HIGHWAY INVENTORY MAPPING

The GeoLink Mapping System has been proven to provide users the ability to build accurate maps and databases for use within GIS and CAD systems. GeoResearch's GeoLink Mapping System brings the technology to field technicians that will enable them to quickly locate, record, and track attribute positions on either existing or new digital maps while inputting new data in the field. Field data collected with the GeoLink Mapping System may also be used to answer formerly unanswered questions such as sign inventories, bridge numbers, roadway changes, and physical condition of all collected graphic features.

Department of Transportation databases are typically comprised of two basic feature types: linear features, such as roadway networks, route numbers, number of lanes, and guardrails; and point features, such as signs, signals, junctions, drains, and intersections. Database information is normally tied to Mileage Reference Marker distances in order to correctly locate features. This information is of major concern to various departments within each state's Department of Transportation including the departments of planning, inventory, maintenance, and pavement management personnel.

Currently, positioning techniques of features are tracked on U. S. Geological Survey quad maps, or similar scale County maps, providing an accuracy of about 20 meters. Digital Measuring Instruments (DMI's) have also been a standard measuring technique to locate feature information. In many situations, arbitrary determination of MRM locations have resulted in errors in locating feature items.

New federal highway programs now either require or encourage accurate positioning information, including the reporting of locational data in terms of latitude and longitude. Debate has centered around whether to maintain current information and systems versus implementing new procedures which meet existing federal requirements.

The GeoLink Mapping System which links GPS location data with feature information has been recognized by many state, federal, and local agencies for its great potential in answering positional requirements. This combined technology has also been recognized as having tremendous benefits related to referencing, and analyzing locational data over long periods of time within Geographic Information System (GIS) software environments.
The GeoLink Mapping System was used on a Highway Inventory Mapping project with the South Dakota Department Of Transportation. The project demonstrated a true kinematic mode of field mapping, where data collection was accomplished from a moving vehicle along 3 major highways. Data collection was completed in only a few hours, but consisted of a complete geo-referenced database with over 2,500 attribute descriptions of the following features:

- Roadway Centerlines
- Roadway Surface Paving
- Roadway Surface Condition
- Lane Width
- Lane Number
- Roadway Jurisdiction
- Roadway Shoulder Type
- Road Names
- Speed Limits
- No Passing Zones
- Points of Roadway Change

- Road Signage
- Signage Message
- Sign Color
- Sign Condition
- Sign Support Composition
- Stop Light Sight Distances

- Mileage Reference Markers
- Bridge Locations
- Bridge MRM Number
- Bridge Condition

- Guardrail Locations
- Guardrail Type

- Railroad Crossings

The GeoLink Mapping System was run on a laptop computer, using a powerful set of macro definitions which made attribute entry fast, efficient, and reduced the likelihood of data entry or transcription error. Multiple attribute description fields were often tied to a single geographic point or linear feature. With the function key setup in GeoLink, one function key made calls to other function keys for additional attribute tagging, and quick field data entry. Function key picklists were created to recall the attribute options for the features. For example, the attribute for Roadway Shoulder Type was either Concrete, Asphalt, Curb, or Gravel, and the options were presented for selection in a picklist form. Other attributes, like Bridge MRM Numbers, were selected from a picklist downloaded from an existing bridge number database at the South Dakota Department of Transportation.
As geographic features were encountered on the planned route, entries were made with the GeoLink Mapping System on the laptop computer. User-definable feature offsets located the graphic features in their true geographical location without having to leave the vehicle. As features were encountered, offsets were input in either Azimuth bearings, or directions, and given an offset direction from the GPS antenna on the vehicle.

All GeoLink-collected features were differentially corrected to obtain a positional accuracy of 2-5 meters. The corrected data files were translated through the GeoLink Data Manager and output into a format compatible with the GIS system of the South Dakota Department of Transportation. The intelligent GIS features were accurately represented geographically, and retained the collected attribution.

After the South Dakota Department of Transportation completes their state-wide highway inventory with the GeoLink Mapping System, they will benefit from a detailed GIS database of data managed on a day-to-day basis. This will provide decision making support, inventorying assistance, and maintenance scheduling in an automated system never before possible. GeoLink equipped field crews can easily download the GIS data into the GeoLink Mapping System, providing field locational positioning for necessary field work and instant updating of the GIS database.