



Project Summary

Organization

PT. Wijaya Karya

Solution

Bridges and Reality Modeling

Location

Gresik-Surabaya,
East Java, Indonesia

Project Objectives

- Implement 3D BIM strategies to improve productivity for detailed engineering design and construction of Teluk Lamong flyover bridge.
- Establish a connected data environment to enhance data quality and simplify collaboration among numerous departments.

Products Used

OpenBuildings Designer,
ContextCapture, Descartes,
LEAP, LumenRT, Navigator,
OpenBridge Modeler, OpenRoads,
ProjectWise, ProStructures

Fast Facts

- WIKA was awarded an IDR 1.3 trillion, BIM-mandated contract to design and construct the Teluk Lamong flyover bridge.
- The team created a reality mesh from a site survey to ensure the design accommodated existing infrastructure.
- WIKA used Bentley's civil design applications for parametric modeling, clash detection, and analysis to optimize design and construction.

ROI

- WIKA generated automated bills of quantity directly from the 3D models, saving IDR 3.9 billion in costs because of volume efficiencies.
- Performing clash detection to avoid rework saved two months in construction time and significant costs.
- WIKA saved 52 days in design time by using a 3D BIM solution compared to traditional 2D workflows.

PT. Wijaya Karya Optimizes Design and Construction of Teluk Lamong Bridge

Implementing 3D Digital Workflows with Bentley Software Saves Significant Time and Costs

A New Approach to Indonesia Infrastructure

Located in Surabaya, East Java, one of the busiest port cities in Indonesia, Teluk Lamong Terminal transports goods locally and regionally, creating heavy traffic congestion along the access roads. As part of the country's National Strategic Program, the Indonesian government initiated the IDR 1.3 trillion Teluk Lamong flyover bridge project to eliminate bottlenecks around the port and minimize traffic jams to and from the terminal. Connecting the terminal with the Gresik-Surabaya toll via the outer west ring road, the 2.4-kilometer-long roadway bridge is expected to reduce travel times from approximately one to two hours to 15 minutes. PT. Wijaya Karya (WIKA) was awarded the main contract from the Indonesian government that requires BIM implementation for detailed engineering design and construction.

This infrastructure project was the first construction initiative using BIM strategies in Indonesia. WIKA faced additional challenges on the bridge project because there were site, time, and budget constraints. To avoid intervention with cemeteries, charitable land, and religious relics, as well as to accommodate two major highway crossing points and an existing railway, the bridge necessitated a unique design with elevated curved contours. WIKA needed user-friendly, integrated applications to effectively implement mandated 3D BIM workflows to accommodate dispersed stakeholders who work in 2D processes within the one-year project deadline. The company adopted Bentley modeling technology to improve existing processes, simplify integration among disciplines, and deliver quality throughout the project lifecycle.

An Integrated Digital Solution

"The idea is to implement BIM processes using Bentley's solution. We tried [implementing BIM processes] with other software, but we could not transfer the data from one application to another. The interoperability of Bentley software is key," explained Novias Nurendra, WIKA's system development department general manager. WIKA performed a survey, establishing ground control points for topographic

data and using drones for aerial photogrammetry, to gain a better understanding of the existing site. The team used ContextCapture and LumenRT to generate a reality model from the captured survey data and imagery in one week, compared to one month using traditional methods.

Working in an immersive reality environment facilitated design strategy, accommodating all existing infrastructure and environmental and cultural site restrictions. Combining Bentley's reality modeling and 3D civil design applications allowed WIKA to examine constructability in real time through construction simulation. The interoperability of Bentley software established new digital strategies in a connected 3D BIM platform, optimizing design scheme to reduce construction errors on-site. The integrated modeling solution minimized difficulties in early engineering stages, improving quality, reducing costs, and shortening design and construction time.

Interoperable Design Applications Deliver Savings

WIKA used Bentley's interoperable 3D civil modeling and analysis applications to implement 3D BIM processes and optimize the Teluk Lamong bridge design. OpenRoads™ ensured road alignment was designed in accordance with standard codes, while OpenBridge™ Modeler enabled parametric bridge modeling to evaluate the bridge geometry and interaction with the proposed road alignment. The ability to perform clash detection allowed WIKA to identify potential problems early in the design phase and avoid costly rework during on-site construction that would have adversely impacted the short project timeframe. "Using BIM [methodologies], we visualize[d] everything and [determined] that the position of the pier head was not proper because it was in the middle of the highway," Nurendra said. "Knowing this in advance [prevented an] improper design that would have cost two months of construction time."

Integrating LEAP® facilitated accurate design and analysis of the unique, combined steel and concrete girder structures to ensure structural integrity and compliance with industry standards. The software provided the team with a steel

“As an outstanding tool for project and construction development, this software allows global interoperability ... to respond to 21st century challenges.”

— Novias Nurendra,
System Development
Department General Manager,
PT. Wijaya Karya

Find out about Bentley at: www.bentley.com

Contact Bentley

1-800-BENTLEY (1-800-236-8539)
Outside the US +1 610-458-5000

Global Office Listings

www.bentley.com/contact

girder solution that used a modular scheme, simplifying and improving the bridge assembly process, while ProStructures enhanced rebar detailing for the concrete supports. Bentley's interoperable BIM technology reduced bridge design and analysis time by 29 days and resulted in a more efficient and expedited construction process. Furthermore, the ability to generate automated, precise bills of quantity directly from the 3D models optimized volume efficiencies to save 52 days in design time and IDR 3.9 billion in costs.

Digitization and 3D Visualization Facilitate Collaboration

To support its goal of adopting digital technology to advance collaboration and communication, WIKA used ProjectWise® and OpenBuildings™ Designer (formerly AECOSim® Building Designer) for data integration and construction scheduling. ProjectWise enabled engineering, procurement, and construction to collaborate in a connected data environment, making models and data accessible to all users from any location and establishing an integrated digital platform to streamline workflows. Working in a connected data environment eliminated travel-related costs, enabling WIKA to save IDR 720 million. Using Navigator Mobile with ProjectWise to share project information improved project coordination between the engineering office and the field, simplifying model reviews and accelerating information mobility and resolution of issues to optimize deliverables.

Likewise, the ability to integrate the project schedule with the 3D models in OpenBuildings Designer added the visual component necessary to demonstrate construction sequencing to keep all relevant team members informed throughout construction. Establishing 3D digital workflows

to share and view data and visualize scheduling improved design and construction processes by 80 percent, reducing operational and resource expenses. Compared to 2D drawings and processes, Bentley's collaborative 3D BIM capabilities provided the digitalization and visualization necessary for all participants and stakeholders to better understand the spatial aspects and overall objective of the project, enabling WIKA to complete the project on schedule.

Successful Delivery Drives Future for BIM

Using Bentley's integrated 3D BIM applications provided the foundation for successful delivery of the Teluk Lamong bridge project. Executing collaborative 3D workflows optimized design and facilitated construction scheduling, enabling process control and traceability of project information to save time and costs while producing accurate, quality deliverables. For the community, the new bridge will solve traffic congestion that exists in both directions at the Teluk Lamong terminal in Surabaya. As the first successful BIM project in Indonesia, the bridge represents the beginning of a BIM trend for future Surabaya infrastructure projects to be delivered faster, cheaper, on time, and within budget.

WIKA established a collaborative 3D digital process on a BIM-mandated project with Bentley software that will serve as a model for future projects. As part of the innovation in one of the largest state-owned companies in Indonesia, WIKA will share its own experience for successful BIM implementation with other contractors working on infrastructure initiatives for the country. Committed to efforts to achieve BIM Level 2 capability before 2020, WIKA plans on integrating digital asset maintenance for full lifecycle BIM in the future.



Bentley's integrated 3D BIM applications provided the foundation for successful delivery of the Teluk Lamong bridge project.