



Project Summary

Organization

AEROMETREX Pty Ltd

Solution

Government

Location

Philadelphia, PA, United States

Project Objectives:

- Deliver an accurate 3D reality model of the City of Philadelphia to help plan the historic 2015 Papal visit.
- Engineer the design, construction, and management of temporary infrastructure, security barricades, and traffic flow for crowd accommodation and safety.

Products Used

ContextCapture, Bentley LumenRT, MicroStation

Fast Facts

- AEROMETREX used ContextCapture to build a 3D reality mesh model of Philadelphia from 28,000 photographs with unprecedented geometrical accuracy.
- ESM integrated MicroStation and Bentley LumenRT to engineer and communicate logistics and simulate the expected operational experience.
- Reality modeling drove the success of this event to the extent that ESM and AEROMETREX have embraced the use of ContextCapture for future projects.

ROI

- Using photogrammetry and ContextCapture eliminated the need for AEROMETREX to conduct site surveys, and provided a 3D city model that can be used for future city developments, saving 200 hours of survey labor and USD 24,000.
- The interoperability of Bentley software resulted in successful implementation of one of the country's largest events, with no major crowd control incidents, and a safe return of the Pope to Vatican City.



AEROMETREX and ESM PRODUCTIONS RECREATE REALITY TO ENGINEER HISTORIC PAPAL VISIT

ContextCapture and Bentley LumenRT Provide Innovative Solutions for Optimal Planning and Security of a World-class Event

Planning an Historic Event

The Papal visit to Philadelphia in September 2015 was the largest public event held in the United States that year, with a 60-acre venue drawing over 50,000 people. The Pope's schedule involved numerous locations, including the Philadelphia International Airport, Independence Mall, St. Charles Borromeo Seminary, the Cathedral Basilica of Saints Peter and Paul, Curran-Fromhold Correctional Facility, and an outdoor mass at the Philadelphia Art Museum along Philadelphia's major artery and cultural center, the Benjamin Franklin Parkway. Local event production company ESM Productions (ESM) was tasked with planning the historic visit, and required massive preparation and coordination among the Vatican Security Offices, the US Secret Service, and municipal and state agencies. Over 56,000 temporary structures and 33 miles of security barricades were needed to accommodate the meetings, activities, and crowds. Due to the magnitude of the event and nature of the honorary guest, safety and security were of utmost importance.

Award-winning mapping leader AEROMETREX was selected to help engineer the complex logistics and provide an accurate 3D model of the City of Philadelphia to ESM, to help ensure smooth traffic flow, optimize security, and provide seamless communication throughout the planning process and the event itself. Given the tight deadlines, level of detail, and interoperability and information mobility necessary for collaboration among all stakeholders, AEROMETREX required comprehensive, realistic, and integrated 3D modeling and simulation software.

Capturing Reality with Unprecedented Accuracy

AEROMETREX captured low-level aerial oblique photos via helicopter and incorporated ground footage, including building facades, street views, and the inside of the Cathedral Basilica of Saints Peter and Paul. The survey team acquired 28,000 digital images at extremely high resolution, providing an outstanding view of the city. The imagery was then color balanced overnight and transported back to AEROMETREX's Adelaide, Australia, offices for further processing to produce a highly detailed, textured 3D reality mesh with 4-8 centimeter

precision (depending on the detail required for different regions of the city) using ContextCapture. Bentley's reality modeling software automatically extracted the finest details from the digital photos, modeling every stationary object – including vegetation, roads, lane markings, sculptures, and buildings – with unprecedented accuracy. Technical director at AEROMETREX, David Byrne, stated, "Bentley's ContextCapture is an amazing piece of software. We were able to capture a detailed square mile of aerial photographs supplemented by ground-based photography and automatically use them to produce a detailed 3D model of downtown Philadelphia."

Using ContextCapture, AEROMETREX scaled and controlled the models to GPS ground control points, achieving optimal spatial accuracy with near survey-grade precision. The software allowed AEROMETREX to geo-coordinate the entire project and precisely measure distances, volumes, and surface area, scaling the models to available GIS data directly within the 3D interface. With an automated tool to perform aerotriangulation, 3D reconstruction, and texture mapping, AEROMETREX delivered a high-fidelity, accurate, and realistic 3D model of the City of Philadelphia simply by photographing it.



AEROMETREX deployed ContextCapture to automatically generate a 3D reality model of Philadelphia from 28,000 digital photographs.

"This project was not only a technical and financial success, but was also a showcase of the capabilities of ContextCapture for realistic, comprehensive 3D reality modeling. We believe this is the mapping system of the future"

— David Byrne,
Technical director, AEROMETREX

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Bentley Technology Produces Models in Record Time

Given the amount of planning and coordination necessary to prepare for the Papal visit, ESM needed the model of the city quickly in order to use it effectively prior to the event. AEROMETREX was under a tight deadline to capture the imagery and produce an accurate model — therefore, it was imperative that the city survey and modeling phases of the project were conducted flawlessly and the models delivered timely. The image capture program was conducted over a period of a week. Using ContextCapture, AEROMETREX processed the photos to produce a 3D reality mesh model and delivered to ESM in an extremely short time frame. The total acquisition and processing time of just four weeks was a complete game changer, enabling ESM to leverage the reality model effectively and seamlessly coordinate a safe and successful event.

"The ability to derive an accurate realistic model of a precinct by merely photographing it is revolutionary," explained Mark Deuter, managing director at AEROMETREX. With its automated modeling features, ContextCapture produced the models faster than any other method of generating such a detailed dataset. In addition, using the software eliminated the need to conduct expensive, dangerous, disruptive, and labor-intensive site surveys of the locations, saving an estimated 200 hours of survey labor, and enabling AEROMETREX to digitally model the City of Philadelphia in record time with unprecedented detail.

Integrated Modeling Solution

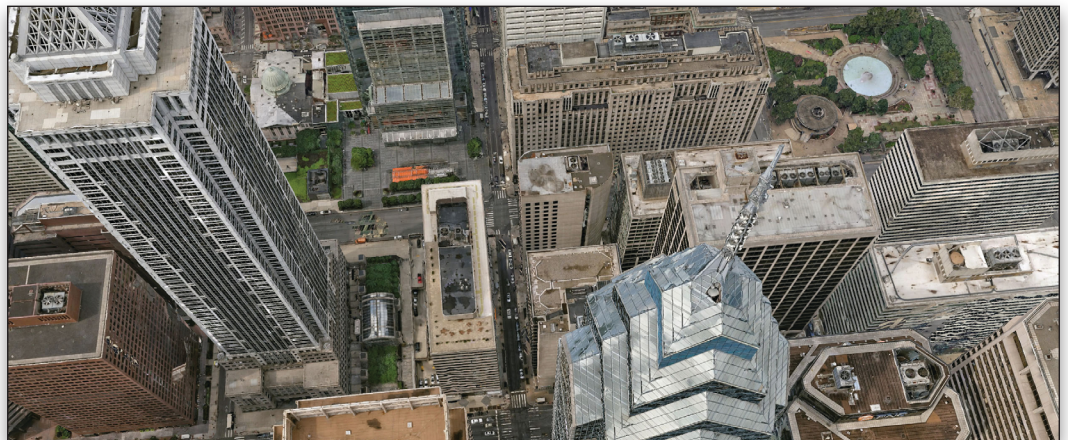
ESM used the 3D reality model extensively to manage and plan the event. ESM imported the mesh into MicroStation®, added 3D models of the temporary structures, and determined the precise layout of the barricades within the context of the reality model. Specifically, ESM populated the model with 2D and 3D maps and designs, resulting in a 28 GB dataset. That dataset was then used to communicate the planning details, including the 56,400 temporary structures, main and secondary stages and seating, 33 miles of security barricade perimeter, Secret Service security requirements, and impact of local road closures to pedestrian traffic.

The interoperability of ContextCapture with MicroStation, Bentley LumenRT, and other third-party modeling and simulation applications provided ESM an integrated solution to engineer in context, modeling the temporary infrastructure and simulating the expected operational experience directly in the reality model without having to go through various translations, imports, and exports. Working seamlessly within the model optimized engineering and planning as well as saved significant time on this imminent project. Furthermore, this interoperable modeling solution facilitated collaboration between producers and users globally to enhance decision making and accelerate planning. Scott Mirkin, President and executive producer of ESM, stated, "In the past, we typically utilized lots of site surveys, but the ability to leverage this 3D reality model has been an absolute game changer for us."

Driving the Future of Reality Modeling

Using photogrammetry and ContextCapture, AEROMETREX created and delivered a comprehensive, highly detailed 3D model of Philadelphia in record time. Visually realistic and dimensionally accurate, the reality model of the city provided an innovative and integrated planning solution resulting in a smooth Papal visit, zero major crowd control incidents, and the safe return of the Pope to the Vatican City. The model facilitated design and placement of temporary infrastructure and barricades to accommodate crowds. Using Bentley LumenRT to animate the model enhanced the security operation surrounding the Pope with unparalleled access to virtual scenarios that could be simulated prior to the visit.

Moreover, the model will be a valuable long-term resource that can be utilized for urban planning, architecture, property development, transport management, disaster management, and other future projects. AEROMETREX conservatively estimated achieving 12 times the return on investment. The impressive results from this project demonstrate that ContextCapture is an application that can be used across the entire infrastructure lifecycle, extending reality modeling to limitless possibilities. "This project was not only a technical and financial success, but was also a showcase of the capabilities of ContextCapture for realistic, comprehensive 3D reality modeling. We believe this is the mapping system of the future," stated Byrne.



Used in combination with MicroStation and Bentley LumenRT, ContextCapture provided the modeling and simulation techniques to accommodate 56,400 temporary structures, 33 miles of security barricades, and special security requirements amid a busy urban infrastructure.