URBAN DEVELOPMENT GAINS NEW PERSPECTIVE WITH OBLIQUE AERIAL IMAGERY

Detailed 3D models based on survey-grade oblique aerial imagery advance planning, design and construction efforts in major metro areas.

by Alexander Wiechert

UltraCam Osprey from Vexcel Imaging

3D models and interactive maps contribute to the development of actionable information.

We live in a three-dimensional world, so understanding complex two-dimensional plans and models can be quite challenging. When objects are represented in a three-dimensional format, it is easier to visualize where features are in relation to each other, what impact a design has on the surrounding areas and structures, and how the final project will appear. This has led to the increased use of detailed digital 3D models in urban development work, with the associated benefits of improved visualization, timely updates, and better results. To obtain the measurements and other data needed to create accurate 3D models, oblique aerial imagery is an attractive alternative to vertical aerial imagery that only captures a top-down view, and ground surveys and terrestrial mapping, which present logistical problems in dense urban areas.

The Side View Advantage

Use of oblique imagery is growing in the architectural, engineering and construction (AEC) industry to meet

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demand for accurate models throughout the project lifecycle, from concept to completion. Effective urban planning requires seeing the "big picture" and communicating with all stakeholders, including the public and potential investors. With access to survey-grade oblique data, developers can model existing buildings and infrastructure to use as a foundation for future changes and improvements.

Traditional vertical imagery has long been used to produce various kinds of location-based information; however, oblique imagery provides additional perspective and valuable information. With an aerial system like the UltraCam Osprey from Vexcel Imaging, high-resolution imagery is captured simultaneously at nadir and oblique: 45-degree angle views in four directions—forward, backward, left and right. Together the 5-band nadir images (PAN, RGB and NIR) and the oblique images (80-megapixel RGB) form a wide footprint for efficient image collection. By applying photogrammetric processes, the comprehensive data enables the creation of photo-realistic digital 3D models that accurately depict buildings from the outside, including the facade, roof slope and dimensions.

To facilitate access to current oblique data of urban areas in the US, Canada, Australia and New Zealand, Vexcel Imaging launched the Vexcel Data Program in 2017. The cloud-based imagery service offers 7.5-centimeter GSD vertical and oblique aerial imagery that is updated annually. To ensure reliable image analysis, consistency is maintained by collecting data with the same type of sensor—the UltraCam Osprey—at the same resolution and using the same workflow every year. Additionally, using a second UltraCam system—the UltraCam Condor wide area mapping camera—nationwide contiguous coverage at 20-centimeter GSD vertical imagery for the US and Germany is collected and updated over a two-year period and offered through the same service. Other European cities and countries will follow in 2020.

Utilizing Oblique Imagery in Urban Development

As population centers continue to grow, geospatial technology is being integrated into every aspect of urban development to address major issues, such as inadequate infrastructure, lack of green space, pollution and crowding.

The development or redevelopment of any large community benefits from using technology to improve performance and quality of services. Geographic information systems provide a wealth of information to form a basis for decision making and prioritizing resources. 3D models and interactive maps contribute to the development of actionable information.

The current emphasis on building sustainable, energy efficient, safer and healthier "smart cities" is creating opportunities to incorporate diverse types of technology. With the addition of oblique imagery, highly accurate 3D models are being used to visualize everything from transportation and telecommunication networks to solar panels on individual buildings. By collecting information through the Internet of Things (IoT) and applying advanced analytics to the data, many communities are working to improve quality of life while protecting the environment and conserving natural resources.

Rebuilding After a Disaster

The insurance industry recognizes the value of having up-to-date aerial

Figure 1: High-Resolution Imagery Allows for Detailed Inspections After Catastrophic Events.

imagery to gain a comprehensive understanding of structure and property features, which allows the company to fairly assess risk and calculate premiums.

In addition, the ability to make comparisons against post-disaster imagery aids in assessing damage and expediting payments to customers. As floods, hurricanes, tornadoes and wildfires increasingly threaten existing homes and businesses, the importance of pre- and post-event views becomes even more apparent.

The Geospatial Intelligence Center (GIC) is a National Insurance Crime Bureau (NICB) initiative in partnership with Vexcel Imaging that is focused on building a database of vertical imagery for every address in the US and both vertical and oblique imagery of top US metro areas. The long-term mission of the GIC is to provide all subscribers with street-level imagery and 3D data products, along with derivative products that include high-density point clouds, digital surface models and ortho mosaics.

The GIC web map portal, built on Esri's ArcGIS cloud-based mapping platform, provides GIC's member insurers access to "blue sky" imagery as well as post-disaster "gray sky" imagery. Real-time access to oblique aerial images helps insurers assign the appropriate coverage and manage claims from their desktop without physically being onsite. Oblique imagery also provides vital information for emergency responders during a disaster and supports planning and rebuilding efforts afterward.

Better Than Ever

Whether retrofitting existing structures, designing new and improved "green" buildings, or planning safe and efficient citywide infrastructure, architects, engineers and contractors have an abundance of geospatial tools and information at their fingertips. With greater access to more detailed and accurate data, everyone involved in urban development projects has an opportunity to explore new ways of solving existing problems.

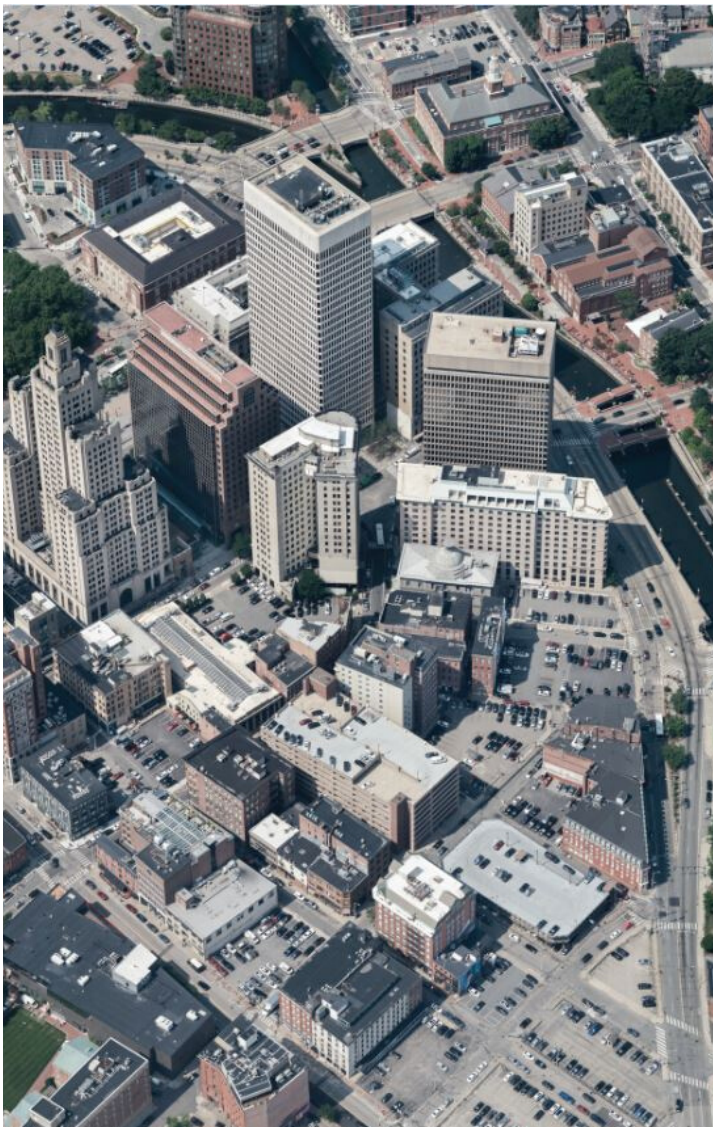

Figure 2: Providence, Rhode Island (US) Captured with An Ultracam Osprey Mark 3 Premium.

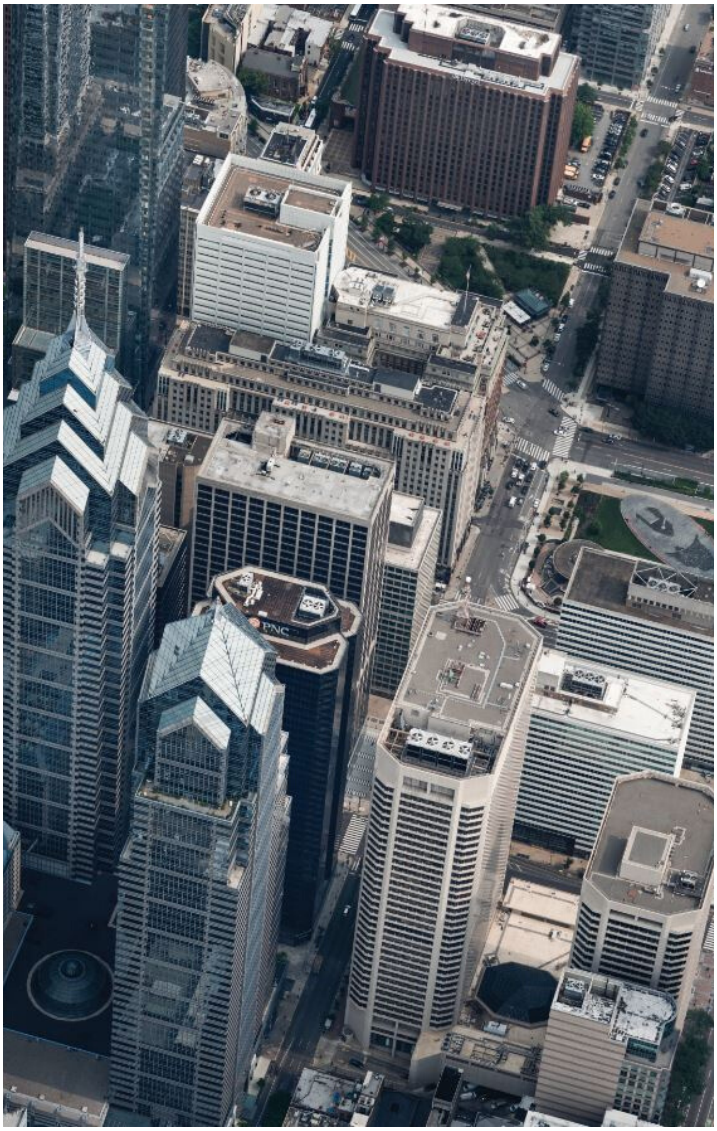

Figure 3: Philadelphia, Pennsylvania (US) Captured with An Ultracam Osprey Mark 3 Premium.