



DAY 1

MARA NORD PROJECT- TRAINING 2010

LESSON 5: INSTALLATION OF GPR SYSTEM TO SURVEY VEHICLES, WHAT SHOULD BE KNOWN



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Contents

1. Antenna mounting
2. Ground coupled antennas – protection vs coupling
3. GPR unit inside the van
4. Traffic safety

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AIR COUPLED ANTENNA MOUNTING

Height of the Air Coupled Antenna (and distance to the vehicle)

Rule of thumb:

"Antenna height should be about 1,5 times the wave length in the air".

- For instance 1.0 GHz antenna wavelength is approx. 30 cm => antenna height should be 45 cm from the pavement.
- Remember antenna bouncing!



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### AIR COUPLED ANTENNA MOUNTING

- A. In front of the vehicle
  - + good protection from other cars
  - + driver sees the antenna all the time
  - + better positioning, easy to use markers and match video
  - blocks video view
  - national traffic safety regulations



- B. Behind the vehicle
  - + good view for video
  - very sensitive to damages
  - difficult to use exact markers



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Bounce preventing straps



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### Special installations



Surveying road edge



Traffic safety regulations



2D antenna array for 3D surveys



Horn and GC antenna setup

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### Covering/protecting



- Plastic bag: simple, cheap and effective!

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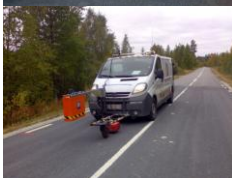
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### GROUND COUPLED ANTENNA MOUNTING

- A. In front of the vehicle
  - + good protection from other cars
  - + better positioning
  - more difficult assembly(?)
  - blocks video view
- B. Behind the vehicle
  - + easier installation(?)
  - cannot be seen, risk of damaging the antenna
  - difficult to use exact markers
  - dust and mud from the wheels



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IDS Dual frequency



GSSI 1.5 GHz

Dust and moisture protection:  
• Mud guards, antenna covers



GSSI



3d Radar

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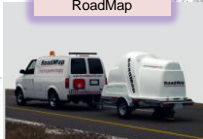
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Malá Geoscience

Sensors & Software RoadMap



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IDS



3D-Radar



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Carts and special assemblys



GSSI



3D-Radar



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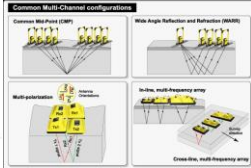
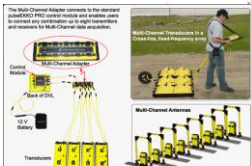
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### Carts and special assemblies



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- Secure mounting of Central Unit inside the van
- laptop/user interface ergonomics and safety
  - ✓ visibility to road
- easy access for contact check/cable
- enough power
- careful and protected installation of cables
- minimized noise sources
  - ✓ power cable installations
  - ✓ antenna cable routes
  - ✓ antenna distances from engine (or car frame – horn)
  - ✓ warning light assemblies (strobolights especially)
- antenna transportation facilities



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### TRAFFIC SAFETY

National regulations in each country for working on the road

Generally GPR surveys are nonstop surveys. Exception are the cross section surveys.

Highways and high traffic roads – special arrangements due to generally slow survey speeds compared to traffic

Warning lights, markers and plates



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**TRAFFIC SAFETY - Example of a survey vehicle**

Separate, powerful (strobo) flashers  
Used in heavy traffic/ challenging environment (bright sunlight)

Warning lights panel



Caution tape patterns

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**TRAFFIC SAFETY requirements for personnel**

Personnel, who are working on the roads, have to pass a traffic safety course

- Arbete på väg in Sweden
- Tieturva I / II in Finland
- Xxx in Norway

The course is valid for 5 years.

The personnel on the road have to also wear safety coloured clothes.

- > Help the motorists notice the personnel on the road easier
- > Always when personnel exit the vehicle



Helmet

Safety coloured clothes with reflectors

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**TRAFFIC SAFETY – announcements**

Before starting the measurements it has to give an announcement to road authority

- In Finland it has to call to 'Tienkäyttäjän linja' and announce the point in time of measurements
- In Sweden before hand an announcement via electrical TA-plan system and before and after measurements a call to traffic center (Good information <http://www.trafikverket.se/Foretag/Bygga-och-underhalla/Vag/Arbete-pa-vag/>)
- In Norway xxxxx



An example of Swedish TA-plan system

**Inloggning**

Ange dina inloggningsuppgifter

Login

Lösenord

Region - Väst region

Minn påg mig

Logga in

[Stäm av på anmälan](#)

[Hjälper till med fel](#)

Problemet att logga in i FFA - Använda servicecenter på 0800 077 988 eller 0800 170888. Tryck vidare >

0800 Östergötlands län ligger närmast i region Mälardalen

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### TRAFFIC SAFETY – examples from Sweden

Cross section survey on a low volume traffic road section



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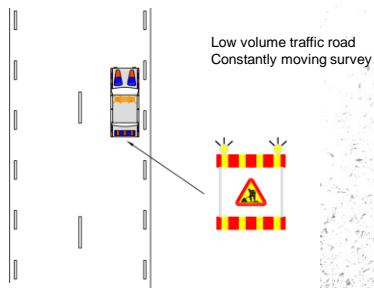
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### TRAFFIC SAFETY – examples from Sweden

Simple warning board with flashlights (Swedish regulations)



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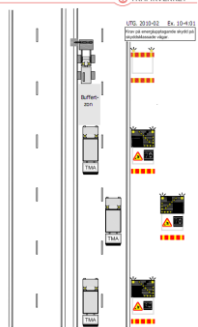
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### TRAFFIC SAFETY – examples from Sweden

Setup for highway survey in Sweden



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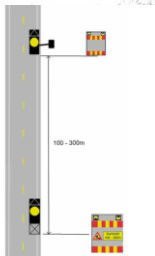
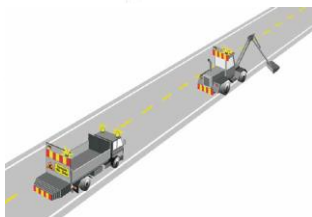
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### TRAFFIC SAFETY – examples from Norway

Moving vehicle with safety car



HÅNDBOK 051 ARBEIDSVARSLING, Vedlegg 3: Eksempler, Bevegelig arbeid med bruk av ledebil

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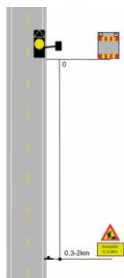
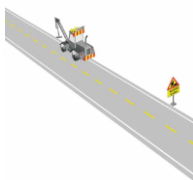
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### TRAFFIC SAFETY – examples from Norway

Moving vehicle



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### TRAFFIC SAFETY – examples from Finland

- Moving car with adequate warning signs
- Measurements in high density routes with safety car
- Bridge measurements in closed area and with separate arrangement



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