



Project Summary

Organization

PT. Wijaya Karya (Persero) Tbk

Solution

Buildings and Campuses

Location

South Jakarta, Jakarta, Indonesia

Project Objectives

- To deliver a healthcare facility that will address the sharp rise in the number of COVID-19 patients.
- To streamline design and construction workflows and deliver in less than one month amid the pandemic.

Project Playbook

ContextCapture, LumenRT, OpenBuildings™, OpenRoads™, ProjectWise®, ProStructures, SYNCHRO™ 4D

Fast Facts

- The Indonesian government faced a hospital bed deficit amid soaring COVID-19 cases.
- WIKA was tasked with delivering a 300-bed, state-of-the-art hospital facility in less than one month to treat pandemic patients in South Jakarta.
- Integrating collaborative BIM methodology with their modular construction approach streamlined workflows and improved decision-making to meet the tight construction schedule.

ROI

- Using Bentley applications, WIKA successfully delivered the modular hospital design within 10 days.
- SYNCHRO 4D reduced construction time by four days to complete construction 20% faster.
- Working in a connected data environment increased ROI by 24%.
- WIKA intends to convert the 3D models into a digital twin for lifecycle hospital management, providing a benchmark for future modular developments.

PT. Wijaya Karya Delivers State-of-the-Art Healthcare Facility in Jakarta, Increasing COVID-19 Bed Capacity

Bentley's Applications Industrialize Project Delivery to Accelerate Hospital Operations by 2 Months

Managing Pandemic Care

Like many countries around the globe, Indonesia has faced soaring COVID-19 cases that have exceeded hospital bed capacity to treat these affected patients. To address this shortage, the Indonesian government initiated plans to construct 14 new hospitals. PT. Wijaya Karya (WIKA) was tasked with building one of them on a 22,700-square-meter former soccer field in South Jakarta. The USD 4 million hospital is a one-story building with a capacity of 300 beds, 35 intensive care unit rooms, and 10 emergency rooms. It is a state-of-the-art facility equipped with a negative pressure isolation system to prevent the flow of virus-contaminated air, eliminating the spread of infectious pathogens to the surrounding environment, and includes a robotic nurse and an integrated command center to connect it to 65 other hospitals.

Given the critical pandemic situation, the government tasked WIKA to complete design and construction works, as well as have the hospital fully operating, in less than a month. Delivery also needed to be cost-effective and environmentally sustainable. To meet these requirements on an incredibly tight timeline, compounded by social distancing requirements, they needed innovative technology solutions to coordinate and accelerate engineering workflows and fast-track construction without sacrificing quality.

Integrating Modular Construction with BIM

With lives at stake, time was of the essence. As a pioneer in modular construction in Indonesia, WIKA strived to push the boundaries of design and construction through their innovative approach. This methodology would not only accelerate construction time to within just a few weeks, but also increase quality, safety, and sustainability by using off-site, factory-controlled processes and lightweight, mostly recycled materials. However, their modular system is challenging to execute, requiring streamlined processes and complex decisions that make conventional design strategies insufficient to meet project deliverables.



With OpenBuildings Designer, WIKA generated a model of the entire hospital building within 10 days.

As a multidiscipline engineering project, WIKA needed to coordinate structural, architectural, and mechanical, engineering, and plumbing (MEP) works to facilitate simultaneous design and construction, and meet the tight delivery schedule. To address these planning, collaboration, and management challenges amid a socially distanced team, WIKA sought to integrate their modular construction standards with digital BIM application. Their goal was to accelerate the design review process, manage complexity of design changes during construction, and achieve efficiency in time, cost, and quality using BIM technology to digitally collaborate. "BIM facilitates the creation of designs that are complex to the construction process, starting from initial digital design to manufacturing workflows in all lines of construction disciplines," explained Romi Ramadhan, BIM manager at WIKA. To implement their BIM strategy, they needed interoperable modeling applications and a unified digital platform.

Leveraging Interoperability Provides Digital Solution

WIKA established a connected data environment using ProjectWise, and adopted Bentley's reality modeling and BIM methodology to carry out their modular approach. They used a quadcopter drone and ContextCapture to capture and process images of the two-hectare project site, creating a reality model of the topographic area.

"We continue to build more and more modular hospitals using Bentley technology as quickly as possible to save more lives."

— Rizky Yusuf Ramadhan,
BIM Coordinator,
PT. Wijaya Karya (Persero) Tbk

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With OpenBuildings Designer, they generated a model of the entire hospital building, including structural, architectural, and MEP elements, as well as incorporated landscape and roadway design with OpenRoads. To optimize design of the indoor airflow system to support patient recovery and prevent viral transmission, WIKA used Hevacomp¹ to perform airflow analysis and simulation within the building model, designing an HVAC system that complies with proper standards. They integrated the 3D models with the construction schedule and costs using SYNCHRO 4D while using LumenRT for visual animation, improving construction visualization for better design verification.

Leveraging Bentley's interoperable applications, WIKA implemented a collaborative BIM methodology, enabling immediate access to real-time data and 3D models without needing to be in the same room. The integrated digital modeling solution facilitated survey, design, simulation, and visualization, allowing design and construction to occur simultaneously, identifying and resolving design clashes, and making virtual changes to avoid errors and costly rework on site. ProjectWise and Navigator especially helped coordinate the various, geographically dispersed engineering disciplines resulting in faster decisions throughout the project lifecycle. "The end result is that Bentley Systems can cover the end-to-end processes both in terms of engineering and management," said Ramadhan. Working in a connected data environment, 13 multidiscipline BIM engineers collaborated from home, streamlining workflows and increasing productivity to keep the tight project schedule on track—all while following social distancing guidelines.

Establishing an Industry Benchmark

By developing and implementing digital BIM workflows, WIKA completed 95 design revisions and resolved 62 clashes

in three days to deliver the modular design in only 10 days, saving USD 400,000. They used SYNCHRO 4D to perform construction simulation and manage the construction process, which reduced construction time by four days to complete construction within 16 days, 20% faster than targeted. This result was extremely important, as it was necessary to have this building completed as soon as possible to provide care to patients with the COVID-19 virus. Working in a unified BIM platform provided complete insight into planning, costs, scheduling, and construction, improving cost efficiency by 18% while optimizing quality. Integrating their modular approach with Bentley's BIM technology, WIKA increased its return on investment by 24% and accelerated hospital operations by two months. The ability to extract accurate material quantities from the 3D models—combined with the sustainability of the modular construction process—contributed to saving up to 3,000 cubic meters of material waste and 10% of project costs. "Bentley technology has the capabilities and tools to make effective and efficient modular workflows so we can optimize project costs and improve efficiency of the design process," said Rizky Yusuf Ramadhan, BIM Coordinator at WIKA.

The connective data environment also improved visualization and decision-making without everyone needing to be in the same room, important during the global pandemic. Bentley's BIM technology played a vital role in modular design and construction, which can slowly shift the world of construction from conventional to digital and industrialize construction project delivery. Moving forward, WIKA will expand BIM application and develop a digital twin for lifecycle management of the modular facility, serving as a benchmark for future developments within the industry. "We continue to build more and more modular hospitals using Bentley technology as quickly as possible to save more lives," said Ramadhan.

¹Hevacomp Mechanical Designer and Hevacomp Dynamic Simulator are now part of OpenBuildings Designer.



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