

SafeRoad SYSTEM



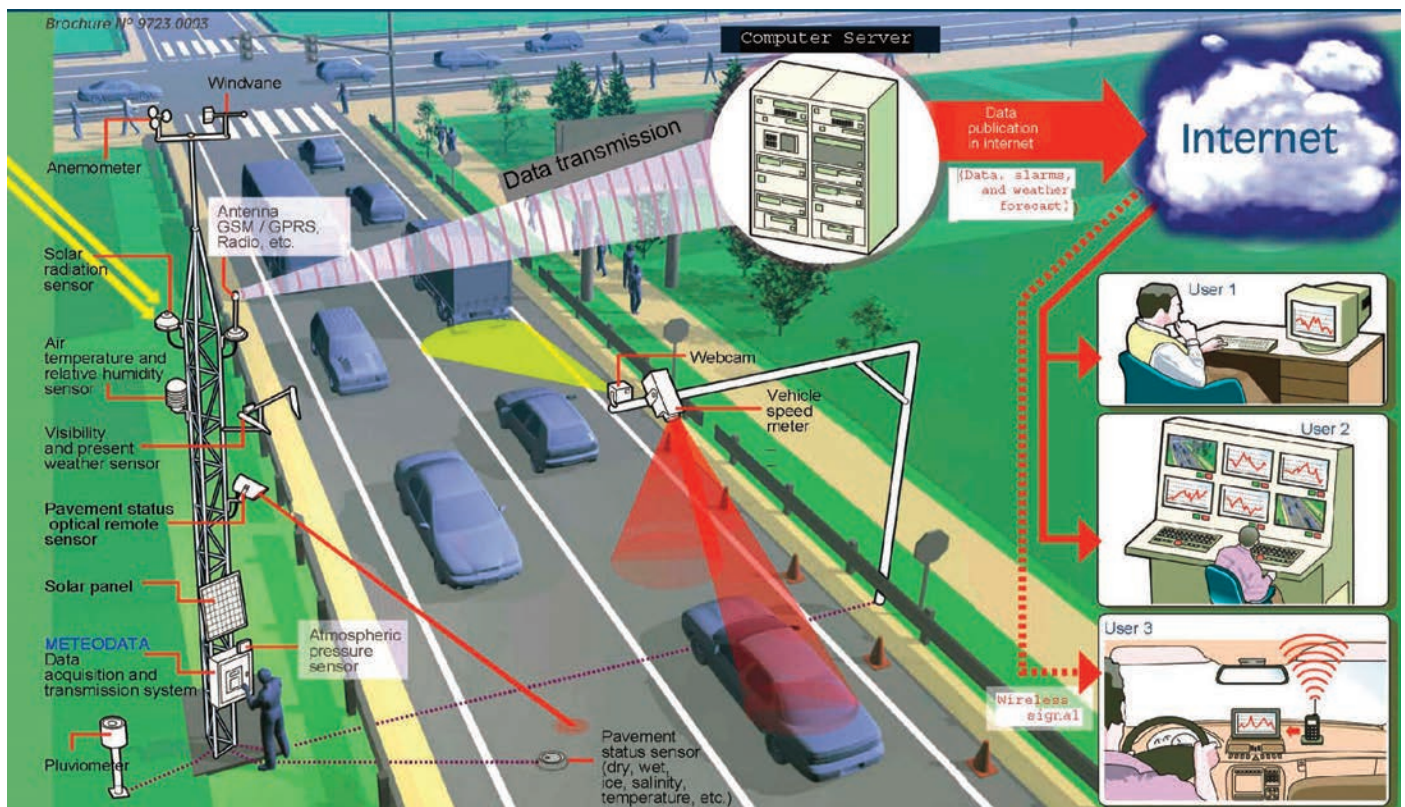
**ADVANCED SOLUTIONS
FOR INCREASED TRAFFIC SAFETY
ON ROADS AND TUNNELS**

GENERAL DESCRIPTION

The **SafeRoad®** System has been specifically designed by GEÓNICA with the aim of offering advanced solutions for increased road safety, integrating an entire series of new technologies which cover the measurement, process, transmission and spreading of environmental data that can be of significant importance for the safety of the circulating vehicles. The **SafeRoad®** System incorporates as well different types of traffic detectors, classifiers, counters and speed metres for vehicles, which are very useful for the authorities and those responsible for road and motorway management and conservation.

The illustration below shows a complete diagram of the **SafeRoad®** System. The data collected from all meteorological sensors, pavement status metres, vehicle detectors and web cameras are stored in the Data Acquisition and Transmission Unit model METEODATA-3000C. All the information is transmitted in quasi-real time to a central computer through the different available methods (radio, optical fibre, GSM / GPRS / 3G or through the Internet), where the data is finally processed, and published on a WEBTRANS server, for general or restricted user access.

CONFIGURATION OF THE SafeRoad® System



THE **SafeRoad®** System CONSISTS OF THE FOLLOWING FUNCTIONAL SUBSYSTEMS:

- Environmental meteorological sensors, for thermal soil flow and pavement status
- Vehicle detectors, counters/classifiers and speed meters. See our DATACAR solution.
- Remote Data Acquisition and Transmission Unit model METEODATA-3000C powered by internal batteries with solar panel charger or mains
- Data transmisión network via radio, GSM/GPRS/3G, Internet, optical fibre, etc.
- Protocols: (DGT) UNE 135441-2 / (NTCIP) NTCIP 1204 V03
- WEBTRANS where the information is spread via Internet to the different system users including warnings, alarms and meteorological predictions
- Digital cameras for still images transmission

METEOROLOGICAL SENSORS

- ◇ Wind speed and direction
- ◇ Temperature and relative humidity of the air
- ◇ Precipitation and present weather, with an indication of the type of meteor:
 - Rain
 - Drizzle
 - Snow / sleet
 - Ice patches, etc.
- ◇ Visibility with indication of:
 - MOR range
 - Clear
 - Haze
- ◇ Solar radiation
- ◇ Atmospheric pressure

SUBSOIL SENSORS

- ◇ Subsoil temperature sensors
- ◇ Thermal flow sensors

WEBCAM (DIGITAL CAMERAS)

- ◇ Digital cameras for capturing and transmission of images to a Central Station.

VEHICLE MULTILANE COUNTERS / CLASSIFIERS

- ◇ Different Technologies: Microwave (MW), Ultrasonic (US), Infrared (IR).
- ◇ Include: optical detectors (IR), ultrasonic and RADAR under individual or combined assembly, for:
 - MultiLane operation
 - Traffic density
 - Detection of stationary traffic
 - Detection of traffic jam
 - Count speed and classification of vehicles
 - Determination of separation between vehicles
 - Detection of movement direction (suicide drivers).

TUNNEL SENSORS

- ◇ Visibility (MOR and EXCO)
- ◇ Axial Wind
- ◇ Tunnel entrance photometer
- ◇ Luxometer
- ◇ Gas detectors: CO , NO₂ , NO

FOG ON THE ROAD?

BAD VISIBILITY?

ICE, SNOW, WATER ON THE ROAD?

GEONICA integrates an entire series of meters in its **SafeRoad®** System, which are capable to establish the range of visibility (MOR Meteorological Optical Range) in meters, according to the definition of the WMO, as well as the status of the present weather, indicating the existence or non-existence of precipitation, its intensity, as well as the specific type of meteor:

- | | |
|-------------------------|-----------------|
| • Rain | • Mist |
| • Intense precipitation | • Snow |
| • Frozen rain | • Haze |
| • Fog | • Ice patches |
| • Drizzle | • Clear weather |



PAVEMENT SENSOR (INTRUSIVE or NON-INTRUSIVE)

The pavement status sensor measures the pavement conditions via multi-sensor block inserted in the roadbed.

Measured parameters:

- ◇ Roadbed temperature
- ◇ Freezing point temperature
- ◇ Pavement status:

- . Wet
- . Humid
- . Dry
- . Ice presence
- . Content in salts
- . Risk of ice formation
- . Presence of snow
- . Thickness of the water plate



METEODATA-3000C FIELD UNITS



As a centralising element for all the information and signals coming from the different sensors and field detectors of the Safe Road® System, we offer the METEODATA-3000C series, an extensive range of Data Acquisition and Transmission Stations. They are provided with different number of channels

depending on the client's needs and offer immense data storage capacity, as well as the possibility to transfer information to a Central Computer, via Radio, GSM/GPRS/3G, Wireless, Internet, etc.

DATA RECEPTION CENTER

HARDWARE

In the Central Station a typical configuration includes the following elements:

- Communications Hardware for the reception of data transmitted by the Remote Stations (e.g. GSM modems, switching devices, Satellite Receivers, etc.)
- Communications (TELETRANS) Server: for querying data from the Remote Stations
- Database Server, including SQL Database
- Web Server: That hosts the Web Hosting Service (WEBTRANS)
- Optional workstations: For one / several users stations management as Client mode

For a small size layout Communications SW and Database may be settle in the same Server. The Central station admits both for servers and Communication Hardware fully redundant giving the System maximum robustness.

MANAGEMENT SOFTWARE

GEONICA SUITE 4K is a set of software programs for Remote Stations configuration and Data Management. The software package runs under Windows operating system. The software components are described below:

✦ TELETRANS-W4K

- Remote communication with stations
- Wide variety of communication systems supported: GSM, GPRS, 3G UMTS/WCDMA, Wi-Fi, WiMAX, Fiber Optic, Ethernet, ISM Radio, RS232, RS485, USB, Satellite (Inmarsat, Thuraya, Insat, Meteosat, GOES, etc), etc.
- Data storage remote request
- Instantaneous data display on tables /charts
- Request of images captured by the stations
- Station settings: time, channels, etc.
- Basic and advanced test of station features
- Calibration of stations and sensors
- Automatic execution of tasks
- Station firmware / configuration update
- Compatible with high availability cluster
- "Keep Alive" function included
- Fully automated and unattended operation

✦ DATAGRAPH-W4K

Query

- View real time data, statistical and historical charts and graphs
- Reporting
- New virtual parameters from existing ones
- Alarms display
- Easy display of parameters with bit-coded data

Maps and Information

- Display of station's status data on map
- Latest data on map
- Display of weather forecasts and camera/radar/satellite images

Monitoring

- Data in real time displayed by means of "gauges"
- Full customization of monitoring environment

WEBPOSTING SOFTWARE

A very valuable option offered by **GEONICA** with the **DATACAR**, is the possibility of WEB Posting, in such a way to provide worldwide access via INTERNET to the historical and instant values of all the parameters measured at the remote station.

Data visualization in Internet is possible thanks to **WEBTRANS Ubiquitas** Application. User is granted to access of his account and look at the traffic parameters any number of remote terminals (number of stations depends on the server configuration).

Some examples of Performance Monitoring graphics are shown at the next page: