Miles of Data Support Caltrans' Future

Huge Volume of Information Paves the Way for Department's Ambitious Repair Program

Caltrans photo by Scott Lorenzo

Caltrans stores much of its data in a server farm in the Sacramento area, while districts throughout the state preserve additional data specific to their region. The need is real. Technology used to create 3-D images of the state highway system, for example, produce quadrillions of bytes.

As Caltrans embarks on the most ambitious repair program in decades, it does so armed with an unprecedented amount of data about California's 50,000 lane miles of pavement.

Caltrans has gathered more raw data in a single, system-wide laser-scan survey than the Hubble Space Telescope sent home during its first 20 years in space. To say the department gathers data on an astronomical scale is no exaggeration.

The vehicle-mounted scanners of the Mobile Terrestrial Laser Scanning (MTLS) generate about 25 gigabytes of data for each mile they survey. Scanning about 15,000 centerline miles takes up 375 terabytes. The Hubble, by comparison, collected about 45 terabytes in its first two decades.

All that data will provide an intricate picture of the repair and rehabilitation needed to achieve the goals of the Road Repair and Accountability Act of 2017, which was created by Senate Bill 1.

Here is a short list of Caltrans partnerships and programs that also generate vast caches of data:

LiDAR

Laser scanning or Light Detection And Ranging (LiDAR) systems use lasers to take three-dimensional measurements of structures on the state highway system. Unlike simple text that takes up very little computer storage space, the 3-D images generated by LiDAR can produce petabytes of data (one petabyte is 1 quadrillion bytes, or 10^{15} — more than four times the data in the U.S. Library of Congress, according to McKinsey & Co.).

PaveM

Caltrans has invested in the Automated Pavement Condition Survey, which assesses the roadway system by using lasers and high-definition images. This data helps predict future pavement performance,

and tracks sustainability and pavement health. PaveM identifies future repairs that provide the best value, taking into account pavement condition, type, climate and project history.

Waze

In 2016, Caltrans entered a partnership with Waze, an online traffic application owned by Google, to receive anonymous traffic and incident report data collected from Waze users (called Wazers). This data, in turn, will be fed into Caltrans' QuickMap system to provide real-time travel information on California's roadways. Waze receives Caltrans' road condition data, construction and road closure information. Once the information sharing is more fully in place, Waze and Caltrans expect to generate more data and provide a thorough overview of road conditions, allowing drivers to better plan commutes and trips. Once implemented, the partnership is expected to help Caltrans locate potholes, mark travel times and receive real-time information on road hazards and incidents. Once implemented, Caltrans expects to receive thousands of these 'markers' a day on average statewide.

GPS

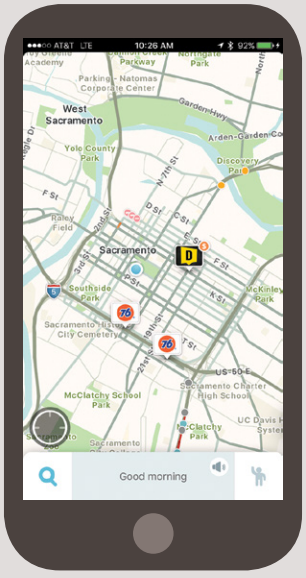
All vehicles in the Caltrans fleet are monitored by a global positioning system via a cloud-based interface. The live tracking data enhances safety, security and lawsuit liability defense. The data provides at-a-glance information for Caltrans managers.

A Major Traffic Incident

Even a single major traffic incident can generate enormous amounts of data. Investigators typically log law enforcement issues, design of the roadway, construction history and maintenance, traffic conditions, weather conditions, speed factors, number of vehicles and past incident records for that location. MM

***Source:** Multiple Caltrans divisions*

Waze App



A partnership with Waze is expected in the future to help Caltrans locate potholes, mark travel times and receive real-time information on road hazards and incidents.

Caltrans photo by Galen Ramos

The vehicle-mounted scanners of the Mobile Terrestrial Laser Scanning (MTLS) generate about 25 gigabytes of data for each mile they survey. Each $1.2 million MTLS uses seven cameras to record roadway features such as cracks, ruts and potholes in minute detail.