

McNicholas Takes on Herculean Task

Leading utilities contractor takes on Sports Park challenge using leading-edge 3D civil engineering software.

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Mark Watson

CAD Surveyor, McNicholas

Global urbanisation is a force widely acknowledged but little understood. Many people would find it hard to believe that half of the world's housing and infrastructure needs for the next 25 years have not yet been built, yet it is true.

Simultaneously, much of the world's existing infrastructure is ageing, and failing; the result will be unprecedented levels of spend over the same period to repair or remodel it.

Moreover, providing roads, utilities, and the infrastructure to support growth and renewal will require engineering on a scale not seen in recent history.

Understanding, embracing and responding to such change is something that one British company has been doing for almost sixty years. Utilities contractor, McNicholas, has been involved in civil engineering in the UK since the last major worldwide infrastructure boom of the 1940s.

Borne out of the post war expansion of the telecommunications industry, Elstree-based McNicholas started out servicing this sector; it went on to add electricity, gas and water – and more recently, rail and renewables – to its portfolio. Today, it has become a leading utility contractor, involved in planning, designing and constructing multi-service utilities infrastructure in increasingly large and complex projects.

One such recent project was the 900,000 sq. foot Park Place shopping centre in Croydon; actually,

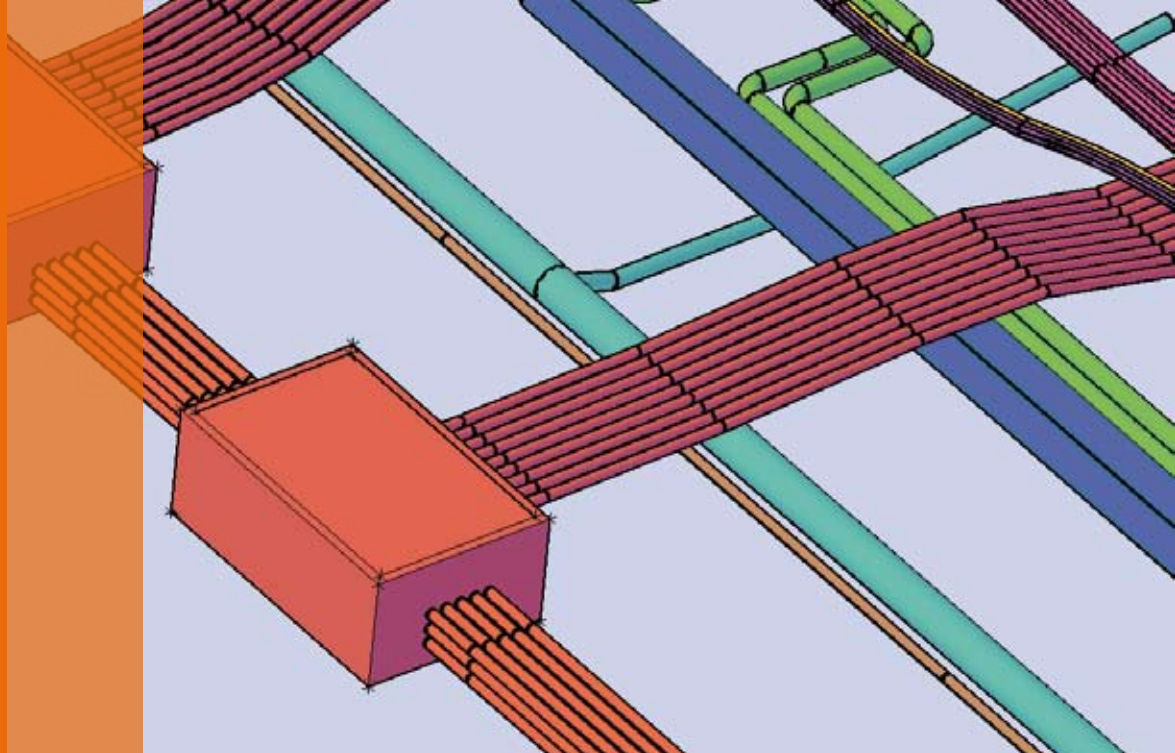
‘shopping centre’ doesn't begin to describe what is essentially a whole new urban district, the total area of which, including roads affected by the scheme, will occupy some 8.5 hectares.

The utilities diversion task for such a large scale project was extremely challenging but it was one that McNicholas – with long experience and the latest 3D civil engineering software – was able to face head on.

21st Century infrastructure planning

Croydon's Park Place required a full utilities diversion plan to be undertaken before demolition; this had to include the construction of new service ducts, including tunnelling and planned phases for the consequent road closures. Because it was critical to minimise disruption and delays, there could be no margin for inadequate or inaccurate information.

In the past, the civil engineering task would have involved digging a lot of holes in the ground to find out where the existing pipework and services were and take measurements. But digging up a built environment necessarily involves the suspension of business or services and the not-inconsiderable task and expense of putting it all back. Even then, using the old 2D design software, it was necessary to input the data, analyse it manually and then process it with another programme to create a cross section. The margins for error were incalculably large.



In the face of such complexity, McNicholas – together with project managers, Bovis Lend Lease – boldly took the decision to remodel the existing site in 3D, using AutoCAD® Civil 3D®.

The first time that you see a fully-integrated, large scale, 3D model of the labyrinthine utilities and services beneath a vast complex like Park Place, you feel like a short-sighted person putting on glasses for the first time.

But perhaps the most remarkable feature of this software is that it doesn't just show you what's already there, it also lets you experience your redesign and alterations plans before they are real.

Increasing collaboration

"A phrase that comes to mind is 'the wow factor'; we were working in conjunction with people like BT Openreach – because obviously we needed to know that what we're designing was correct and going to work for them. And other companies like Virgin Media and Southern Gas Network – we had to have a good working relationship with these guys and they used to come into the office to look at how the model was progressing – they even brought in their colleagues just to look at the model – they thought it was amazing," says McNicholas's CAD surveyor, Mark Watson.

Communicating its ideas comprehensively with high impact 3D presentations enabled McNicholas to quickly get across its design intent to all the stakeholders and was an important factor in getting the job.

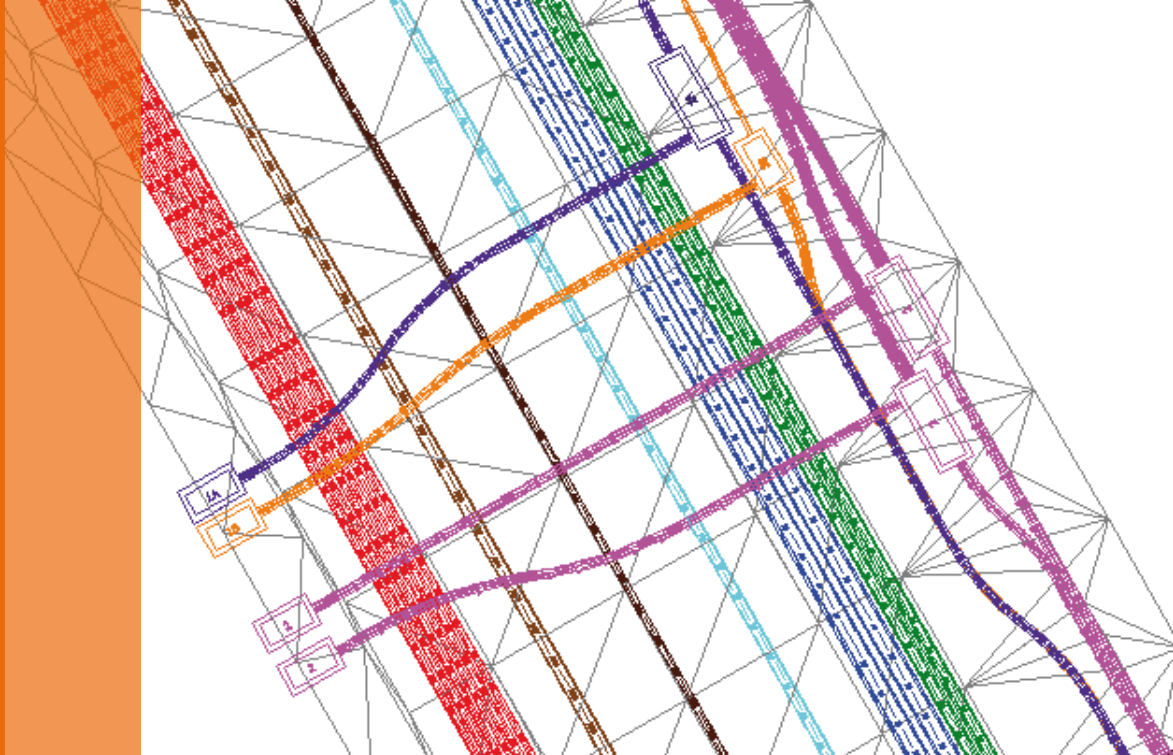
Minimising risk

"Using Civil 3D, we can create a full 3D environment and truly understand where everything lives, eliminating risk when designing a utility diversion." Watson goes on to explain how moving around a fully integrated 3D model enables each member of the team to view pipe, duct or chamber, from any angle and understand its position in the context of the whole project.

"We realised that using Civil 3D eliminated a lot of risk with designing multi-utilities diversions; because of its clash detection ability and also by being able to put cross sections anywhere through your model at any angle, we could see exactly what clearances we'd have on any of the utilities we've modelled!" he enthuses.

In this respect, McNicholas is a pioneer in its use of 3D technology, as Autodesk's Jack Strongitharm explains:

"They're using what is really a drainage part of the package to do underground utilities and the level of complexity that they're taking it to with the job in Croydon – it's absolutely amazing, there's so much information in there. They have carried out radar scans to locate all these pipes and cables and then modelled them all up in 3D so they can work out where all the cables need to be moved to or dug out, it's so much more information than a drawing would normally ever have given them."



Data management advantage

Given the sheer volume of data involved in their projects, McNicholas decided to install Autodesk's data storage management facility, Vault, to better manage the Croydon project.

"We were helped by the guys at Excitech, they told us that on projects of this magnitude, Vault would really help us and they were right. It's enabled us to manage all the files a lot more easily. We were trying to create one huge model and have everything in one storage file but the amount of data that's stored in every single pipe, structure and surface is just too large to handle. Using Vault, you can create references from different drawing files so it made the whole project more manageable," says Watson.

Vault will also be critical to the infrastructural planning of a prominent Sports Park McNicholas is currently working on, in order to make the project more manageable.

As for Croydon, the new Sports Park is a highly-complex project, but what is completely different is that the utilities are largely being created from scratch rather than being diverted, and this creates further innovative challenges. The project involves multiple venues, each with their own multiple facilities and McNicholas is designing and building the Gas, Water, Electric and Telecommunications that will serve each and all of those venues.

"At the moment, I'm working on trying to fit water mains, HV & EHV electrics, along with three different communications networks into a corridor, and they all have to cross each other at some point. I am also

trying to design how they will be actually laid out on site – they all have mandatory clearances – the telecommunications ducts cannot be any closer than 300mm from the electric ducts and so forth. So it's a case of drawing all the pipes referenced to surfaces I've already created from topographical information received, and using alignments, sample lines, section and profile views to correctly design the utility corridor."

But this is a long term project – completion is still some two years away – and by then, McNicholas's infrastructural design repertoire is likely to have expanded even further.

In the same way that the firm's use of Civil 3D enabled it to take on a project like Croydon, it is also helping McNicholas to push the boundaries once again by allowing them to take on the project management of underground utilities projects as well as being the contractor for its constituent tasks.

Whilst the McNicholas brand is built on its long experience, its future positioning seems to be very much based on its willingness to embrace the tools of the future.

For more information

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