



AUTODESK **CONSTRUCTION CLOUD™**

LEVEL

Cloud-based Collaboration Makes Resilient Infrastructure Possible on the Largest Dike in the Netherlands

For more than 85 years, the Afsluitdijk, a 32-kilometer dam, has been a hallmark of Dutch hydraulic engineering. The dam protects a large portion of the Netherlands from the Wadden Sea and regulates the water level in Lake IJsselmeer, Holland's biggest lake.

This impressive infrastructure project is a model of protective and preventive damage control, incorporating ecological and recreational components. Project planners have implemented the latest technology to work collaboratively and efficiently to strengthen the enclosure dam, increase its capacity to discharge water and build pumps to transport water into the sea.

Rijkswaterstaat, part of the Dutch Ministry of Infrastructure and the Environment, awarded the renewal project to LEVVEL, a consortium made up of Van Oord Aberdeen Infrastructure Partners B.V., BAM PPP PGGM Infrastructure Coöperatie U.A. (part of Royal BAM Group), Arcadis and EPICo NL 2 B.V. The consortium is responsible for the design, build, finance, and maintenance of the project which is expected to be completed in 2023.



Customer Snapshot

FIRM SIZE: 500-1000
FIRM TYPE: GENERAL CONTRACTOR
REVENUE: N/A
FOCUS AREA: INFRASTRUCTURE
HQ: DEN OEVER, NETHERLANDS

PHASE:



DESIGN



PLAN



BUILD



OPERATE

PRODUCTS:



VALUE DRIVERS:



Quality



Cost

Strengthening the Largest Dike of the Netherlands

The Afsluitdijk project is a complex multidisciplinary undertaking involving numerous stakeholders, requiring extensive cloud-based collaboration and relying on construction data and quality management. Its design includes:

- Raising and strengthening the dike with 75,000 innovative level-blocks on top of the current basalt cladding.
- Reconstructing and expanding the lock complex at Den Oever with two large pumping stations, allowing more water drainage from the IJsselmeer into the Wadden Sea.
- Creating a cycling path over the full length of the Afsluitdijk to increase the recreational use of the dam while widening the emergency lanes to make the adjacent motorway safer.

With more than 500 people from architecture, civil engineering, and construction working together during the design and preconstruction process, effective cross-discipline collaboration was the key challenge for success.

“We needed to reimagine the design and preconstruction phase by using a common data environment to create a shared view of all activities, dependencies, deadlines, and inquiries,” says Yuri Grotewal, BIM Coordinator





at Royal BAM Group. “This would eliminate data silos, streamline review cycles, and extract real-time data for design coordination and review, quantity-take-off, and mark-ups.”

Construction Data Management Forms a Cornerstone for Collaboration

To develop an ecosystem that supports multi-disciplinary collaboration, LEVVEL deployed BIM 360 and Assemble within Autodesk Construction Cloud™. The team uses the tools together for integrated 3D modeling to create a single source of truth for greater efficiency, collaboration, and quality management.

“BIM 360 is at the core of our cloud-based collaboration process and has the most prominent role in the project,” says Ronald Huizinga, BIM Manager at Arcadis. “The latest model data is always available in 3D and 2D and is easily accessible by all project stakeholders. Without BIM 360, collaboration would be a nightmare.”

With a design team of up to 300 people, collaborating in a single environment was essential. Designers would upload models directly from Civil 3D and Revit into BIM 360 for design collaboration and coordination. Planners also used Dynamo and advanced scripting to speed up the design process, citing the tools’ ability to increase collaboration and automated publishes, interactivity, and the ability to work simultaneously. By providing the ability to create computational design, designers can produce concepts that iterate faster and earlier.

Besides saving time, the intuitive workflow for reviewing models improves quality and insight. The digital model allowed designers to work on the project simultaneously through iterative review rounds with issues and mark-ups. Before this workflow, traditional rounds of review could take up to five days. With BIM 360, reviews are closed in one day, which is an 80% reduction in time for design coordination.

BIM 360 also helps facilitate model coordination during the design phase. Nearly 200 members of the design staff and 30 modelers were able to effectively collaborate during the Afsluitdijk project, avoiding the potential for costly rework. The entire team benefited from automated clash detection, enhanced insight into the number of clashes, and instant feedback on the state of the model and major clash groups through automatic grouping. “BIM 360 has become the beating heart of the design process within our organization,” says Huizinga.

Quality Management and Takeoffs Lead to Better Outcomes

Assemble is used by the team to condition, query, and connect BIM data to key workflows, using the tool’s ability to provide up-to-date visualization of the total project status. Through Assemble, various project stakeholders can access the model, saving half of the time with every update of quantity take-off compared to the traditional workflow.

“Assemble is a great tool as it’s easy to use, regardless of BIM technology expertise,” says Douwe Bosma, BIM Specialist at Royal BAM Group. “With Assemble, you can create your own structure of the BIM model and extract data for quality checks and quantity take-off. You can see which parameters are not filled, add the missing data, and push it back to Revit.”

With Assemble, the team can easily track, manage, and analyze model and quality management data. Multiple stakeholders can access Assemble to observe project quantities and stay up to date whenever a new model is published. This results in tremendous efficiency gains on a project of this magnitude, which will play a vital role in the long-term management of the project. Viewing the geometry objects based on a predefined structure with their quantities has never been this easy.

The team is implementing a variety of innovative workflows on this project.

“We make state-of-the-art 4D impressions and animations to communicate with the client,” Huizinga says, adding that the renders and animations are used to elaborate the build sequence and to give insight into the phasing. This process speeds up the time to get permits from authorities and helps to communicate with the client.

Resilient Infrastructure, Made Possible by Cloud-based Collaboration, Is the Future of the Netherlands

The grand scale of the Afsluitdijk reinforcement is unique for the Netherlands. It represents the latest developments in dealing with rising sea levels, water safety, ecology, and sustainability, while building a safe and secure dam using state-of-the-art design and cloud-based collaboration.

The dam, a model of resilient infrastructure, delivers 40,000 tonnes less CO2 emissions, a reduction of no less than 56% compared to alternative solutions. Each level-block of the dam receives a chip and is therefore easy to trace for maintenance. The blocks are transported via water and quickly assembled onsite with a minimal footprint.

By exploring automation possibilities early in the project, the team understood where to improve based on process and repetitive manual workflows, resulting in time savings, efficient collaborative methods, and measurable results – all hallmarks of this project. The team was able to connect the construction phases, producing a high-quality model during design that aided in deploying the right tools during preconstruction to mitigate errors downstream.

By using the most state-of-the-art risk management, sustainable construction methods as well as proven Autodesk technologies, it is expected that the dam will withstand a once-in-every-ten-thousand-year storm.

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-Ronald Huizinga
BIM Manager,
Arcadis