

Appendix LAX – Los Angeles, California 2003 Annual Report on Freeway Mobility and Reliability

This report is a supplement to: *Monitoring Urban Freeways in 2003: Current Conditions and Trends from Archived Operations Data*. Texas Transportation Institute and Cambridge Systematics, Inc., Report No. FHWA-HOP-05-018, December 2004, available at <http://mobility.tamu.edu/mmp>.

Exhibit LAX-1: Current Measures and Trends

| Measures | Current Year | Last Year | | Two Years Ago | |
|--------------------------------------|--------------|-----------|--------|---------------|--------|
| | 2003 | 2002 | Change | 2001 | Change |
| Performance Measures | | | | | |
| Travel Time Index | 1.29 | 1.42 | -9% ↓ | 1.35 | -5% ↓ |
| Planning Time Index | 1.54 | 1.85 | -17% ↓ | 1.75 | -12% ↓ |
| Buffer Index | 16% | 26% | -10% ↓ | 25% | -9% ↓ |
| % Congested Travel | 36% | 60% | -24% ↓ | 59% | -23% ↓ |
| Total Delay (veh-hours) per 1000 VMT | 4.87 | 6.55 | -26% ↓ | 5.64 | -14% ↓ |
| Explanatory Measures | | | | | |
| Peak Period VMT (000) | 19,710 | 20,750 | -5% ↓ | 14,580 | +35% ↑ |
| Avg. Annual DVMT (000) | 81,950 | 82,030 | 0% — | 63,960 | +28% ↑ |
| Data Quality Measures | | | | | |
| % complete | 98% | 55% | +43% ↑ | 50% | +48% ↑ |
| % valid | 98% | 97% | +1% ↑ | 54% | +44% ↑ |
| % of VMT covered | 86% | 87% | -1% ↓ | 70% | 16% ↑ |
| % of freeway miles | 89% | 90% | -1% ↓ | 90% | -1% ↓ |

* See pages 11 and 12 for maps of freeway coverage, measure definitions, and further documentation.

Exhibit LAX-2: 2000 to 2003 Annual Trends

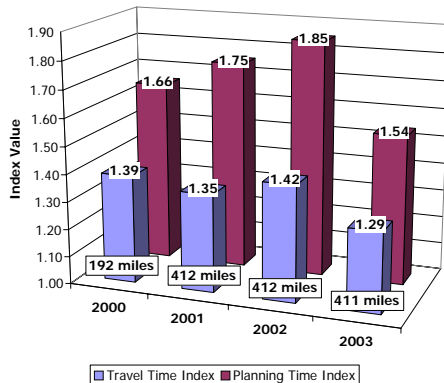
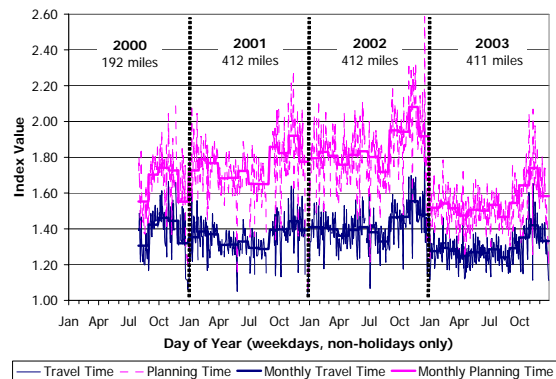


Exhibit LAX-3: Daily and Monthly Trends



Comments

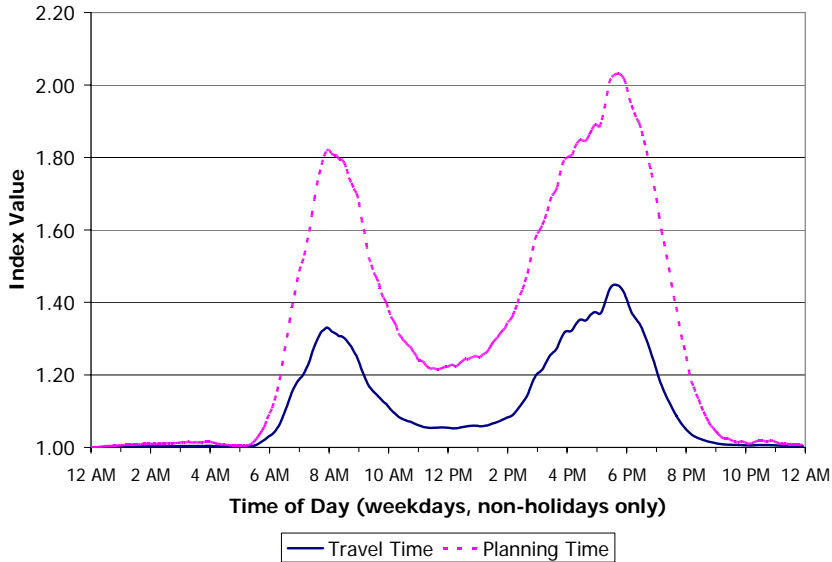
- The 2003 travel time index and buffer index improved substantially as compared to 2002 levels, showing a 9% and 10% improvement, respectively. The congested travel and delay showed even more improvement, at 24% and 26%. Because of these drastic areawide changes, the 2003 data should be considered as possibly suspect.
- Vehicle travel remained relatively constant, with significant improvement in data completeness.

Data Source(s): PeMS (<http://pems.eecs.berkeley.edu>) in cooperation with Caltrans (<http://www.dot.ca.gov/>)
Includes 411 of 463 (89%) total freeway miles in Los Angeles; collected using loop detectors; see page 11 for additional information on the data source

Data Analysis: Texas Transportation Institute, analysis completed September 2004

Time of Day Patterns and Trends

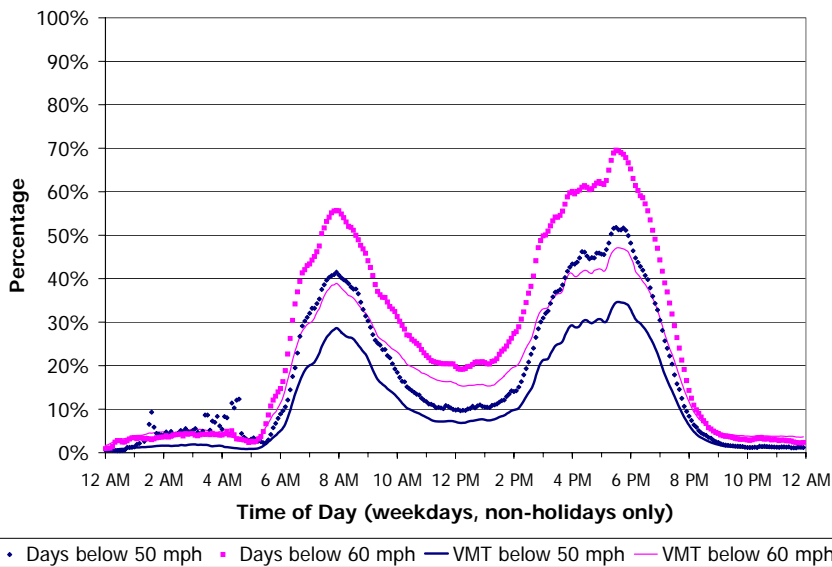
The charts on this page illustrate average weekday (no holidays included) traffic patterns and trends that were measured on the freeway sections instrumented with operations-based traffic sensors.



Comments

- This chart shows areawide congestion and reliability patterns. The difference between the solid line (travel time index) and the dashed line (planning time index) is the additional “buffer” or “time cushion” that travelers must add to average trip times to ensure 95% on-time arrival.
- The evening congestion level is higher and longer than in the morning.
- Travelers must add 25-35% additional buffer time during peak times to account for traffic unreliability.

Exhibit LAX-4: Mobility and Reliability by Time of Average Weekday



Comments

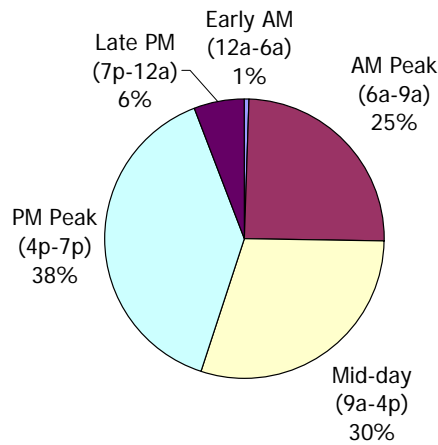
- This chart illustrates the difference in using two different speed thresholds (50 and 60 mph) to compute the percent of congested days as well as the percent of congested travel.
- There is about a 10-15% difference in using a 50 mph or 60 mph congestion threshold.

Exhibit LAX-5: Frequency and Percentage of Congested Travel by Time of Average Weekday

Time Period of the Day Patterns and Trends

The charts on this page illustrate average weekday (no holidays included) traffic patterns and trends that were measured on the freeway sections instrumented with operations-based traffic sensors. The time periods are defined uniformly for all cities to facilitate trend analysis over time and between cities. The time periods are defined as follows:

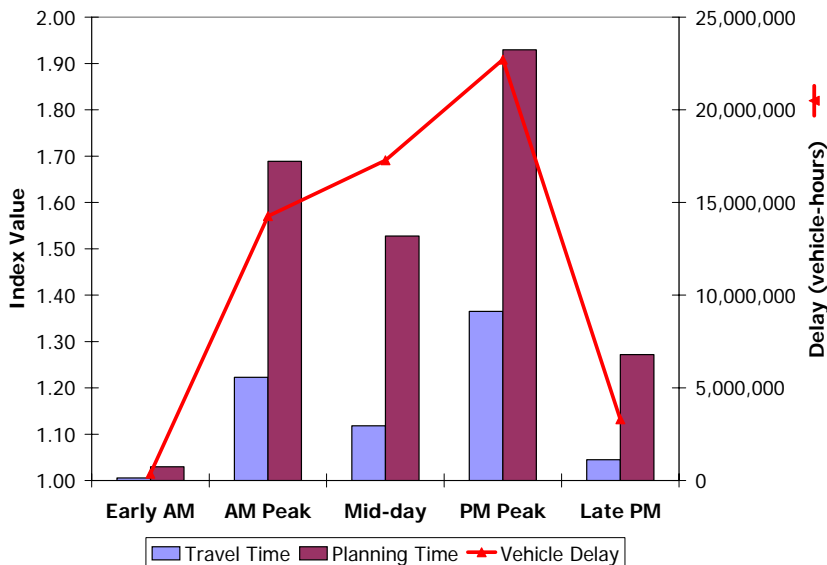
- Early AM: 12 to 6 am
- AM Peak: 6 to 9 am
- Mid-day: 9 am to 4 pm
- PM Peak: 4 to 7 pm
- Late PM: 7 pm to 12 am



Comments

- This chart shows the percent of delay that occurred during different time periods of an average weekday. Note that the AM and PM peak periods are the same duration, but that the other time periods have different lengths.
- The delay in the afternoon peak period is greater than the morning peak period.
- Delay during the mid-day period is greater than delay during the morning peak period.

Exhibit LAX-6: Percent of Delay by Time Period



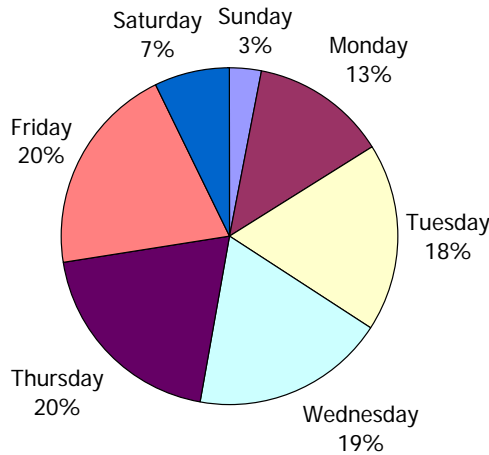
Comments

- This chart shows congestion and reliability (shown as bars) as well as delay (shown as a line) during different time periods of an average weekday.
- The trends in this chart follow closely those shown in Exhibit 6.
- The travel time index for the mid-day period is low, but the delay is relatively high because of the length of this time period (7 hours).

Exhibit LAX-7: Mobility, Reliability, and Delay by Time Period

Day of Week Patterns and Trends

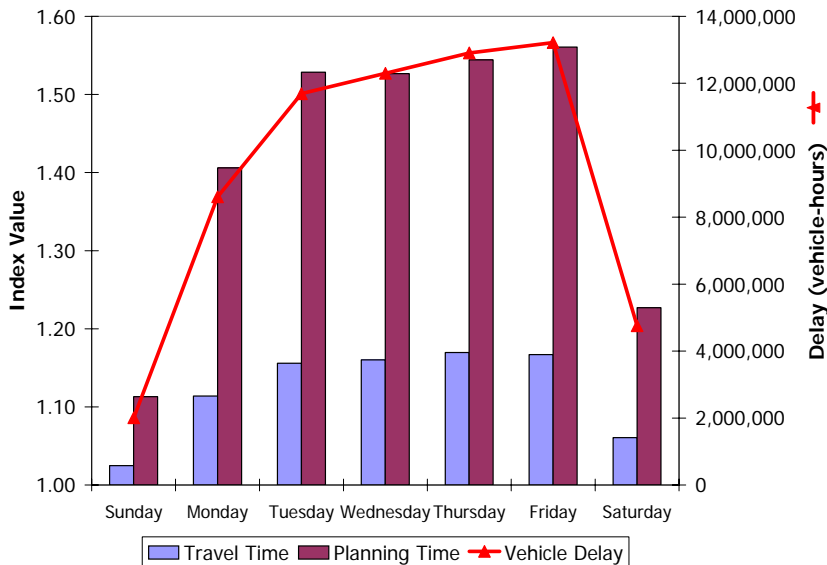
The charts on this page illustrate average traffic patterns and trends that were measured on the freeway sections instrumented with operations-based traffic sensors. Because of different peak period times and lengths on weekdays and weekends, the statistics presented on this page are 24-hour daily totals or averages.



Comments

- This chart shows the percent of total daily delay that occurred during each day of the week.
- The delay on Monday is significantly less than all other weekdays. Delay on all other weekdays is comparable.
- Both weekend days combined have about 50% of the normal weekday delay.

Exhibit LAX-8: Percent of Daily Vehicle Delay by Day of Week



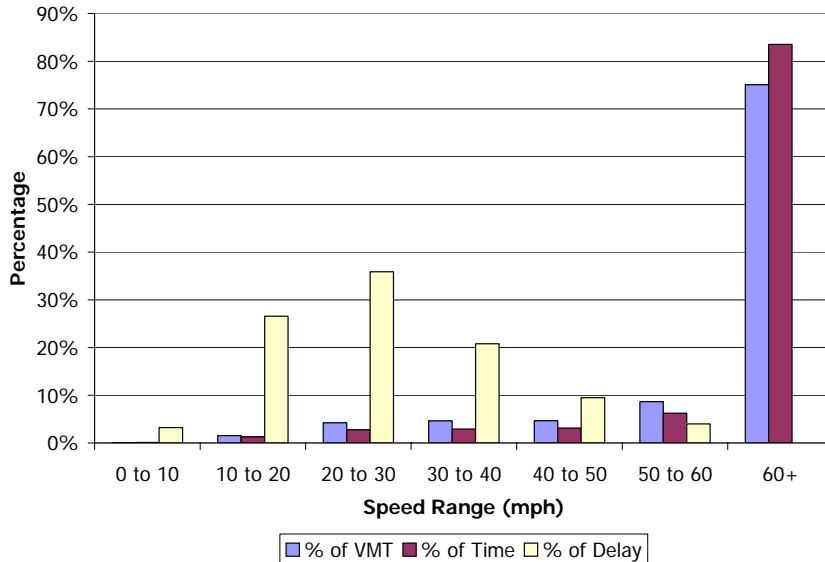
Comments

- This chart shows average daily congestion and reliability (shown as bars) as well as total daily delay (shown as a line) during each day of the week.
- The trends in this chart follow closely those shown in Exhibit 8.
- Friday has the most delay and is the least reliable day (highest planning time index).

Exhibit LAX-9: Mobility, Reliability, and Delay by Day of Week

Other Traffic Data Patterns and Trends

The chart on this page illustrates average traffic patterns and trends that were measured on the freeway sections instrumented with operations-based traffic sensors.



Comments

- This chart shows the percent of VMT, time, and delay in different speed ranges. This chart is useful to determine how much VMT and delay is occurring at different congestion levels.
- About 75% of the VMT occurred at speeds greater than 60 mph.
- More than 85% of the delay is at speeds less than 40 mph.

Exhibit LAX-10: Percent of VMT, Delay and Time Periods in Different Speed Ranges

Mobility and Reliability Statistics for Specific Freeway Sections

The table in this section illustrates average weekday (no holidays included) statistics from the freeway sections instrumented with operations-based traffic sensors. Where possible, the freeway sections have been defined to begin and end at major interchanges, streets, or other locations where traffic conditions are likely to change. The freeway sections are typically between 5 and 10 miles in length.

Exhibit LAX-11. Mobility and Reliability by Section and Time Period

| Freeway Section (sorted from most congested to least congested sections) | Length (mi) | Travel Time Index | | | | Buffer Index | | | |
|--|----------------|----------------------------|-------------------|----------------------------|---------------------------|----------------------------|-------------------|----------------------------|---------------------------|
| | | Morning Peak (6a-9a) | Midday (9a-4p) | Evening Peak (4p-7p) | Average peak period | Morning Peak (6a-9a) | Midday (9a-4p) | Evening Peak (4p-7p) | Average peak period |
| CA 57 HOV NB: BREA CYN RD to SB 57/60 SEP | 3.21 | 1.01 | 1.41 | 2.93 | 2.42 | 0% | 126% | 43% | 31% |
| I-110 NB: IMPERIAL HWY to YALE ST | 11.12 | 1.82 | 1.40 | 2.03 | 1.92 | 48% | 55% | 62% | 55% |
| I-405 NB: EL SEGUNDO BD to NATIONAL BLVD | 9.15 | 1.81 | 1.56 | 1.77 | 1.79 | 61% | 61% | 88% | 74% |
| I-210 HOV EB: 134/210 SEP to RTE 605/210 SEP | 12.59 | 1.01 | 1.14 | 2.10 | 1.78 | 1% | 62% | 54% | 39% |
| I-10 EB: JCT 405 NE CONN to JCT 10/110 SEP | 9.19 | 1.53 | 1.30 | 1.89 | 1.72 | 68% | 73% | 53% | 60% |
| I-10 EB: JCT 710/10 SEP TO GARVEY AVE | 9.73 | 1.02 | 1.21 | 2.31 | 1.70 | 11% | 77% | 52% | 32% |
| US 101 SB: ST 134/101 SEP to BEAUDRY AVE | 10.27 | 1.68 | 1.33 | 1.70 | 1.69 | 74% | 51% | 88% | 81% |
| I-405 SB: VENTURA BLVD to NATIONAL BLVD | 9.94 | 1.60 | 1.45 | 1.74 | 1.66 | 46% | 87% | 105% | 72% |
| US 101 SB: ST 101/405 SEP to ST 134/101 SEP | 5.38 | 1.46 | 1.59 | 1.85 | 1.66 | 84% | 62% | 39% | 61% |
| I-210 EB: SEP210/164 to RTE 605/210 SEP | 7.68 | 1.01 | 1.11 | 2.30 | 1.65 | 0% | 51% | 43% | 22% |
| I-5 NB: COYOTE CR to E CONNECTOR | 6.95 | 1.71 | 1.44 | 1.59 | 1.64 | 72% | 52% | 39% | 55% |
| I-605 HOV NB: JCT 91/605 SEP to RTE 605 5 SEP | 6.32 | 1.50 | 1.55 | 1.65 | 1.60 | 36% | 33% | 40% | 38% |
| I-405 NB: NATIONAL BLVD to SEPULVEDA BLVD | 8.94 | 1.01 | 1.17 | 2.13 | 1.57 | 1% | 59% | 40% | 21% |
| I-10 WB: JCT 710/10 SEP to JCT 10/110 SEP | 5.48 | 1.89 | 1.23 | 1.04 | 1.55 | 63% | 110% | 0% | 37% |
| I-10 WB: JCT 10/110 SEP to JCT 405 NE CONN | 10.77 | 1.90 | 1.25 | 1.22 | 1.55 | 75% | 73% | 42% | 58% |
| I-5 SB: JCT 710/5 SEP to E CONNECTOR | 7.11 | 1.11 | 1.28 | 1.96 | 1.54 | 51% | 78% | 40% | 45% |
| I-10 EB: JCT 1/2/10 SEP to JCT 405 NE CONN | 3.89 | 1.09 | 1.15 | 2.00 | 1.54 | 46% | 66% | 97% | 71% |
| CA 91 EB: 91/710 SEP to 183RD ST | 8.62 | 1.19 | 1.25 | 1.87 | 1.53 | 44% | 72% | 29% | 36% |
| US 101 SB: JCT 101/27 SEP to 101/405 SEP | 8.00 | 1.40 | 1.24 | 1.62 | 1.51 | 71% | 73% | 65% | 68% |
| I-605 SB: JCT 60/605 SEP to RTE 605 5 SEP | 8.10 | 1.47 | 1.26 | 1.54 | 1.50 | 50% | 50% | 58% | 54% |
| I-110 SB: LA RIV BOH CONN to IMPERIAL HWY | 11.57 | 1.28 | 1.13 | 1.72 | 1.49 | 35% | 38% | 45% | 40% |
| I-405 SB: NATIONAL BLVD to IMPERIAL | 8.05 | 1.10 | 1.23 | 1.86 | 1.47 | 32% | 51% | 35% | 33% |
| I-5 SB: JCT 2/5 SEP to JCT 710/5 SEP | 8.58 | 1.16 | 1.28 | 1.80 | 1.46 | 35% | 77% | 71% | 52% |
| I-5 SB: E CONNECTOR to COYOTE CR | 6.95 | 1.31 | 1.24 | 1.61 | 1.45 | 41% | 44% | 32% | 37% |
| US 101 NB: ST 101/170 SEP to 101/405 SEP | 5.43 | 1.38 | 1.11 | 1.53 | 1.45 | 73% | 47% | 53% | 63% |

Exhibit LAX-11 (Continued). Mobility and Reliability by Section and Time Period

| Freeway Section (sorted from most congested to least congested sections) | Length (mi) | Travel Time Index | | | | Buffer Index | | | |
|--|----------------|----------------------------|-------------------|----------------------------|---------------------------|----------------------------|-------------------|----------------------------|---------------------------|
| | | Morning Peak (6a-9a) | Midday (9a-4p) | Evening Peak (4p-7p) | Average peak period | Morning Peak (6a-9a) | Midday (9a-4p) | Evening Peak (4p-7p) | Average peak period |
| CA 14 SB: VIA PRINCESS to PLACERITA CN | 3.55 | 1.71 | 1.01 | 1.00 | 1.45 | 125% | 0% | 0% | 79% |
| I-405 SB: ST 405/110 SEP to ST 405/710 SEP | 5.56 | 1.03 | 1.12 | 1.84 | 1.44 | 15% | 55% | 51% | 33% |
| I-210 WB: RTE 605/210 SEP to SEP210/164 | 7.39 | 1.76 | 1.10 | 1.12 | 1.44 | 65% | 64% | 44% | 55% |
| CA 57 NB: BREA CYN RD to ST 57/210/10 SE | 6.99 | 1.02 | 1.18 | 1.79 | 1.44 | 3% | 64% | 30% | 17% |
| I-405 SB: IMPERIAL to ST 405/110 SEP | 8.41 | 1.03 | 1.09 | 1.81 | 1.42 | 16% | 44% | 91% | 53% |
| CA 60 EB: ST 60 ST 10 SEP to RTE 60/605 SEP | 11.80 | 1.03 | 1.09 | 1.75 | 1.41 | 13% | 45% | 50% | 33% |
| CA 170 NB: ST 101 170 SEP to ST 170/5 SEP RT | 5.69 | 1.00 | 1.07 | 1.72 | 1.41 | 0% | 48% | 54% | 30% |
| I-405 SB: RTE 405/118 SEP to VENTURA BLVD | 6.68 | 1.73 | 1.09 | 1.01 | 1.40 | 105% | 40% | 1% | 58% |
| I-5 SB: JCT 134/5 SEP to JCT 2/5 SEP | 4.85 | 1.39 | 1.21 | 1.40 | 1.39 | 70% | 83% | 127% | 98% |
| I-605 NB: RTE 605 5 SEP to JCT 60/605 SEP | 6.86 | 1.03 | 1.15 | 1.77 | 1.39 | 7% | 55% | 50% | 28% |
| I-405 NB: SEPULVEDA BLVD to PLUMMER ST | 6.63 | 1.00 | 1.06 | 1.64 | 1.37 | 0% | 33% | 52% | 30% |
| CA 60 EB: RTE 60/605 SEP to ST 60/57 SEP | 11.43 | 1.01 | 1.18 | 1.72 | 1.37 | 6% | 57% | 32% | 20% |
| US 101 NB: JCT 10/101 to ST 101/170 SEP | 11.73 | 1.01 | 1.04 | 1.72 | 1.37 | 7% | 20% | 53% | 31% |
| I-105 EB: LA RIVER BR/SEP to JCT 605/105 SEP | 5.05 | 1.09 | 1.24 | 1.64 | 1.36 | 34% | 80% | 68% | 51% |
| I-10 WB: GARVEY AVE to JCT 710/10 SEP | 9.72 | 1.69 | 1.11 | 1.01 | 1.36 | 47% | 55% | 5% | 27% |
| CA 57 SB: ST 57/210/10 SE to BREA CYN RD | 6.84 | 1.62 | 1.07 | 1.10 | 1.36 | 92% | 26% | 57% | 74% |
| I-5 NB: E CONNECTOR to JCT 710/5 SEP | 7.15 | 1.58 | 1.14 | 1.10 | 1.35 | 44% | 46% | 55% | 49% |
| I-5 NB: JCT 710/5 SEP to JCT 2/5 SEP | 8.57 | 1.11 | 1.17 | 1.61 | 1.35 | 27% | 58% | 54% | 40% |
| I-10 WB: JCT 57/210/10 S GARVEY AVE | 11.17 | 1.58 | 1.10 | 1.12 | 1.35 | 57% | 42% | 38% | 48% |
| I-210 EB: CASITAS AVE to SEP210/164 | 7.41 | 1.01 | 1.09 | 1.69 | 1.34 | 8% | 47% | 64% | 35% |
| I-605 NB: SPRING ST OC to RTE 605 5 SEP | 10.59 | 1.27 | 1.13 | 1.41 | 1.34 | 69% | 50% | 79% | 74% |
| US 101 NB: 101/405 SEP to JCT 101/27 SEP | 7.68 | 1.35 | 1.09 | 1.31 | 1.33 | 45% | 28% | 24% | 35% |
| I-405 HOV SB: ST 405/110 SEP to ST 405/710 SEP | 5.31 | 1.00 | 1.08 | 1.46 | 1.33 | 0% | 35% | 52% | 37% |
| I-105 HOV EB: LACIENAGA to 105/110 SEP | 6.53 | 1.00 | 1.05 | 1.46 | 1.33 | 0% | 31% | 58% | 42% |
| I-405 HOV SB: EL SEGUNDO BD to ST 405/110 SEP | 7.56 | 1.01 | 1.06 | 1.42 | 1.32 | 2% | 28% | 79% | 60% |
| I-710 NB: JCT 105/710 SEP to JCT 60/710 SEP | 9.26 | 1.33 | 1.13 | 1.30 | 1.32 | 55% | 41% | 37% | 46% |
| CA 134 WB: 5/134 SEP AT LA to LEDGE AVE | 4.87 | 1.14 | 1.08 | 1.47 | 1.31 | 55% | 31% | 109% | 83% |
| I-110 SB: IMPERIAL HWY to JCT 405/110 SEP | 5.37 | 1.11 | 1.06 | 1.47 | 1.29 | 57% | 50% | 40% | 48% |
| CA 60 WB: ST 60/71 SEP RT to RTE 60/605 SEP | 18.82 | 1.44 | 1.16 | 1.16 | 1.29 | 68% | 57% | 44% | 56% |

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Exhibit LAX-11 (Continued). Mobility and Reliability by Section and Time Period

| Freeway Section (sorted from most congested to least congested sections) | Length (mi) | Travel Time Index | | | | Buffer Index | | | |
|--|----------------|----------------------------|-------------------|----------------------------|---------------------------|----------------------------|-------------------|----------------------------|---------------------------|
| | | Morning Peak (6a-9a) | Midday (9a-4p) | Evening Peak (4p-7p) | Average peak period | Morning Peak (6a-9a) | Midday (9a-4p) | Evening Peak (4p-7p) | Average peak period |
| I-105 EB: 105/110 SEP to LA RIVER BR/SEP | 5.95 | 1.04 | 1.14 | 1.54 | 1.29 | 24% | 49% | 30% | 27% |
| I-105 EB: AIRPORT VIA to 105/110 SEP | 7.11 | 1.02 | 1.07 | 1.52 | 1.28 | 5% | 44% | 48% | 27% |
| I-105 WB: WRIGHT ROAD to 105/110 SEP | 5.66 | 1.47 | 1.03 | 1.06 | 1.27 | 46% | 14% | 16% | 31% |
| I-405 SB: ST 405/710 SEP to STUDEBAKER RD | 7.01 | 1.01 | 1.06 | 1.49 | 1.27 | 0% | 33% | 42% | 22% |
| CA 60 WB: RTE 60/605 SEP to ST 60 ST 10 SEP | 11.52 | 1.44 | 1.07 | 1.06 | 1.27 | 44% | 34% | 11% | 29% |
| CA 134 EB: DENNY AVE to 5/134 SEP AT LA | 4.99 | 1.05 | 1.02 | 1.49 | 1.27 | 32% | 0% | 81% | 56% |
| I-10 EB: JCT 10/110 SEP to JCT 710/10 SEP | 7.57 | 1.00 | 1.05 | 1.44 | 1.26 | 0% | 24% | 49% | 29% |
| CA 91 EB: JCT 110/91 SEP to 91/710 SEP | 6.11 | 1.00 | 1.08 | 1.47 | 1.25 | 0% | 40% | 78% | 42% |
| CA 91 WB: 183RD ST to 91/710 SEP | 8.69 | 1.35 | 1.09 | 1.15 | 1.25 | 60% | 23% | 20% | 40% |
| I-605 NB: JCT 60/605 SEP to ARROW HWY | 7.32 | 1.11 | 1.07 | 1.39 | 1.25 | 32% | 35% | 48% | 40% |
| I-710 SB: JCT 60/710 SEP to JCT 105/710 SEP | 9.43 | 1.05 | 1.09 | 1.44 | 1.24 | 25% | 46% | 37% | 31% |
| I-605 HOV NB: RTE 605 5 SEP to ST 605/10 SEP | 10.16 | 1.00 | 1.05 | 1.36 | 1.24 | 0% | 27% | 38% | 25% |
| I-210 WB: ST 210/57/10 SE to RTE 605/210 SEP | 10.95 | 1.46 | 1.02 | 1.01 | 1.23 | 58% | 0% | 0% | 29% |
| I-405 NB: ST 405/110 SEP to EL SEGUNDO BD | 7.25 | 1.36 | 1.05 | 1.08 | 1.22 | 53% | 28% | 21% | 37% |
| I-710 NB: DEL AMO BLVD to JCT 105/710 SEP | 5.17 | 1.09 | 1.08 | 1.31 | 1.21 | 48% | 32% | 68% | 59% |
| I-5 SB: JCT170/5 SEP to JCT 134/5 SEP | 9.68 | 1.21 | 1.13 | 1.21 | 1.21 | 54% | 22% | 60% | 57% |
| I-405 HOV SB: ST 405/710 SEP to STUDEBAKER RD | 7.01 | 1.00 | 1.05 | 1.28 | 1.20 | 0% | 21% | 41% | 29% |
| I-210 HOV WB: RTE 605/210 SEP to 134/210 SEP | 12.07 | 1.28 | 1.03 | 1.06 | 1.19 | 38% | 15% | 24% | 32% |
| US 101 SB: LINDERO CYN RD to JCT 101/27 SEP | 12.15 | 1.02 | 1.03 | 1.35 | 1.18 | 16% | 13% | 56% | 35% |
| I-5 NB: JCT 134/5 SEP to JCT 170/5 SEP | 9.66 | 1.02 | 1.06 | 1.33 | 1.18 | 5% | 23% | 43% | 25% |
| I-210 HOV WB: ST 210/57/10 SE to RTE 605/210 SEP | 11.74 | 1.28 | 1.00 | 1.01 | 1.18 | 52% | 0% | 0% | 32% |
| I-105 HOV EB: 105/110 SEP to JCT 605/105 SEP | 9.87 | 1.00 | 1.06 | 1.25 | 1.18 | 0% | 23% | 23% | 16% |
| I-10 EB: GARVEY AVE to JCT 57/210/10 S | 10.87 | 1.00 | 1.04 | 1.30 | 1.17 | 0% | 18% | 25% | 14% |
| CA 14 HOV SB: VIA PRINCESS to ST 14/126 SEP | 3.55 | 1.26 | 1.04 | 1.02 | 1.17 | 64% | 0% | 0% | 40% |
| I-605 SB: ARROW HWY to JCT 60/605 SEP | 5.71 | 1.28 | 1.05 | 1.02 | 1.16 | 56% | 24% | 8% | 33% |
| I-405 HOV SB: RTE 405/118 SEP to EL SEGUNDO BD | 15.21 | 1.24 | 1.02 | 1.04 | 1.16 | 81% | 5% | 30% | 60% |
| I-405 NB: STUDEBAKER RD to ST 405/710 SEP | 7.09 | 1.27 | 1.04 | 1.02 | 1.16 | 53% | 18% | 9% | 32% |
| I-5 NB: JCT 170/5 SEP to JCT 14/5 SEP | 8.82 | 1.00 | 1.03 | 1.26 | 1.15 | 0% | 16% | 67% | 39% |
| CA 57 HOV SB: SB 57/60 SEP to BREA CYN RD | 2.61 | 1.22 | 1.00 | 1.00 | 1.15 | 60% | 0% | 0% | 39% |

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|--|----------------|----------------------------|-------------------|----------------------------|---------------------------|----------------------------|-------------------|----------------------------|---------------------------|
| | | Morning Peak (6a-9a) | Midday (9a-4p) | Evening Peak (4p-7p) | Average peak period | Morning Peak (6a-9a) | Midday (9a-4p) | Evening Peak (4p-7p) | Average peak period |
| I-105 WB: JCT 605/105 SEP to WRIGHT ROAD | 5.14 | 1.22 | 1.02 | 1.06 | 1.14 | 55% | 7% | 19% | 38% |
| I-105 WB: 105/110 SEP to AIRPORT VIA | 7.00 | 1.26 | 1.02 | 1.01 | 1.14 | 27% | 12% | 0% | 14% |
| CA 91 HOV EB: CENTRAL AVE to 183RD ST | 12.76 | 1.00 | 1.04 | 1.19 | 1.14 | 0% | 20% | 31% | 22% |
| CA 170 SB: ST 170/5 SEP RT to ST 101 170 SEP | 5.60 | 1.23 | 1.05 | 1.01 | 1.13 | 78% | 20% | 0% | 43% |
| CA 91 WB: 91/710 SEP to JCT 110/91 SEP | 5.57 | 1.22 | 1.01 | 1.02 | 1.13 | 27% | 3% | 6% | 18% |
| CA 2 WB: RTE 2/210 SEP to ROSEBUD AVE | 8.87 | 1.21 | 1.01 | 1.00 | 1.12 | 50% | 2% | 0% | 28% |
| I-405 NB: 405/710 SEP to ST 405/110 SEP | 5.63 | 1.16 | 1.02 | 1.07 | 1.12 | 50% | 7% | 32% | 41% |
| I-105 HOV WB: JCT 605/105 SEP to 105/110 SEP | 9.55 | 1.19 | 1.01 | 1.01 | 1.11 | 47% | 0% | 2% | 28% |
| I-710 SB: JCT 105/710 SEP to DEL AMO BLVD | 5.12 | 1.18 | 1.07 | 1.03 | 1.11 | 62% | 25% | 15% | 40% |
| I-10 WB: JCT 405 NE CONN to JCT 1/2/10 SEP | 3.65 | 1.03 | 1.03 | 1.18 | 1.10 | 18% | 15% | 42% | 29% |
| I-110 NB: ST 110/47 SEP to JCT 405/110 SEP | 7.52 | 1.14 | 1.04 | 1.05 | 1.10 | 40% | 12% | 25% | 33% |
| I-210 EB: RTE 605/210 SEP to ST 210/57/10 SE | 10.78 | 1.00 | 1.02 | 1.16 | 1.09 | 0% | 11% | 21% | 12% |
| I-210 HOV EB: RTE 605/210 SEP to ST 210/57/10 SE | 11.66 | 1.00 | 1.01 | 1.11 | 1.08 | 0% | 5% | 22% | 17% |
| CA 118 EB: HAPPY CAMP CR to COCHRAN ST | 11.31 | 1.03 | 1.00 | 1.12 | 1.08 | 16% | 0% | 48% | 33% |
| US 101 NB: LINDERO CYN RD to PLEASANT VLY RD | 13.60 | 1.00 | 1.02 | 1.13 | 1.07 | 0% | 3% | 44% | 25% |
| I-210 WB: SEP210/164 to ARROYO BLVD | 7.99 | 1.09 | 1.02 | 1.05 | 1.07 | 20% | 14% | 25% | 22% |
| I-5 NB: JCT 2/5 SEP to JCT 134/5 SEP | 4.91 | 1.01 | 1.06 | 1.12 | 1.07 | 1% | 26% | 28% | 15% |
| CA 134 WB: BB 134/710 SEP to 5/134 SEP AT LA | 7.68 | 1.11 | 1.02 | 1.01 | 1.06 | 49% | 0% | 3% | 28% |
| I-405 HOV NB: ST 405/110 SEP to EL SEGUNDO BD | 7.56 | 1.09 | 1.03 | 1.03 | 1.06 | 18% | 13% | 12% | 16% |
| CA 170 HOV NB: ST 101 170 SEP to ST 170/5 SEP RT | 5.69 | 1.04 | 1.01 | 1.07 | 1.06 | 28% | 6% | 31% | 30% |
| CA 118 EB: COCHRAN ST to WOODLEY AVE | 11.35 | 1.01 | 1.00 | 1.12 | 1.06 | 3% | 0% | 29% | 16% |
| I-5 SB: ST 5/405 SEP to JCT170/5 SEP | 7.76 | 1.10 | 1.00 | 1.01 | 1.06 | 30% | 0% | 0% | 18% |
| CA 14 HOV NB: ST 14/126 SEP to VIA PRINCESS | 5.43 | 1.00 | 1.01 | 1.07 | 1.06 | 1% | 6% | 22% | 18% |
| I-405 HOV NB: EL SEGUNDO BD to PLUMMER ST | 10.30 | 1.00 | 1.02 | 1.07 | 1.06 | 0% | 4% | 11% | 9% |
| I-605 HOV SB: ST 605/10 SEP to RTE 605 5 SEP | 11.38 | 1.03 | 1.03 | 1.08 | 1.06 | 11% | 12% | 32% | 21% |
| US 101 NB: JCT 101/27 SEP to LINDERO CYN RD | 12.51 | 1.06 | 1.01 | 1.04 | 1.05 | 23% | 2% | 17% | 20% |
| I-605 SB: RTE 605 5 SEP to SPRING ST OC | 10.27 | 1.03 | 1.01 | 1.04 | 1.03 | 10% | 3% | 11% | 11% |
| I-105 HOV WB: 105/110 SEP to INGLEWOOD AV | 5.75 | 1.05 | 1.00 | 1.00 | 1.03 | 16% | 0% | 0% | 10% |
| I-110 NB: JCT 405/110 SEP to IMPERIAL HWY | 5.46 | 1.02 | 1.01 | 1.04 | 1.03 | 10% | 3% | 16% | 13% |

Exhibit LAX-11 (Continued). Mobility and Reliability by Section and Time Period

| Freeway Section (sorted from most congested to least congested sections) | Length (mi) | Travel Time Index | | | | Buffer Index | | | |
|--|----------------|----------------------------|-------------------|----------------------------|---------------------------|----------------------------|-------------------|----------------------------|---------------------------|
| | | Morning Peak (6a-9a) | Midday (9a-4p) | Evening Peak (4p-7p) | Average peak period | Morning Peak (6a-9a) | Midday (9a-4p) | Evening Peak (4p-7p) | Average peak period |
| I-10 HOV EB: JCT 710/10 SEP to AZUSA AVE | 14.11 | 1.00 | 1.01 | 1.04 | 1.03 | 0% | 5% | 12% | 8% |
| I-5 SB: Hungry Vly Road to ST 5/405 Sep | 22.04 | 1.02 | 1.01 | 1.03 | 1.03 | 14% | 0% | 12% | 13% |
| CA 134 HOV EB: DENNY AVE to BB 134/710 SEP | 13.14 | 1.01 | 1.01 | 1.03 | 1.02 | 0% | 0% | 13% | 9% |
| I-5 NB: JCT 14/5 SEP to RTE 5/138 SEP L | 21.00 | 1.02 | 1.02 | 1.03 | 1.02 | 9% | 0% | 10% | 10% |
| US 101 SB: PLEASANT VLY RD to LINDERO CYN RD | 13.79 | 1.03 | 1.00 | 1.01 | 1.02 | 26% | 0% | 0% | 13% |
| I-405 HOV NB: STUDEBAKER RD to ST 405/710 SEP | 7.09 | 1.03 | 1.02 | 1.01 | 1.02 | 12% | 2% | 0% | 7% |
| I-10 HOV EB: WESTERN AVE to JCT 710/10 SEP | 9.13 | 1.00 | 1.01 | 1.04 | 1.02 | 0% | 0% | 27% | 12% |
| CA 134 EB: 5/134 SEP AT LA to BB 134/710 SEP | 8.15 | 1.00 | 1.01 | 1.03 | 1.02 | 0% | 0% | 12% | 7% |
| I-110 HOV NB: 88TH PLACE to EXPOSITION | 5.21 | 1.02 | 1.00 | 1.01 | 1.02 | 13% | 0% | 0% | 7% |
| CA 91 HOV WB: 183RD ST to AVALON BLVD | 13.91 | 1.02 | 1.00 | 1.00 | 1.02 | 8% | 0% | 0% | 5% |
| I-405 HOV NB: ST 405/710 SEP to ST 405/110 SEP | 5.32 | 1.02 | 1.01 | 1.01 | 1.01 | 10% | 0% | 3% | 7% |
| CA 118 WB: WOODLEY AVE to COCHRAN ST | 10.29 | 1.01 | 1.00 | 1.02 | 1.01 | 4% | 0% | 5% | 5% |
| I-10 HOV WB: JCT 710/10 SEP to JCT 5/10 SEP | 3.35 | 1.01 | 1.00 | 1.01 | 1.01 | 4% | 0% | 6% | 5% |
| I-10 WB: COLLEGE AVE to JCT 57/210/10 S | 5.41 | 1.01 | 1.00 | 1.01 | 1.01 | 0% | 0% | 7% | 4% |
| CA 118 HOV WB: JCT 405/118 to ST 118/27 SEP | 10.10 | 1.01 | 1.00 | 1.00 | 1.01 | 7% | 0% | 2% | 5% |
| CA 134 HOV WB: BB 134/710 SEP to PASS AVE | 11.57 | 1.01 | 1.00 | 1.01 | 1.01 | 1% | 0% | 4% | 2% |
| CA 118 HOV EB: ST 118/27 SEP to JCT 405/118 | 10.22 | 1.00 | 1.00 | 1.01 | 1.01 | 0% | 0% | 5% | 4% |
| I-110 HOV SB: EXPOSITION to 120TH STREET | 6.67 | 1.00 | 1.00 | 1.01 | 1.01 | 0% | 0% | 4% | 3% |
| CA 14 NB: ST 14/126 SEP to VIA PRINCESS | 5.43 | 1.00 | 1.00 | 1.01 | 1.01 | 0% | 0% | 3% | 2% |
| I-10 EB: JCT 57/210/10 S to COLLEGE AVE | 5.82 | 1.00 | 1.00 | 1.01 | 1.00 | 0% | 0% | 6% | 3% |
| CA 170 HOV SB: ST 170/5 SEP RT to BURBANK | 4.87 | 1.01 | 1.00 | 1.00 | 1.00 | 3% | 0% | 0% | 2% |
| I-605 HOV SB: RTE 605 5 SEP to JCT 91/605 SEP | 6.04 | 1.00 | 1.00 | 1.00 | 1.00 | 0% | 0% | 0% | 0% |
| I-10 HOV WB: AZUSA AVE to JCT 710/10 SEP | 16.13 | 1.00 | 1.00 | 1.00 | 1.00 | 1% | 1% | 0% | 0% |
| CA 118 WB: COCHRAN ST to PRINCETON AVE | 12.87 | 1.00 | 1.00 | 1.00 | 1.00 | 0% | 0% | 0% | 0% |
| Average for all Sections | | 1.22 | 1.12 | 1.37 | 1.29 | 34% | 34% | 37% | 36% |

Comments

- This table shows average weekday congestion (travel time index) and reliability (buffer index) for specific routes for different time periods of the day.

Source and Coverage of Data

This report was produced using data collected by Caltrans and archived by PeMS (<http://pems.eecs.berkeley.edu>). A map of the freeway routes on which traffic data was collected is shown below (dots indicate sensor locations).



Exhibit LAX-12: Freeway Routes with Traffic Sensors in Los Angeles
 (Source of graphic: PeMS, <http://pems.eecs.berkeley.edu>)

Exhibit LAX-13: Instrumented Freeway Coverage in Los Angeles

| Coverage Measures | Year | Instrumented Freeway Routes | Total Freeway System ¹ | Percent Coverage |
|--|------|-----------------------------|-----------------------------------|------------------|
| Lane-miles | 2000 | 1,670 | 3,780 | 44% |
| | 2001 | 3,700 | 3,927 | 94% |
| | 2002 | 3,700 | 4,095 | 90% |
| | 2003 | 3,697 | 4,253 | 87% |
| Centerline-miles | 2000 | 329 | 458 | 72% |
| | 2001 | 412 | 458 | 90% |
| | 2002 | 412 | 460 | 90% |
| | 2003 | 411 | 463 | 89% |
| Average annual daily vehicle-miles of travel (DVMT) (1000) | 2000 | 28,860 | 88,547 | 33% |
| | 2001 | 63,960 | 90,829 | 70% |
| | 2002 | 82,030 | 94,738 | 87% |
| | 2003 | 81,950 | 94,750 | 86% |

¹Source is FHWA's Highway Performance Monitoring System and the Texas Transportation Institute's Urban Mobility Study (<http://mobility.tamu.edu/ums>).

Documentation and Definitions

Performance Measures

- **Travel Time Index:** ratio of the average peak period travel time to an off-peak travel time. For example, a value of 1.20 means that average peak travel times are 20% longer than off-peak travel times. In this report, the morning peak period is from 6 to 9 a.m. and the evening peak period is from 4 to 7 p.m. The off-peak travel time is calculated by assuming a free-flow speed of 60 mph.
- **Planning Time Index:** statistically defined as the 95th percentile Travel Time Index, this measure also represents the extra time most travelers include when planning peak period trips. For example, a value of 1.60 means that travelers plan for an additional 60% travel time above the off-peak travel times to ensure 95% on-time arrival.
- **Buffer Index:** the extra time (or buffer) needed to ensure on-time arrival for most trips. For example, a value of 40% means that a traveler should budget an additional 8 minute buffer for a 20-minute average peak trip time to ensure 95% on-time arrival. In this report, the buffer index is a VMT-weighted average of the buffer index for each route for the morning and evening peak period. The buffer index is calculated for each route and time period as follows: $\text{buffer index} = (95^{\text{th}} \text{ percentile travel time} - \text{average travel time}) / \text{average travel time}$.
- **% Congested Travel:** the congested peak period vehicle-miles of travel (VMT) divided by total VMT in the peak period. This is a relative measure of the amount of peak period travel affected by congestion.
- **Total Delay per 1000 VMT:** the total vehicle delay (in vehicle-hours) divided by the amount of VMT. This is a relative measure of the total delay and will not be as affected by changes in the level of sensor instrumentation for a particular city.
- **Vehicle Delay:** the delay (in vehicle-hours) experienced by vehicles traveling less than free-flow speeds (assumed to be 60 mph in this report).

Explanatory Measures

- **Peak Period VMT:** the average amount of VMT within the defined peak periods (weekdays from 6 to 9 a.m. and 4 to 7 p.m.) for the year. Peak period VMT is reported by 1000s.
- **Average Annual DVMT (000):** the average annual amount of daily VMT (DVMT) for all days and times for the year. Average annual DVMT is reported by 1000s.

Data Quality Measures

- **% complete:** the number of valid reported data values divided by the number of total expected data values (given the number of active sensors and time periods). In this report, % complete is reported as the lowest value of either traffic volume or speed data.
- **% valid:** the number of reported data values that passed defined acceptance criteria divided by the total number of reported data values. In this report, % valid is reported as the lowest value of either traffic volume or speed data.
- **% of DVMT covered:** the amount of average annual DVMT reported by sensors divided by the areawide average annual DVMT as estimated in FHWA's Highway Performance Monitoring System and TTI's Urban Mobility Study. This measure characterizes the relative amount of areawide travel that has the performance indicated in this report.
- **% coverage of freeway mileage:** the amount of freeway lane-miles containing sensors divided by the areawide freeway lane-miles as estimated in FHWA's Highway Performance Monitoring System and TTI's Urban Mobility Study. This measure characterizes the relative amount of areawide freeways that has the performance indicated in this report.