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Advancing Infrastructure

Mapping and Surveying

Reality Modeling for Going Digital Strategy

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Reality modeling makes mapping and surveying faster and safer.

Reality modeling is the process of capturing existing site conditions to provide real-world digital context. Rapidly changing environments and difficulty accessing clear survey lines can make it challenging and dangerous to gather accurate spatial data with traditional surveying and mapping methods. Adopting reality modeling can improve margins by offering users engineering-ready reality meshes, orthophotos, digital surface models, and point clouds faster than before.

ContextCapture, Bentley's reality modeling software, automatically generates high-fidelity 3D reality models from simple photographs and/or point clouds. These photos can be taken from a variety of devices and techniques, including aerial LiDAR, drone photography, hand-held cameras, laser scanners, and smart phones. The process brings new opportunities to optimize workflows to win projects.

Users can implement high-definition photography and, when needed, the additional accuracy of point clouds, to gather the information needed to create high-fidelity georeferenced 3D models, reducing health and safety risks for works at dangerous sites. These 3D reality models are quickly generated for users to incorporate into their design, construction, and operation workflows.

Provide digital context during design workflows

Reality modeling accelerates the decision-making process with advanced knowledge and insight into existing site conditions.

- Carry out construction simulations to evaluate potential impacts
- Uncover financial implications early
- Optimize information sharing
- Improve collaboration

Accelerate project delivery during construction workflows

Reality modeling gives an accurate perspective of the job site, allows monitoring and evaluating of progress, and enables verification of a job performance with the design.

- Ease collaboration between stakeholders
- Provide up-to-date construction documentation and inspection
- Allow the calculation of cut/fill quantities as often as necessary
- Improve safety
- Lower costs of as-built survey

Improve the operations and maintenance of assets

Reality modeling helps to better manage assets through easily documenting assets in 3D and linking 3D-registered equipment to operations and engineering data.

- Optimize maintenance and service activities
- Lower cost of asset inspection
- Reduce safety risks
- Develop more repeatable inspection processes
- Provide easier access of hard-to-inspect locations
- Safeguard against asset downtime

Bentley's reality modeling solutions allow you to securely manage, share, and stream 3D reality models across project teams and software applications, increasing team productivity and collaboration.

Reality modeling is going mainstream and the following innovative mapping and surveying projects have credited it for their success.

Pennsylvania State University, Department of Architectural Engineering

University Park, Pennsylvania, United States

Virtual Penn State Campus

The University Park campus located in State College, Pennsylvania is Penn State University's largest of 24 campuses, featuring almost 1,000 buildings and structures with numerous assets contained within each facility. To more efficiently meet campus operations and maintenance demands, the university developed a reality model of the campus that integrates geospatial and asset work order data.

Using Bentley software, the team generated a detailed, geospatially accurate 3D reality mesh of the campus and surrounding area from 2,500 aerial images in less than two days. They integrated geospatial and asset work order data from the university's own geospatial information system and computerized maintenance management system with the reality mesh. As the collaborative storage interface, ProjectWise provided web-based access to the model, which eliminated the need for computer storage space and model transfer time, and also improved information sharing among stakeholders to optimize campus facility and asset management.

Project Playbook: ContextCapture, MicroStation®, ProjectWise®

The Virtual Penn State initiative, which used Bentley's ContextCapture, iModel capabilities, and ProjectWise to create an accurate and complete model of campus and overlay CMMS data, has provided both initial and potential benefits for maintenance activities for the Office of Physical Plant. An immediate benefit of the initiative was the ability to visualize accurate locations of work orders, which can increase response and performance by combining technician trips to work orders.
Future benefits include the availability of the virtual model to perform façade inspections and develop work orders from the campus model, based on critical repairs that influence life-safety.

– Craig R. Dubler, Facility Asset Management (FAM) Program Manager, Pennsylvania State University

VIEW PROJECT PROFILE

Sanborn Map Company, Inc.

Santa Clara County, California, United States

Sanborn3D HD Maps for Autonomous Driving: Santa Clara

Operating self-driving vehicles safely will require the cars to have purpose-built, map-based data sets that contain detailed mapping information with absolute, precise accuracy compared to the results from current geospatial positioning system resources. To address this need, the Sanborn Map Company developed proprietary HD mapping technology that created high-precision, 3D maps of California's Santa Clara area, specifically for use in autonomous vehicle models. The company needed a way to showcase the quality of its mapping data to its partner automotive firms.

The team used ContextCapture to generate a 3D reality mesh from oblique imagery of Santa Clara County, and integrated its HD map data to create a virtual simulation tool for testing autonomous cars. ContextCapture automated the process of creating a high-quality model that, using traditional methods, would have required a team of 3D modelers working for six months at an estimated cost of USD 100,000.

Project Playbook: ContextCapture, Descartes

Self-driving cars are no longer a futuristic idea. Major auto manufacturers have already released, or are soon to release, self-driving features that give the car some ability to drive itself. Through the 3D mesh generated using Bentley's ContextCapture Center software, Sanborn's Advanced Technology group has been able to showcase the quality of the HD Map data, including true-ground-absolute accuracy than those found in current conventional resources, to its partner automotive firms. The automation of producing 3D models for city-sized projects by ContextCapture made the project much faster than previously possible.

– Sharad V. Oberoi, Director of IT & Software Engineering, Sanborn Map Company

Tianjin Municipal Engineering Design & Research Institute

Shenzhen, Guangdong, China

Application of BIM in East Grade-separated Junction Engineering of Yangang, Shenzhen

In China's Guangdong province, the Shenzhen municipal government retained Tianjin Municipal Engineering Design & Research Institute to design a grade-separated junction for a multi-road crossing in Yangang. The complex intersection covered 236,000 square meters and required expertise in bridge and tunnel engineering, among six other disciplines. The Institute's approach for this CNY 1.19 billion project was to adopt collaborative BIM technology.

From initial reality modeling of the project site with ContextCapture to renderings with LumenRT for final design reviews, Bentley software provided a unified 3D design platform that allowed the Institute to work quickly and accurately. By establishing a standard for visual management, the Institute enabled every discipline to find and eliminate conflicts, which saved one month during preliminary design. The BIM process reduced costs by 12 percent.

Project Playbook: LumenRT, ContextCapture, MicroStation, Navigator, OpenRoads™ Designer, ProjectWise, SYNCHRO™ AWP

Bentley's software for civil infrastructure has incomparable advantages in the design and construction of municipal roads and pipe rack engineering. It can provide one-stop solutions that express the design intention in a better manner, improve design efficiency, and reliably solve the problems faced in the construction process.

– Yanxiang Wang, Designer of Raw Water Engineering, Tianjin Municipal Engineering Design & Research Institute

By using Bentley software and services all the disciplines of our institute can perform 3D design throughout the whole process. It not only improves the technological level and design quality of our institute, but also lays a solid foundation for the appreciation of our designs and the launch of the whole lifecycle.

– Yi Yang, Director of Digital Center, Guangdong Research Institute of Water Resource and Hydropower

Guangdong Hydropower Planning & Design Institute

Guangdong, China

Guangdong Pearl River Delta Water Resources Allocation Project

The Pearl River Delta Water Resources Allocation project is a CNY 34.7 billion urban water conservation and supply initiative in the Guangdong province of China. It includes 114.9 kilometers of water lines and shield tunnels running through four cities. Guangdong Research Institute of Water Resource and Hydropower is responsible for planning and designing the project, which is expected to resolve water shortage issues and improve water supply.

The project team used Bentley applications to generate and refine 3D reality models of the planned locations and to produce animations that provided stakeholders with an intuitive understanding of the project. The team used Bentley software for clash detection, which reduced design time by 1,500 hours and saved nearly CNY 250,000 in design costs. Streamlined workflows enabled the team to deliver the project 23 days ahead of schedule.

Project Playbook: Bentley Raceway and Cable Management, ContextCapture, Descartes, LumenRT, MicroStation, Navigator, OpenBuildings™ Designer, OpenCities™ Map, OpenRoads, OpenRoads ConceptStation, OpenRoads Designer, OpenRoads Navigator, ProjectWise, Bentley Substation

Shanghai Hangyao Information Technology Co., Ltd.

Shanghai, China

Aerial Photography by Unmanned Aerial Vehicles for Shanghai Disney Resort

The Shanghai Disney Resort is located in the Pudong New Area of Shanghai and is the first Disneyland in mainland China. Prior to its official opening in June 2016, Shanghai Hangyao Information Technology used UAVs to capture aerial photography of the 9.78-square kilometer resort area and surrounding terrain to produce full-scale, live action 3D models. The survey and reality modeling provided a means for collecting overall information on the resort that will be used to optimize security, improve area construction, promote tourism, and serve as effective advertising.

The project team used ContextCapture to generate 3D reality information models from multiple data types. These accurate models helped streamline collaboration among the resort's construction, operations, and maintenance teams, improve communication among stakeholders, and made the model accessible by diverse users via a web-based application. Bentley's reality modeling technology enhanced modeling accuracy and efficiency by several times and reduced direct costs by millions of Yuan.

Project Playbook: ContextCapture

The 3D, live-action information models established by Bentley's ContextCapture not only objectively demonstrate the conditions of 3D models, but also contain rigorous mathematical relations.

– Yanning Wang, Deputy Managing Director and CTO, Shanghai Hangyao Information Technology Co., Ltd.

Heilongjiang Construction High-Tech Capital Group Co., Ltd.

Harbin City, Heilongjiang, China

Digital Application in Heilongjiang Construction Industry Modernization Demonstration Park

Covering 1.26 million square meters, the Heilongjiang Construction Industry Modernization Demonstration Park is a prefabrication industrial building project aimed at transforming traditional construction in Heilongjiang province into an environmentally, green economic industry. The CNY 3.6 billion project required multiple, dispersed participants to collaborate on a tight planning, design, and construction timeline.

The project team implemented a coordinated 3D BIM strategy and industrialized project delivery using a digital twin, establishing an open, connected data environment (CDE). Using ProjectWise and Bentley's integrated 3D digital applications—including OpenRoads ConceptStation and OpenBuildings Designer—shortened design time by five days and cost evaluation time by 80%. ContextCapture helped generate an accurate 3D reality model, improving earthworks measurements and calculations by two times. Working in Bentley's CDE saved CNY 4.5 million in construction costs and provided a complete lifecycle asset management solution.

Project Playbook: ContextCapture, LumenRT, MicroStation, Navigator, OpenBuildings Designer, OpenRoads, ProjectWise, ProStructures, STAAD®

MMC Gamuda KVMRT (T) Sdn. Bhd.

Kuala Lumpur, Malaysia

Drone Surveying for BIM and GIS Data Capture – Malaysian Metro Megaproject

The Sungai-Buloh-Serdang-Putrajaya (SSP) Line runs through the center of Kuala Lumpur and its southern suburbs, serving approximately 2 million people. As Malaysia's first metro megaproject, it includes constructing 13.5-kilometer twin bored tunnels and 17 individual construction sites, the largest exceeding 17,000 square meters in the dense capital city. MMC-Gamuda joint venture is the turnkey contractor tasked with optimizing project design and constructability.

The team used drones to quickly capture hundreds of high-quality images and infinite amounts of data along the project corridor, processing the images with ContextCapture to deliver accurate 3D reality meshes of the site. Using ProjectWise to establish an open, connected data environment provided the interoperability to make the reality models available across cloud-based BIM and GIS data platforms, enhancing understanding of existing site conditions. Bentley's BIM and reality modeling solution optimized digital workflows on the USD 7.5 billion metro megaproject, saving 1,000 resource hours for surveyors, engineers, and project managers.

Project Playbook: AssetWise®, ContextCapture, Navigator, OpenRail™, ProjectWise

POWERCHINA ZhongNan Engineering Corporation Limited

Xiangxi Autonomous Prefecture, Hunan, China

Application of Digital Platform for Targeted Poverty Alleviation in Shibadong Village

One of China's poverty alleviation targets in a remote area of the Hunan province, Shibadong Village is implementing a three-month construction renovation project. Faced with an eroding limestone landscape and lack of mapping data and engineering drawings, POWERCHINA ZhongNan Engineering Corporation was tasked with completing the renovation initiative within the required timeframe. The company needed to guide construction and promote targeted poverty alleviation concepts while facilitating village planning and management.

The team used OpenBuildings Designer for BIM design, ProjectWise for project team collaboration, and ContextCapture to generate a 3D reality model of the site. The applications helped establish a web-accessible digital platform and a digital twin. The comprehensive digital solution streamlined planning, construction, and management to save 80% in time and 60% in costs. The automated features of ContextCapture processed more than 100,000 aerial and ground captured images within 15 days, saving approximately CNY 1 million.

Project Playbook: ContextCapture, Descartes, MicroStation, Navigator, OpenBuildings Designer, ProjectWise

Acmepoint Energy Services

Hualien, Taiwan

Passenger Clearance Center at Hualien Harbor

This solar power generation project required installing nearly 15,000 solar panels, with 4,000 on the main roof of a building and 11,000 on the car park shed. The total power capacity of the panels is estimated to be 4.6 megawatts. Acmepoint Energy Services is responsible for planning the entire solar panel configuration and structural design. Given that the roof of the building is an arc and cannot be measured safely using manual survey methods, the company implemented 3D reality modeling.

The team used unmanned aerial vehicles to capture images of the building and project site. ContextCapture was used to process the photos into a 3D reality mesh. The digital solution avoided on-site risk when climbing the roof and saved resource costs in the initial evaluation. ContextCapture provided accurate measurement and visualization to better understand the entire site and optimize planning.

Project Playbook: ContextCapture

CHS

Gaoxing, Taichung, Taiwan

Photographic Geological Phenomena through UAV

This project involved surveying and calculating the scope of collapsed earth to rehabilitate and recover designated areas from natural disasters. Previous manual geological site surveys were time-consuming and error-prone. The project team relied on reality modeling technology to provide a time-efficient, cost-effective solution to accurately determine and remedy geological changes as a result of catastrophic conditions.

The team acquired aerial images and numerical topographic data and used ContextCapture to generate a 3D reality model of the site. Using the model for real-time, visual earthworks analysis saved 30 days compared to on-site evaluation by personnel and significantly reduced costs. Bentley's 3D reality modeling technology provides a basis for accurate topographic comparison of the collapsed area after undergoing disaster, quantitatively defining and establishing the scope of the collapse for more effective remediation.

Project Playbook: ContextCapture, Pointools

Clove Technologies Pvt. Ltd.

Hyderabad, Telangana, India

Advanced Landscape & Development Remodeling

Phoenix Group, a workspace leasing company, is planning new infrastructure at Hi-Tech City in Hyderabad, Telangana, India. To assist engineers and landscape architects in preparing optimal designs, Clove Technologies needed to understand the belowground and aboveground utility features. Initiating a hybrid data approach that required integration and alignment of ground-penetrating radar data with aboveground control points, Clove Technologies relied on reality modeling to present accurate visuals for the designers and architects.

The team used ContextCapture to process the imagery and point clouds into a 3D reality model. Using ContextCapture significantly reduced resource hours by fusing the captured data to achieve highly accurate visuals. The interoperability of Bentley's applications enabled the direct export of the 3D reality model to an open-source web application, allowing stakeholders to access the models while reducing Clove's investment in data integration technology. The applications optimized digital data sharing to save 30% in project costs.

Project Playbook: ContextCapture, MicroStation

Department of Civil Engineering, National Taipei University of Technology

Taipei City, Taiwan

Civil Engineering Coexists with Limited Nature

National Taipei University of Technology is an historic university in Taiwan with campus buildings and structures comprised of old materials. The university's department of civil engineering initiated a TWD 15 million project to explore sustainability and integrate civil engineering works to mitigate and control negative environmental impacts. Faced with selecting green materials for structural improvement while minimizing construction costs and applying proper engineering practices, the department implemented 3D reality modeling to determine if there might be any conflicts between the environment and the design plan.

Using unmanned aerial vehicles, the team collected digital images of existing environmental information and used ContextCapture to generate a 3D reality model to find a sustainable design and construction process. MicroStation and ContextCapture supported multiple file formats to shorten conversion times, while the comprehensive digital visualizations facilitated accurate cost estimates. LumenRT simulated traffic and passenger flow, providing references for complete design evaluation.

Project Playbook: ContextCapture, Descartes, LumenRT, MicroStation

Drone ID

Jeonju, Jeollabuk, South Korea

Automated Drone Flight in the Jeonju Redevelopment Zone and 3D Modeling

In 2016, a redevelopment plan was established for the Jungnosong area of Jeonju City, South Korea. To monitor the changes in the area as part of the redevelopment and improve road works and volume measurements, the project team initiated a digital data capture and 3D modeling approach.

The team at Drone ID used unmanned aerial vehicles to acquire 900 images of the redevelopment site. ContextCapture and Descartes were used to process them and generate orthophotos and 3D models. Bentley's integrated reality modeling applications allowed Drone ID to produce accurate models, a high-resolution map, and numerical data that improved work efficiency. The digital solution achieved results in three days, compared to six months using manual methods and eliminated the impact on area residents.

Project Playbook: ContextCapture, Descartes

Fenghua Engineering Consulting Co., Ltd.

Taipei City, Taiwan

Commissioned Engineering Design and Technical Supervision Services for New Taipei City DF230 Potential Debris Flow Torrent Control Phase II Project

Located on collapsed and unstable terrain, the river in Taipei City, Taiwan is scoured on both banks, and the site requires road reconstruction and slope protection. Fenghua Engineering Consulting is responsible for designing and supervising the project from detailed design through construction. Faced with precarious site conditions that make human on-site survey highly risky, the company introduced reality modeling to enable engineers to clearly understand the field conditions.

The project team used unmanned aerial vehicles to survey the site and ContextCapture to process the images and generate a reality mesh of the existing conditions. Integrating the 3D reality model into the BIM process provided an accurate representation of the area to facilitate and optimize design. Bentley's reality modeling application helped monitor landslide displacement and significantly reduced time and risks associated with traditional on-site survey.

Project Playbook: ContextCapture

Engineering Systems Inc.

Aurora, Illinois, United States

Proof-of-Concept for Commercial Building Progression

As part of a USD 1.6 million commercial precast building infrastructure project in Aurora, Illinois, Engineering Systems Inc. (ESI) piloted a proof of concept initiative, exploring the potential application of drone-captured images and data for design and construction progress. The team captured photos and information for the 180,000-square-foot warehouse and distribution facility.

Using ContextCapture and Pointools facilitated processing of 10 separate data sets within five months. ESI used Bentley applications to combine images of point cloud data and video of the building, creating visual renderings that illustrate the progression of the precast building structure. Bentley's solutions proved that it is feasible to work on huge data sets with vast points, interactively manage scene parameters, and quickly import native point cloud models, saving time and resources. The digital applications produced precise reality meshes and established reliable 3D visualizations for efficient collaboration.

Project Playbook: ContextCapture, Pointools

Soarscape Technology Development (Shanghai) Co., Ltd.

Shanghai, China

Reality 3D Simulation for Self-driving Cars

Testing the safety and reliability of self-driving cars is time consuming and expensive. Soarscape Technology Development Shanghai undertook the development of a 3D data acquisition, modeling, and 3D automatic driving simulation system. The team, faced with site constraints and costly, voluminous data collection along a 10-kilometer trafficked road in Shanghai, integrated digital modeling technology to build the 3D reality model and simulate automatic driving tests.

The team used ContextCapture to perform automatic 3D reality modeling. The fully processed reality mesh was imported into LumenRT for 3D simulation and animation. The automated modeling features reduced modeling time from three months to 10 days, saving CNY 260,000 in data acquisition and associated labor costs. The applications provide a seamless solution from data production through model editing, application, and optimization, eliminating data conversion and achieving successful 3D simulation of automatic driving.

Project Playbook: ContextCapture, LumenRT, OpenRoads

Geospatial Technologies, L&T Construction

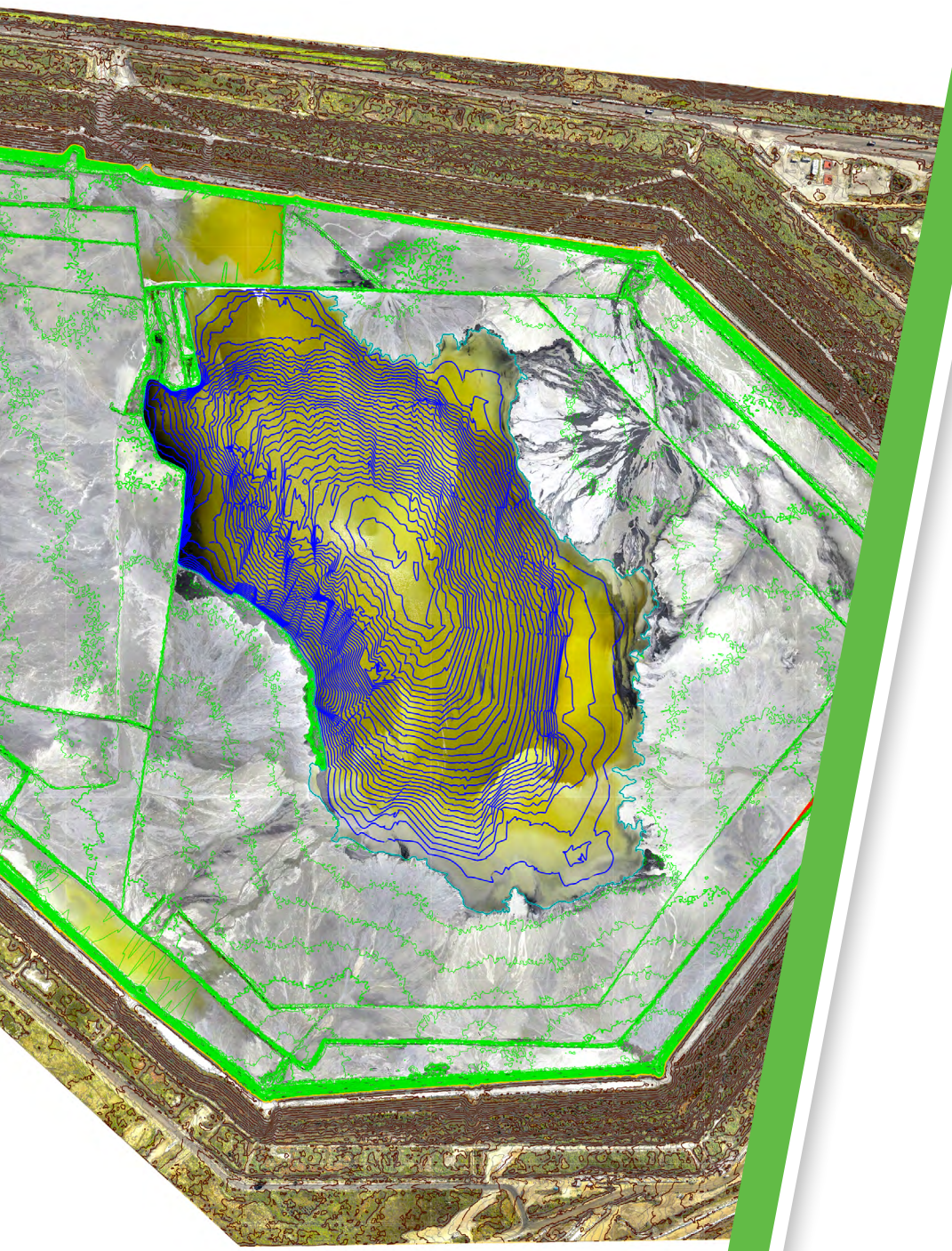
Chennai, Tamil Nadu, India

Quantity Estimation Using Drone-based Photogrammetry in Keerapakkam Quarry

Located in Tamil Nadu, India the Keerapakkam Quarry occupies approximately 6.5 acres of land and converts raw materials into aggregates used by L&T Construction. Manual methods for measuring stockpiles are time consuming, subjective, and dangerous for on-site quarry surveyors to conduct. To eliminate these challenges and ensure timely, accurate volume reporting, L&T sought a digital solution using reality modeling.

The project team used ContextCapture and MicroStation to process images into 3D meshes and point clouds for engineering analysis and measurement. This practice allowed the team to accurately define the stockpile boundaries and calculate volume estimations. LumenRT provided animated simulations and created an immersive virtual environment to help top management understand the geographic conditions and enhance decision-making. The applications streamlined and accelerated workflows by four times. The digital solution saves 108 resource hours, delivers high-quality data with 15% more accuracy, and reduces annual costs to estimate aggregate quantities by INR 3 million annually.

Project Playbook: ContextCapture, LumenRT, MicroStation



iGlobe Group

Secunda, Mpumalanga, South Africa

Fine Ash Dam 5 – 3D Visualization by Unmanned Vehicles

Fine Ash Dam 5 (FAD5) is one of numerous waste disposal sites in Secunda, Mpumalanga, South Africa that requires near-accurate volume calculations to make informed decisions for optimal waste management. The iGlobe Group was tasked with surveying FAD5 and providing volumetric and predictive plans. Faced with time-consuming challenges, including dam sludge and shallow water depths, the company relied on integrated reality modeling to meet project deliverables.

The project team recorded over 25,000 geographic control points and captured images of the dam site. ContextCapture and OpenRoads facilitated processing of the survey data into point clouds and 3D prediction models for accurate volume analysis. Using Bentley applications, the team generated a digital twin of FAD5 to visualize and monitor water depths for more informed decision-making. The reality modeling solution improved productivity of managing and editing digital files for better terrain analysis. Instead of taking five days to manually survey and process the data, Bentley applications provided deliverables in 27 hours.

Project Playbook: ContextCapture, OpenRoads

Infinitydron

Chiesa Valmalenco, Sondrio, Italy

Alpino Chiesa Valmalenco Survey

The historic Valmalenco Valley in northern Italy encompasses three mountain ranges and numerous pastures. To help protect natural resources and strengthen the economy, the municipality is trying to restore a former glacial lake and transform it into a tourist destination. Infinitydron was retained to conduct a feasibility study to determine a relevant method for the lake restoration. Faced with climate and elevation changes consistent with the alpine environment, the company relied on reality modeling to deliver a digital twin to the municipality as a suggested solution.

The company used terrestrial scanning and unmanned aerial vehicles to capture data and images of a 40-hectare area. ContextCapture helped generate a 3D reality model of the existing complex site. Using ContextCapture saved 40% in time, allowing the team to deliver a detailed, accurate model to the municipal administration in less than two days. The cost-effective 3D modeling solution will be used as a digital twin to create preliminary designs for restoring the lake.

Project Playbook: ContextCapture

Survey of India

Karnal, Haryana, India

Large-scale Cadastral Mapping for State of Haryana

India's Haryana state consists of 10 rural and urban municipalities. To support state government departments in their effort to establish a digital basis for revenue records management, Survey of India carried out GIS mapping and reality modeling to create cadastral and land parcel maps of the area. Faced with large-scale mapping that required accurate outputs on a tight timeline, the team deployed integrated reality modeling and GIS technology.

The team carried out drone-based mapping, using ContextCapture and OpenCities Map to produce an accurate reality mesh of the areas and high-quality vector maps. Authorities could now visualize the entire existing state with precisely georeferenced models for efficient state management and planning. Establishing an open, connected data environment provided a single framework to integrate multiscale spatial data and meet timelines. The team created a cost-effective, accurate mapping and modeling solution that, compared to traditional methods, would have required five times the amount of resources.

Project Playbook: ContextCapture, OpenCities Map

Soarscape Technology Development (Shanghai) Co., Ltd.

Shantou, Guangdong, China

Helicopter Oblique 3D Large Area 1:500 High-precision Cadastral Mapping

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To investigate the land-use conditions in China's Shantou downtown area, a rural cadastral survey covering 100 square kilometers was initiated. Soarscape Technology Development Shanghai undertook oblique photography data acquisition, processing, and 3D modeling of the area. The CNY 5 million project required a 1.5-centimeter, high-resolution image acquisition amid numerous tall buildings. The team also needed to process a high volume of captured data.

The team used an aerial camera to capture 500,000 photos with 100 million pixels, and ContextCapture to process the images into a 3D reality model to serve as a cadastral map. The comprehensive and automated data processing features in ContextCapture enabled the team to complete the modeling in 30 days and save CNY 2 million, compared to 10 months with manual surveying and manual methods. ContextCapture provided a precise visual representation with basic accurate data, which advanced land registration and certification works for the Shantou area and serves as a benchmark for China's mapping and surveying industry.

Project Playbook: ContextCapture

University of Seoul

Cheongju, Chungcheongbuk, South Korea

Drone Using Non-reference Point Ground Displacement Detection

With field situations continuously changing as construction progresses, it is helpful to detect and monitor displacement areas. Since common methods for displacement detection can be time consuming and expensive, the University of Seoul conducted a research project using reality modeling to develop an automated process to detect the displacement area of a construction site.

The project team used non-reference point drones that do not require GPS surveying, while ContextCapture helped generate a high-precision 3D reality mesh of a construction site. Using the reality model simplified and accelerated displacement detection of a 1-cubic-meter area. The accurate visual model generated by ContextCapture improved work efficiency of the construction supervisor by more than 30%.

Project Playbook: ContextCapture

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About Bentley Systems

Bentley Systems is a leading global provider of software solutions to engineers, architects, geospatial professionals, constructors, and owner-operators for the design, construction, and operations of infrastructure. Bentley's MicroStation-based engineering and BIM applications, and its digital twin cloud services, advance the project delivery (ProjectWise) and the asset performance (AssetWise) of transportation and other public works, utilities, industrial and resources plants, and commercial and institutional facilities.

Bentley Systems employs more than 3,500 colleagues and generates annual revenues of more than $700 million in 172 countries. From inception in 1984, the company has remained majority-owned by its five founding Bentley brothers.

For additional information, visit **www.bentley.com**.

About ContextCapture

ContextCapture is Bentley's reality modeling software that can quickly produce 3D models of existing conditions for infrastructure projects of all types, derived from simple photographs and/or point cloud. Without the need for expensive or specialized equipment, ContextCapture enables users to quickly create and use these highly detailed 3D engineering-ready reality meshes to provide precise real-world context for design, construction, and operations decisions throughout the lifecycle of projects. Project teams can easily and consistently share reality modeling information, consumable and accessible, on desktop and mobile devices, in many formats, including native use within MicroStation for any engineering, operations, maintenance, or GIS workflow.

For additional information, visit **www.bentley.com/ContextCapture**.

Image courtesy of Enedis

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