

Leica Geosystems **TruStory**

Leica Zeno 15 for Asset Inventory



■ Company

North Ayrshire Council

■ Challenge

Create a pilot project for the creation of a GIS based asset inventory including road infrastructure

■ Objective

A system providing asset location to OS National Grid coordinates by collecting all required data including attributes in real-time without post processing

■ Project period

2010-2011

■ Location

Irvine, Scotland



■ Deliverable

GIS based asset inventory representing all required road assets in the form of geo location and related attribute data, e.g. lighting columns, gullies, manholes, traffic signals and road signs.

■ Hardware and Software

● Surveying hardware and software

- Leica Zeno 15 GIS Data Collector
- Leica Zeno Field Onboard Software
- Leica SmartNet Reference Station Network

● Office software

- ESRI ArcGIS
- ESRI ArcPad Studio
- ESRI Arcpad Toolbar Manager

The project was to create a system for the collection and storage of asset inventory data based upon ESRI ArcGIS and the Leica Zeno 15 GIS handheld, and evaluate with respect to ease of use and geospatial accuracy.

The completion of an MSc in Geospatial and Mapping Sciences at the University of Glasgow was the main driving force behind this project. It seemed sensible to base it on the creation and evaluation of a system which could be beneficial to Estates Technical Surveyor Colin Bradford's employer North Ayrshire Council. After investigation into existing data standards and user requirements, Leica Zeno Field data capture software customisation was carried out with respect to

toolbars and attribute data input forms. A parent map was created in ArcGIS and all necessary elements including asset layers, symbology, background mapping etc. were output to the Leica Zeno 15 GIS data collector by means of the ESRI AXF format.

Workflow chain

The collected data consisted of geospatial and attribute data relating to assets. The data was transferred using the ESRI AXF format via the Leica Zeno Docking Station. Once collected, the data was checked into ESRI ArcMap for storage, display and analysis.

Accuracy Evaluation

A separate geospatial accuracy evaluation was carried out based on accuracy achieved using both





■ Benefits

- Leica Zeno 15 GIS Data Collector provides a user friendly interface, and enables standardised data collection through customisation and procedures
- Use of Zeno Field software enables the operator to take all required ESRI ArcMap elements into the field for editing
- Use of the GNSS antenna enables the accurate geo location of assets to a standard which more than meets the needs of a GIS regardless of RTK correction method
- Location can be obtained from Leica DISTO measurements relative to background map features, should satellites be hidden

Leica SmartNet and SBAS (EGNOS) RTK systems. This was based upon two main criteria. These were as follows:

Accuracy relative to Ordnance Survey Mastermap Topography Layer achieved using SBAS and Leica SmartNet via OSTN02 transformation. This involved collecting data with the Leica Zeno 15 GIS handheld using normal working methods, i.e. holding the device above a feature. A large sample of well defined OS map features were selected and positions were measured using the Leica Zeno Field Software to collect GPS observations. Horizontal displacement error from the relative map points was recorded and the abbreviated results were as follows:

RTK correction system	Mean horizontal distance error (m)	RMSE of horizontal distance errors (m)
SBAS (EGNOS)	0.98	1.01
Leica SmartNet	0.48	0.54

(GNSS: GPS only; Conditions: open sky)

This evaluation may also indicate other factors relating to errors in the OS mapping in addition to the evaluation of the Zeno GNSS performance.

Absolute accuracy achieved using SBAS and Leica SmartNet.

The basis for this evaluation was ten defined control points established using dual frequency, post processed static GPS. These points were then each measured twice using the Leica Zeno 15 / Zeno Field with a fixed antenna/tripod assembly using both SBAS and Leica SmartNet RTK. This resulted in a sample size of twenty for both RTK methods. Colin's evaluation of the absolute accuracy achieved using Leica Zeno with both RTK methods was as follows:

RTK correction system	Mean horizontal distance error (m)	RMSE of horizontal distance errors (m)
SBAS (EGNOS)	0.77	0.81
Leica SmartNet	0.20	0.22

(GNSS: GPS only; Conditions: open sky)

After the accuracy evaluation, Colin Bradford came to the conclusion that Leica SmartNet provided accuracy which was more than sufficient for the representation of the data. Should SmartNet be unavailable due to GSM/GPRS signal loss, then SBAS would provide a satisfactory backup.

Conclusion

The creation of an accurate inventory enabled effective asset management. A pre requisite to efficient management was accurate, reliable data relating to all relevant assets which enabled better planning and resource management based on data relating to condition, asset type, location etc. GIS provides the perfect platform upon which to store this data.

The Leica Zeno 15 provides a user friendly interface, and enables standardised data collection through efficient customisation and procedures. The use of Zeno Field software enables the operator to take all required ESRI ArcMap elements into the field for maximum efficiency.