Plowman Craven



Don Viaduct

Client:

BAM Nuttall

WHAT'S THE STORY?

With the iconic Don Viaduct needing to have a second track added, Plowman Craven was contracted to carry out a high-accuracy, sub-5mm drone survey of the bridge that would in the first instance assess the state of the structure.

This was done using our Vogel R3D drone survey solution, with the resulting data being used to produce an information-rich 3D BIM model of the bridge and the surrounding areas that enabled design works for the upgrade as well as the future management of the structure.

How did we do it?

By using a drone to capture the majority of the data, significant time, cost and safety savings can be made. Once survey control had been put in place on the ground, our dedicated UAV team was able to rapidly survey the entire site – tracks and all – without the need for 'boots on ballast' or closure of the line.

Flying from a position of safety, our award-winning Vogel R3D is the only UAV-based survey solution verified as able to capture data to Network Rail's Band 1 accuracy level of sub-5mm.

To ensure nothing was missed, we then terrestrially laserscanned at ground level to capture the underside of the bridge, the supports and the surrounding topography. The point clouds from both surveys were combined into one point cloud database and from that a topographical survey of the site and a BIM model in Revit of the viaduct and its supports were extracted.



AT A GLANCE:

- Part of £170m Aberdeen-Inverness rail upgrade
- High-accuracy Vogel R3D drone survey
- Information-rich 3D BIM model for design work
- Bridge & surrounds captured to sub-5mm accuracy
- Rapid survey with no line closures or workers on track

The wider project:

The work on the Don Viaduct is part of the wider project to upgrade the route between Aberdeen and Inverness enabling faster and more frequent trains by doubling the tracks to enable travel in both directions.

Plowman Craven has been involved from the beginning, providing Network Rail's principal contractors - BAM Nuttall - with a range of surveying and mapping services.

"The project displayed commendable collaborative working on an exacting timescale with an invaluable contribution by Plowman Craven."

Jack Mitchell, Digital Construction Manager, BAM Nuttall Rail Projects SNE





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CASE STUDY



Why BIM?

Using the data captured during the drone survey, our expert BIM team was able to model every single component of the structure, right down to all 80,000 individual rivets.

All of these components are classified, meaning the entire model can be viewed, interrogated, measured, marked-up and even walked through by anybody at any time - removing the need to revisit the site at a later date. That is invaluable on a project with multiple stakeholders in different locations.

Creating such a highly-detailed digital survey model early in the process ensured maximum value for the client. The intelligence now obtainable – such as the requirement for parts to be replaced or repaired - has enabled the future manageability of the asset and helped all interested parties, from designers to project managers, to make more informed decisions.





Additional Benefits

As well as helping with design and asset management, the model and accompanying 360/panoramic imagery has a range of other benefits from site visualisations to logistics planning.

For example, on this project we mocked up a theoretical scaffold bridge in the model to show how the scaffold would look. We factored in how the water level of the river may affect the integrity of the scaffold – something the client was extremely interested in understanding.

We conducted a costing exercise of how much it might cost to paint the bridge, using the model to calculate the exact surface area, the volume of paint required, how long it would take to do and what the cost implications for this would be. This feeds into 4D Construction Sequencing, providing an intelligent visual of the project timeline.

We also showed the animated fly-through to both Network Rail and BAM Nuttall, during which an environmental expert spotted an invasive species – something that could have taken weeks to manually search for.





Link to the web-based version

About Plowman Craven

Plowman Craven provides integrated measurement and consultancy services to the property and infrastructure markets, pioneering the use of technical innovation to deliver proven expertise and trusted results throughout the project lifecycle.

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