



Bridging the Gap

Your Connection to Engineering Services

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Views From the Air and Underwater with Photogrammetry



Caltrans Office of Photogrammetry and Preliminary Investigations (OPPI) plays a vital role in supporting bridge design and statewide transportation projects by capturing the data that engineers rely on to build safely and efficiently. Over the past three years, OPPI has mapped more than 1,000 centerline miles and, in 2025 alone, produced 200 new foundation plans and surveyed 19 field locations.

What exactly is photogrammetry? It's the science of collecting physical information from 2D photos, often aerial images captured by drones soaring overhead to extract detailed physical information about the land below. When surveying areas over heavily populated areas like highways, OPPI deploys subcontractor fixed-wing aircrafts or helicopters to capture large-format aerial digital images.

Using these images, OPPI produces visual mapping products like photography and photographic reproductions, photogrammetric digital topographic maps, digital ortho-photographs, and photogrammetric digital terrain data. By overlapping the many areal images of the same landscape features, advanced photogrammetry software can be used to generate photorealistic 3D representations of California's terrain.

Photogrammetric and digital terrain mapping are best used for charting areas that are large, dangerous for human occupation, or inaccessible. OPPI collects supplemental site data for Bridge Design, like topography, Light Detection and Ranging (LiDAR) and bathymetry (the study of beds or floors of water bodies) data for structure hydraulics of a bridge is over water.

Bathymetric information helps engineers create structure hydraulics reports and foundation plans. Caltrans surveyors will wade in water, use remote-controlled boats, and even get in a kayak if conditions are too murky for other equipment.

Transportation Surveyor Tiffany Bean says, "My work is a lot of fun. Utilizing aerial LiDAR point clouds, I download millions of points, manipulate them, and extract data to build a model that is delivered to design. Remote sensing is a powerful tool that has made lane surveying more efficient and safer. I really enjoy working in the virtual environment and contributing to great projects."

From aerial LiDAR and drone imagery to kayaks and remote controlled boats, OPPI's work blends advanced technology with hands on field expertise to deliver the critical data behind California's bridges. Their innovations in photogrammetry and advanced technology make surveying safer, faster, and far more precise; allowing engineers to design with confidence, even in challenging or hard to reach environments. The ability to turn millions of data points into accurate digital models is fun, rewarding, and essential to building the infrastructure that keeps California moving.

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