

New Bocimi Toll Road Aims to Reduce Travel Time and Boost Indonesia's Sukabumi Economy

Bentley's Integrated Technology Establishes Digital Construction Processes to Complete Earthworks Five Times Faster and Avoid Costly Rework

SUPPORTING REGIONAL CONNECTIVITY AND TOURISM

The Bogor-Ciawi-Sukabumi (Bocimi) toll road is a series of national strategic projects to help reduce traffic congestion along the existing factory-lined roadway, as well as enhance regional connectivity and tourism in West Java. Spanning 54 kilometers, the new highway corridor is expected to shorten travel time between the Bogor and Sukabumi provinces from two hours to 30 minutes and boost economic conditions in the surrounding Sukabumi area. Construction is divided into four phases, the first of which measures 15.35 kilometers and is already complete.

PT Waskita Karya (Waskita) is the main contractor for the IDR 2.1 trillion second section, spanning 11.9 kilometers between Cigombong and Cibadak, and set for completion in 2023 after being delayed due to the pandemic. Located in a monsoon-prone area, the toll road must withstand the heavy rainfall, requiring innovative design and construction methods to accommodate the extreme weather. "It has been recorded that the potential for rain in Sukabumi reaches more than 70% annually," said Muhamad Saifudin Ashari, site engineering and standardization officer for Section 2 at Waskita.

ADDRESSING SITE AND SCHEDULE CHALLENGES

With excessive rainfall at the project site drenching the soil and presenting a high risk for potential landslides, earthworks became a significant challenge. Comprising 17% of the total project value, earthworks measurements and data had to be timely, accurately, and effectively monitored to overcome soil stability issues and keep the project on schedule. "The current manual method by surveyors takes a long time. It takes one week to measure all the traces, not including data

processing time," said Ashari. To carry out the soil stability analysis, Waskita needed the soil measurement data. Both the data retrieval method and, subsequently, the availability of the data to perform the necessary analysis were insufficient to ensure optimal construction of the toll road section. Waskita realized that they needed continually updated information on the progress of the earthworks according to work location and had to establish a reliable database to manage and access the soil data to perform the stability analysis.

Not only was it important to have timely and accurate updates on earthworks, but also reliable insight into the entire construction progress on site. Having limited time to visit the construction area due to rainy weather, the owner and supervisor needed to understand what was happening in the field in real time to make effective decisions, while avoiding errors and keeping the project on schedule. Waskita wanted to ensure that all team members clearly knew the current construction stage in relation to the entire project plan. "There is a need to visualize the sequencing of work stages in accordance with the overall project schedule," said Ashari. To address the climate and topography issues and ensure precise construction sequencing, Waskita needed to implement digital construction processes.

ESTABLISHING INTEGRATED DIGITAL WORKFLOWS

Using Bentley's integrated modeling and analysis technology, Waskita developed 3D BIM workflows and a connected digital environment that provided clear visualization of the existing site conditions and construction progress in the field. Waskita surveyed the field using drones and, with ContextCapture, processed the captured data into a 3D reality mesh. "The reality mesh accurately depicts what is the true progress at the site, giving a clearer picture

PROJECT SUMMARY

ORGANIZATION

PT Waskita Karya (Persero) Tbk

SOLUTION

Roads and Highways

LOCATION

Sukabumi, West Java, Indonesia

PROJECT OBJECTIVES

- To deliver Section 2 of the Bocimi toll road, reducing traffic congestion along the Bogor Sukabumi national road.
- To establish a connected digital environment that supports a holistic view of the entire project progress.

PROJECT PLAYBOOK

ContextCapture, gINT[®], OpenBridge[®], OpenRoads[™], PLAXIS[®], SYNCHRO[™]

FAST FACTS

- The new Bocimi toll road aims to reduce travel times between Bogor and Sukabumi from two hours to 30 minutes.
- PT Waskita Karya is the construction manager for the 11.9-kilometer second section of the four-phased Indonesian national strategic project.
- They used Bentley's applications to develop 3D BIM and digital construction workflows.

ROI

- Linking the 3D model with SYNCHRO to simulate the construction plan provided clear visualization of the work schedule.
- Leveraging OpenRoads with ContextCapture shortened earthworks calculations and reporting time up to five times.
- Using gINT and PLAXIS facilitated accurate slope stability analysis to successfully address issues in landslide-prone locations.



“With BIM, we can see the project as a whole without having to build it first.”

– *Muhamad Saifudin Ashari, Site Engineering and Standardization Officer of the Ciawi-Sukabumi Toll Road Section 2, PT Waskita Karya (Persero) Tbk*

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of the progress of work, as required by the owner,” said Ashari. Leveraging the reality mesh model with the 3D corridor model developed in OpenRoads, Waskita quickly performed the earthworks calculations and monitoring. They then imported the earthworks and soil test data into gINT to create a digital database accessible to the team to later calculate and analyze slope stability with PLAXIS, helping optimize design and construction in locations prone to landslides.

Lastly, Waskita used SYNCHRO to link the 3D BIM model with the work schedule data to simulate the construction plan and facilitate 4D construction monitoring within the connected data environment. “We can add issues related to the work done and problems that occur in the field into the 3D BIM model in the connected data environment. Issues can be seen by everyone so that problems that are happening in the field can be immediately identified and resolved,” said Ashari. By establishing integrated digital BIM and construction workflows using Bentley’s applications, Waskita facilitated visual design and construction review and approval processes among the entire team.

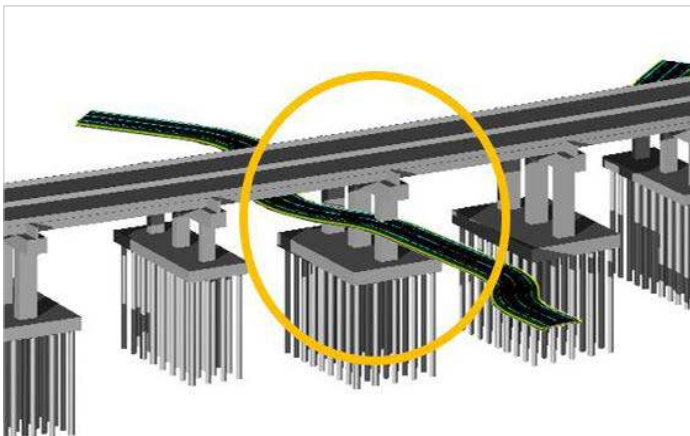
DIGITIZATION DELIVERS BENEFITS

Through digitization and the application of collaborative 3D and 4D BIM process, Waskita improved design and construction of the Bocimi Section 2 project. Working in a digital, visually connected data environment presented a holistic

view of the sequence of works and progress on site. This process streamlined communication and design and construction review and approval processes among stakeholders to timely meet project deliverables. “Repetition of work due to work sequence errors can be avoided and work time can be controlled according to the planned, scheduled deliverable,” said Ashari.

The BIM model effectively visualized the proposed project milestones, provided a clear depiction of work sequence and construction progress in the field, and facilitated performance of clash detection, minimizing errors. For example, in one local road location where there was no BIM model, there was additional work required on site to accommodate a low bridge clearance on an already built bridge. If that clash had been identified digitally at the outset with the superimposed model in Bentley’s OpenRoads Designer, Waskita could have saved IDR 30 million in additional work.

By going digital and automating previous manual processes, Waskita not only eliminated human errors and costly rework, but they also shortened earthworks calculations and reporting times from two weeks to three days. “Digital construction has made our work easier. The timeliness of schedule and cost efficiency becomes easier,” said Ashari.



PT Waskita Karya is the construction manager for the 11.9-kilometer second section of the four-phased Indonesian national strategic project.



Leveraging OpenRoads with ContextCapture shortened earthworks calculations and reporting time up to five times.