

Network Centrelines

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This article sets out the detail around the centrelines as the spatial representation of the network.

A centreline is the polyline spatial representation of an individual network segment or section. When combined together, these individual segments create a connected centreline network. Within the context of the RAMM, each defined road_id should have a spatial centreline representation in the database.

The Centreline network is important as it provides the principal spatial framework for all assets, datasets and activities to be spatially located on the network. Some RAMM applications are heavily reliant on the centreline network for core functionality, such as RAMM Mobile.

Centreline Rules

Use RAMM Network Manager to manage all centrelines and follow the following principles:

- Digitise centrelines along the length of the network segment, either aligned with the marked centre of the asset e.g. painted centreline, or the approximate centre of the pavement asset if no markings are visible.
- The orientation of the centreline should be in alignment with the increasing direction of the network segment as defined in the carriageway table.
- The spatial representation must be in the local map projection.

Within RAMM, the centreline data is stored in the map_road_layer table, however this is not directly accessible or editable through the RAMM application or SQL.

File formats supported for centreline management include;

- Well Known Text (WKT) File format
- Text file
- Spatial File (TAB file or Shape file)

Network Segments and Intersections

Each centreline should be made up of one or more line segments, which break at intersection points.

RAMM has an automated process in place to manage programmatic calibration between carriageway data and the associated centreline representation. This process attempts to match centreline breaks to carriageway section start/end points. Therefore, to facilitate this process it is necessary to break centrelines at intersection points.

For example, in the screenshot below, the blue centreline has been created with breaks at the intersection points with the existing centrelines, which are represented by the yellow polylines.



The centreline for a road_id with multiple intersection points, would have multiple segments, to create a spatial representation of the model.

In the example below, the road_id centreline would consist of 5 line segments, to represent each component of the line between intersection points. Each segment has been colour coded to show the extents of the individual line segments;



Well Known Text (WKT) File Format

The Well Known Text (WKT) file requires centreline data to be provided in a specific structure, to enable the RAMM Network Manager application to interpret the information and create a spatial representation in the database.

The required format includes the road_id, sequence number and northing and easting details, as a pipe delimited string; *road_id|sequence|coordinates*

It is important the coordinates in the linestring, are defined and ordered in the increasing direction of the road. An example of this is below, for a centreline with two segments for a single road:

```
30002|05|LINESTRING (1756266.85 5919213.1, 1756352.16 5919253.86)
```

```
30002|10|LINESTRING (1756352.16 5919253.86, 1756410.4 5919282.18)
```

If measures are known for points in the linestring, these can be embedded in the WKT file as well, in the following format;

road_id|sequence|coordinates measure

An example of this is below, for a centreline with two segments, with measures, for a single road:

```
30002|05|LINESTRING (1756266.85 5919213.1 0, 1756352.16 5919253.86 92)
```

```
30002|10|LINESTRING (1756352.16 5919253.86 92, 1756410.4 5919282.18 155)
```

Each sequence is representative of the network segment between two intersecting points on the centreline. For consecutive segments, the start point of a segment should be the same as the end point of the preceding segment.

This is illustrated in the example below, where the end point of the first segment is the same as the start point of the second segment;

```
30002|05|LINESTRING (1756266.85 5919213.1, 1756352.16 5919253.86)
```

```
30002|10|LINESTRING (1756352.16 5919253.86, 1756410.4 5919282.18)
```

Calibration Points

The centreline network is a flat two-dimensional representation of the network. As the physical world is three-dimensional, some alignment discrepancies between linear and spatial measurement systems can occur.

This is particularly common in scenarios where there are gradient changes in the vertical alignment of a network section. In these situations, the straight-line distance between two points does not reflect any additional centreline length resulting from these changes in gradient, therefore resulting in a difference between the spatial length and measure linear length.

A calibration point allows for a specific node on the network, to have both a defined northing and easting and measured linear displacement associated at the same location.

RAMM will automatically recalibrate all linear asset against the spatial network, to factor in any calibration points that have been added.

Calibration Point Management in RAMM

The map calibration points that are user definable are stored in the map_calibration_ud table. These points can be added through the Pocket RAMM application and loaded through RAMM Manager. The required fields for

calibration points include;

- road_id - the road_id for which the calibration point is being added
- ramm_location - the linear displacement of the point, from the road_id's origin point
- easting - NZTM easting coordinate
- northing - NZTM northing coordinate

System generated calibration points are stored in the map_calibration_cw table, although this is not directly accessible by RAMM users.

Calibration points are added to the database either through Pocket RAMM or via a loadfile through the RAMM Manager application.

Calibration Points and Roundabouts

(also see the *Carriageway* section) Where a road passes through a roundabout, the displacements are measured between the approach islands, and a corresponding carriageway gap is created between these displacements.

However, for the purposes of the centreline network, and to achieve a connected network model, it is necessary to create a spatial join between any adjacent roads and the centreline of the roundabout. Therefore calibration points are used to model these network features to make adjustments for these differences.

For example on Stonefields Avenue, there is a roundabout and subsequent carriageway section break at the Tihi Street Roundabout:

Road ID	Road Name	Start m	Start name	End m	End name
35983	STONEFIELDS AVE	0	MORRIN RD RAB	247	COLLEGE RD
35983	STONEFIELDS AVE	247	COLLEGE RD	423	STONEMASON AVE RAB
35983	STONEFIELDS AVE	451	STONEMASON AVE RAB	684	TIHI ST RAB
35983	STONEFIELDS AVE	716	TIHI ST RAB	829	ARUHE ST
35983	STONEFIELDS AVE	829	ARUHE ST	919	KAURIKI TCE

The 684m and 716m displacements are recorded at the approach islands, not at the intersection with the roundabout centreline.

Therefore calibration points shall be inserted at the point of the approach islands, to reconcile these coordinates with the start_m or end_m locations of the carriageway sections.

