Adelaide Metropolitan Rail

Rail Upgrade Project

JBT Consulting Pty Ltd
Brad Tite
Principal Water Engineer

PROJECT OWNERS:

Government of South Australia - Department of Transport, Energy and Infrastructure

DATE:

In-progress with final track upgrades occurring in late 2013

SCOPE:

To develop a site to be ready for mining within two years of approval

12d DIMENSIONS:

- Rail, Drainage, Sewer & Services, Land Development

Image Source: www.infrastructure.sa.gov.au

Project Summary

Upgrade of approximately 130km of rail track, including new concrete sleepers, formation earthworks, drainage and services for the Adelaide Metropolitan rail network.

All design and construction work associated with the $200M project was undertaken by the Tracksure Joint Venture, which primarily comprised the John Holland Group, Coleman Rail and York Civil.

JBT Consulting provided specialist drainage design services to the joint venture.

The Challenge

Quick and accurate measurement of drainage quantities was a critical issue for the Tracksure construction team, for both pricing and procurement purposes.

On previous smaller projects, Tracksure staff would manually: measure pipe lengths and pipe depths, count drainage structures, assess drainage structure arrangements and enter all of this information into a drainage schedule spreadsheet.

This process was time consuming and prone to operator error, and the output was not standardised. Tracksure wanted a better process for this project, something that did not require manual measurement of drainage system elements.

The Solution

For this project, we developed a more automated process for drainage system scheduling, utilising the standard output reports from the 12d Drainage module. All subsurface drainage systems were modelled and designed in 3D, using the 12d Drainage module.

The drainage designs were still documented on general arrangement plans and longitudinal sections, as per the attached drawing examples. However, additional drainage scheduling information was also presented in separate drawings.

The drainage schedules documented every drainage structure and conduit, and totalled the different conduit lengths and different structure types. This drainage scheduling information made it very easy for the Tracksure team to price the entire drainage system in one simple step, as the schedules included every drainage system element. It also made procurement easy, as the drainage schedules included information on drainage structures, including type, size, depth, and arrangement of pipe penetrations.

The drainage schedules were automatically generated using a specially prepared spreadsheet (after the standard 12d Drainage reports were pasted in to the spreadsheet). The spreadsheet incorporated two lookup tables, one for the drainage structures and one for the drainage conduits.

The spreadsheet then generated the drainage schedules automatically, by reading the “raw” information input from the standard 12d Drainage reports. Cross referencing the lookup tables occurred to add extra information, and then populating the actual drainage schedule sheet.

The drainage structure schedules included information listing the structure label and description, setout coordinates, surface levels, invert levels, depth, reference drawings, additional comments and pipe penetration details (pipe size and invert level).

The drainage conduit schedules included information listing the conduit link (US struct – DS struct), conduit description, length, diameter (size), average depth, reference drawings and additional comments.

The drainage schedules also totalled the overall conduit lengths for each conduit size and class and totalled the overall number of structures for each different structure type. These totals enabled the Tracksure construction team to quickly and accurately determine the overall scope of the drainage works for each package, without even needing to look at the drainage layout plans or the drainage longitudinal sections.

The drainage schedule spreadsheets were actually provided to Tracksure so that the team could easily prepare the quantities take-offs, without really even needing to look at the drainage design drawings.

Result

The Tracksure construction team was appreciative of the high standard of drainage scheduling information which was able to be provided during the project. The team members had been advised that their demonstrated process would be adopted on future projects as an example of high quality presentation and documentation.

For more information

To find out more about how you can create better designs faster with the 12d Model solution for civil engineering design, visit www.12d.com.

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12d Model

Roads and Highways

12d Model's design option is the smarter solution for the design, modification and maintenance of Road and Highway projects.

Enjoy advanced 3D tools to design local and major roads, intersections, roundabouts, highways, interchanges and much more.

Ports and Dredging

12d Model is the solution for port infrastructure and dredging, easily managing the very large datasets and complex volume calculations often required by these projects.

A complete range of flexible and customisable volume calculation tools allow teams to extract and present the information quickly and easily.

Land Development

12d Model is the most versatile solution for the creation of sustainable land development projects, including residential, commercial and industrial developments, recreational areas, landfills, and agriculture projects.

Easily manage all aspects of your land development project from earthwork quantities, road design utilities and drainage design.

Airport Infrastructure

12d Model provides a solution for the design, construction and analysis of new airports, as well as the upgrade and maintenance of existing runways and airport infrastructure.

Easily manage large airport infrastructure projects and share data across multi-disciplinary teams.

Rail

12d Track has been specifically designed for the survey, design and construction of light, heavy and high speed rail projects.

Extensive railway tools in 12d Track allow the rail designer to quickly and easily design their projects. These options are built on the existing 3D modelling and design tools available in 12d Model.

Mining Infrastructure

12d Model's powerful set of exploration, site investigation, survey and analysis tools are crucial for the initial design, construction and ongoing operation of mining projects.

Comprehensive tools for the survey, design and construction of access roads, railways, earthworks and services allow for the coordinated design and management of mining infrastructure from within 12d Model.

Drainage, Sewer and Utilities

12d Model provides comprehensive tools for the design, analysis and optimisation of stormwater and sewer projects using rational, dynamic (hydrograph) and 2d drainage methods.

Powerful clash detection management allows for efficient 3D modelling of service networks such as gas, electricity, telecommunications and water prior to construction.

Surveying

12d Model is a complete surveying package providing the tools to manage all facets of surveyed data including LIDAR, topographical, as-built, conformance, traversing, geodetics, data mapping, labelling and much more.

The 12d Field option runs on a ruggedized tablet and gives the user access to full 12d Model functionality, allowing you to take the entire project into the field with the most comprehensive pick-up and set-out tools.

Oil and Gas

12d Model assists with the design, construction and mapping of oil and gas pipelines, original site exploration and the wide range of infrastructure required for oil and gas projects.

Accurate 3D modelling and the ability to share data between users allow teams to quickly and easily coordinate designs.

Construction

12d Model is the ultimate software for construction with powerful set-out options, direct interfaces to machine control and detailed conformance reporting and auditing.

Manage 3D data and control volumes, quantities and progress claims with 12d Model. Set-out your project and undertake conformance and as-built surveys live on-site using 12d Field.

Rivers, Dams and Hydrology

12d Model handles very large datasets and interfaces with a wide range of analysis packages, making it perfect for flood studies and the management of rivers and dams.

12d has partnered with industry leading analysis software, allowing users to apply 2D drainage analysis from within 12d Model.

Environmental

12d Model's ability to handle very large datasets combined with flexible and comprehensive 3D analysis and modeling tools make it perfect for a wide variety of environmental projects.

Existing workflows can adopt 12d Model easily as it allows users to directly interface with GIS systems and most software packages and file formats.

Why Choose 12d?

- **Powerful data processing & intelligent functionality.**
- **Modular, easy to update & completely customisable.**
- **Seamless integration with major industry software and hardware.**
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- **Friendly support & training from industry experts.**

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