area 2

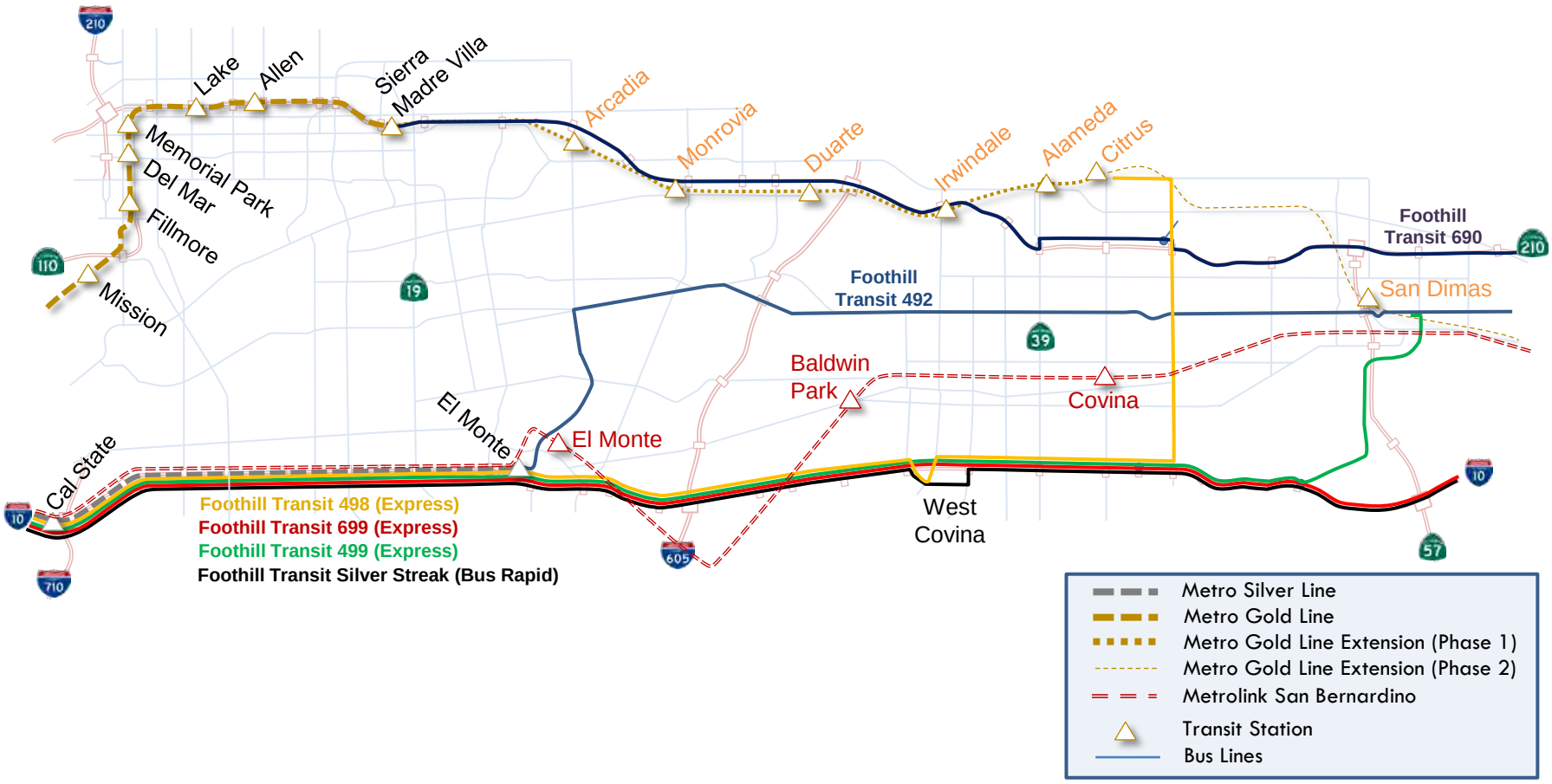
Arcadia / Monrovia
Duarte

Area 3

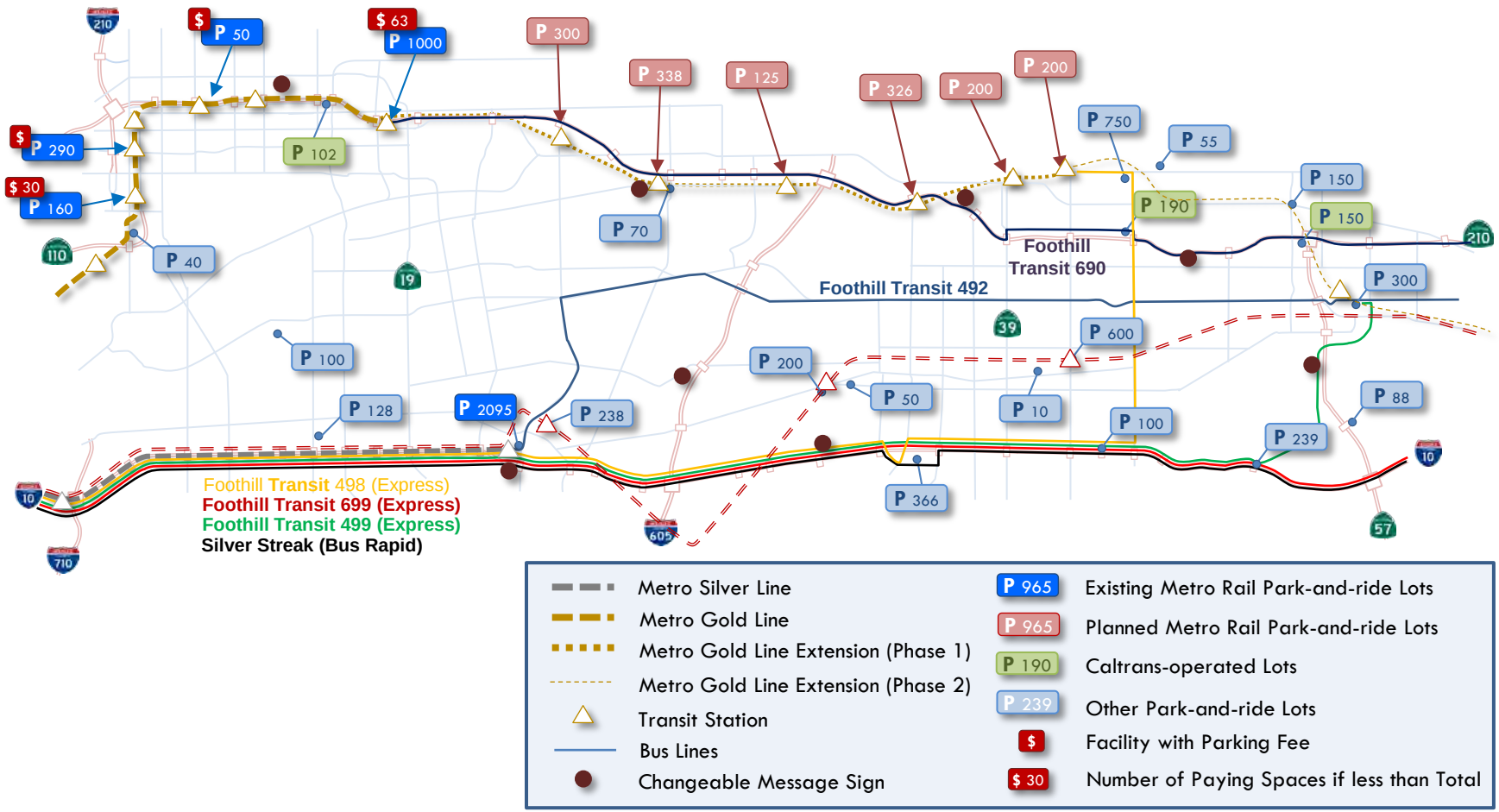
Azusa / Glendora / Citrus
Irwindale / San Dimas



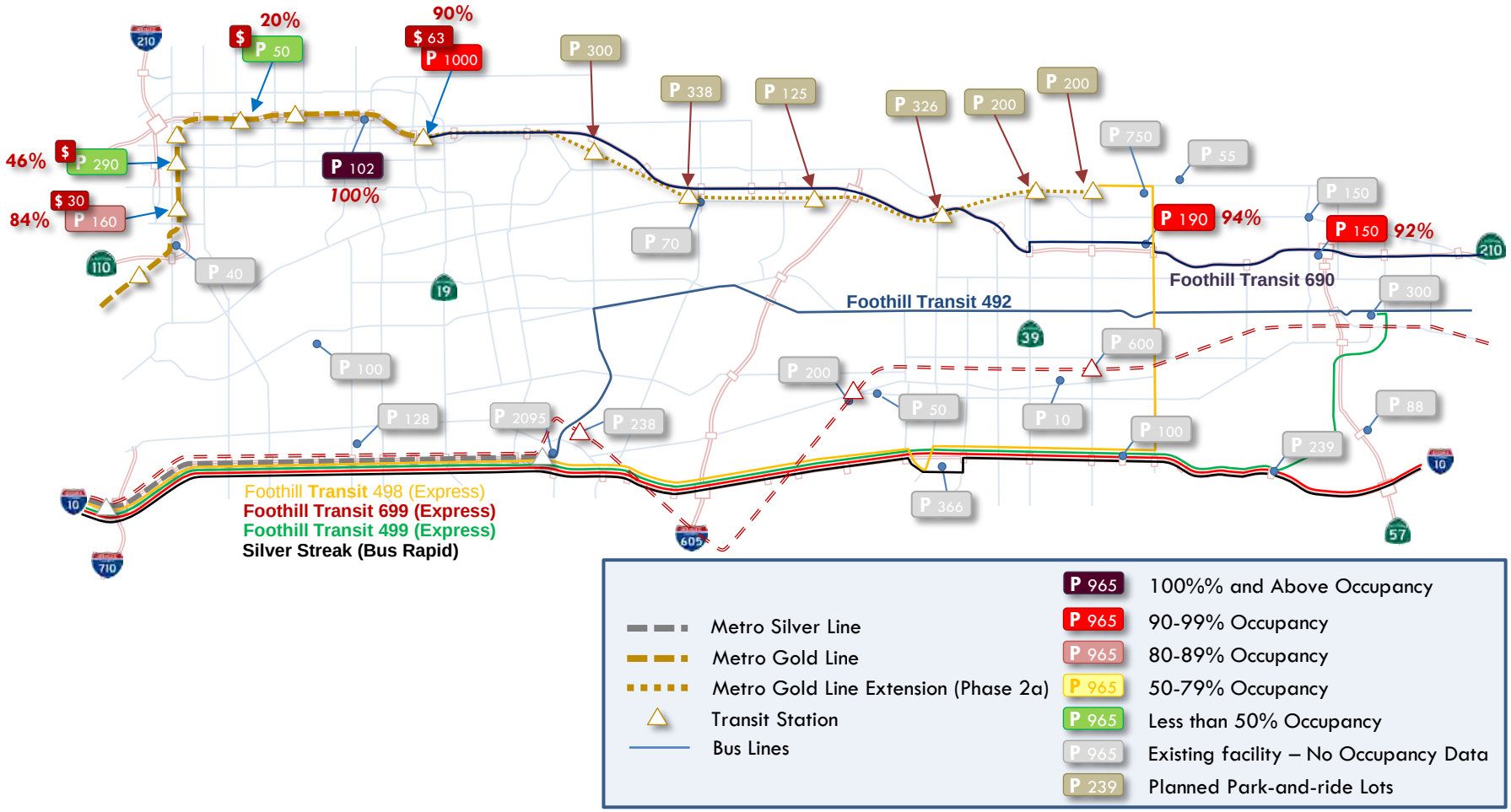
Transit Services – Light Rail & Bus Lines



Park & Ride / Changeable Message Signs

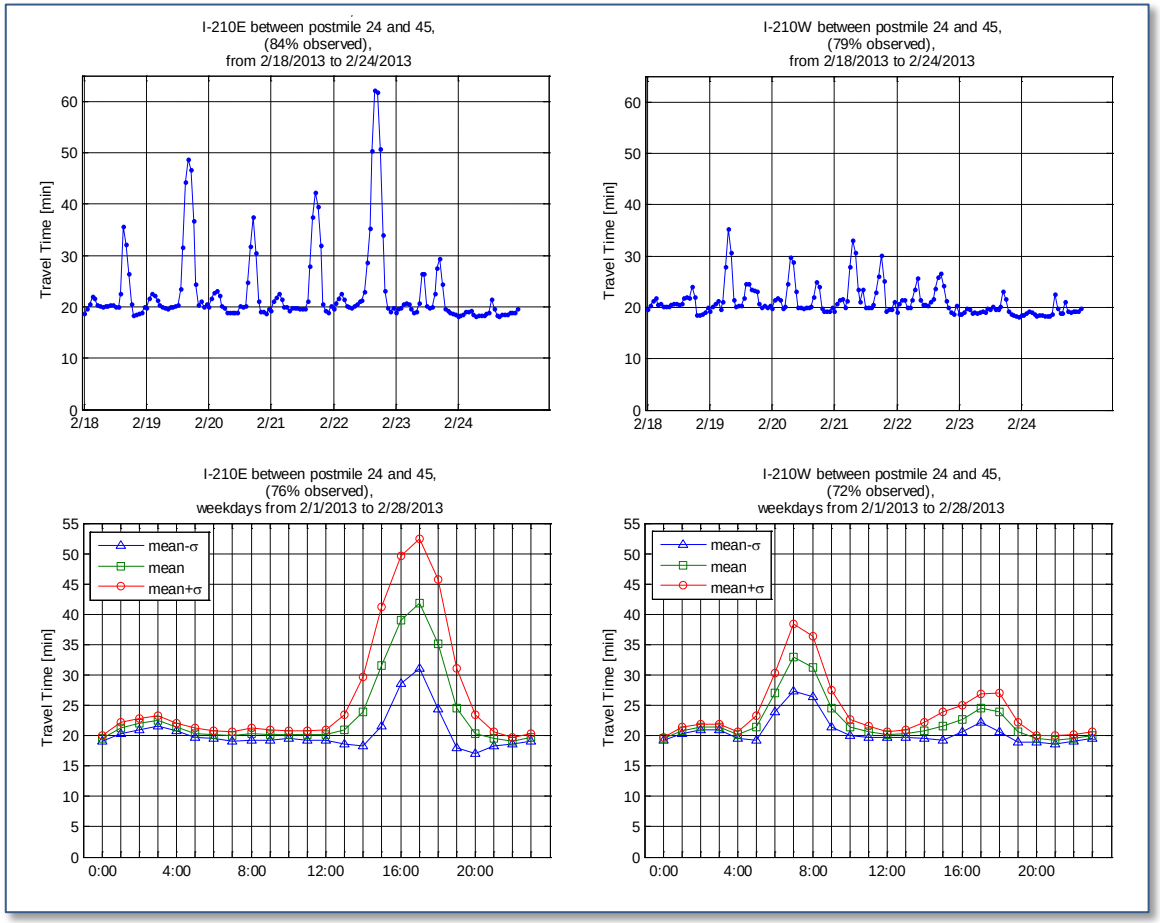


Parking Occupancy

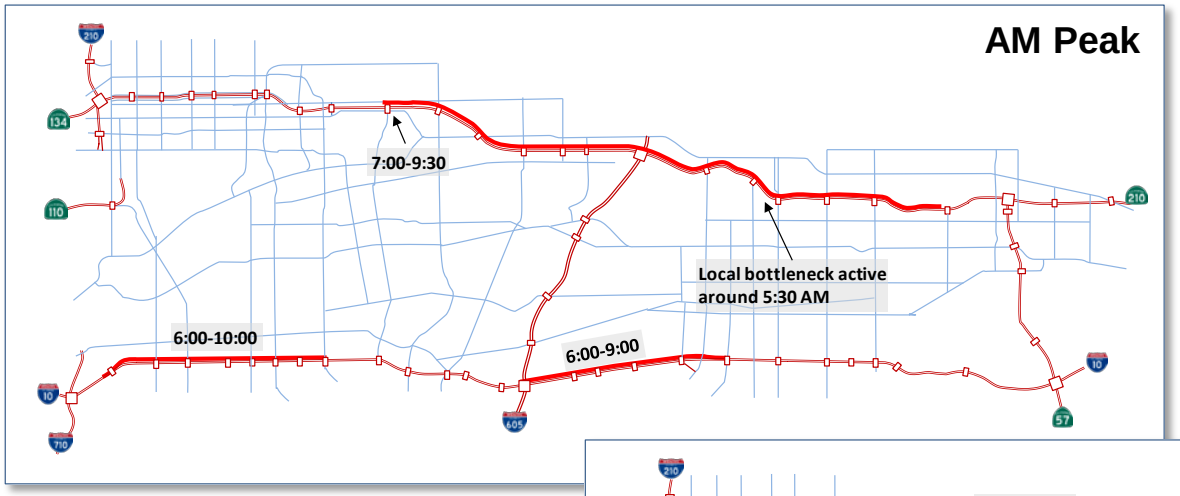


Congestion Analysis – Freeway Travel Times

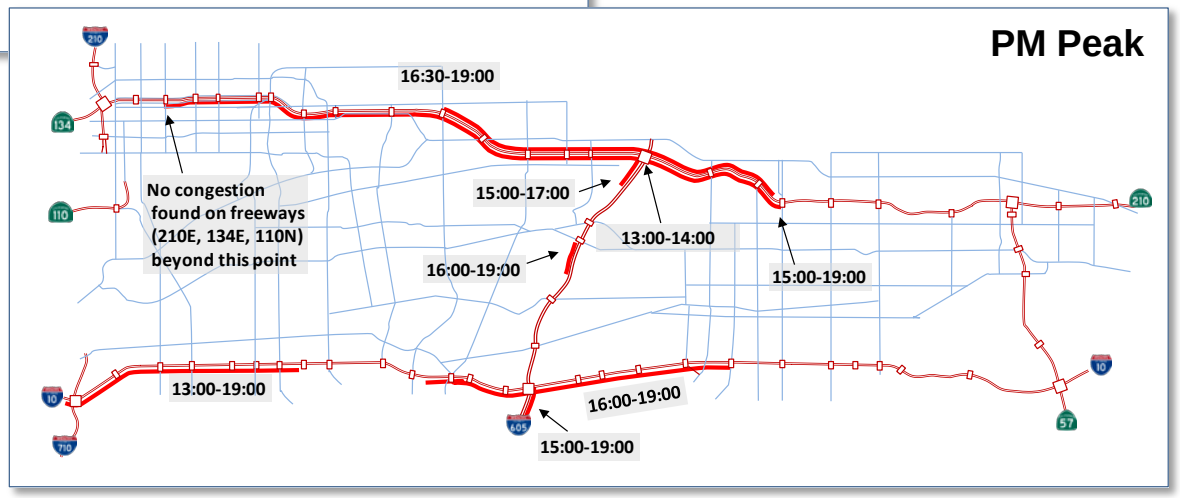
- **Free-flow**
  - ~20 min
- **EB Congestion**
  - 30-55 min,
  - PM peak
  - Significantly higher peak travel times on Fridays
- **WB Congestion**
  - 25-40 min
  - AM peak



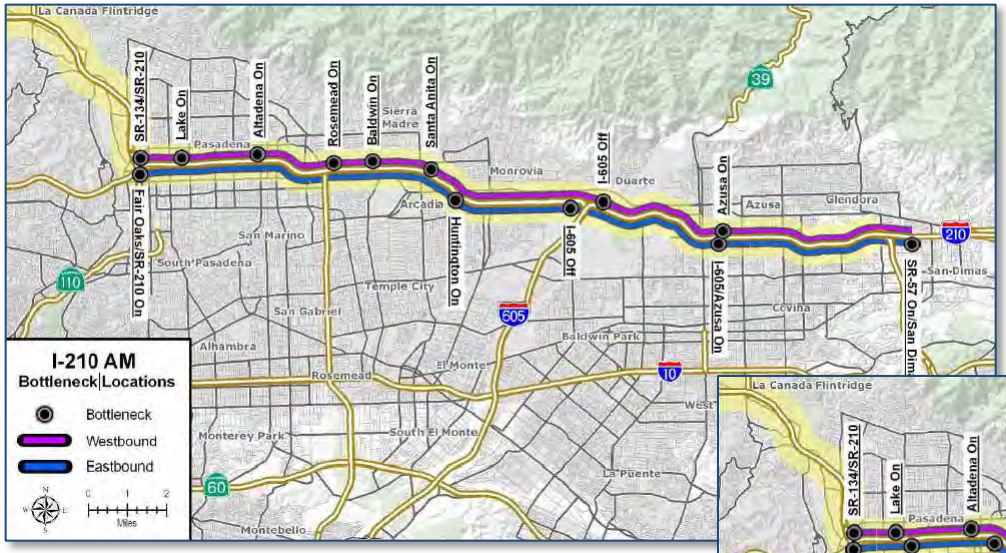
Congestion Analysis – Freeway Congestion



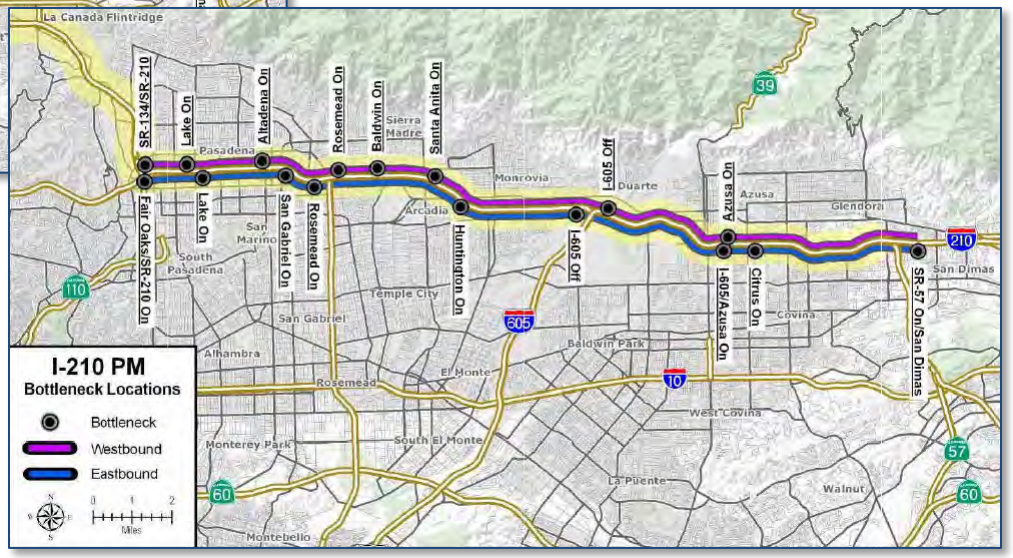
Frequently occurring congestion area based on 2013 PeMS data



Congestion Analysis – Freeway Congestion

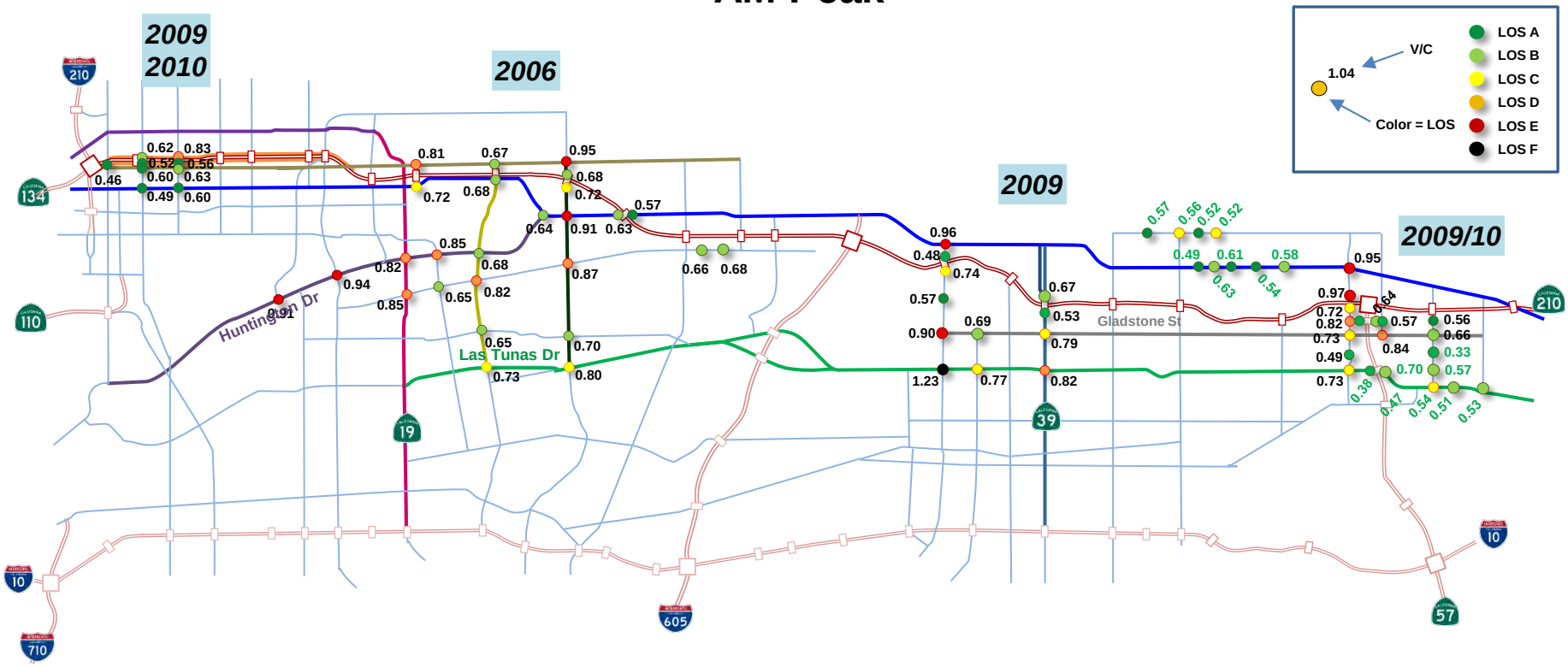


Bottlenecks identified in 2010 CSMP based on 2006-2008 data

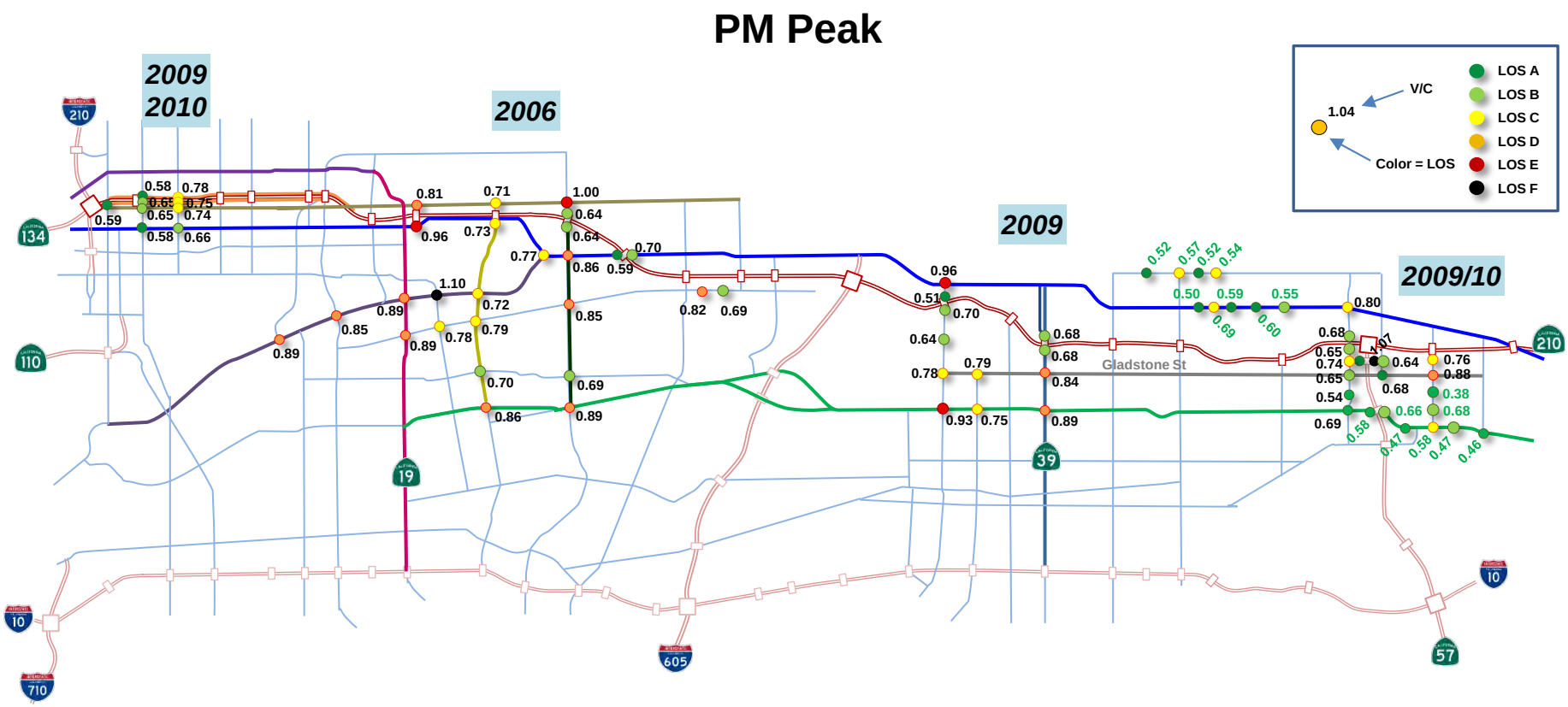


Congestion Analysis – Intersection V/C Ratios

AM Peak

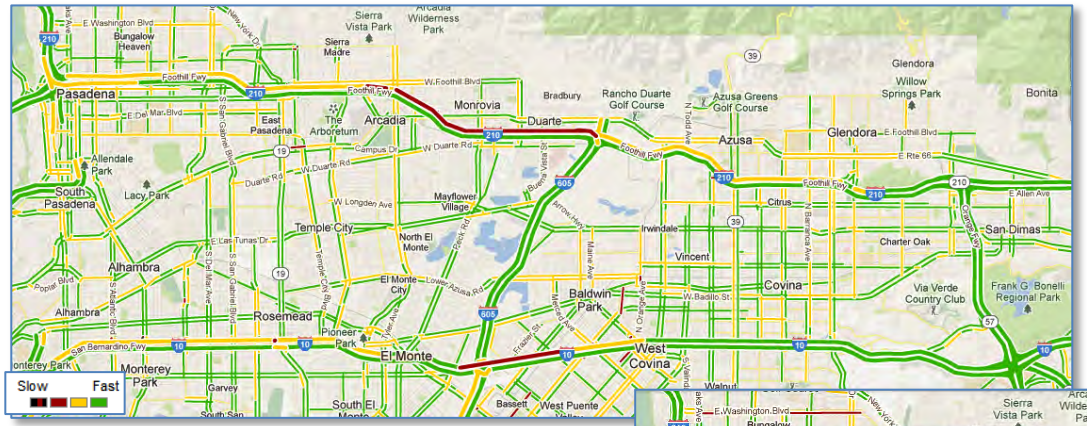


Congestion Analysis – Intersection V/C Ratios

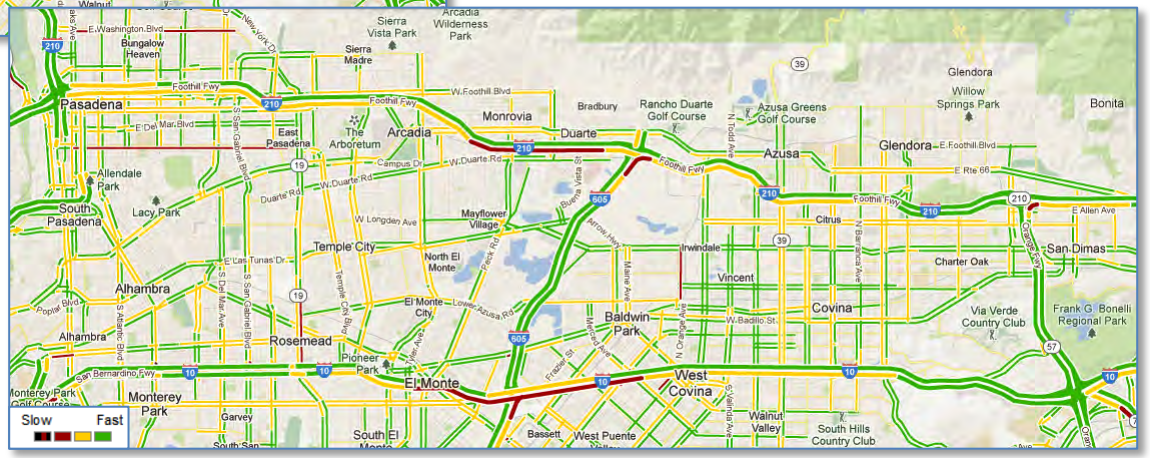


Congestion Analysis – Observed Speeds

Google Data
Tuesday, April 16, 2013 – 8:00 AM

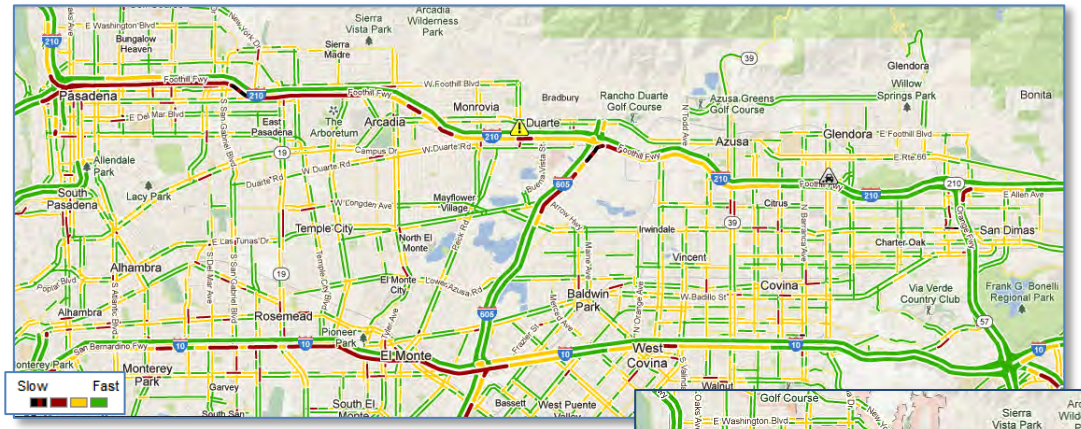


Google Data
Tuesday, April 16, 2013 – 6:00 PM

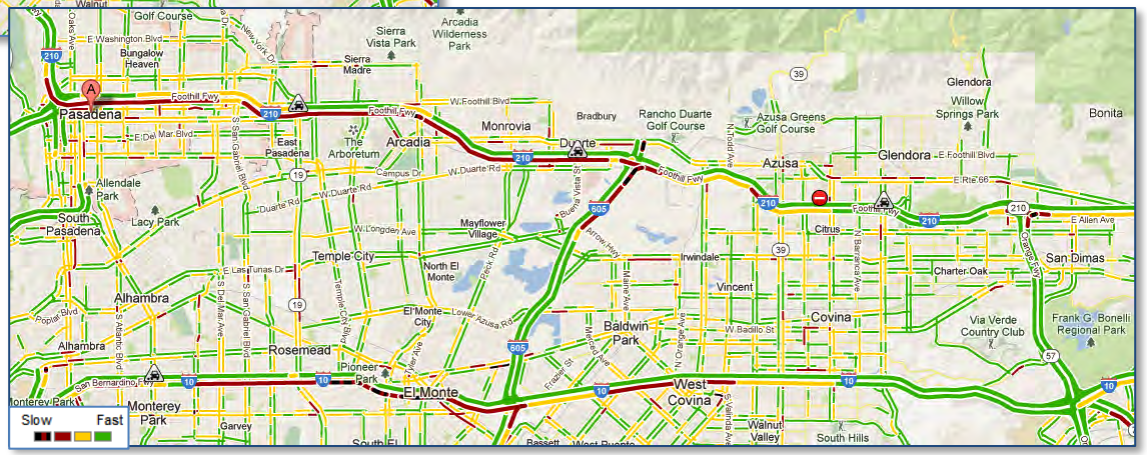


Congestion Analysis – Observed Speeds

Google Data
Friday, April 19, 2013 – 3:20 PM

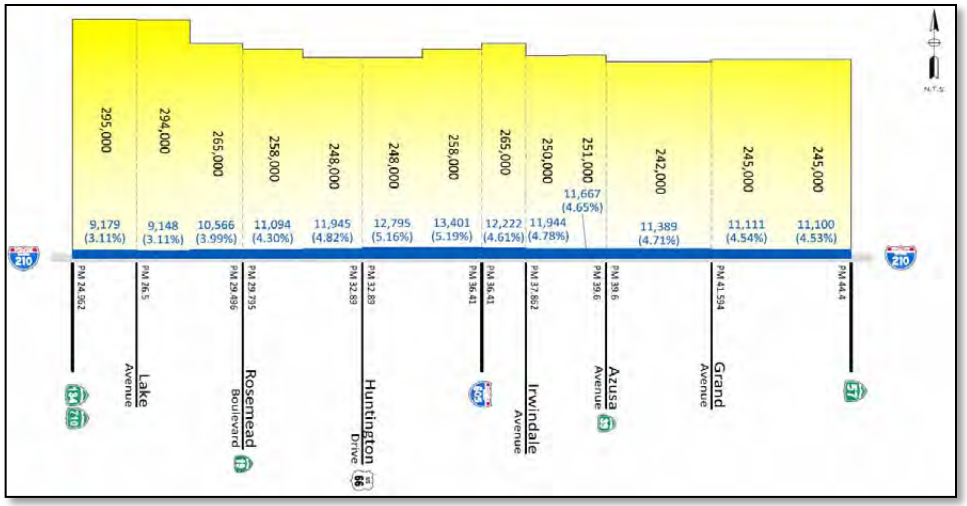


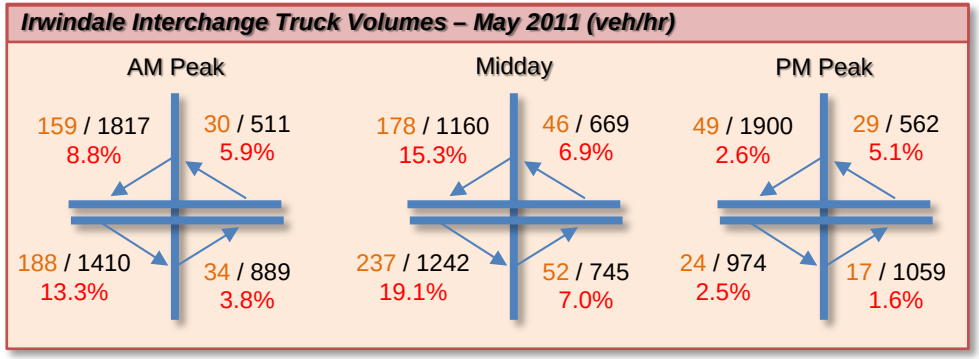
Google Data
Friday, April 19, 2013 – 5:10 PM



Truck Operations

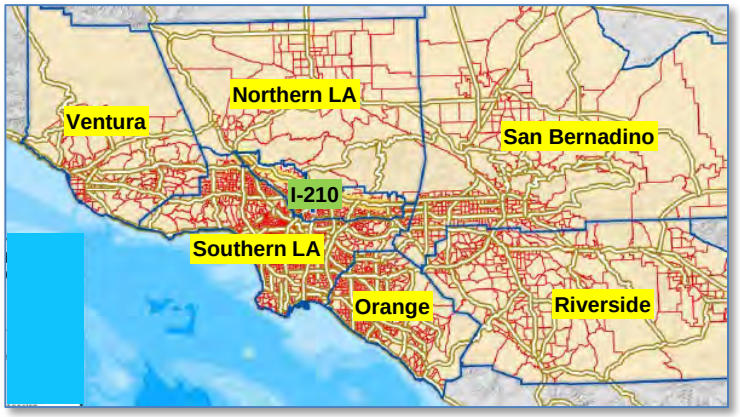
- **Truck volumes**
  - 3-5% of overall traffic along mainline
  - Typically less than 1% on most arterial ramps
  - Exception: Irwindale interchange during AM peak and Midday periods





Travel Demand Profile

- **Travel demand analysis (AM Peak)**
  - Based on Caltrans version of SCAG's 2000 travel demand model
  - Trips with portion of travel within I-210 corridor area

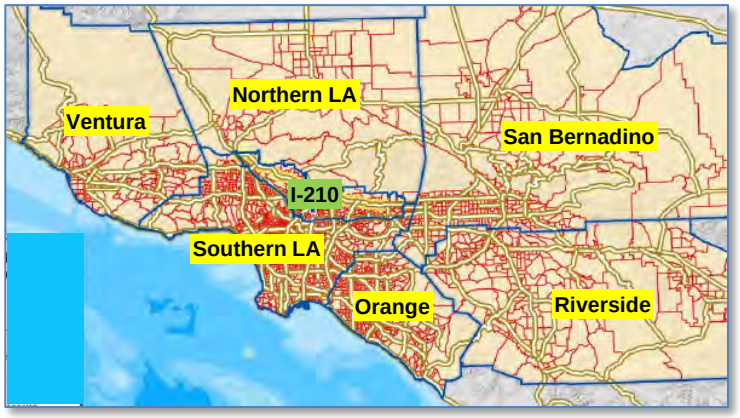


	I-210	Southern LA	Northern LA	Orange	Riverside	San Bernadino	Ventura	Outside Zone	Total Origin
I-210	83,477	49,842	3,872	3,230	622	3,431	2,886	483	147,843
Southern LA	37.275	2,703	504	31	129	518	154	225	4,301
897	7,780	1,766	76	61	29	95	76	14	9,897
Orange County	2,852	45	12	0	0	0	13	74	2,996
Riverside	1,678	286	9	0	0	0	23	113	2,109
San Bernardino	7,932	1,652	71	3	0	0	105	99	9.862
Ventura	2,006	103	50	10	45	109	0	33	2,356
Outside Zones	280	180	9	21	85	90	10	336	1,011
Total Dest.	106,042	56,577	4.603	3,356	910	4,243	3,267	1,377	180,375

Source: I-210 CSMP Report (2010)

Travel Demand Profile

- **Travel demand analysis (PM Peak)**
  - Based on Caltrans version of SCAG's 2000 travel demand model
  - Trips with portion of travel within I-210 corridor area

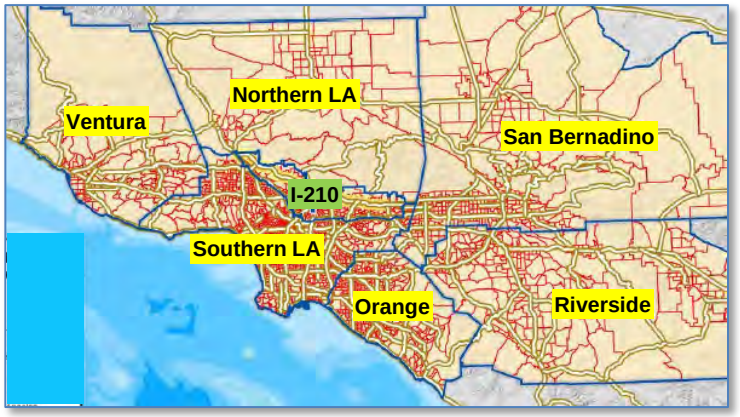


	I-210	Southern LA	Northern LA	Orange	Riverside	San Bernadino	Ventura	Outside Zone	Total Origin
I-210	122,552	58,306	10,380	4,747	2,271	11,035	2,886	597	212,774
Southern LA	74,797	2,809	1,617	122	409	2,048	154	363	82.319
Northern LA	7,297	1,092	133	53	43	155	76	16	8,865
Orange County	5,735	55	96	0	0	1	13	111	6.011
Riverside	1,306	248	27	0	0	0	23	135	1,739
San Bernardino	7,103	1,275	167	3	0	0	105	125	8.778
Ventura	2,056	103	55	14	46	134	0	46	2,454
Outside Zones	1,062	546	23	284	341	278	15	1,164	3,713
Total Dest.	221,908	64,434	12,498	5,223	3,110	13,651	3,272	2,557	326,653

Source: I-210 CSMP Report (2010)

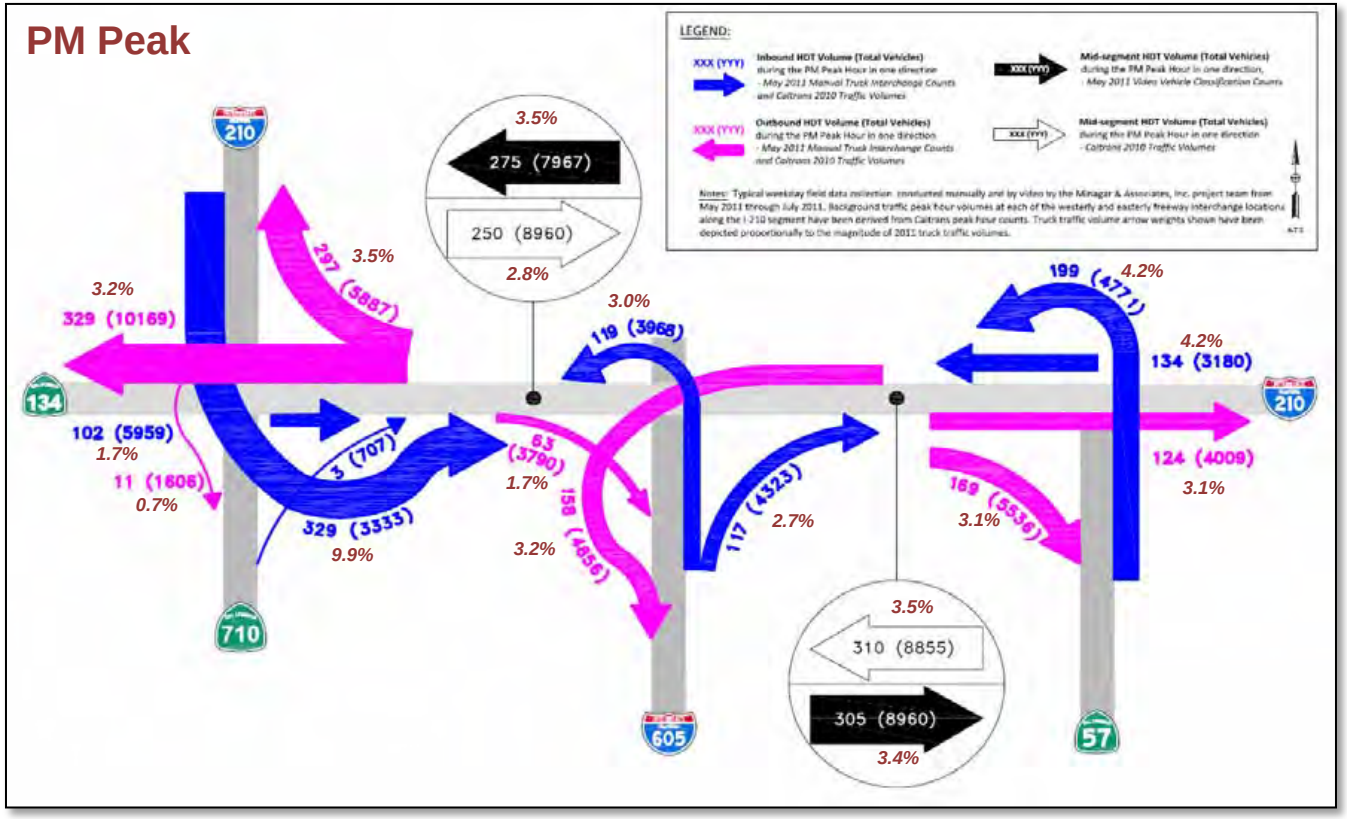
Travel Demand Profile

- **Travel demand 52% greater during PM peak**
- **85-87% of trip originating or terminating in LA County**
  - 38-39% travel within I-210 corridor
  - 41% travel to/from Southern LA County
  - 7% travel to/from other sections of LA County

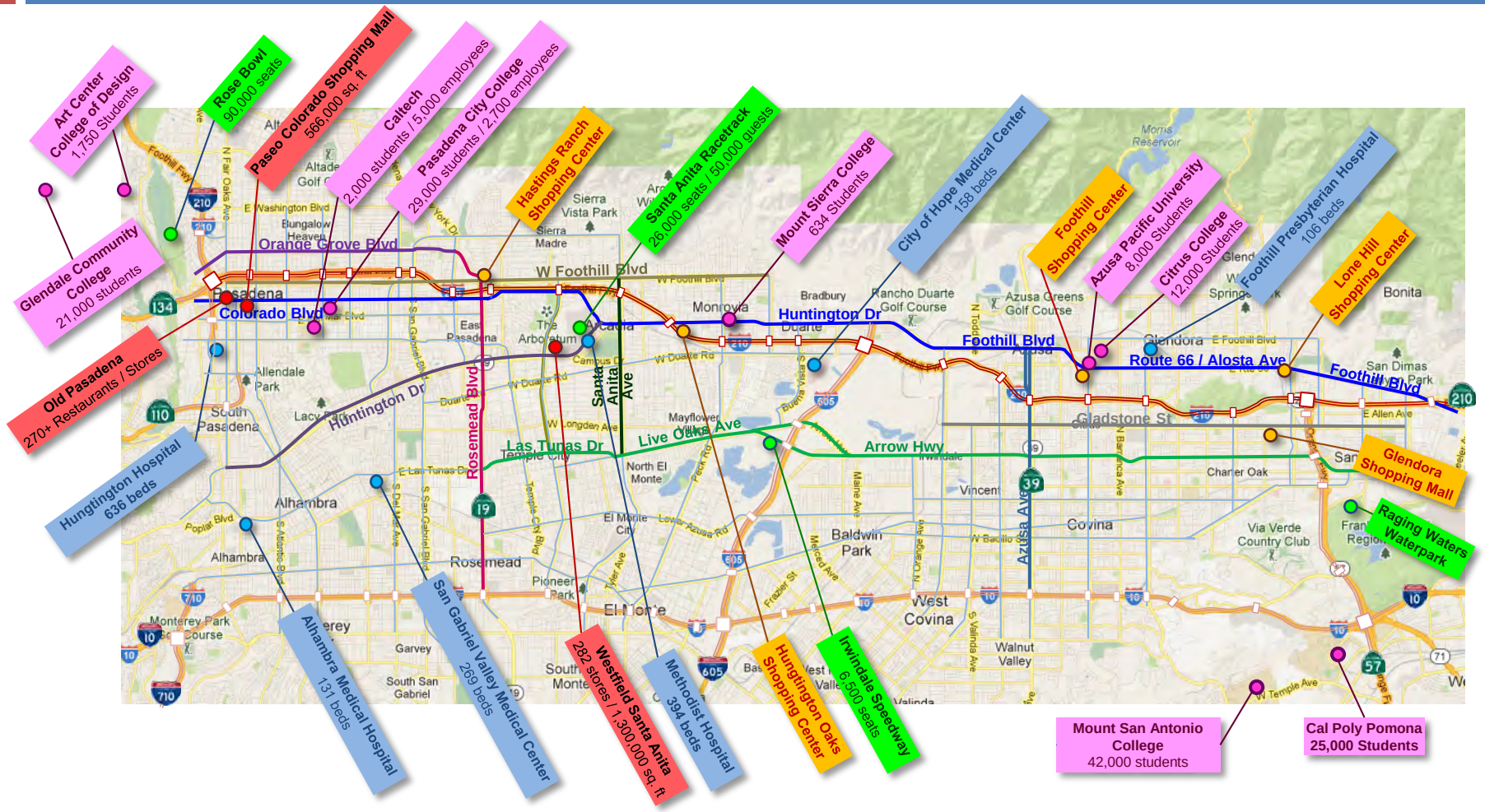


Travel Demand Profile

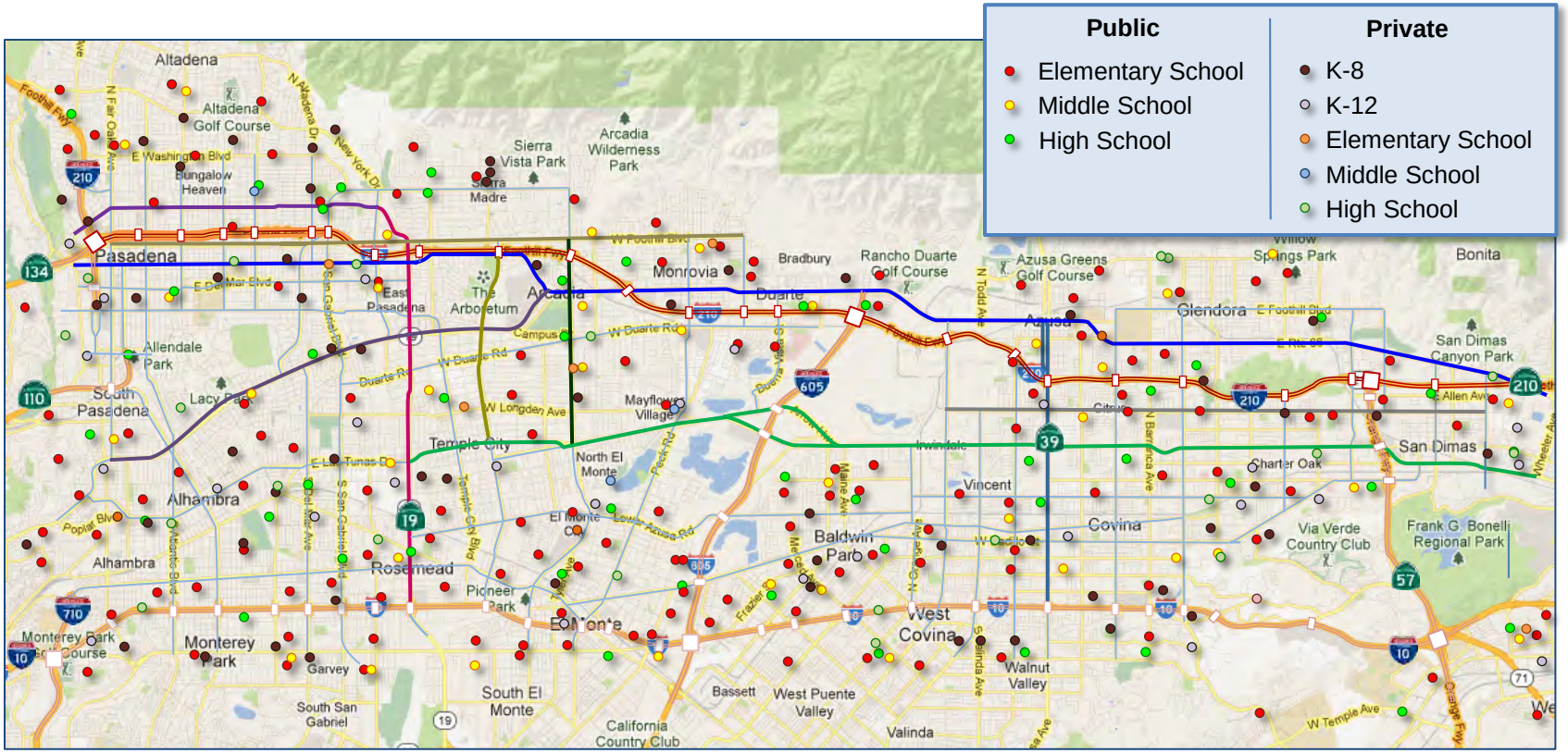
- **Freeway interchange truck volumes**



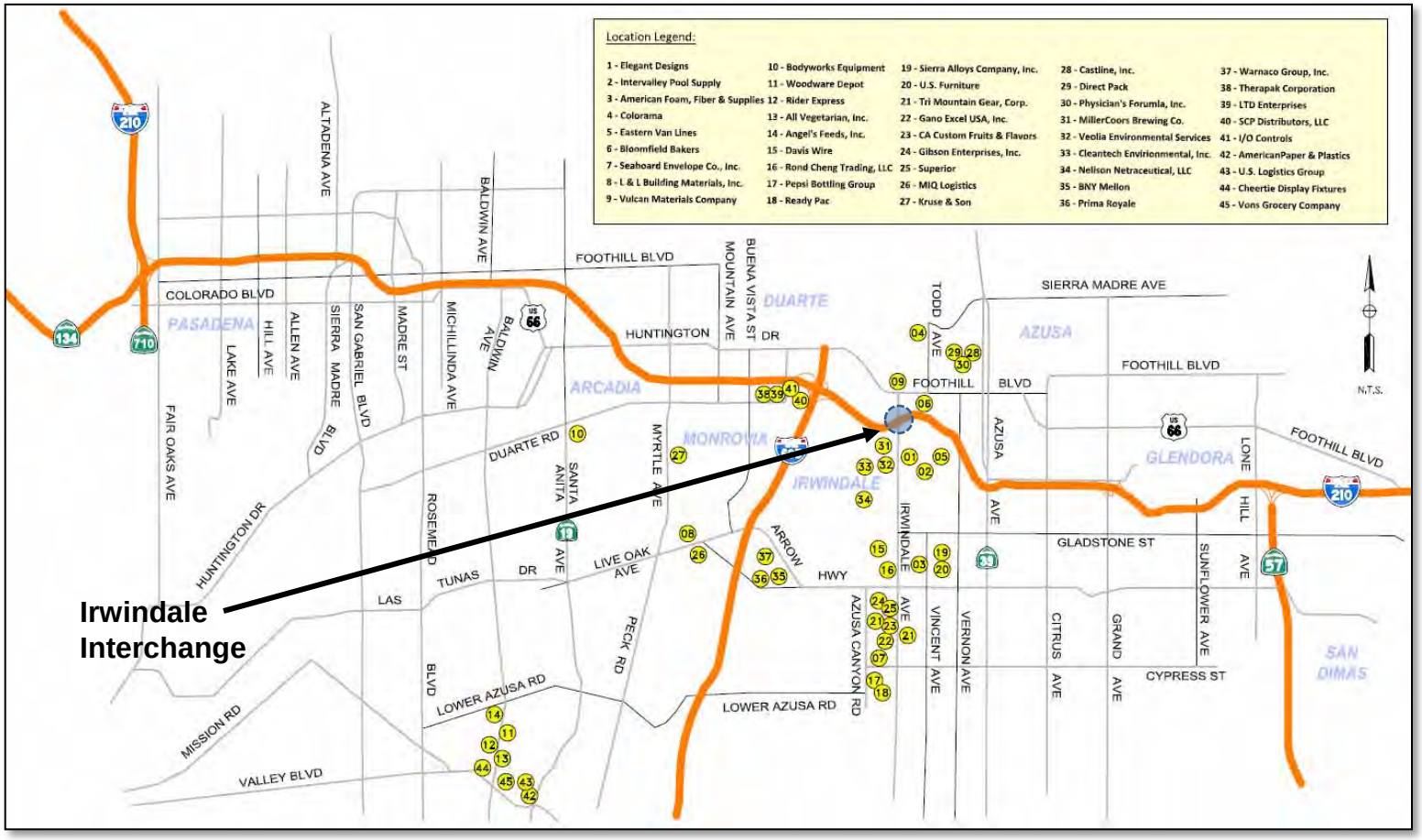
Trip Generators – Malls, Hospitals, Colleges



Trip Generators – Schools



Trip Generators – Warehouses



Trip Generators – Major Events

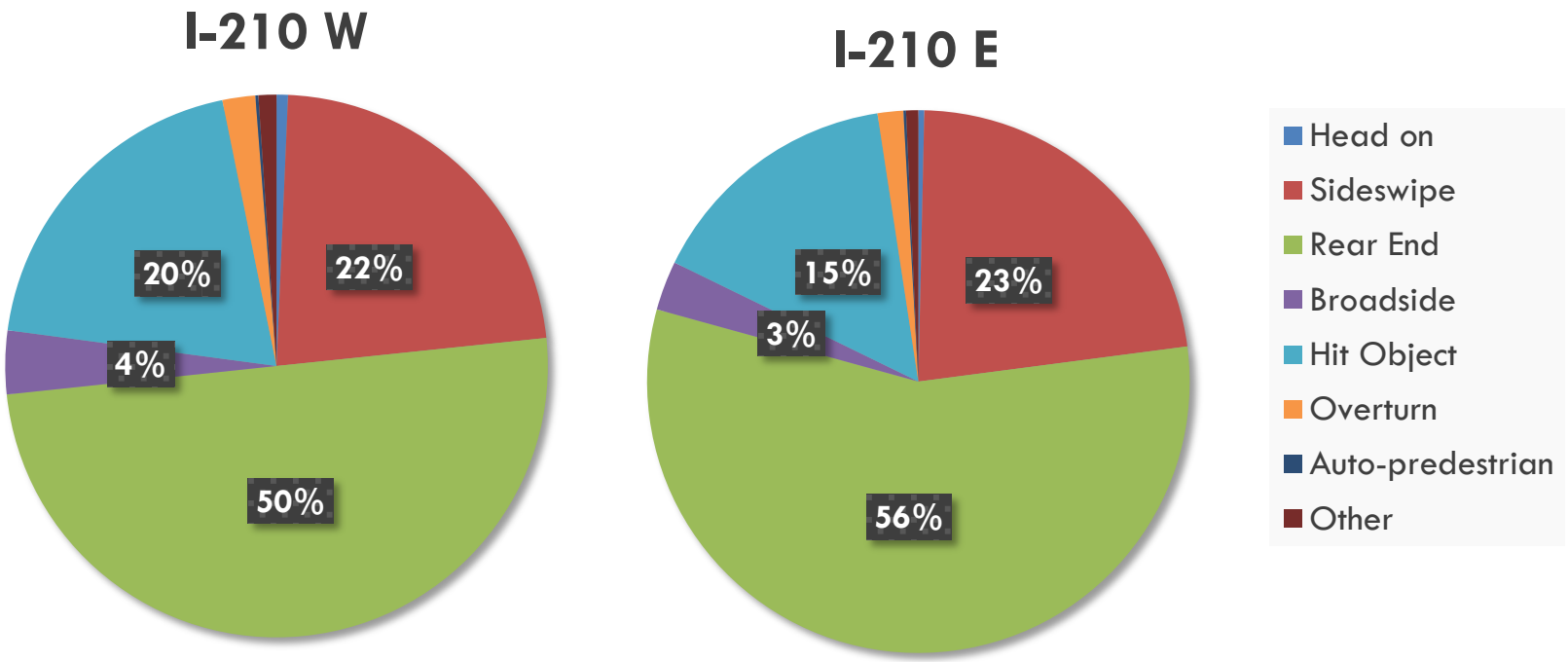
- **Tournament of Roses & Rose Parade**
- **Rose Bowl**
- **Pasadena Marathon**
- **Art Night (Pasadena – Spring and Fall)**

Incidents – Frequency and Rates

All Incident Types, All Days, Jan 2012 – Dec 2012

Section	I-210 W				I-210 E			
	Number of Incidents	VMT	Incidents/ Day	Incidents/ million VMT	Number of Incidents	VMT	Incidents/ day	Incidents/ million VMT
SR-134 to Rosemead	871	218,358,820	2.39	3.99	834	232,814,377	2.28	3.58
Rosemead to I-605	1,081	315,127,783	2.96	3.43	1,451	290,060,629	3.98	5.00
I-605 to SR-57	1,479	388,333,834	4.05	3.81	1,457	369,802,092	3.99	3.94
Total	3,431	921,820,437	9.40	3.72	3,751	892,677,099	10.28	4.20

Incidents – Causes

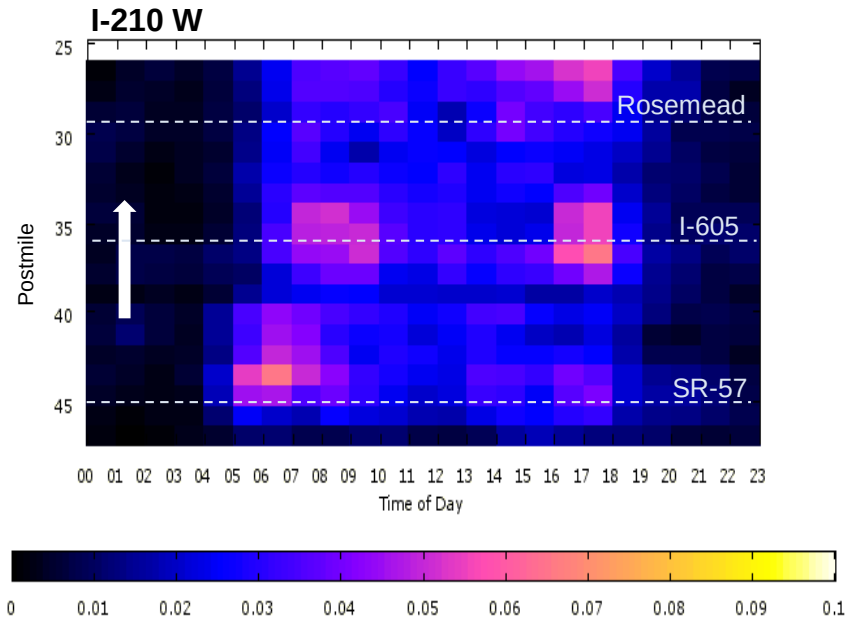


Database: Traffic Accident Surveillance and Analysis System (TASAS)

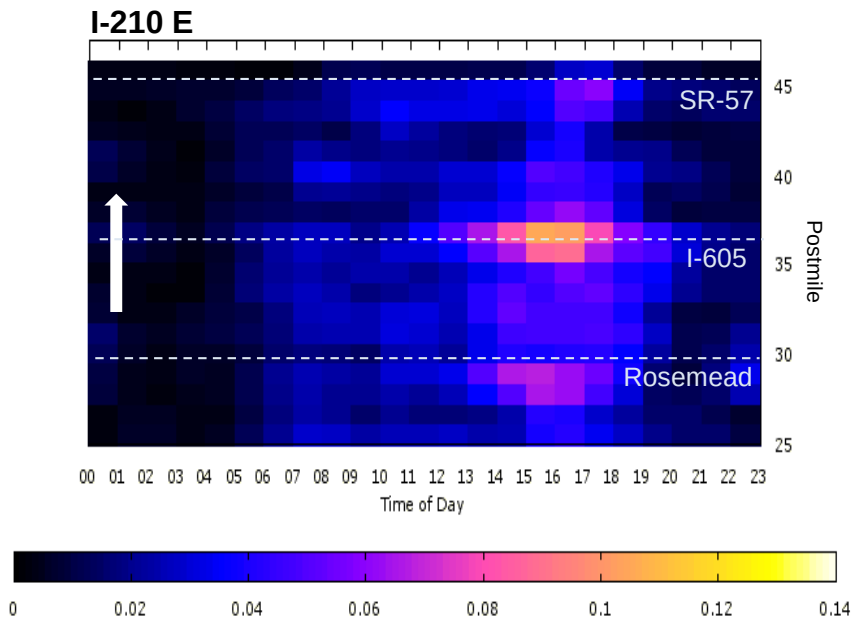
Study Period: 2000-2009

Incidents – Frequency by Location and Time

- **Incidents primarily occurring near freeway interchanges and in peak travel period (AM Peak → WB / PM Peak → EB)**



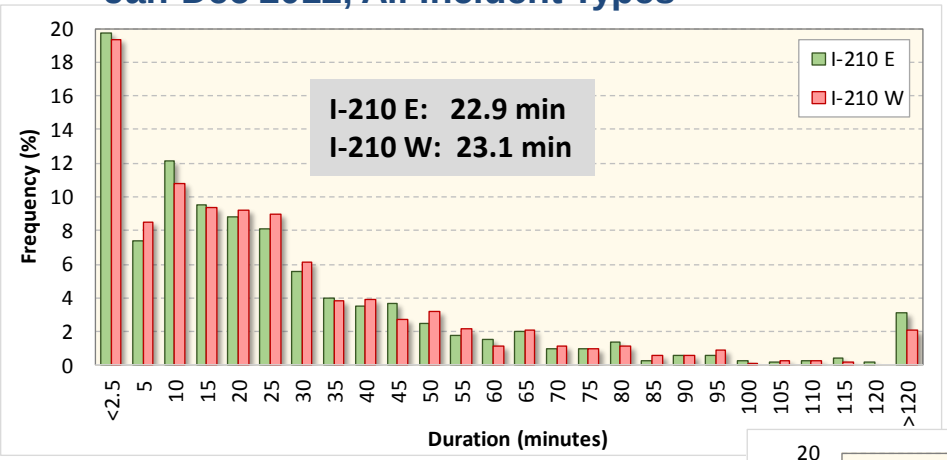
Incidents / day
Jan 2012 – Dec 2012
I-210 E



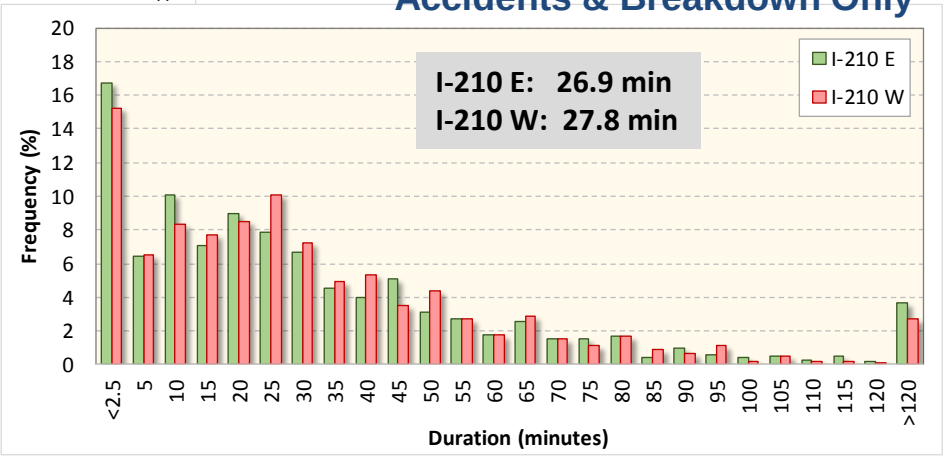
Incidents / day
Jan 2012 – Dec 2012
I-210 E

Incidents – Duration

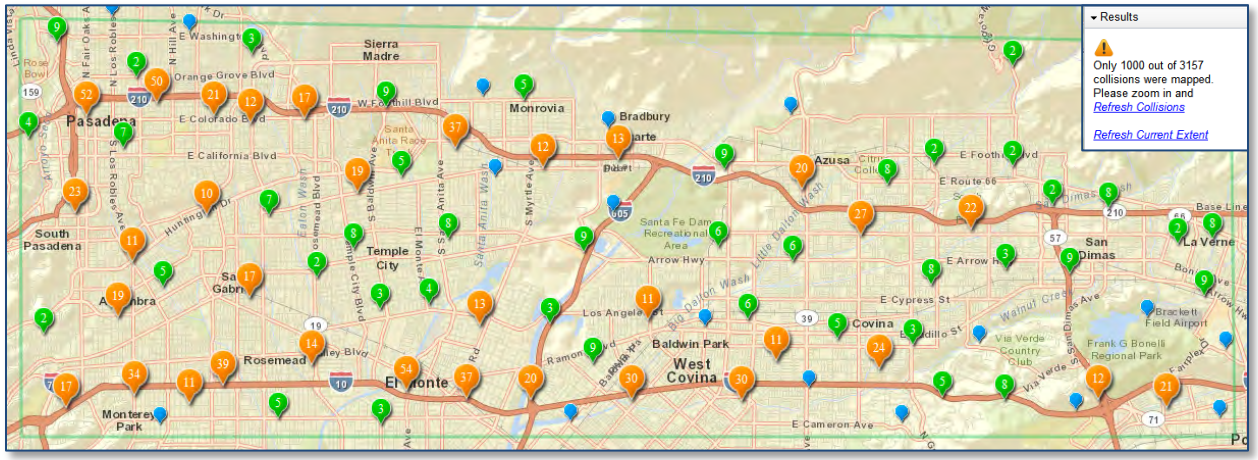
Jan-Dec 2012, All Incident Types

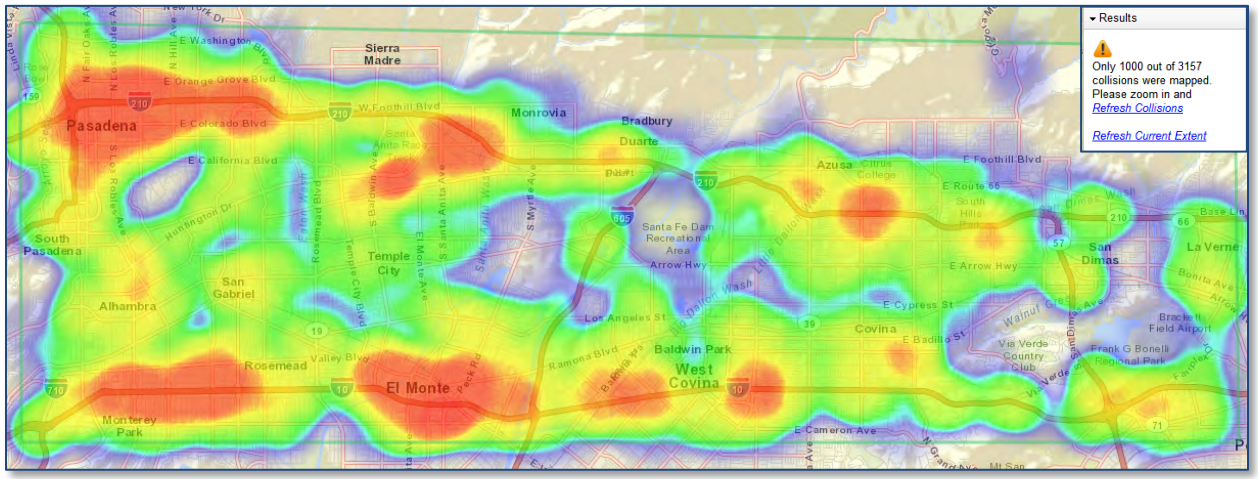


Jan-Dec 2012
Accidents & Breakdown Only



Incidents – Spatial Distribution

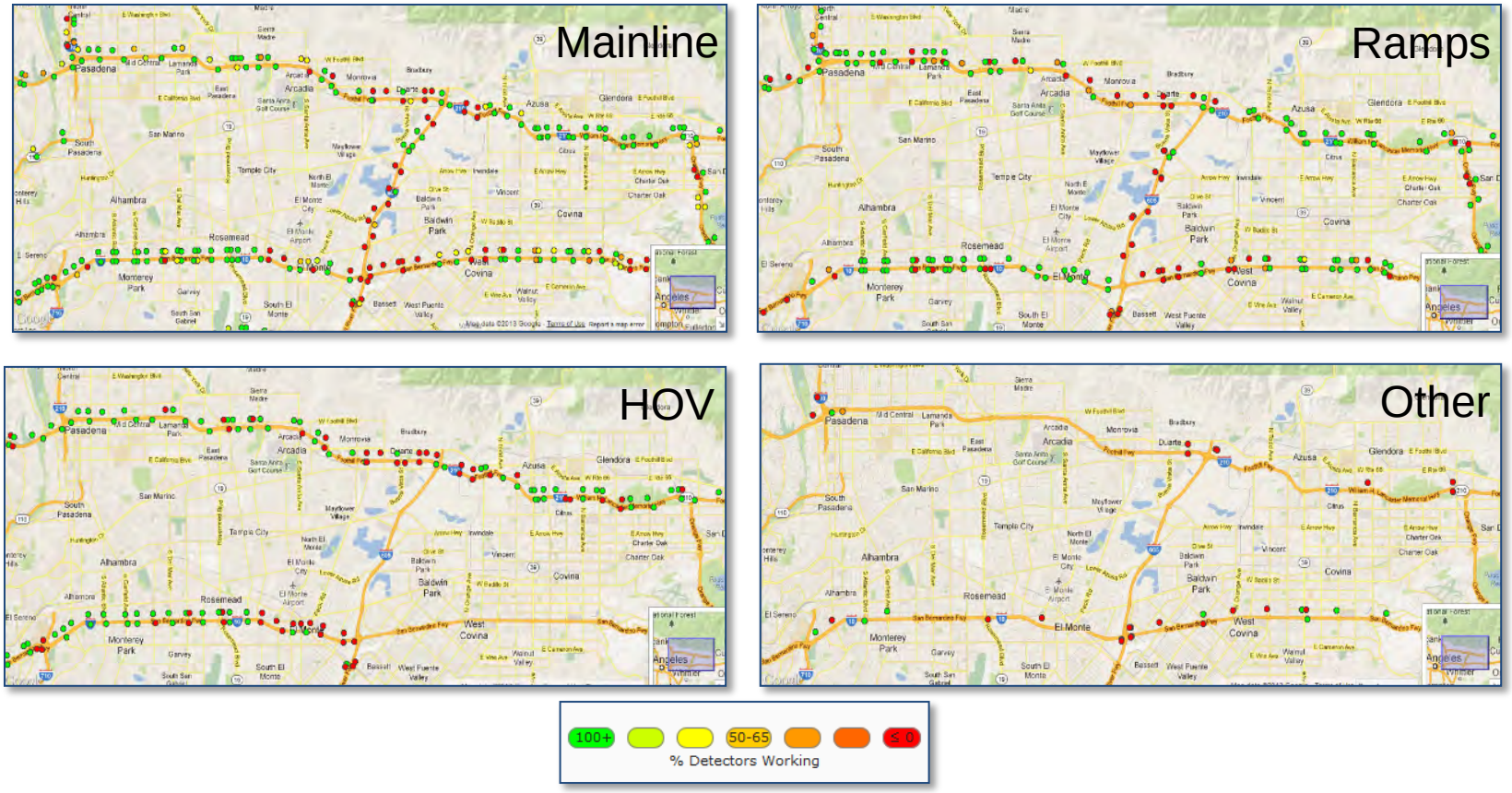




TIMS Data
Jan-Dec 2011

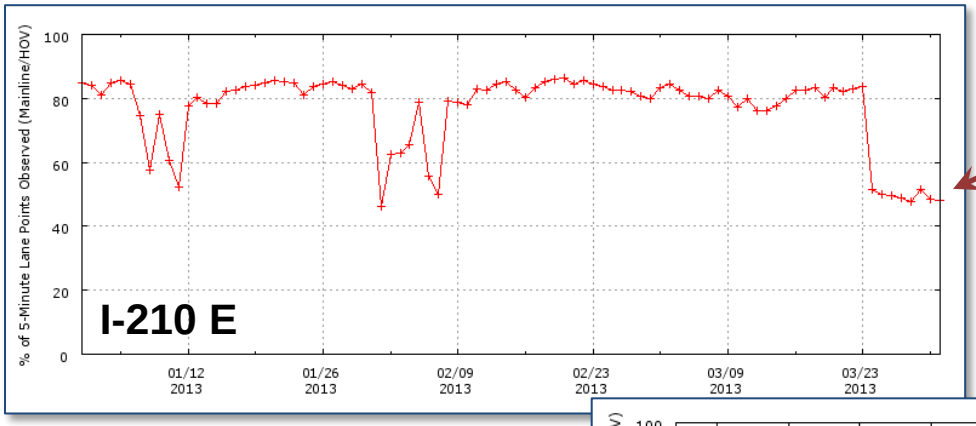
Freeway Sensors – % Working

- **Percentage of detectors working, Jan-Mar 2013**

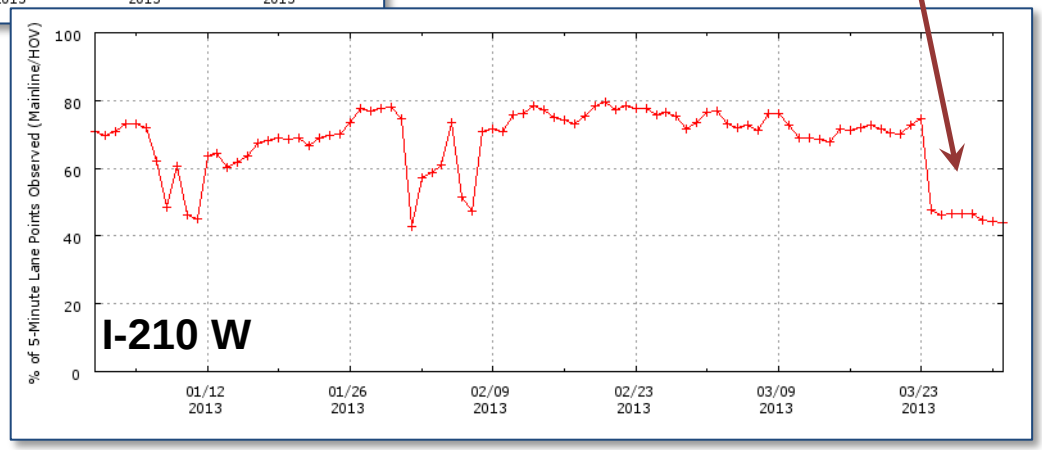


Freeway Sensors – % Observed Data

- **Percentage of observed 5-minute data, Jan-Mar 2013**

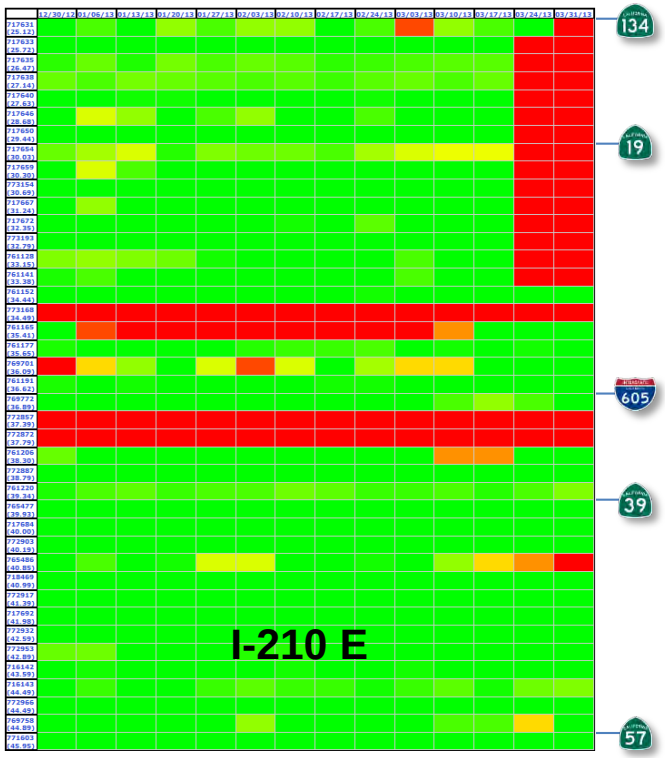


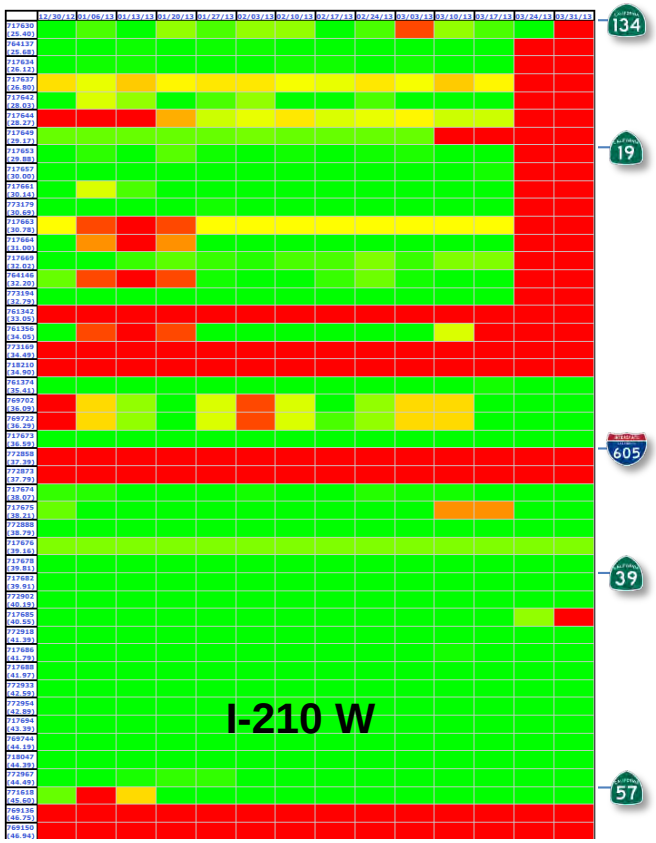
Drop due to communication line down between SR-134 and I-605



Freeway Sensors – % Working

- **Mainline** *(Jan-Mar 2013)*



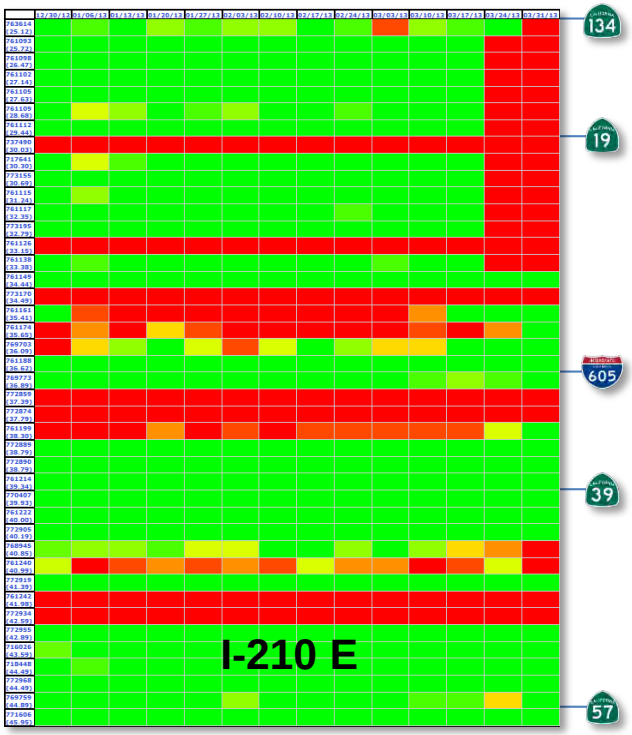


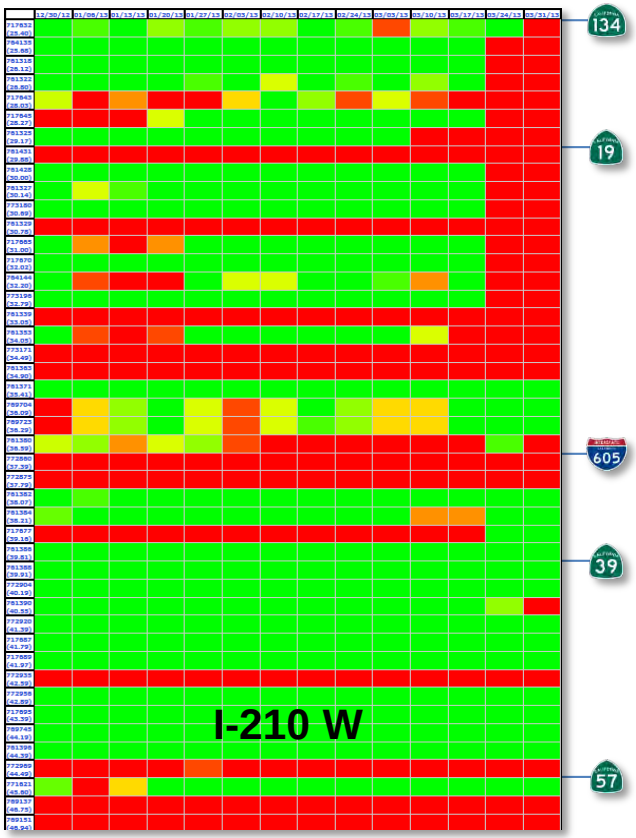
100%

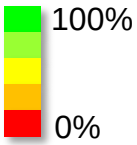
0%

Freeway Sensors – % Working

- **HOV lanes** *(Jan-Mar 2013)*

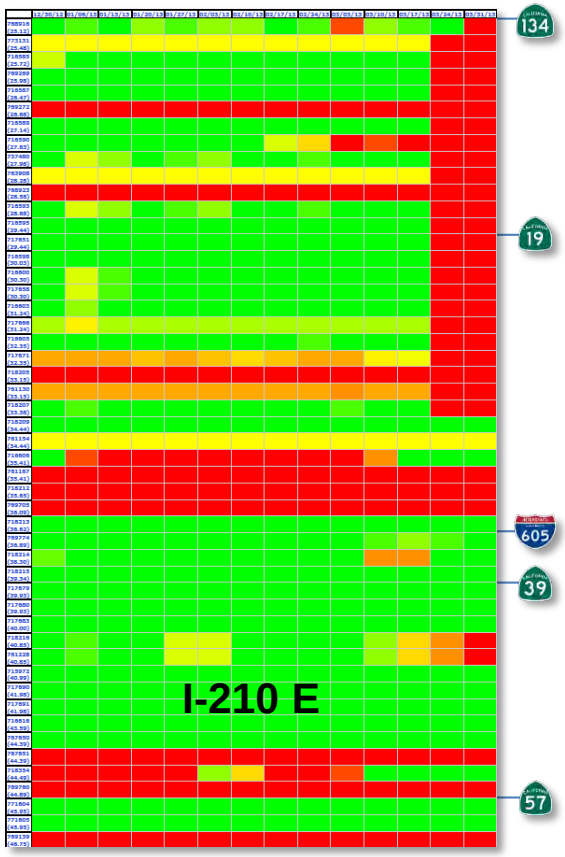


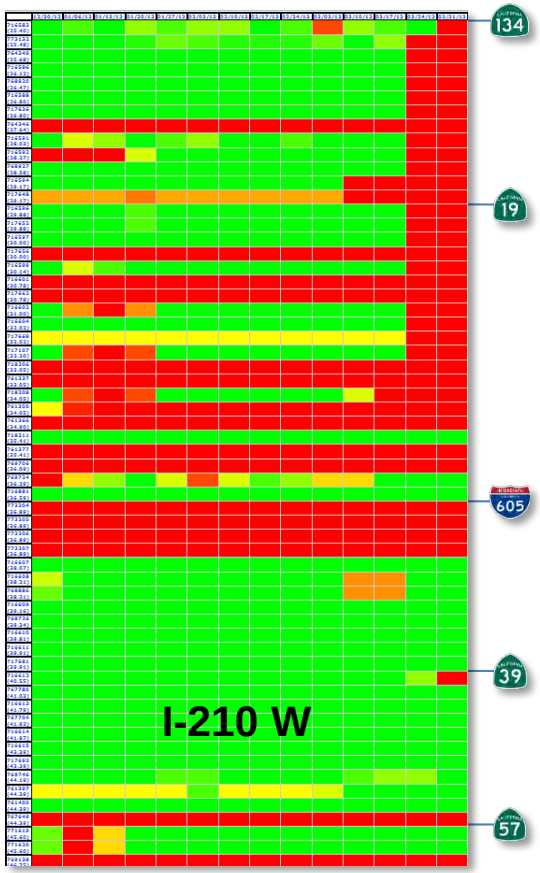


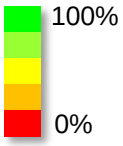


Freeway Sensors – % Working

- **On-ramps and off-ramps** *(Jan-Mar 2013)*







Freeway Sensors – Operational Status

- **Mainline sensors** *(03/29/2013)*

Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6
I210-E	717631	R25.14	25.12	4311	FAIR OAKS 1	Mainline						
I210-E	717633	R25.74	25.72	4522	MARENGO	Mainline						
I210-E	717635	R26.49	26.47	4248	LAKE 2	Mainline						
I210-E	717638	R27.16	27.14	4249	HILL 1	Mainline						
I210-E	717640	R27.65	27.63	4250	ALLEN	Mainline						
I210-E	717646	R28.7	28.68	4251	SAN GABRIEL	Mainline						
I210-E	717650	R29.46	29.44	4252	SIERRA MADRE V2	Mainline						
I210-E	717654	R29.74	30.029	4253	ROSEMEAD 1	Mainline						
I210-E	717659	R30.01	30.299	4254	MICHILLINDA	Mainline						
I210-E	773154	R30.4	30.689	2116	VAQUERO	Mainline						
I210-E	717667	R30.95	31.239	4255	BALDWIN	Mainline						
I210-E	717672	R32.06	32.349	4256	SANTA ANITA 2	Mainline						
I210-E	773193	R32.5	32.789	2117	E OF SECOND	Mainline						
I210-E	761128	R32.86	33.149	4257	HUNTINGTON 1	Mainline						
I210-E	761141	R33.09	33.379	4258	HUNTINGTON 2	Mainline						
I210-E	761152	R34.15	34.439	4259	MYRTLE AV	Mainline						
I210-E	773168	R34.2	34.489	2118	CALIFORNIA	Mainline						
I210-E	761165	R35.12	35.409	4260	MOUNTAIN	Mainline						
I210-E	761177	R35.36	35.649	4261	BUENA VISTA	Mainline						
I210-E	769701	R35.8	36.089	2412	HIGHLAND	Mainline						
I210-E	761191	R36.33	36.619	4262	MOUNT OLIVE DR / 605	Mainline						
I210-E	769772	R36.6	36.889	2416	NB 605 TO EB 210 CON	Mainline						
I210-E	772857	R37.1	37.389	2119	SAN GABRIEL RIVER	Mainline						
I210-E	772872	R37.5	37.789	2120	W/O IRWINDALE	Mainline						
I210-E	761206	R38.009	38.298	4264	IRWINDALE	Mainline						
I210-E	772887	R38.5	38.789	2121	ZACHARY PADILLA	Mainline						
I210-E	761220	R39.05	39.339	4265	VERNON	Mainline						
I210-E	765477	R39.64	39.929	4266	AZUSA 1	Mainline						
I210-E	717684	R39.71	39.999	4267	AZUSA 2	Mainline						
I210-E	772903	R39.9	40.189	2122	PASADENA AVE	Mainline						
I210-E	765486	R40.564	40.853	4268	CITRUS 1	Mainline						
I210-E	718469	R40.7	40.989	4269	CITRUS 2	Mainline						
I210-E	772917	R41.1	41.389	2133	E/B 210-W/O BARRANCA	Mainline						
I210-E	717692	R41.69	41.979	4270	GRAND AV	Mainline						
I210-E	772932	R42.3	42.589	2134	E/O GLENDORA	Mainline						
I210-E	772953	R42.6	42.889	2135	BONNIE COVE	Mainline						
I210-E	716142	R43.3	43.589	4271	SUNFLOWER AV	Mainline						
I210-E	716143	R44.2	44.489	4451	LONE HILL AV	Mainline						
I210-E	772966	R44.2	44.489	2408	AMELIA	Mainline						
I210-E	769758	R44.6	44.889	2431	NB 57 TO EB 210 CON	Mainline						
I210-E	771603	R45.66	45.949	6008	SAN DIMAS AVE	Mainline						

Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6
I210-W	717630	R25.42	25.4	4311	FAIR OAKS 1	Mainline						
I210-W	764137	R25.7	25.68	2548	MARENGO	Mainline						
I210-W	717634	R26.14	26.12	4309	LAKE 1	Mainline						
I210-W	717637	R26.82	26.8	4308	HILL	Mainline						
I210-W	717642	R28.05	28.03	4307	ALTADENA	Mainline						
I210-W	717644	R28.29	28.27	4306	SAN GABRIEL	Mainline						
I210-W	717649	R29.19	29.17	4305	SIERRA MADRE V1	Mainline						
I210-W	717653	R29.59	29.879	4304	ROSEMEAD 1	Mainline						
I210-W	717657	R29.71	29.999	4569	ROSEMEAD 2	Mainline						
I210-W	717661	R29.85	30.139	4516	MICHILLINDA	Mainline						
I210-W	773179	R30.4	30.689	2672	VAQUERO	Mainline						
I210-W	717663	R30.49	30.779	4303	BALDWIN 1	Mainline						
I210-W	717664	R30.71	30.999	4302	BALDWIN 2	Mainline						
I210-W	717669	R31.73	32.019	4301	SANTA ANITA 1	Mainline						
I210-W	764146	R31.91	32.199	4300	SANTA ANITA 2	Mainline						
I210-W	773194	R32.5	32.789	2117	E OF SECOND	Mainline						
I210-W	761342	R32.76	33.049	4299	HUNTINGTON 1	Mainline						
I210-W	761356	R33.76	34.049	4298	MYRTLE AV	Mainline						
I210-W	773169	R34.2	34.489	2118	CALIFORNIA	Mainline						
I210-W	718210	R34.61	34.899	4297	MOUNTAIN AV	Mainline						
I210-W	761374	R35.12	35.409	4296	BUENA VISTA	Mainline						
I210-W	769702	R35.8	36.089	2412	HIGHLAND	Mainline						
I210-W	769722	R36	36.289	2415	NB 605 TO WB 210 CON	Mainline						
I210-W	717673	R36.3	36.589	4294	MOUNT OLIVE DR / 605	Mainline						
I210-W	772858	R37.1	37.389	2119	SAN GABRIEL RIVER	Mainline						
I210-W	772873	R37.5	37.789	2120	W/O IRWINDALE	Mainline						
I210-W	717674	R37.78	38.069	4293	IRWINDALE 1	Mainline						
I210-W	717675	R37.919	38.208	4292	IRWINDALE 2	Mainline						
I210-W	772888	R38.5	38.789	2121	ZACHARY PADILLA	Mainline						
I210-W	717676	R38.87	39.159	4291	VERNON	Mainline						
I210-W	717678	R39.52	39.809	4290	AZUSA 1	Mainline						
I210-W	717682	R39.62	39.909	4289	AZUSA 2	Mainline						
I210-W	772902	R39.9	40.189	2122	PASADENA AVE	Mainline						
I210-W	717685	R40.26	40.549	4288	CITRUS	Mainline						
I210-W	772918	R41.1	41.389	2133	E/B 210-W/O BARRANCA	Mainline						
I210-W	717686	R41.5	41.789	4287	GRAND 1	Mainline						
I210-W	717688	R41.68	41.969	4286	GRAND 2	Mainline						
I210-W	772933	R42.3	42.589	2134	E/O GLENDORA	Mainline						
I210-W	772954	R42.6	42.889	2135	BONNIE COVE	Mainline						
I210-W	717694	R43.1	43.389	4285	SUNFLOWER AV	Mainline						
I210-W	769744	R43.9	44.189	2430	NB 57 TO WB 210 CONN	Mainline						
I210-W	718047	R44.1	44.389	4283	LONE HILL AV	Mainline						
I210-W	772967	R44.2	44.489	2408	AMELIA	Mainline						
I210-W	771618	R45.31	45.599	6009	SAN DIMAS AVE	Mainline						
I210-W	769136	R46.46	46.749	4797	FOOTHILL BLVD SB	Mainline						
I210-W	769150	R46.65	46.939	4796	FOOTHILL BLVD NB	Mainline						

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

Freeway Sensors – Operational Status

- **HOV sensors** *(03/29/2013)*

Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1
I210-E	763614	R25.14	25.12	4311	FAIR OAKS 1	HOV	
I210-E	761093	R25.74	25.72	4522	MARENGO	HOV	
I210-E	761098	R26.49	26.47	4248	LAKE 2	HOV	
I210-E	761102	R27.16	27.14	4249	HILL 1	HOV	
I210-E	761105	R27.65	27.63	4250	ALLEN	HOV	
I210-E	761109	R28.7	28.68	4251	SAN GABRIEL	HOV	
I210-E	761112	R29.46	29.44	4252	SIERRA MADRE V2	HOV	
I210-E	737490	R29.74	30.029	4253	ROSEMEAD 1	HOV	
I210-E	717641	R30.01	30.299	4254	MICHILLINDA	HOV	
I210-E	773155	R30.4	30.689	2116	VAQUERO	HOV	
I210-E	761115	R30.95	31.239	4255	BALDWIN	HOV	
I210-E	761117	R32.06	32.349	4256	SANTA ANITA 2	HOV	
I210-E	773195	R32.5	32.789	2117	E OF SECOND	HOV	
I210-E	761126	R32.86	33.149	4257	HUNTINGTON 1	HOV	
I210-E	761138	R33.09	33.379	4258	HUNTINGTON 2	HOV	
I210-E	761149	R34.15	34.439	4259	MYRTLE AV	HOV	
I210-E	773170	R34.2	34.489	2118	CALIFORNIA	HOV	
I210-E	761161	R35.12	35.409	4260	MOUNTAIN	HOV	
I210-E	761174	R35.36	35.649	4261	BUENA VISTA	HOV	
I210-E	769703	R35.8	36.089	2412	HIGHLAND	HOV	
I210-E	761188	R36.33	36.619	4262	MOUNT OLIVE DR / 605	HOV	
I210-E	769773	R36.6	36.889	2416	NB 605 TO EB 210 CON	HOV	
I210-E	772859	R37.1	37.389	2119	SAN GABRIEL RIVER	HOV	
I210-E	772874	R37.5	37.789	2120	W/O IRWINDALE	HOV	
I210-E	761199	R38.009	38.298	4264	IRWINDALE	HOV	
I210-E	772889	R38.5	38.789	2121	ZACHARY PADILLA	HOV	
I210-E	772890	R38.5	38.789	2121	ZACHARY PADILLA	HOV	
I210-E	761214	R39.05	39.339	4265	VERNON	HOV	
I210-E	770407	R39.64	39.929	4266	AZUSA 1	HOV	
I210-E	761222	R39.71	39.999	4267	AZUSA 2	HOV	
I210-E	772905	R39.9	40.189	2122	PASADENA AVE	HOV	
I210-E	768945	R40.56	40.849	4268	CITRUS 1	HOV	
I210-E	761240	R40.7	40.989	4269	CITRUS 2	HOV	
I210-E	772919	R41.1	41.389	2133	E/B 210-W/O BARRANCA	HOV	
I210-E	761242	R41.69	41.979	4270	GRAND AV	HOV	
I210-E	772934	R42.3	42.589	2134	E/O GLENDORA	HOV	
I210-E	772955	R42.6	42.889	2135	BONNIE COVE	HOV	
I210-E	716026	R43.3	43.589	4271	SUNFLOWER AV	HOV	
I210-E	718448	R44.2	44.489	4451	LONE HILL AV	HOV	
I210-E	772968	R44.2	44.489	2408	AMELIA	HOV	
I210-E	769759	R44.6	44.889	2431	NB 57 TO EB 210 CON	HOV	
I210-E	771606	R45.66	45.949	6008	SAN DIMAS AVE	HOV	

Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1
I210-W	717632	R25.42	25.4	4311	FAIR OAKS 1	HOV	
I210-W	764135	R25.7	25.68	2548	MARENGO	HOV	
I210-W	761318	R26.14	26.12	4309	LAKE 1	HOV	
I210-W	761322	R26.82	26.8	4308	HILL	HOV	
I210-W	717643	R28.05	28.03	4307	ALTADENA	HOV	
I210-W	717645	R28.29	28.27	4306	SAN GABRIEL	HOV	
I210-W	761325	R29.19	29.17	4305	SIERRA MADRE V1	HOV	
I210-W	761431	R29.59	29.879	4304	ROSEMEAD 1	HOV	
I210-W	761428	R29.71	29.999	4569	ROSEMEAD 2	HOV	
I210-W	761327	R29.85	30.139	4516	MICHILLINDA	HOV	
I210-W	773180	R30.4	30.689	2672	VAQUERO	HOV	
I210-W	761329	R30.49	30.779	4303	BALDWIN 1	HOV	
I210-W	717665	R30.71	30.999	4302	BALDWIN 2	HOV	
I210-W	717670	R31.73	32.019	4301	SANTA ANITA 1	HOV	
I210-W	764144	R31.91	32.199	4300	SANTA ANITA 2	HOV	
I210-W	773196	R32.5	32.789	2117	E OF SECOND	HOV	
I210-W	761339	R32.76	33.049	4299	HUNTINGTON 1	HOV	
I210-W	761353	R33.76	34.049	4298	MYRTLE AV	HOV	
I210-W	773171	R34.2	34.489	2118	CALIFORNIA	HOV	
I210-W	761363	R34.61	34.899	4297	MOUNTAIN AV	HOV	
I210-W	761371	R35.12	35.409	4296	BUENA VISTA	HOV	
I210-W	769704	R35.8	36.089	2412	HIGHLAND	HOV	
I210-W	769723	R36	36.289	2415	NB 605 TO WB 210 CON	HOV	
I210-W	761380	R36.3	36.589	4294	MOUNT OLIVE DR / 605	HOV	
I210-W	772860	R37.1	37.389	2119	SAN GABRIEL RIVER	HOV	
I210-W	772875	R37.5	37.789	2120	W/O IRWINDALE	HOV	
I210-W	761382	R37.78	38.069	4293	IRWINDALE 1	HOV	
I210-W	761384	R37.919	38.208	4292	IRWINDALE 2	HOV	
I210-W	717677	R38.87	39.159	4291	VERNON	HOV	
I210-W	761386	R39.52	39.809	4290	AZUSA 1	HOV	
I210-W	761388	R39.62	39.909	4289	AZUSA 2	HOV	
I210-W	772904	R39.9	40.189	2122	PASADENA AVE	HOV	
I210-W	761390	R40.26	40.549	4288	CITRUS	HOV	
I210-W	772920	R41.1	41.389	2133	E/B 210-W/O BARRANCA	HOV	
I210-W	717687	R41.5	41.789	4287	GRAND 1	HOV	
I210-W	717689	R41.68	41.969	4286	GRAND 2	HOV	
I210-W	772935	R42.3	42.589	2134	E/O GLENDORA	HOV	
I210-W	772956	R42.6	42.889	2135	BONNIE COVE	HOV	
I210-W	717695	R43.1	43.389	4285	SUNFLOWER AV	HOV	
I210-W	769745	R43.9	44.189	2430	NB 57 TO WB 210 CONN	HOV	
I210-W	761396	R44.1	44.389	4283	LONE HILL AV	HOV	
I210-W	772969	R44.2	44.489	2408	AMELIA	HOV	
I210-W	771621	R45.31	45.599	6009	SAN DIMAS AVE	HOV	
I210-W	769137	R46.46	46.749	4797	FOOTHILL BLVD SB	HOV	
I210-W	769151	R46.65	46.939	4796	FOOTHILL BLVD NB	HOV	

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

Freeway Sensors – Operational Status

- **On-ramps** *(03/29/2013)*

Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1	Lane 2
I210-E	716585	R25.74	25.72	4522	MARENGO	On Ramp		
I210-E	716587	R26.49	26.47	4248	LAKE NB	On Ramp		
I210-E	716589	R27.16	27.14	4249	HILL NB	On Ramp		
I210-E	716590	R27.65	27.63	4250	ALLEN	On Ramp		
I210-E	716593	R28.7	28.68	4251	SAN GABRIEL	On Ramp		
I210-E	716595	R29.46	29.44	4252	SIERRA MADRE V2	On Ramp		
I210-E	716598	R29.74	30.029	4253	ROSEMEAD NB	On Ramp		
I210-E	716600	R30.01	30.299	4254	MICHILLINDA	On Ramp		
I210-E	716603	R30.95	31.239	4255	BALDWIN	On Ramp		
I210-E	716605	R32.06	32.349	4256	SANTA ANITA 2	On Ramp		
I210-E	718205	R32.86	33.149	4257	HUNTINGTON WB	On Ramp		
I210-E	718207	R33.09	33.379	4258	HUNTINGTON EB	On Ramp		
I210-E	718209	R34.15	34.439	4259	MYRTLE AV	On Ramp		
I210-E	716606	R35.12	35.409	4260	MOUNTAIN	On Ramp		
I210-E	718212	R35.36	35.649	4261	BUENA VISTA	On Ramp		
I210-E	718213	R36.33	36.619	4262	MOUNT OLIVE DR / 605	On Ramp		
I210-E	769774	R36.6	36.889	2416	NB 605 TO EB 210 CON	On Ramp		
I210-E	718214	R38.009	38.298	4264	IRWINDALE	On Ramp		
I210-E	718215	R39.05	39.339	4265	VERNON	On Ramp		
I210-E	717679	R39.64	39.929	4266	AZUSA SB	On Ramp		
I210-E	717683	R39.71	39.999	4267	AZUSA NB	On Ramp		
I210-E	718216	R40.56	40.849	4268	CITRUS SB	On Ramp		
I210-E	715972	R40.7	40.989	4269	CITRUS NB	On Ramp		
I210-E	717690	R41.69	41.979	4270	GRAND AV	On Ramp		
I210-E	716616	R43.3	43.589	4271	SUNFLOWER AV	On Ramp		
I210-E	718354	R44.2	44.489	4451	LONE HILL AV	On Ramp		
I210-E	769760	R44.6	44.889	2431	NB 57 TO EB 210 CON	On Ramp		
I210-E	771604	R45.66	45.949	6008	SAN DIMAS AVE	On Ramp		

Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1	Lane 2
I210-W	716583	R25.42	25.4	4311	FAIR OAKS 1	On Ramp		
I210-W	716586	R26.14	26.12	4309	LAKE 1	On Ramp		
I210-W	716588	R26.82	26.8	4308	HILL	On Ramp		
I210-W	716591	R28.05	28.03	4307	ALTADENA	On Ramp		
I210-W	716592	R28.29	28.27	4306	SAN GABRIEL	On Ramp		
I210-W	716594	R29.19	29.17	4305	SIERRA MADRE V1	On Ramp		
I210-W	716596	R29.59	29.879	4304	ROSEMEAD 1	On Ramp		
I210-W	716597	R29.71	29.999	4569	ROSEMEAD 2	On Ramp		
I210-W	716599	R29.85	30.139	4516	MICHILLINDA	On Ramp		
I210-W	716601	R30.49	30.779	4303	BALDWIN SB	On Ramp		
I210-W	716602	R30.71	30.999	4302	BALDWIN NB	On Ramp		
I210-W	716604	R31.73	32.019	4301	SANTA ANITA SB	On Ramp		
I210-W	717107	R31.91	32.199	4300	SANTA ANITA NB	On Ramp		
I210-W	718206	R32.76	33.049	4299	HUNTINGTON 1	On Ramp		
I210-W	718208	R33.76	34.049	4298	MYRTLE AV	On Ramp		
I210-W	761366	R34.61	34.899	4297	MOUNTAIN / CENTRAL	On Ramp		
I210-W	718211	R35.12	35.409	4296	BUENA VISTA	On Ramp		
I210-W	769724	R36	36.289	2415	NB 605 TO WB 210 CON	On Ramp		
I210-W	716881	R36.3	36.589	4294	MOUNT OLIVE DR	On Ramp		
I210-W	716607	R37.78	38.069	4293	IRWINDALE SB	On Ramp		
I210-W	716608	R37.919	38.208	4292	IRWINDALE NB	On Ramp		
I210-W	716609	R38.87	39.159	4291	VERNON	On Ramp		
I210-W	716610	R39.52	39.809	4290	AZUSA SB	On Ramp		
I210-W	716611	R39.62	39.909	4289	AZUSA NB	On Ramp		
I210-W	716612	R40.26	40.549	4288	CITRUS	On Ramp		
I210-W	716613	R41.5	41.789	4287	GRAND SB	On Ramp		
I210-W	716614	R41.68	41.969	4286	GRAND NB	On Ramp		
I210-W	716615	R43.1	43.389	4285	SUNFLOWER AV	On Ramp		
I210-W	769746	R43.9	44.189	2430	NB 57 TO WB 210 CONN	On Ramp		
I210-W	761400	R44.1	44.389	4283	LONE HILL AV	On Ramp		
I210-W	771619	R45.31	45.599	6009	SAN DIMAS AVE	On Ramp		
I210-W	769138	R46.46	46.749	4797	FOOTHILL BLVD SB	On Ramp		
I210-W	769152	R46.65	46.939	4796	FOOTHILL BLVD NB	On Ramp		

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

Freeway Sensors – Operational Status

- **Off-ramp & freeway connectors** *(03/29/2013)*

Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1	Lane 2	Lane 3
I210-E	769269	R26	25.98	2574	LAKE AVE OFF(LAKE 1)	Off Ramp			
I210-E	769272	R26.7	26.68	2575	HILL AVE OFF	Off Ramp			
I210-E	737480	R28	27.98	2569	ALTADENA	Off Ramp			
I210-E	763908	R28.3	28.28	2568	SIERRA MADRE V1	Off Ramp			
I210-E	768923	R28.6	28.58	2567	SIERRA MADRE OFF	Off Ramp			
I210-E	717651	R29.46	29.44	4252	SIERRA MADRE V2	Off Ramp			
I210-E	717658	R30.01	30.299	4254	MICHILLINDA	Off Ramp			
I210-E	717666	R30.95	31.239	4255	BALDWIN	Off Ramp			
I210-E	717671	R32.06	32.349	4256	SANTA ANITA 2	Off Ramp			
I210-E	761130	R32.86	33.149	4257	HUNTINGTON WB	Off Ramp			
I210-E	761154	R34.15	34.439	4259	MYRTLE AV	Off Ramp			
I210-E	761167	R35.12	35.409	4260	MOUNTAIN	Off Ramp			
I210-E	717680	R39.64	39.929	4266	AZUSA SB	Off Ramp			
I210-E	761228	R40.56	40.849	4268	CITRUS SB	Off Ramp			
I210-E	717691	R41.69	41.979	4270	GRAND AV NB	Off Ramp			
I210-E	767650	R44.1	44.389	4283	LONE HILL AV	Off Ramp			
I210-E	771605	R45.66	45.949	6008	SAN DIMAS AVE	Off Ramp			
I210-E	769139	R46.46	46.749	4797	FOOTHILL BLVD SB	Off Ramp			

Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1	Lane 2	Lane 3
I210-W	773132	R25.5	25.48	2547	FAIR OAKS OFF	Off Ramp			
I210-W	764349	R25.7	25.68	2548	MARENGO	Off Ramp			
I210-W	768920	R26.49	26.47	2549	LAKE 2 - OFF	Off Ramp			
I210-W	717636	R26.82	26.8	4308	HILL	Off Ramp			
I210-W	764346	R27.66	27.64	2551	ALLEN	Off Ramp			
I210-W	768927	R28.6	28.58	2218	SAN GABRIEL OFF	Off Ramp			
I210-W	717648	R29.19	29.17	4305	SIERRA MADRE V1	Off Ramp			
I210-W	717652	R29.59	29.879	4304	ROSEMEAD 1	Off Ramp			
I210-W	717656	R29.71	29.999	4569	ROSEMEAD 2	Off Ramp			
I210-W	717662	R30.49	30.779	4303	BALDWIN SB	Off Ramp			
I210-W	717668	R31.73	32.019	4301	SANTA ANITA SB	Off Ramp			
I210-W	761337	R32.76	33.049	4299	HUNTINGTON 1	Off Ramp			
I210-W	761350	R33.76	34.049	4298	MYRTLE AV	Off Ramp			
I210-W	761377	R35.12	35.409	4296	BUENA VISTA	Off Ramp			
I210-W	768886	R37.92	38.209	4292	IRWINDALE 2	Off Ramp			
I210-W	768726	R39.05	39.339	4265	VERNON	Off Ramp			
I210-W	717681	R39.62	39.909	4289	AZUSA NB	Off Ramp			
I210-W	767780	R40.742	41.031	4269	CITRUS 2	Off Ramp			
I210-W	767704	R41.626	41.915	4286	GRAND	Off Ramp			
I210-W	717693	R43.1	43.389	4285	SUNFLOWER AV	Off Ramp			
I210-W	761397	R44.1	44.389	4451	LONE HILL AV	Off Ramp			
I210-W	771620	R45.31	45.599	6009	SAN DIMAS AVE	Off Ramp			

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

Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1	Lane 2
I210-E	768916	R25.14	25.12	4311	NB 710 EXT TO EB 210	Fwy-Fwy		
I210-E	773131	R25.5	25.48	2547	FAIR OAKS OFF	Fwy-Fwy		
I210-E	769705	R35.8	36.089	2412	EB 210 TO SB 605	Fwy-Fwy		
I210-E	767651	R44.1	44.389	4283	EB 210 TO SB 57	Fwy-Fwy		

Fwy-Dir	VDS	CA PM	Abs PM	MS ID	Name	Type	Lane 1	Lane 2
I210-W	769706	R35.8	36.089	2412	NB 605 TO WB 210	Fwy-Fwy		
I210-W	773204	R36.6	36.889	2407	NB 605 TO MT. OLIVE	Fwy-Fwy		
I210-W	773205	R36.6	36.889	2407	EB 210 TO MT. OLIVE	Fwy-Fwy		
I210-W	773206	R36.6	36.889	2407	SB 605 FROM WB 210	Fwy-Fwy		
I210-W	773207	R36.6	36.889	2407	NB 605 TO EB 210	Fwy-Fwy		
I210-W	769638	R41.466	41.755	4287	GRAND 1	Coll/Dist		
I210-W	767649	R44.1	44.389	4283	NB 57 TO WB 210	Fwy-Fwy		

Arterial Sensors

- **Pasadena**
  - Video detection systems at 58 intersections (Iteris and Econolite)
  - Traffic detectors at 80 intersections
    - Capability to measure mid-link volumes and speeds
    - Provide necessary data to allow traffic responsive signal operation
  - Approximately 2/3 of the intersections currently have some type of vehicle detection and actuation system

Traffic Signal Controllers

- **Pasadena**
  - 239 intersections with 170 controllers/BiTran 233 firmware
  - Remaining 92 intersections have been upgraded to operate with 2070 controllers/BiTran 2033 software.

- **Arcadia**
  - Majority of controllers equipped with LACO-4E firmware
  - Upgrade to LACO-4E in progress along Duarte, Colorado, Foothill
  - 2070 controller with D4 firmware to be installed at Huntington & Holly (entrance to race tracks) due to complexity of intersection
- **LA County**
  - 170E or 170ATC controllers with HC-11/QUAD UART processors
  - LACO-4 firmware deployed using AB3418E protocol

Traffic Management Systems

Level 1	Level 2	Level 2b	Level 3
• San Marino • Bradbury • Sierra Madre	• Duarte • Glendora • Monrovia • Baldwin Park *(LA County)* • Temple City *(LA County)* • El Monte *(LA County)*	• Arcadia • Azusa • Irwindale • San Dimas • South Pasadena • Covina • Alhambra • Montebello • Monterrey Park • Rosemead • San Gabriel • West Covina	• Caltrans • LA County Public Works • Pasadena
Do not operate their own traffic signals	Passively manage traffic signals	Actively manage traffic signals during peak and exception periods + Some ITS devices	Actively manage traffic signals during day + Large scale ITS deployments
Signals operated by another agency	**Signals may be operated by another agency**	**Agencies with own ATMS system**	

Based on 2004 data

Traffic Management Systems

- **City of Pasadena**
  - Siemens i2tms (Majority of intersections)
  - McCain QuicNet Pro (60 intersections)
  - TransCore Series 2000 (40 shared State/County intersections)

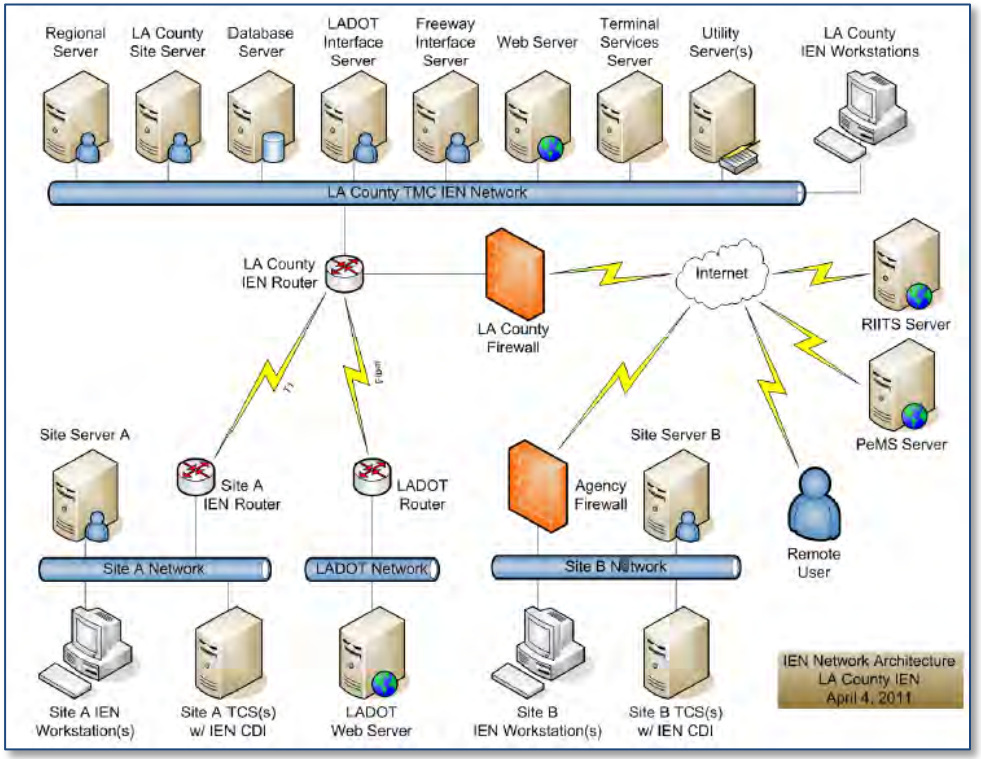
- **TransCore TransSuite**
  - Arcadia
  - Irwindale (19 intersections) – *Installing as of 2012/03*
  - Alhambra (71 intersections)
  - West Covina (61 intersections) – *Installing as of 2012/03*

Traffic Management Systems

- **Kimley-Horn KITS**
  - San Dimas - *Planned*
  - LA County Unincorporated Areas
  - Cities electing to have LA County operating their signals
    - El Monte
    - San Gabriel
    - Temple City
    - Baldwin Park
- **Econolite Centracs**
  - Glendora (31 intersections) – *Installing as of 2012/03*

Information Exchange Network (IEN)

- Coordinated communication network enabling participant to share traffic signal information and control
- Designed to collect second-by-second data
- Operational since 2002



Information Exchange Network (IEN)

- Interfaces with traffic signal control software:
  - LADOT traffic signal control system
  - TransCore Series 2000
  - TransCore TransSuite TCS
  - Siemens i2TMS
  - McCain QuicNet
  - Kimley Horn KITS
  - Econolite Centracs

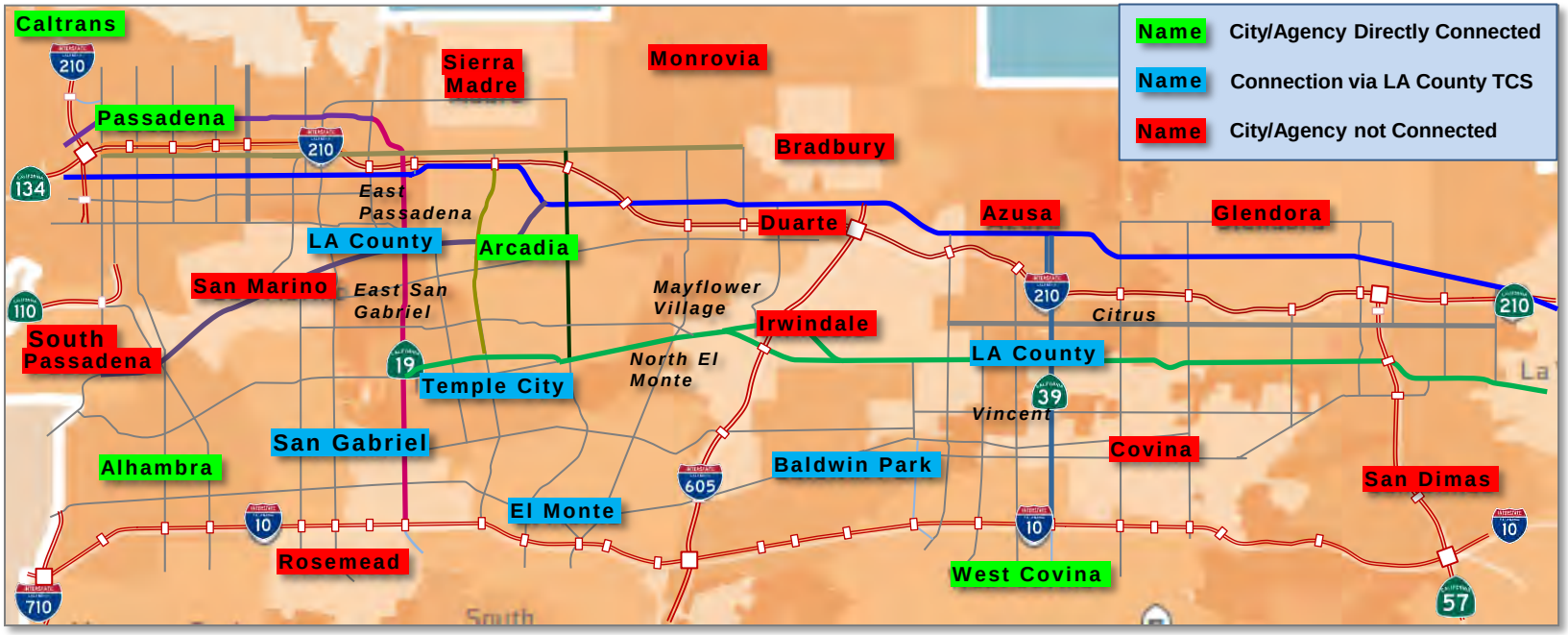
- Freeway Data Interface (*completed Sept. 2010*)
  - Pulls data from RIITS and PeMS into the IEN.
  - Allows the IEN to report freeway congestion status, incidents, and lane closures to IEN users

Information Exchange Network (IEN)

- IEN Web Server
  - XML-based web service to provide summary intersection and arterial detector data to authorized external systems.
  - Not currently accessible from the Internet

Information Exchange Network (IEN)

- **Cities/agencies connected to IEN**



Connections to Regional TMCs

- **Pasadena**
  - Many intersections connected to County TMC via the IEN
  - Because the IEN connection has not been consistent, the city is entertaining installing a direct fiber connection
- **Arcadia**
  - Intersections with LACO-4E controllers typically connected to County TMC via IEN
- **Duarte**
  - 5 intersections to be upgraded with LACO-4E and connected to County TMC
    - All city-controlled intersections along Huntington Dr. (5 intersections)
- **Monrovia**
  - 10 intersections to be upgraded with LACO-4E and connected to County TMC
    - All city-controlled intersections along Huntington Dr (9 intersections)
    - Duarte & Myrtle

Positive Aspects

- **Corridor geometry**
  - Linear corridor (east-west alignment).
  - Several parallel arterials in close proximity of I-210.
  - I-10 running parallel to I-210, 4 to 5 miles to the south.
  - Several possibilities for crossover between I-210 and I-10
    - I-605 and SR-57 freeways
    - SR-19 (Rosemead) and SR-19 (Azusa) arterials
  - One-way frontage streets on each side of I-210 within Pasadena

Positive Aspects

- **Highly directional traffic control needs**
  - AM peak → Westbound
  - PM peak → Eastbound

- **Need to manage time-specific/event traffic patterns**
  - Higher congestion levels on Friday afternoon due to weekend traffic
  - Traffic associated with events at the Rose Bowl stadium & Santa Anita racetrack
  - Events associated with Caltech, Cal Poly Pomona and other colleges
- **Average truck traffic disruptions**
  - Trucks only represent 3-5% of traffic → Typical of many urban freeways.
  - Only one interchange has a high proportion (15-20%) of trucks → Allow exploring solutions to improve truck operations around freeway merges.

Positive Aspects

- **Traffic sensing infrastructure**
  - Very good PeMS coverage of freeway mainline, HOV lanes, and ramps
  - Many intersections within Pasadena already equipped with traffic sensors
  - SMART test deployment site along Orange Grove Blvd in Pasadena
    - System collecting event-based high resolution traffic data from multiple intersections and generating real time arterial performance measures, such as intersection queue length and arterial travel time

Positive Aspects

- **Freeway traffic control**
  - All I-210 ramps metered, including interchanges with I-605 and SR-57
  - SWARM test corridor → Very likely that a good ramp metering communication infrastructure is already in place.
  - HOV lane along entire length of I-210 in both directions.

- **Arterial traffic control**
  - Traffic-responsive system may exist along arterials of interest in Pasadena and Arcadia
  - Local TMC in Pasadena

Positive Aspects

- **Transit coverage**
  - Metro Gold Line along I-210
    - Direct connection with downtown Los Angeles
    - Current terminus at the Pasadena/Arcadia boundary, but to be extended to Glendora by 2015 and further west subsequently
    - Stations typically within ½ mile of the freeway
  - Metro Silver line along I-10
    - Terminus in El Monte, just west of I-605
    - Direct connection with downtown Los Angeles
  - Several express buses running along I-10 and I-210
    - Additional transit connections with downtown Los Angeles
  - Several park-and-ride facilities within the corridor

Positive Aspects

- **Potential for implementing a Phase 1 system entirely within the city of Passadena**
  - System covering I-210, local frontage roads, and possibly one or more additional parallel arterials.
  - Potential for system extension through Arcadia

- **Possibility to divide the corridor into distinct control areas:**
  - Pasadena: High signal density/dense street network
  - Arcadia/Duarte/Monrovia: Medium signal density
  - East of I-605: Low-Medium signal density

Areas of Concern

- **Freeway and arterial congestion levels**
  - High level of congestion along I-210 may limit ICM benefits during peak hour (same problem with I-710)
  - Some intersections along local street networks already operating near capacity, constraining potential traffic management solutions during peak hour

- **Parking availability**
  - High occupancy (> 80%) at many park-and-ride facilities

Other Notable Elements

- **Potential for dual I-10/I-210 control:**
  - Traffic conditions along I-10 will likely need to be considered when developing strategies for I-210
- **Frequency of accidents**
  - Same daily frequency of accidents as I-710 (10 per day along corridor)
  - ½ the accident rate, as I-210 has about twice the VMT as I-710

Summary

Item	Rating	Notes
Geometry	Excellent	Several Parallel arterials in close proximity to I-210; freeway frontage streets in Pasadena
Freeway Traffic Detection	Very Good	Sensors on mainline and most ramps
Arterial Traffic Detection	Promising	Many intersections already equipped with traffic sensors
Traffic Demand Patterns	Very Good	Westbound traffic during AM peak; eastbound traffic during PM peak, average % of trucks
Existing Freeway Control	Excellent	Existing HOV lanes; ramps and freeway interchanges metered
Existing Arterial Control	Good	Traffic responsive system already in place on some arterials, participation of key cities in IEN
Existing Transit Services	Very Good	Metro Gold Line running parallel to I-210, in close proximity
Park-and-ride capabilities	Uncertain	Many facilities exhibit high occupancy rates
ICM Opportunities – Peak Hour	Challenging	High congestion level on freeway; some arterials with limited extra capacities at some intersections; incident response needs; different traffic pattern on Fridays
ICM Opportunities – Off Peak	Excellent	Many large scale events; incident response needs