

Measured progress

Southern California-inspired developments are creating a global data resource

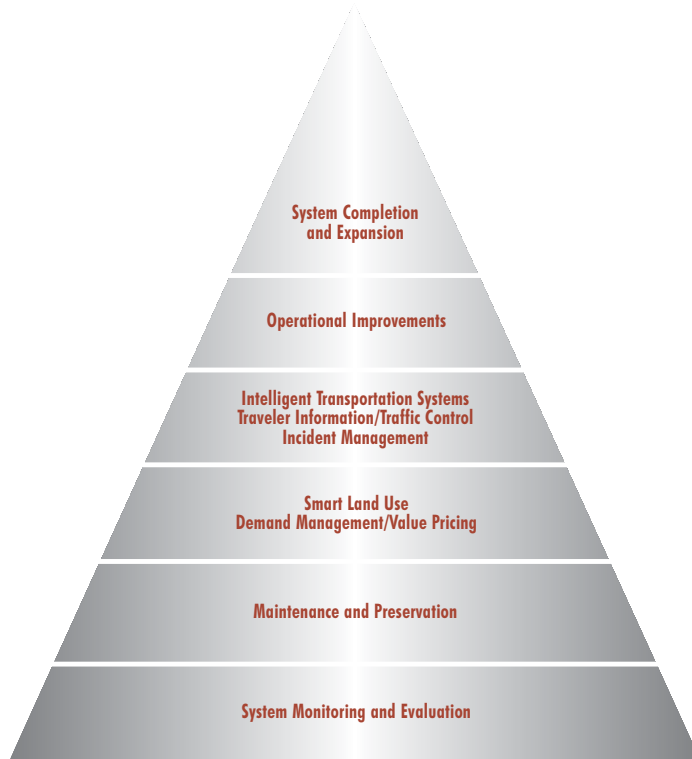


Figure 1: The Caltrans mobility pyramid

Four of the US's top 10 worst traffic bottlenecks are in Southern California. With Caltrans logging nearly 360,000 daily hours of vehicle delay, decisions on where to spend limited resources become critical - not least for traffic detection to supply data to support the case for freeway improvements.

There are over 18,000 detectors currently in service in Southern California. Most are loop-based sensors, although wireless magnetometer and radar alternatives are becoming more common. The majority are in use for traffic-responsive ramp metering on approaches to freeways.

To maximise their value for analysing highway performance - both regionally and State-wide - a research project at the University of California at Berkeley has developed a dedicated Performance Measurement System (PeMS). PeMS stores traffic data from the six most congestion-prone of Caltrans's 12 districts (including those four in Southern California). It incorporates tools for manipulating this to show, for example, day-long vehicle volumes on a particular route or freeway segment speeds at a given point in time.

Caltrans planners measure PeMS-derived vehicle delay information to determine the needs for future improvements, for example additional freeway lanes or the incorporation of ITS applications such as ramp metering. They also draw on detection data to determine travel time predictions for display on Caltrans's Changeable Message Signs (CMS).

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Local analysis determines if an accident has occurred, to allow implementation of predetermined response plans using Caltrans' advanced transportation management system (ATMS) software. Engineers can interrogate sensor diagnostics to decide whether a loop is providing them with valid data.

Value-Added Resellers (VARs) process the data to provide relevant information in a more accessible format to drivers, who can also plan routes by directly accessing real-time data presented on PeMS maps. More widely, researchers across the US and around the world are drawing on PeMS traffic data in order to further their understanding of practical transportation issues.

More investment

Over the next 18 months, Caltrans District 08, which covers the San Bernardino and Riverside counties (lying to the east of Los Angeles and Orange counties), is planning to deploy over 1,000 new detection points on lanes to gain coverage on congested freeways. Both counties have experienced unprecedented population growth over the last two decades, much of it due to lower housing costs for people employed in their neighbours.

This growth has caused significant increases in the duration of freeway congestion. Combined with a lack of resources over a number of years, it has left many key freeways without detection coverage, with the region thus unable to provide traveller information and store freeway performance data on them.

Lack of performance information also makes it more difficult to compete for the scarce resources available for freeway improvements. But, with the recent approval of Proposition 1B, the region plans to instrument many more segments.

Some 30 per cent of the detectors will be magnetometer sensors supplied by California-based Sensys Networks. These small roadway-embedded units are independent of hardware infrastructure, operate wirelessly and can be located where power is not readily available.

Performance-based

Caltrans's performance-based approach originated with a 2000 initiative called Traffic Operations Program Strategies (TOPS), which led to a 2004 Transportation Management System (TMS) Master Plan. Concepts from this underwent further refinement for Go California.

As Figure 1 shows, the approach uses a hierarchical progression built on system monitoring and evaluation. Comments Caltrans District 08 Chief, Freeway Systems Thomas Ainsworth: "It progresses from the most essential activities at the bottom to 'last-resort' ones at the top. Those lower down return a higher benefit-cost ratio.

"This leads to the principle that system expansion should occur only after the maximum productivity has been obtained from what already exists. Each layer builds on what is below it."

The aim of the system as used in Southern California is therefore to: understand, in as much detail as possible, how the existing system operates; maintain and preserve the existing infrastructure; properly manage demands placed on it by making smart land-use decisions; manage and control the existing system to extract the maximum utility from it; make small improvements where necessary to eliminate bottlenecks; and expand the system only when this is really needed and nothing else will suffice. ■

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