

Zwolle-Herfte Railway Expansion:

On the Digital Transformation Track

Opened in 1864, the historic Zwolle station is the biggest train traffic junction in the Netherlands, connecting eight directions of train travel between the country's north and south. The station had become a bottleneck to the nearby Herfte railway junction, requiring an update to its aging infrastructure to increase the network's capacity.

The Zwolle-Herfte expansion project was commissioned as an alliance between ProRail, a government task organization responsible for managing the Dutch railway network infrastructure, and VolkerWessels, a global construction corporation that provides design and build services for track design and civil engineering structures across multiple brands.

At a cost of 170 million Euros, the project will double the capacity of the tracks between Zwolle and the Herfte junctions and include a free rail junction at Herfte with a 700m dive-under railway tunnel, allowing trains to cross above and below to decrease travel time in all directions. Two bridges and three railway viaducts will replace old steel railway bridges, spanning existing roads and canals. Track switches will also have to be moved. The marshalling yard will be expanded to manage a greater volume of trains, requiring the creation of a groundwater protection layer to safeguard the drinking water extraction zone in this area.

Project: Rail track extension Zwolle-Herfte

Construction consortium: An alliance contract between ProRail and VolkerWessels' NoorderSport

Cost: 170 million Euros

Completion: Summer 2021

For leading international company VolkerWessels, exchanging data through open formats across disciplines and project stakeholders was key to the success of the Zwolle-Herfte railway expansion project, one of the biggest junctions of the Netherlands.

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ArGIS® 3D Scene of railway underpass |
Courtesy of VolkerWessels

Breaking Through Complex Project Challenges

Designers working on the project have to contend with existing gas and water pipes, roads, tracks, and other utilities. In addition, the expansion area is a couple of kilometers long and contains numerous intersections with roads, canals, and bicycle paths; existing structures such as catenary portals make surveying the project area another challenge.

The teams must also deal with a limited window for on-site progress – for example, they would need to take advantage of the reduced train traffic during the 72 hours over a weekend to execute activities such as track laying, construction, and electrical work in this compact timeframe.

Finally, an important aspect of this project is to support the company's efforts to apply sustainable practices in their business. To do so:

- Of the 26 km of track laid, 50% is comprised of reused track, with 12 km of reused sleepers and 10 km of new sleepers.
- 19% of the 37,000 metric tons of track ballast is reused.

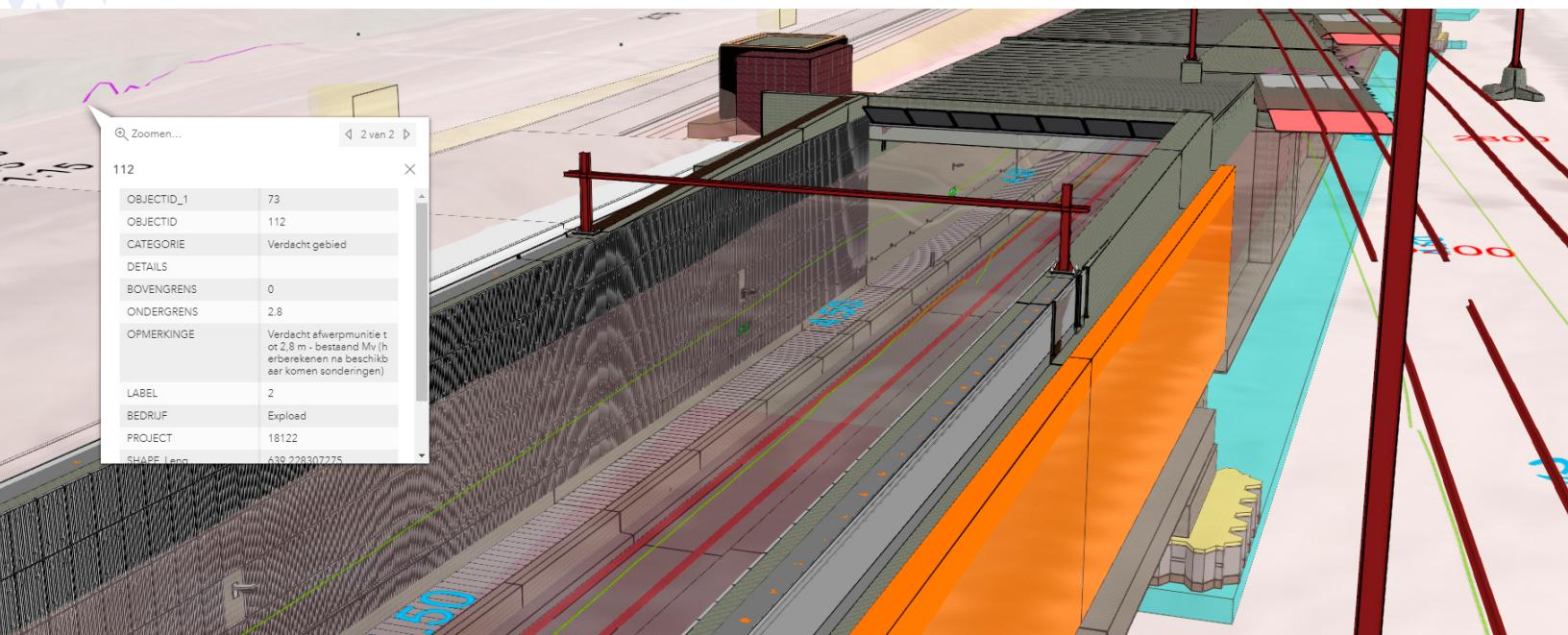
Optimizing Outcomes with BIM and GIS

Because the Zwolle-Herfte railway project requires vast and diverse datasets – ranging from civil structure designs and track layout plans to the location of ground utilities – an integrated BIM and GIS (Geographic Information System) approach formed the foundation of the project strategy in order to make the data accessible to all project stakeholders.

The team uses Autodesk's ArcGIS Connector® for Civil 3D®, a tool developed as a result of [Autodesk's partnership with Esri](#), to streamline the flow between GIS data and the design models in Civil 3D® – a game changer, according to VolkerWessels.

"In the rail industry, we utilize an extremely high volume of data that is frequently updated. Diverting all of it into a single place makes a huge difference in data maintenance," says Jeroen Tishauser, Senior Specialist at VolkerWessels Infra Competence Centre.

"Integrating GIS as a standard step in the workflow is one of the most important things we have done."



The information management team uses Esri's ArcGIS® software to map the different aspects of the project, from underground utilities to ground-level surroundings, taking into account the availability of land, time schedules, transport routes, and other logistics. Visualizations are created and stored in an ArcGIS Enterprise environment, making the information accessible to team members who need it.

The integration of design data with visualized map data brings new levels of insight to the geospatial understanding of the Zwolle-Herfte expansion project.

"We are able to integrate design into our maps – not only importing design data, but integrating and updating maps based on design plans. Mapping becomes more accurate and compelling," says Jan-Peter Ter Maaten, Team Leader GIS at VolkerWessels.

Work scheduling and inspections data is universally available, saving time where project members would otherwise check and request information from different teams.

Thanks to the integration of BIM with GIS, all team members are now able to view visualizations of the planning processes alongside a timeline, ensuring everyone is up to speed on the project status and predicted outcomes.

Ensuring BIM and GIS Integration Success

Setting company best practices for how to use BIM and GIS data most effectively is vital for the success of this project. In the past, project teams would download information and implement it in their software environment. This information was not always up-to-date, often resulting in duplicated efforts and team members working with outdated data.

Integrating BIM with GIS was an important step to ensure team members had access to up-to-date project data. Updates to GIS data are reflected in the BIM design model. Any geospatial information contradictions, such as cabling or gas pipes that impact a design, can be more easily identified and addressed by designers without needing to visit the site or request additional information from their GIS team member.

"The possibility to connect data on different platforms reduces the time that is needed to find the right data, and discussions are more to the point," says Ter Maaten. "The benefits are about transparency and better collaboration."

Integrated Workflows Boost Project Success

Along with access to current and more complete design and GIS data, the team improved operational efficiencies and project quality by utilizing an integrated set of tools.

Here's how:

- ReCap Pro® enabled the team to use rich data from point clouds of the entire tracks captured with scanners from the front of trains to make better decisions throughout project design and delivery.
- Civil 3D® was used by engineers for all the track layout and design including track alignment, ballasts, and cross-sections.
- Revit® was used for civil structures such as bridges, tunnels, underpasses, lighting, electrification, lift shafts, as well as the design for the expanded station itself. The team also used Revit to create multiple section views to better understand design and construction coordination challenges.
- Esri's ArcGIS® enabled the mapping of spatial as well as scheduling aspects of the project; for example, underground utilities and the track availability required throughout the project.
- The ArcGIS Connector® for Civil 3D® facilitated the dynamic exchange of data, giving designers access to up-to-date integrated design and geospatial data, providing much richer project information and giving them confidence and speed in making design decisions.

Reaping the Benefits of Digital Transformation

For VolkerWessels, enabling key stakeholders with a holistic perspective of the project is streamlining workflows and communications throughout the lifecycle.

Connecting BIM and GIS data with scheduling data, for example, provides useful insights into where to divert trains while tracks are rebuilt, benefiting phasing and scheduling – key aspects of rail projects, where minimal impact on train operations is important.

“Autodesk® software has been a driver of new development and ideas. The ability to integrate maps with design and the standardized use of Autodesk® have fostered innovation from a GIS perspective,” says Ter Maaten.

“Our use of GIS has grown rapidly. It really becomes part of the project toolbox, and then you start doing really beautiful things.”

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VOLKERWESSELS: OPERATIONAL EFFICIENCIES THROUGH MORE INTEGRATED WORKFLOWS

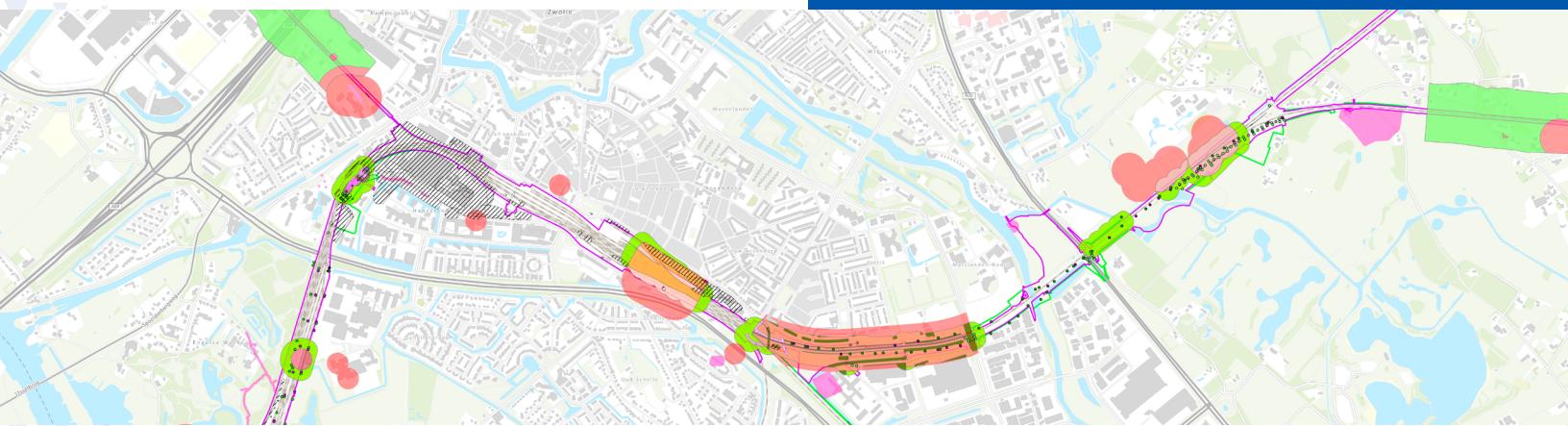
As a corporation working across several industries, VolkerWessels uses numerous software packages and vendors to design and execute their projects.

Interoperability between processes and workflows from different disciplines and teams from different companies is a top priority. That's why VolkerWessels needs to ensure more seamless movement of data between different software tools and platforms.

The company also needs to enable efficient collaboration with their external partners. It is important that partners have access to current project data, often making native design files directly available to them.

In order to facilitate this integrated approach, VolkerWessels works with the open-BIM IFC format. Thanks to Autodesk's strategic focus on interoperability, this format is supported in Revit®, Civil 3D®, and other Autodesk® software used by VolkerWessels.

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Railway project overview in ArcGIS® | Courtesy of VolkerWessels