



## Project Summary

**Organization**  
AEROMETREX

**Solution**  
Reality Modeling

**Location**  
Parramatta, New South Wales,  
Australia

### Project Objectives

- Create a 3D model for all aspects of planning, route selection, estimating, and consultation.
- Unify data for all disciplines and create a federated dataset for a 3D framework.

### Products Used

Bentley AXSYS, ContextCapture,  
OpenRail

## Fast Facts

- The Parramatta Light Rail project was AEROMETREX's largest high-resolution ContextCapture project, covering 19.6 square kilometers.
- The project team used ContextCapture to edit and retexture the 3D models, providing high data integrity.

## ROI

- AEROMETREX photographed approximately 60,000 images of the corridor over a period of six weeks and processed images in only 26 days.
- The team completed the model in 45 days by using Bentley applications to edit the 3D model, meeting their project deadline.

# AEROMETREX Creates 3D Reality Model to Reduce Sydney Congestion

Bentley's Reality Modeling Solution Processed 60,000 Images in 26 Days for Sydney's Parramatta Light Rail

## Designing a New Rail Line Connecting the Greater Parramatta Area

In November 2016, Australia's Department of Transport New South Wales (NSW) commissioned AEROMETREX, a world leader in reality modeling, to design the Parramatta Light Rail. The Parramatta Light Rail project was designed to facilitate the shift of Sydney's population center to the west.

Like many large cities, Sydney, Australia is experiencing rapid growth and unsustainable property prices. The city cannot expand to the east, north, or south due to physical barriers, so it is moving west toward the Greater Parramatta area. By 2036, it is estimated that more than half of Sydney's population will be centered in this area. There are already developments in place for new residential and commercial locations, a new health precinct, and better access to the Sydney Olympic Park facilities. The challenge, however, is that existing public transportation and rail networks are inadequate to handle these developments. The Parramatta Light Rail project will help ease some of Sydney's most congested traffic routes and reduce commuting times.

AEROMETREX was retained to create a 3D reality model of the proposed rail network route. This model would be used for preliminary route selection and, later, for community consultation and as a surveying data source. The reality mesh would cover an area of 19.6 square kilometers, or about 7.55 square miles. AEROMETREX needed to create a 3D model that would be used for all aspects of planning, route selection, estimating, and consultation. The project team wanted a model that would help unify data for all disciplines involved in the project, as well as to create a federated dataset to use as the 3D framework for the project.

## Creating a 3D Model from Photographs

The Parramatta Light Rail project was the largest high-resolution ContextCapture project undertaken by AEROMETREX. To create the 3D model, the project team photographed nearly 60,000 images of the corridor from a low-altitude oblique perspective using a helicopter over a period of six weeks. By using a helicopter to take photographs of the area, it was

safer for the surveyors because they did not have to be on the ground on a busy road or rail corridor. It also helped reduce traffic congestion; any ground-based methods would have added to Parramatta Road's congestion, requiring specialist traffic management companies to manage any stationary surveying.

The reality mesh was then scaled to GPS-surveyed ground control using Bentley's ContextCapture to provide a final overall accuracy. It took about 10 weeks to create and deliver the 3D model to the client. The project team edited and retextured the 3D models, providing high data integrity on features that were of special interest to AEROMETREX's client. The team also created a "true ortho" of the area, a scale-corrected 2D image where all the features, including the one above the terrain surface, were represented in their true position. This feature ensured that no details were obscured by buildings or trees.

## Providing a Single Source of Truth

AEROMETREX's 3D model improved collaboration between stakeholders by adding interpretability and context to all forms of other data. It created a single source of truth and provided easy incorporation of design models and underground services. The model can be displayed and used



*The Parramatta Light Rail project was the largest high-resolution ContextCapture project undertaken by AEROMETREX, creating a comprehensive reality mesh from 60,000 images.*

*“The application of Bentley’s ContextCapture reality modeling to a large, expensive, and high-profile political project is a long step forward in the adoption of this technology for serious engineering applications. This is no longer a ‘recent disruptor’ technology. It is the future of mapping and surveying.”*

– Mark Deuter, Managing Director, AEROMETREX Pty. Ltd.

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with all Bentley applications. The project has delivered a holistic, interdisciplinary, and federated dataset, creating a solitary location where users can trust that the information is accurate. The design models could also be readily integrated into the reality mesh and even textured in the final presentation. They can then be used to access various parts of the project, such as security and visibility, before beginning the physical construction. Finally, the ability to integrate and display underground services data into a 3D reality model is a profound benefit, improving collaboration between rail construction contractors and utility and service companies.

### **Improving Community Connectivity**

Once constructed, the project will have significant positive impacts on the local community. Currently, the 3D reality model removes uncertainty and fear of the unknown by allowing the community to view the model from any angle or perspective. This capability helps people see how the project will impact the local community and the benefits. The project will ultimately lead to fast and safe public transport and connect western Sydney communities that were currently only available by car. It will also decentralize jobs and growth to the west, reduce pressure on growth in other parts of the city, and provide an essential link between Sydney and Parramatta.

By using Bentley applications to help design the rail, the project team reduced its environmental impact on the surrounding area. ContextCapture allowed the data to be

captured quickly in a helicopter, minimizing the number of vehicles needed to survey the area. Also, the inclusion of accurately depicted features in the reality mesh will enable better management of environmental impact on those features, which may not have been modeled in traditional surveying approaches. It is much more cost-effective to assess impacts and to test scenarios in the virtual world than in the physical world. Virtual modeling has zero environmental influence apart from the electricity used to run computers.

### **Saving Time with 3D Modeling**

The final data products were delivered to the client in April 2017. Implementing Bentley applications realized significant time savings for the Parramatta Light Rail plan. The project team processed the thousands of images in 26 days. Using Bentley applications allowed the team to edit the model in 45 days, meeting the project deadline.

Moving forward, team members will test various options for the rail line in the virtual space, including routing, obstruction removal, property assessment of property acquisitions, and widening of corridors. The successful execution of the final Parramatta Light Rail plan connected the western Sydney communities with the rest of the city.

Since this project has been implemented, AEROMETREX has continued to enhance their project solutions by using Bentley’s sophisticated reality modeling applications.