

Share with Pride

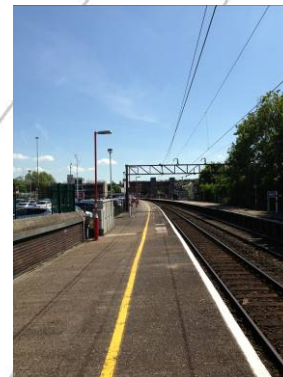
SWP 013/15

*Train Mounted Laser Survey of Birmingham
New Street Area Resignalling Phase 7.*

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Mick Brook - Infrastructure Projects




Summary


This communication sets out how Network Rail's Multi Purpose Vehicle (MPV) DR98008, installed with a laser scanner compatible with OmniSurveyor3D was used to generate a model for signal sighting purposes for the Birmingham New Street (BNS) Station area.





Life Saving Rules

Working responsibly


 Always be sure the required plans and permits are in place, before you start a job or go on or near the line.


 Always use equipment that is fit for its intended purpose.

 Never undertake any job unless you have been trained and assessed as competent.


 Never work or drive while under the influence of drugs or alcohol.


Driving

 Never use a hand-held or hands-free phone, or programme any other mobile device, while driving.


 Always obey the speed limit and wear a seat belt.

Working with electricity


 Always test before applying earths or straps.

 Never assume equipment is isolated – always test before touch.

Working at height

 Always use a safety harness when working at height, unless other protection is in place.

Working with moving equipment

 Never enter the agreed exclusion zone, unless directed to by the person in charge.

- This project specifically targeted undertaking the sighting of signals from the users desktop, thus eliminating the need for site visits.
- This reduces the requirement for Engineers to be on track.
- This also eliminates the risks involved in driving to and from site.

Problem Statement

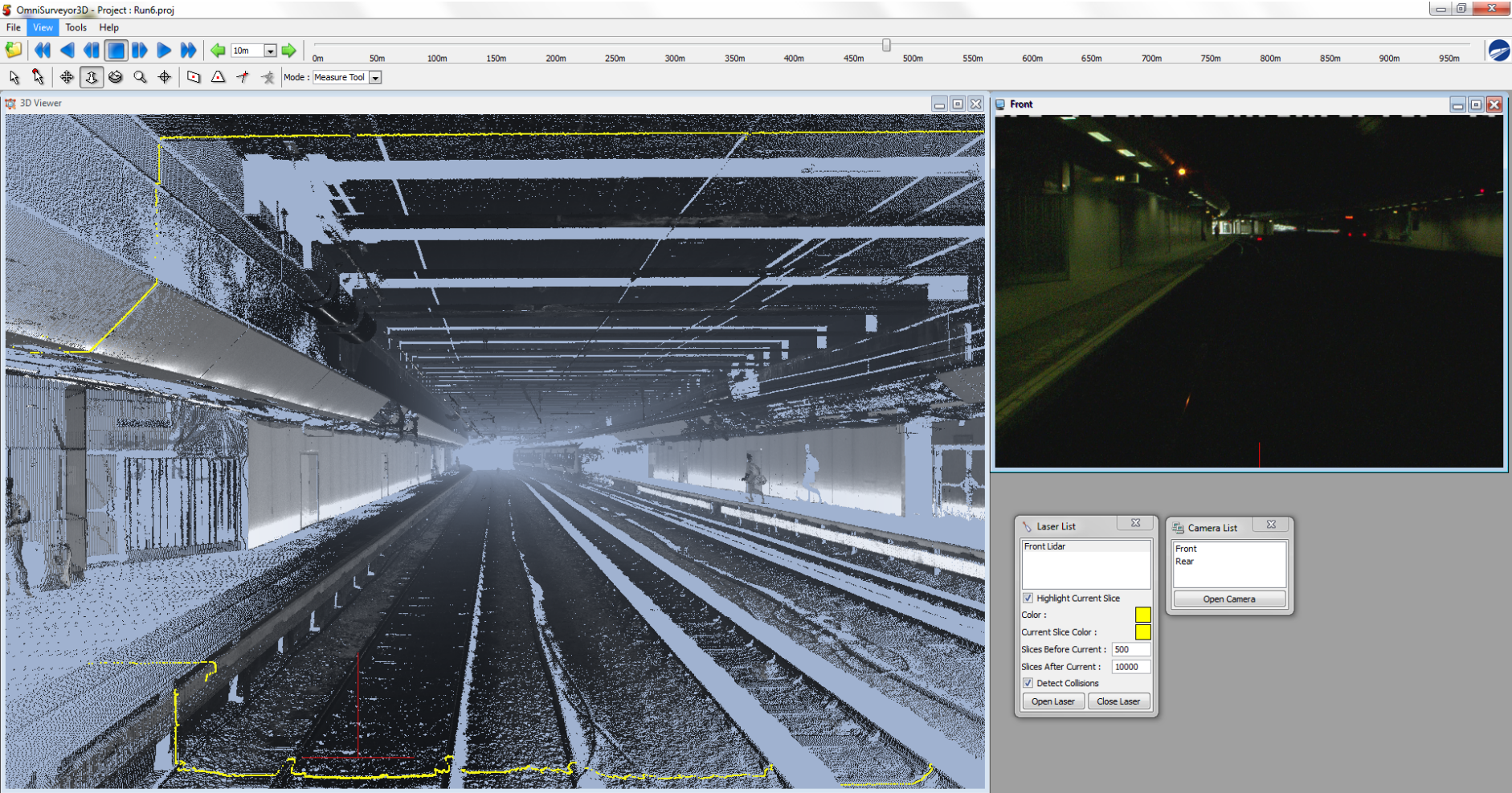
- Infrastructure Projects (IP) and Birmingham Signalling Design Group (SDG) had a requirement for a Signal Sighting Survey to be undertaken in the Birmingham New Street station area.
- Signal sighting activities, carried out on track pose a significant safety risk to staff.
- BNS station is a particularly difficult area of the network to survey due to the high density of tunnel areas, rendering traditional HD video surveys too dark for use. GPS coverage is also poor therefore having a detrimental affect on on-train positional systems, and the high volumes of traffic mean access and possessions are not easy to obtain.
- As a consequence, the options to capture data for signal sighting were restricted to either taking the entire sighting committee on track, or creating a full 3D model of the station area.

Solution Identified

- Signalling Innovations Group (SIG) proposed the use of a combined video and laser survey, using existing tools used by SDG for signal sighting, including OmniSurveyor3D® (OS3D).
- As part of the Signalling National Innovations Portfolio (SNIP), an MPV was upgraded for use as a survey platform for asset inventory surveys. A number of 'virtual' signalling assets were also created for use with in OS3D for Signal Sighting.
- IP agreed to use the MPV for the survey. SIG managed the installation of the survey equipment, including the laser and managed the survey.
- Survey extents were agreed and IP arranged access to the BNS area. Asset Information – Data Collection Services ran the survey on 28th September 2014.



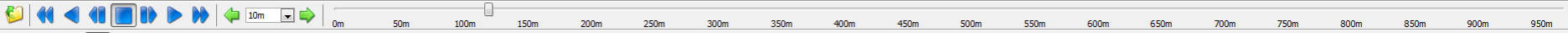
Laser Data in Station Area



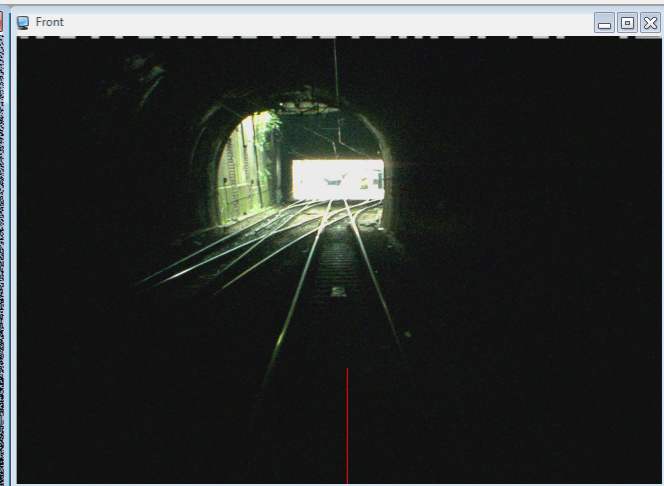
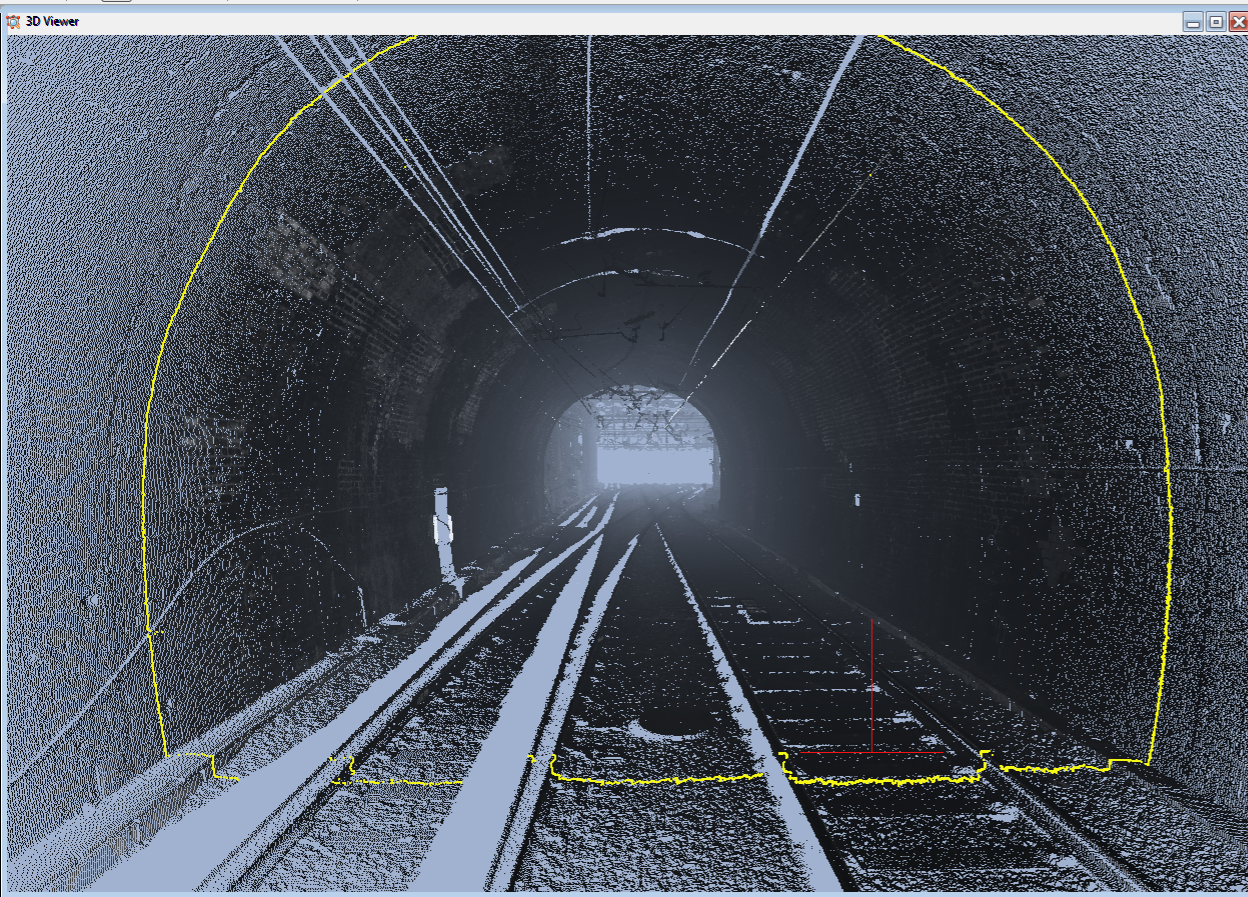
Laser Data in Tunnel Area

OmniSurveyor3D - Project: Run6.proj

File View Tools Help



Mode: Measure Tool



Laser List

Front Lidar

Highlight Current Slice

Color:

Current Slice Color:

Slices Before Current: 500

Slices After Current: 10000

Detect Collisions

Open Laser Close Laser

Camera List

Front
Rear

Open Camera

Current distance: 118.543 m Current time: Sun - 11:53:37:23 (42817.924) User Ref: N/A User Ref: N/A



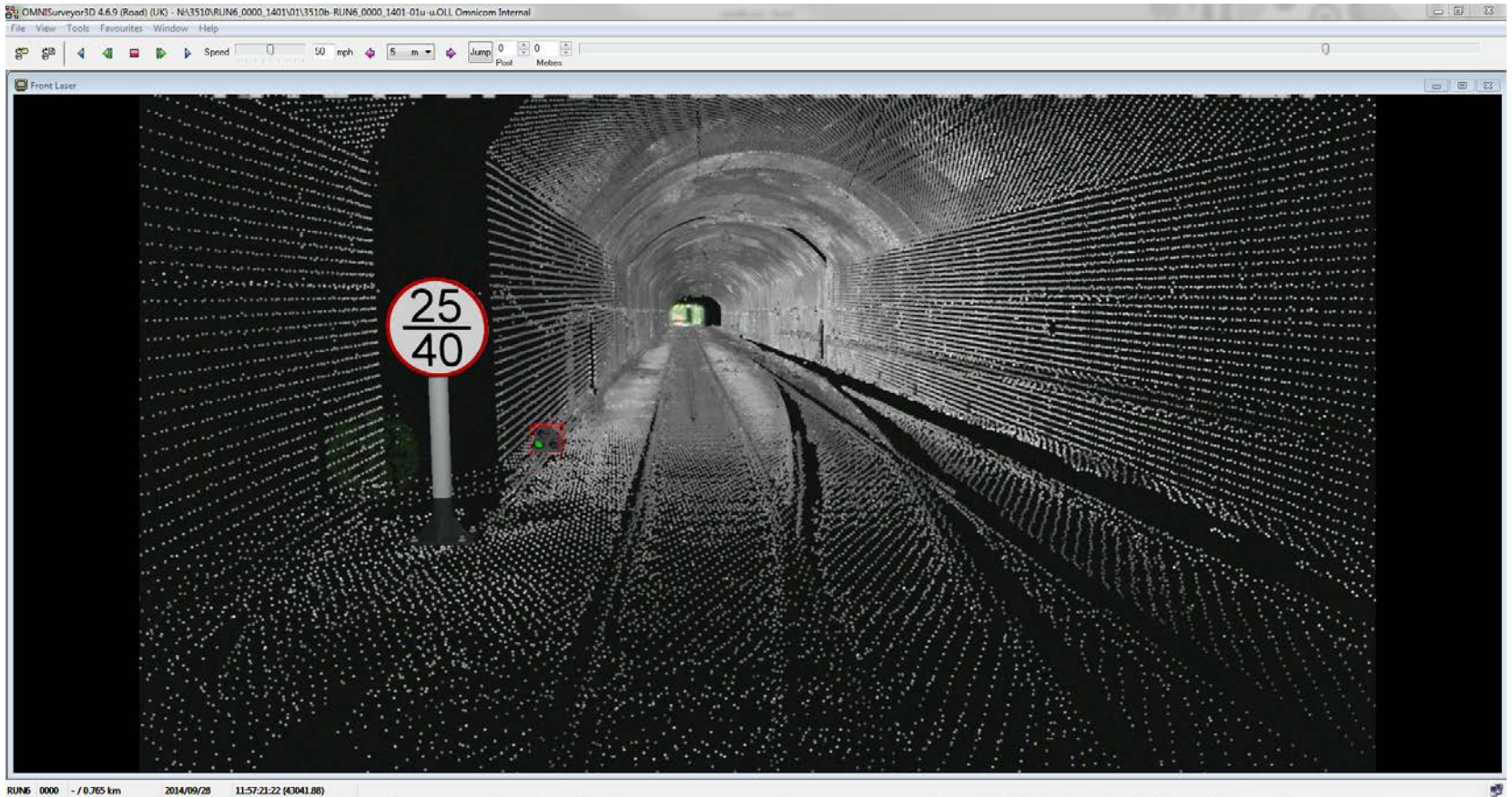
Data Processing

- The slides above show example video and laser data in part of the station and tunnel areas. Rendering the raw laser data requires large computer processing power and so data compression is required.
- Post processing the data also allows the project to synchronise laser data with the video.
- Access to Platform 1 and East Dock Road were not available for survey. Manipulating the laser data allows the project team to create sighting data from the adjacent roads, whilst maintaining the correct drivers eye position.
- Data is processed to allow bi-directional use of each video clip. Thus reducing the number of train runs through the station.
- The slide below shows a heavily compressed image of laser data, overlaid on to the video for use by the signal sighting specialist.

Video Overlaid With Laser Data



Sighting Model



- SSIM Models overlaid on the combined laser video image. These images are used for the Sighting Committee.

Conclusions and Opportunities

- The sighting process for BNS is underway by Birmingham SDG using the data captured via this process.
- The MPV has surveyed Euston Station area on behalf of IP.
 - For the Euston survey the point cloud will be aligned with the project datums.
 - Survey was combined with routine Track Geometry measurement runs collaborating with S&C Diamond Project.
- The MPV and sighting tools are now available for use on all future projects.
- The project has identified clear benefits to safety, time, quality and cost. Further work is underway to quantify these.
- SIG are investigating the development of tools to allow further on site tasks to be done from the desk top in the laser data, including Platform Edge Gauging, Cable Routing, Clearance and Fouling Point measurements.

Further information...

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