

Situational awareness transforms construction management for Align JV

Align JV

The Challenge

- Build highly collaborative situational awareness tools using out-of-the-box technologies to support data-driven decision making on one of the UK's major infrastructure projects.

The Benefits

- Data-driven decision making
- Enhanced collaboration
- Effective BIM and GIS integration
- Management time savings

Align JV is a joint venture playing a key role in the construction of HS2 Phase One. It is using ArcGIS to deliver new, innovative, near real-time data visualisations of surface works, helping senior management and stakeholders across engaged organisations make vital decisions on a daily basis. As a result, management of planned works has been transformed helping deliver the programme ahead of schedule.

The Challenge

The geology and scale of works are among the enormous geotechnical and engineering challenges faced daily by construction partners working on the HS2 project. Align JV, a joint venture formed of Bouygues Travaux Publics, Sir Robert McAlpine and VolkerFitzpatrick, is charged with the delivery of the complex Central 1 section of HS2 Phase One, in a rural environment. This section includes the Colne Valley Viaduct at 3.37km long, what will become the longest railway bridge in the UK; a 16km twin-bored tunnel, the longest tunnel in HS2 Phase One sector and five vertical shafts to provide necessary ventilation and emergency access.

The viaduct alone requires 1,000 unique concrete segments, each up to 140 tonnes in weight, which will form the deck of the viaduct and over 100,000 precision-engineered 8.5 tonne concrete segments are required to build the concrete rings that line the tunnels. Managing the impact of this significant construction programme necessitates minimal disruption to residents and businesses, reducing the impact on the road and transport network, minimal impact on the environment while keeping communities informed at every stage.

To deliver on all this, while liaising with numerous other partners and the supply chain, it was vital for Align JV to have optimal situational awareness of the entire works. Being able to track the progress of multiple elements of the project at any one time would help not only to reassure local communities and ensure that the structures are being built and operated to the highest safety standards, but also adhere to the Government's Code of Construction Practice and Considerate Constructors Scheme.

The Solution

The AEC sector has, for many years, been using Esri GIS (Geographic Information System) solutions to improve workflows, bringing context to projects and enhance collaboration throughout project lifecycles. More recently construction companies have broken away from old-school engineering practices to find new, innovative ways of tracking progress and providing vital information to stakeholders.

Align JV's GIS team had first-hand knowledge from working on previous projects as to how GIS and, specifically, integrating GIS with BIM data, could provide best in class situational awareness tools. Dashboards had not previously been used and were seen as vital to better understand the progress of surface works in this mammoth operation. Initially a number of mock dashboards were created using out-of-the-box apps (ArcGIS Web AppBuilder and ArcGIS Dashboards) in ArcGIS Enterprise, which were shared amongst technical and non-technical colleagues across the organisation. By integrating the ArcGIS stack using ETL tools, data is harvested from various systems and pushed into ArcGIS Enterprise in order to visualise it, helping personnel to understand events as they happen and make more informed decisions. Positive feedback enabled the GIS team to finalise the

“ The implementation of these out-of-the-box tools has resulted in substantial qualitative gains at the highest levels of management and decision making. We have successfully replaced outmoded trackers with easy-to-understand, data driven GIS solutions. ”

Derek Van Rensburg, Surface Works Construction Director, Align JV



Completed A412 road crossing between P55 and P54 with a grout connection at the Colne Valley Site, October 2022

workflows required to set up a number of dashboards, tailored to different audiences. Thirteen dashboards and two apps now give access to real-time project data, all in an easy-to-read format. The main boardroom conference screen features a dashboard presenting the data required for senior executives to track KPIs and make strategic decisions based on project goals. Examples of construction dashboards include viaduct pier and pile progress, jetty construction progress, segment and deck progress, tunnel cross passage progress, headwall installation and barrette installation progress.

This unprecedented situational awareness of the operational status of and construction components is not only helping with project efficiencies but driving a step-change in industry standards for health and safety performance.

The Benefits

Data-driven Decision Making

Complete situational awareness and the status of different construction elements across the project enables both senior management and operational teams to make assessments on progress, and deviations from KPIs can be flagged immediately. This access to exponentially more information helps teams act on information in near real-time and supports increased accountability across project teams.

Enhanced Collaboration

13 dashboards (and applications) have been created helping Align JV quickly collaborate with numerous internal and external stakeholders. For example, working with the viaduct segment factory and girder launching teams, enabling teams to track the whole lifecycle of segments from the factory to the storing yard, and to the launching girder.

Effective GIS & BIM Integration

Bringing together the most up-to-date CAD design models alongside production and planning trackers into GIS datasets and into dashboards, allows a much wider audience near real-time access to information. A digital twin model of the development of the viaduct and tunnel construction assets is represented in near real-time is a game-changer and set to be vital tool for future joint ventures.

Management Time Savings

The implementation of dashboard tools has resulted in substantial gains at the highest levels of management and decision-making. Considerable time is being saved by management from the replacement of former industry-standard and cumbersome trackers, with easy-to-understand and data-driven GIS solutions to support near real-time decision-making. The new dashboards also negate the need for Align JV to invest in other costly, digital solutions.

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