

Date: 2008-06-12 Reference:

## The strive for a high quality road data base



## **The Swedish National Road database**

**Road Data operations at the Swedish Road Administration (SRA) exist all over the country. Just as our name says, we work on data related to roads in Sweden. This means among other things that we are responsible for the National Road database where a vast amount of up-to-date information is stored.**

The construction of our National Road Database started at the Swedish Road Administration in the mid nineties after a governmental decision. The vision was to create a road database where the Swedish Road Administration, all municipalities and the forest industry together were responsible for the initial data supply and update procedures of road data. Today the state-, the municipality- and the forest road network with attributes are inserted in the database and we are now in the update face.

The data is stored in a SQL Server environment with an information model according to the Swedish standard for road and railroad networks. Until the last couple of years the data was only accessible with applications developed by the Road Administration. Today thru a purchase of Transport Network Engine, a third party software developed by an ESRI partner, the National Road database is now available on an ESRI platform as well. This platform is now used for analyses, presentations and data delivery.

### **DATA USAGE**

There are many different areas of application for road data in society. Here are some examples:

- **National Land Survey of Sweden**, to update products such as maps.
- **The forest industry**, for transport planning between saw timber sites and sawmills.
- **Emergency services**, for planning and navigation purposes.
- **Universities and colleges** for different courses that include GIS (Geographical Information Systems).
- **County bus services and transport/mobility services** for route or travel planning or and driving times based on speed limit regulations.
- **ITS companies**, for ISA (Intelligent Speed Adaptation) systems.
- **Software suppliers**, for such things as navigation equipment.
- **Municipal authorities** for in-house operations, for example, traffic planning, school transport planning as well as for the maintenance and operation of municipal roads.
- **Swedish National Rural Development Agency** in analyses of how far people have to travel to public services.

This widespread use of data has forced us to focus on quality.

## **THIS IS HOW WE WORK**

The organisation of our operations is based on the five basic steps we follow in our work procedure. These are:

### **Collecting of data**

The SRA, the National Land Survey of Sweden, the forestry industry and Swedish Local Authorities collect data directly from source. This includes everything from official regulations to other legal documents. The source could for example be local traffic regulations, construction documents, as-built drawings, etc. This can also involve certain field measurements. Since the National Road database is based on national and international standards different kinds of data capturing software can be used, either developed by the Swedish Road Administration or by other organizations or companies. In order to secure the data quality all software to be used for data collection has to be run thru a test bench at the Road Administration. We also carry out monitoring inspections at our data suppliers to quality assure the collection of data.

### **Preparation and updating the data**

The supplier prepares the data prior to central assembling for the database. This is done at a common production centre using different methods and routines. A data quality acceptance test is carried out, both at the preparation stage and prior to assemblage. Furthermore, a certain percentage of the delivered data is checked once more by a quality control officer to ensure that all routines are followed.

### **Quality control of the data**

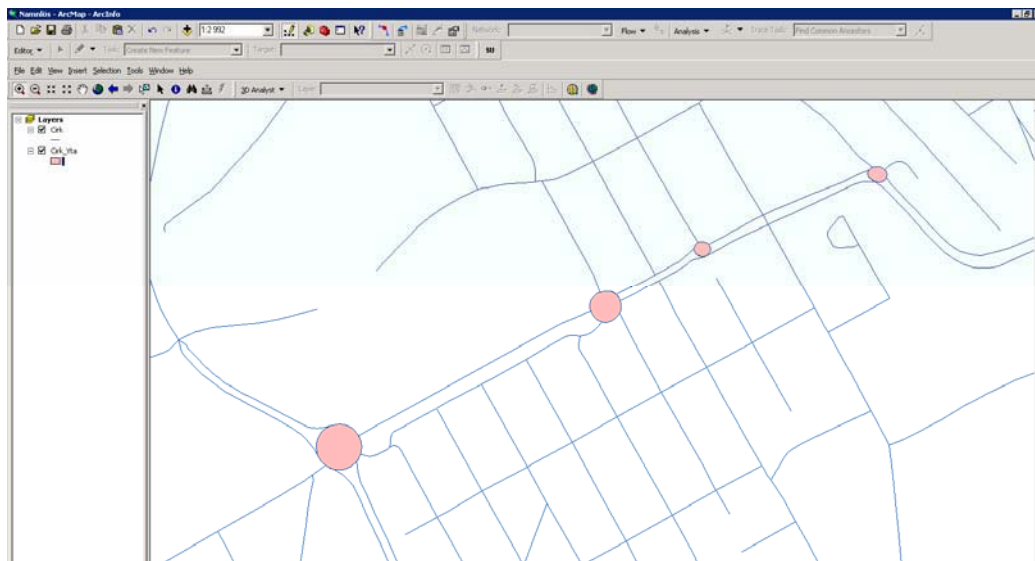
We control and declare the data in the databases through automated quality controls and visual inspections. The automated quality controls are done in our ESRI environment where we identify illegal combinations of attributes, for example surface type “gravel” on a highway or speed limit 110 km/h on a forest road. As for today we have a list of more than 250 illegal combinations of attributes that are checked periodically.

We also use data sources from other authorities or companies to verify the contents of the database. Street maps from municipalities or telephone companies have been used to control the street names registered in the database. An ongoing software development project will result in a procedure where all street names that are entered in the data capturing software will be compared to the street names registered in an

official database operated by the National Land Survey. This will protect us from misspellings and other mistakes done by the operator.

In the National Road database some of the feature classes are of a hierarchical nature. The highest hierarchical level of the feature class “Functional road class” are set to 0 and this network is made more dense thru the use of road links with the class 1 and so on down to class 9. In order to check the different hierarchical levels the ESRI extension “Utility network analyst” is used. This enables us to locate island or wrongly classified “Functional road class”.

Geometrical pattern recognition is another area where we use both ArcGIS and FME, Feature Manipulation Engine. Some objects, for example roundabouts, have a distinct geometrical shape. In the case of roundabouts we look for connected road links that creates a circular object with a reasonable area. For all identified road links the program checks if the feature class “One way street” is registered.



*Roundabouts detected thru geometrical pattern recognition.*

The thematic accuracy of the database can not only be controlled by automated quality controls. For that reason we have a statistical ArcGIS based application that provides us with a random selection of roads where we compare the value of certain feature classes to a true value found on either a traffic signs or documents with local traffic regulations. This means that we sometimes can control the thematic accuracy without leaving the office but sometimes we have to do a field control. This year we focus the

thematic accuracy control on features critical for navigation in densely populated areas. Fortunately all of those can be captured from documents with local traffic regulations. In a near future all authorities responsible for deciding on traffic regulation have to insert these into a database operated by the Swedish Road Administration. This database will be the source for many of our feature classes.



*Vehicle operated by the company Visimind used for quality field control*

### **Package and deliver the data**

The data is delivered to customers either as a pre-packaged standard product or as a customised product. All datasets is delivered via the SRA website, [www.vv.se/lastkajen](http://www.vv.se/lastkajen) in the following types of file format: \*.shp, \*.nvd, \*.xml, \*.mdb (geodatabase).

### **THE FUTURE**

We really believe that the cooperation between different authorities, municipalities and the forest industry has been the right path for building a road database in a small county like Sweden. As the usage of the data increases we will have to focus even harder on quality.