Survey Management System (SMS)

…the one in all solution

SMS Applications

SMS Applications

- The focus of SMS is in the use of survey information. With automated data collection and processing, the surveyors and engineers are enabled to concentrate on survey information management.
- Typical SMS applications include:
  - Topographical Surveys
  - Network Levelling
  - Rail and highway Construction
  - Utilities Survey for Positioning Pipelines and Conduits
  - Monitoring Structural Deformation, such as:
    - Monitoring Cracks
    - Determining transverse bending in bridges
  - Geology and Soil Mechanics, such as:
    - Ground creep
    - Large-scale sinkage
    - Analyzing the consequences of earthquakes
    - etc.

SMS Applications

Deformation Monitoring

- As part of Facilities Management, Monitoring plays a key role in civil engineering and environmental management.
- SMS provides precise survey results suitable for applications in subsidence and settlement monitoring.
- SMS allows management to cope with higher frequencies of surveying activities with the same level of manpower.
- SMS is unique in providing excellent and comprehensive tools for monitoring Structural Deformation.
- SMS can be customized so that cycle selection and designation of base, previous and current visits (Epoch) is automated, with options that include random comparisons.
- The survey party performs the survey and the SMS software compute the movements, generate charts and provide trend analysis.
- System is flexible and will accommodate 3-D input such as GPS/Traverse.
- Results are instantly available upon completion of field activity, Fig. 7-1.
- With the surveyor's familiar interface, the use of the software is easy, allowing users with limited knowledge of computers to achieve instant computerization.

SMS Applications

...Applications - Monitoring Contd.

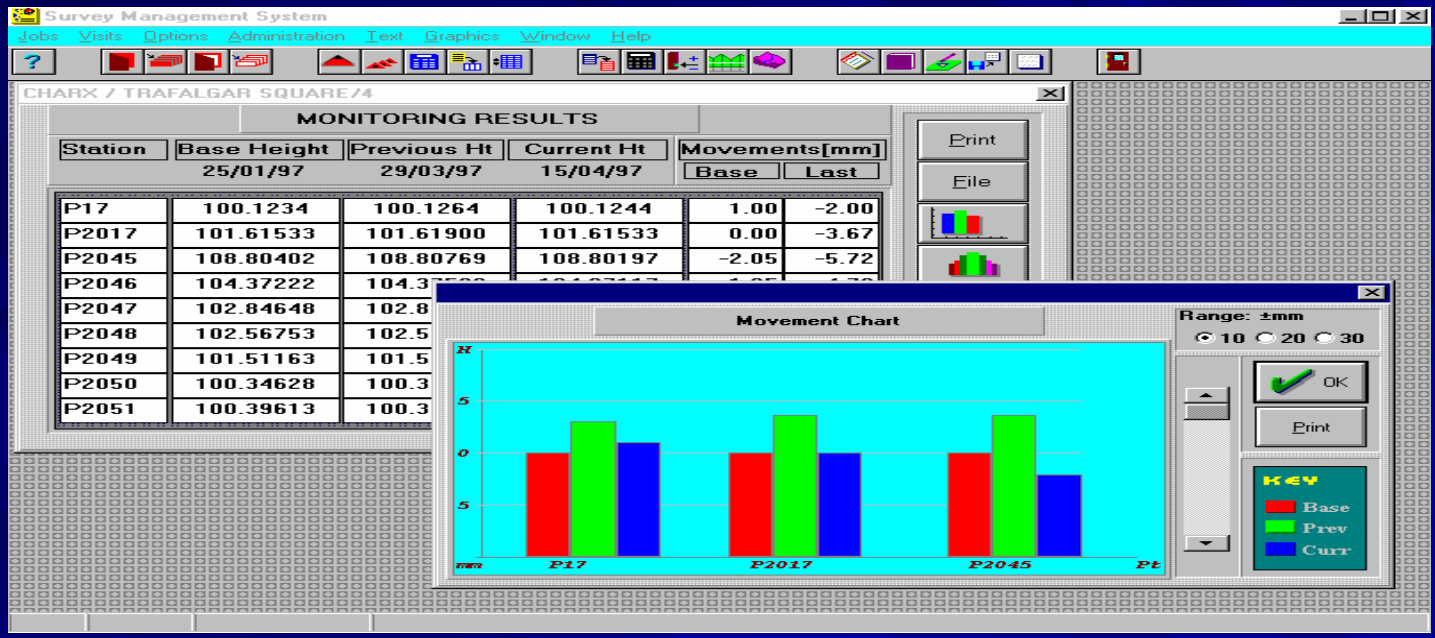

Fig. 7-1

- Trend Analysis charts the history of movements from any chosen base reference.
- The result is presented in tables and high quality 3-D graphical images viewed on the screen or sent to the printer.
- SMS is a complete all-in-one suite such that the use of external graphic packages is not necessary, Fig. 7-2.
- The survey results may be generated in cross-sections if desired.

SMS Applications

…Applications - Monitoring Contd.

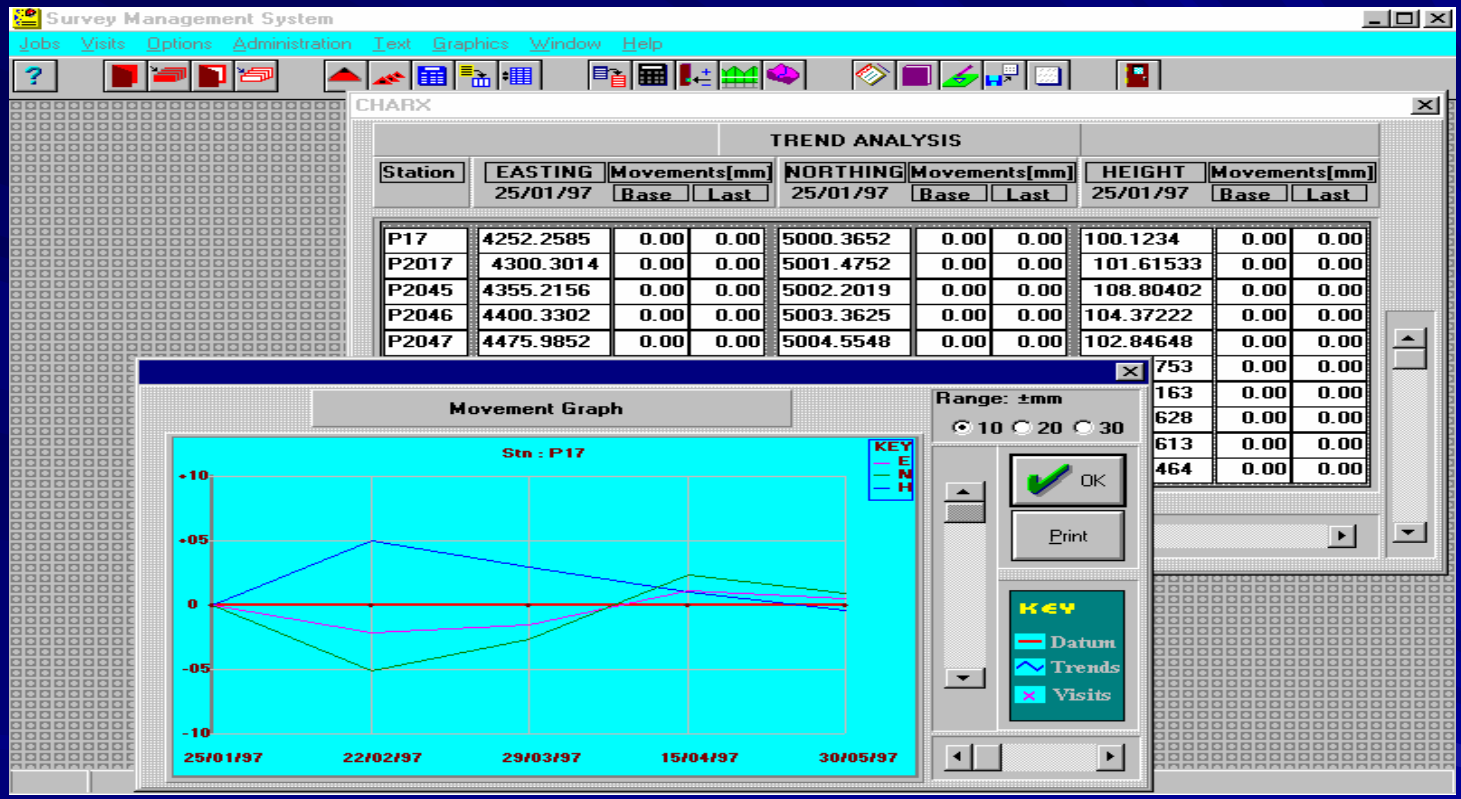

Fig. 7-2

- SMS highlights movements from user-specified tolerance to a depth of seven cycles, Fig. 7-3.

SMS Applications

…Applications - Monitoring Contd.

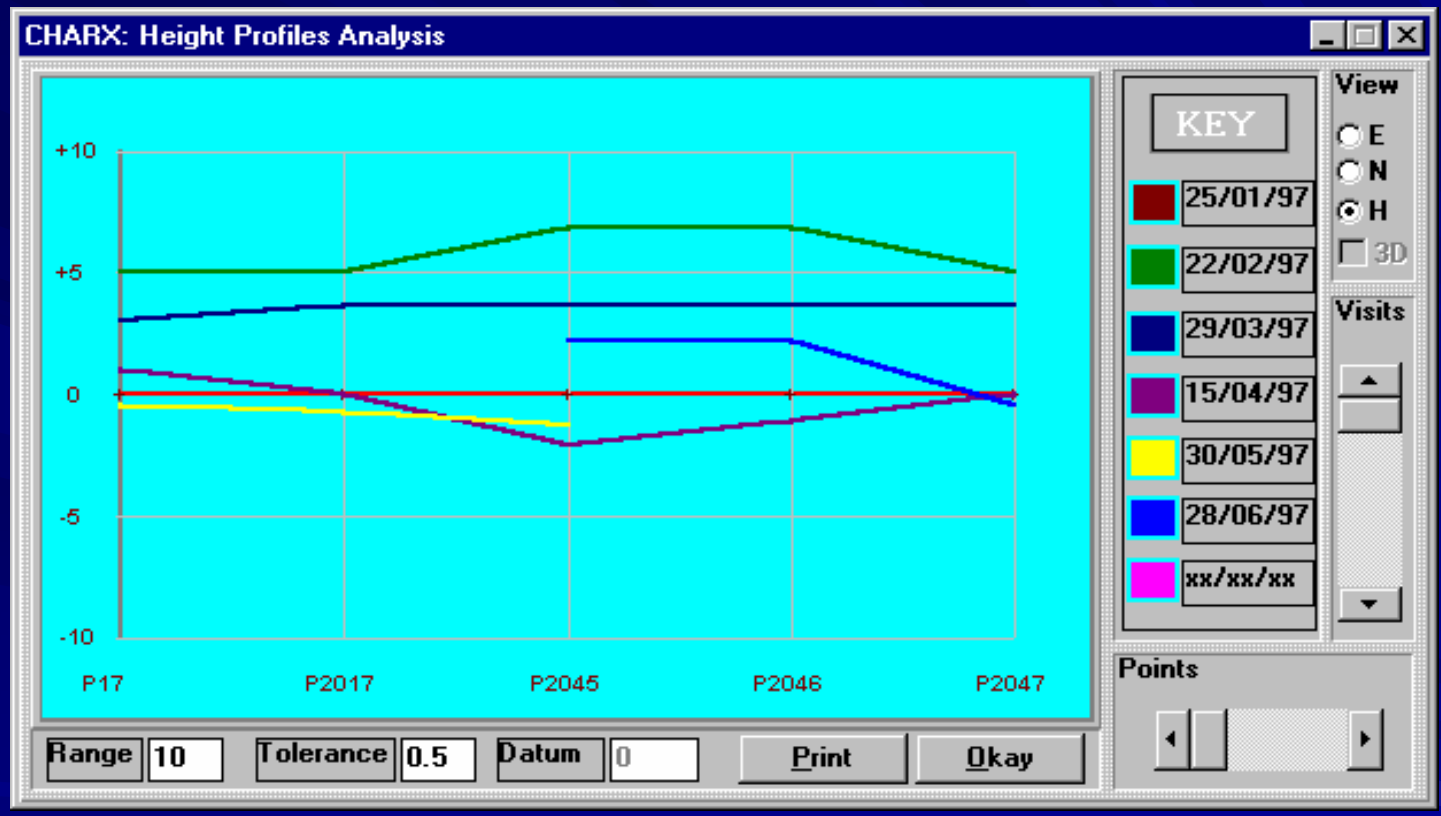

Fig. 7-3

- The tabulated and graphical survey results may be delivered to a Printer or saved to a disk in ASCII or SMS file format.

SMS Applications

Earthwork Information

- Volume computation is a major requirement in civil and construction engineering.
- SMS software has excellent facilities to utilize level information for the following projects in Civil Engineering:
  - *Road Works*
  - *Dredge Quantity*

SMS Applications

Road Works

- Longitudinal profile is available in every level run using a digital level, where staff readings and distances are measurable.
- There is a dedicated database for this activity, Fig. 8-1.

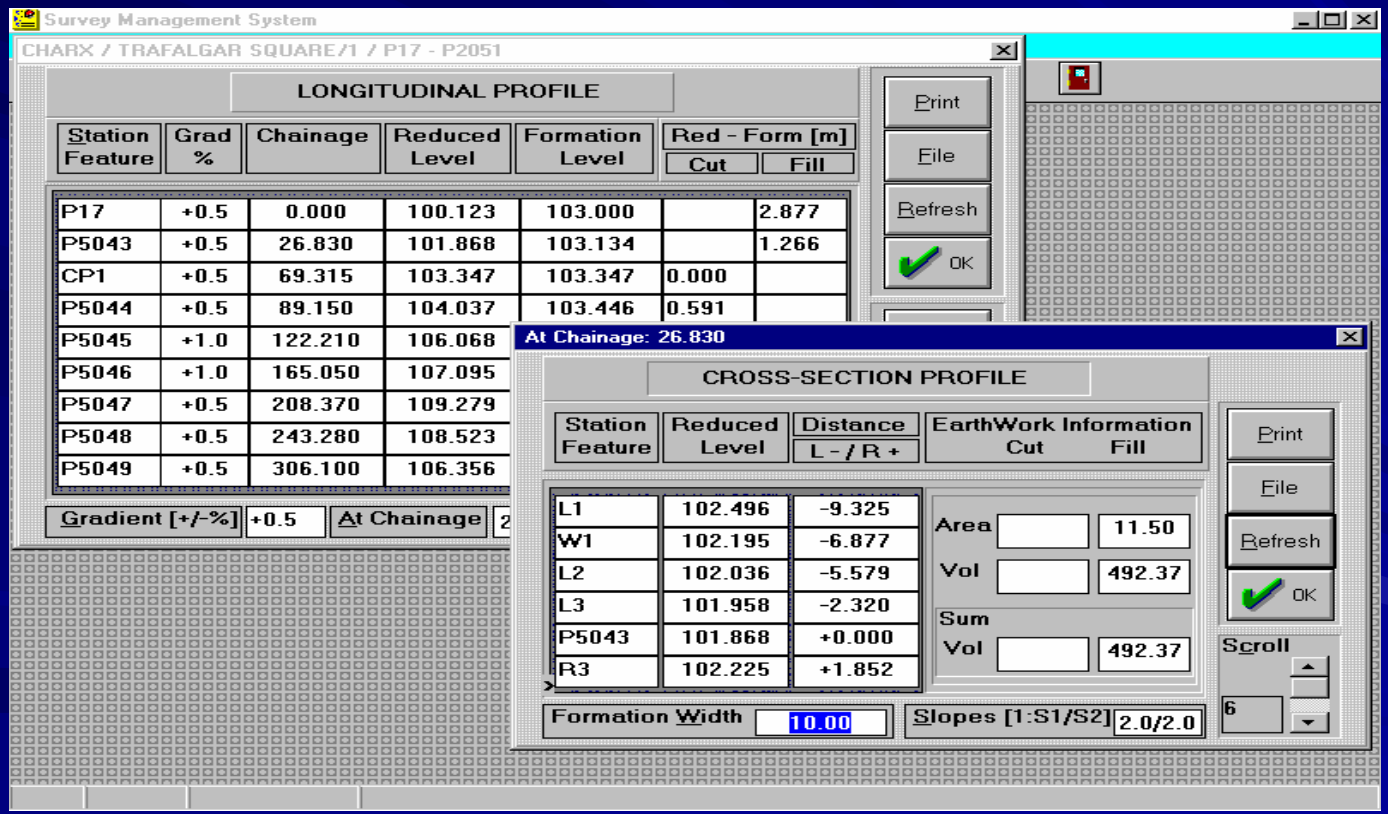

Fig. 8-1

SMS Applications

…Applications – Road Works Contd.

- Based on the survey model, SMS provides for input of gradients as well as formation level.
- Cross-sections and volumes may be determined at the job site.
- Graphic output, Fig. 8-2 produced on a printer is excellent.
- There are options for output to custom file formats.

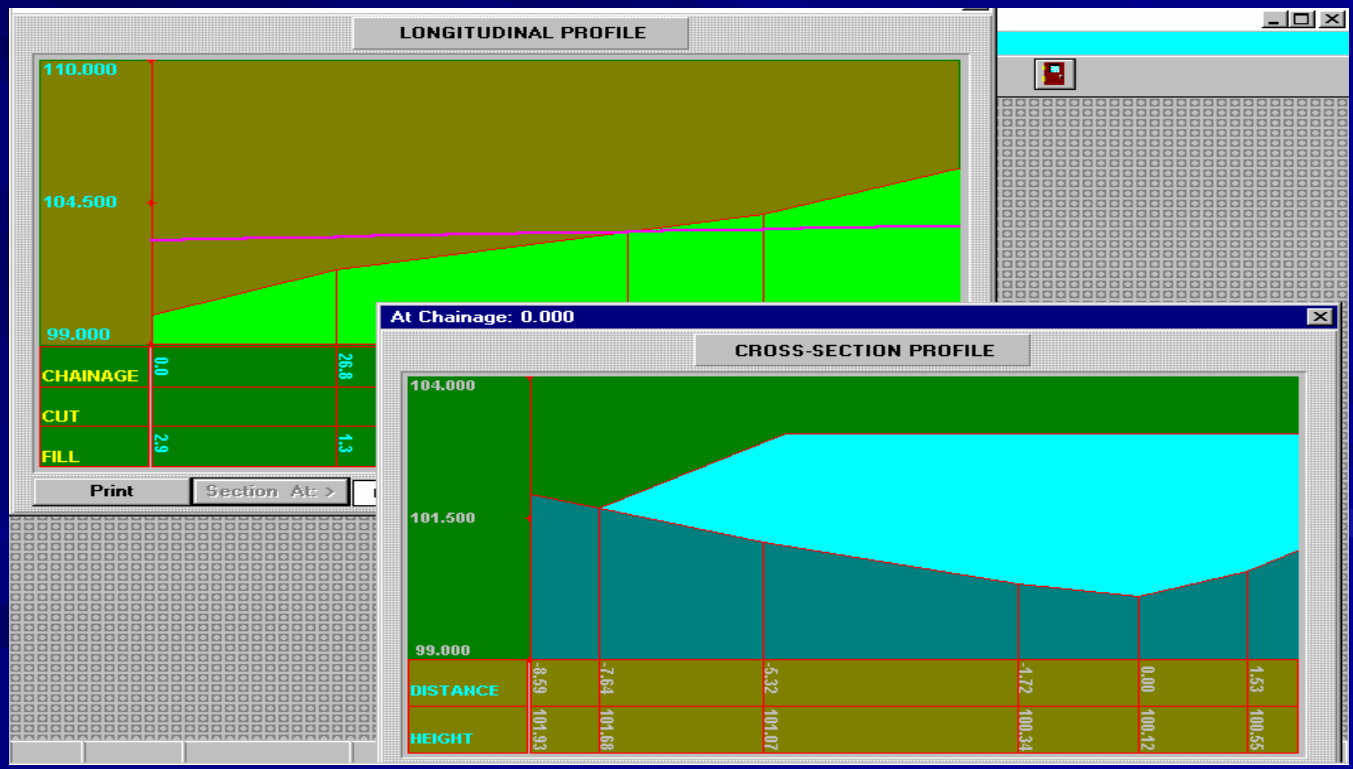

Fig. 8-2

SMS Applications

…Applications – Road Works Contd.

- Volumes are tabulated to assist quantity analysis.
- Design and topography may be visualised or realised in a 3-D diagram, Fig. 8-3.
- There are also tools to save the output to a file.

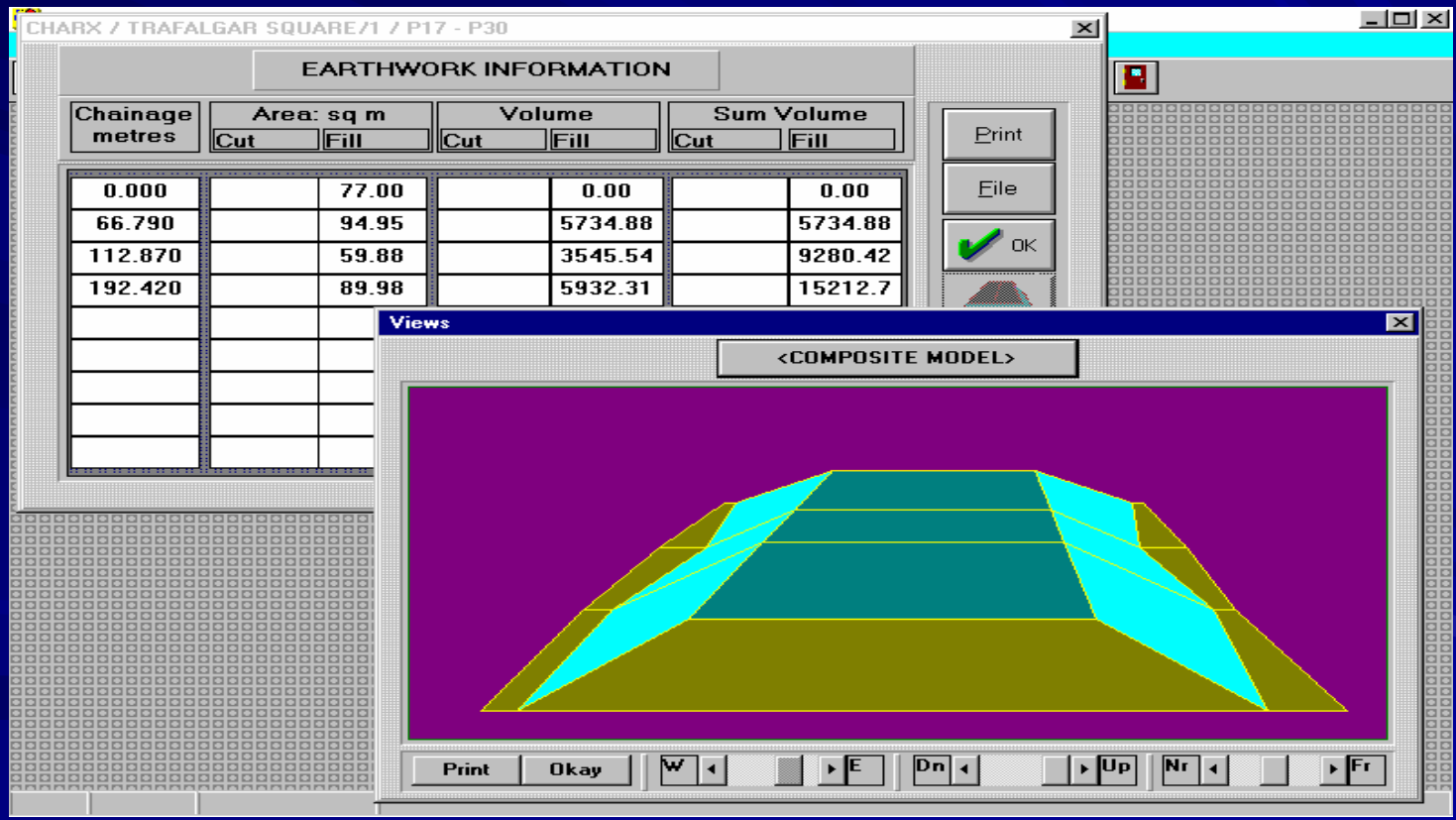

Fig. 8-3

SMS Applications

Dredge Quantity

- Quantity of dredge is available from two data types:
  - Soundings.
  - Levels.
- There are two spreadsheet-like tables for data input, pre and post survey. A third table, Fig. 8-4, is for post-editor, useful in defining depth ceiling and boundary demarcations.

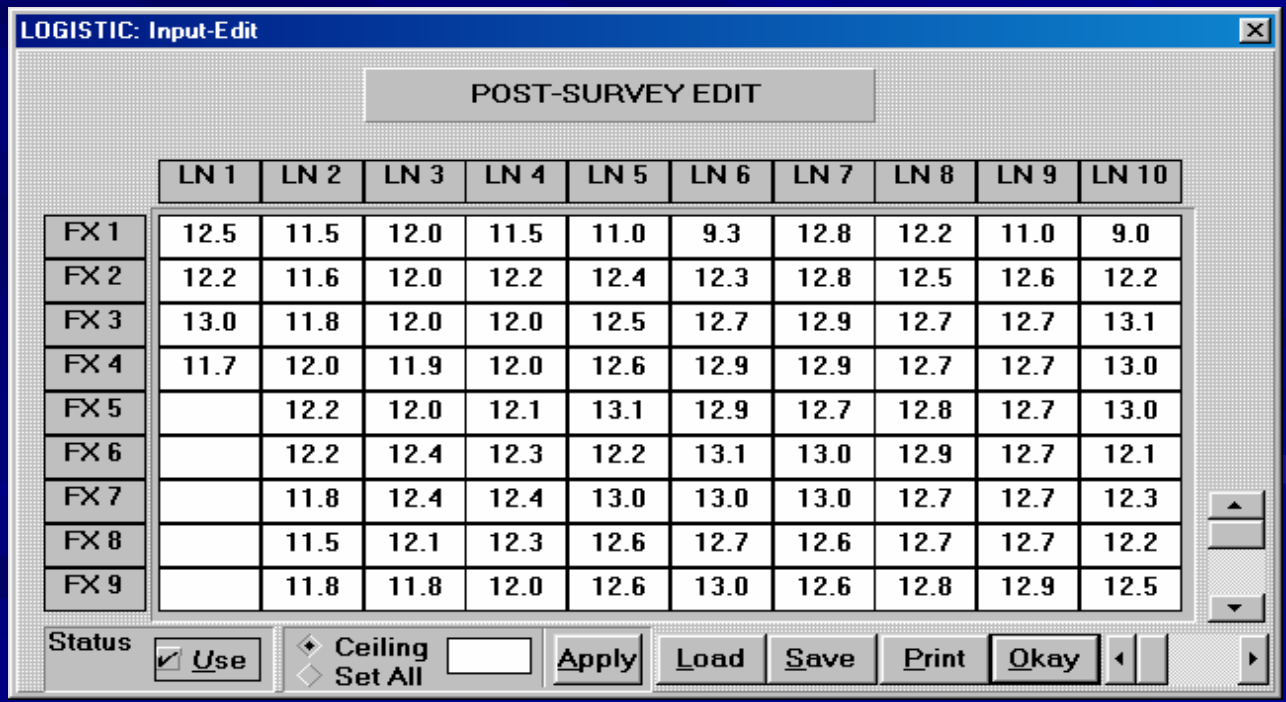

Fig. 8-4

SMS Applications

Applications – Dredge Quantity Contd.

- The dredge module is managed as records in a database system.
- The database fields allow textual descriptions of up to 1000 characters.
- This is complemented by graphical display of Line Profiles, Cross-Sections and terrain model of pre-survey observations.
- The database fields are illustrated in Fig. 8-5.

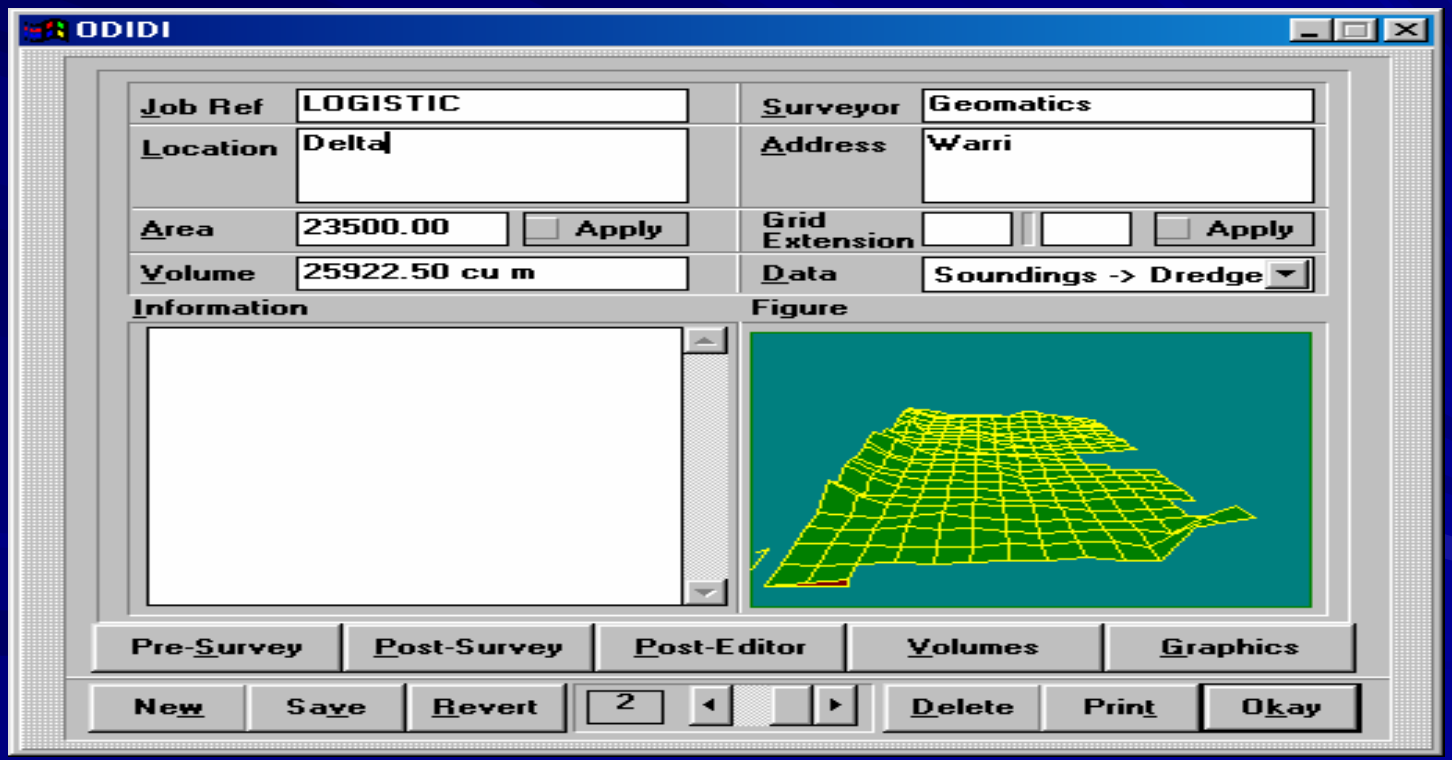

Fig. 8-5

SMS Applications

Applications – Dredge Quantity Contd.

- Area and volume are computed for each grid and tabulated.
- Volume computation is automatic and precise.
- There is option to specify area during computation.
- Computed volume is very accurate and depends on the quality of data and grid network.
- Moreover, SMS processes soundings as well as levels in computing dredge and sand-fill quantities.
- The resulting plans / models of the survey may be visualized on the screen or reproduced on a printer.

SMS Applications

Land Information

- SMS provides Land Record as the basis of a land information system.
- The module includes 2-D Traverse, hence the integration of survey fieldwork and land records.
- Land Record System is a database with capabilities for graphical data fields and capacity to hold up to 16,000 records in a compact job file.
- The database reads output files from traverse computations.
- Input and editing may be manual and processing includes boundary descriptions such as bearings and distances.
- Land records system is unique in providing graphic plans of survey to the standards of cartography without the requirement of a CAD package.
- With the familiar surveyor's interface, the use of the system is easy, allowing surveyors with limited knowledge of computers to achieve instant automation.
- Attributes include ownership, area of parcel, graphic plan and historical information, Fig. 9-1 and Fig. 9-2.

SMS Applications

Applications – Land Information Contd.

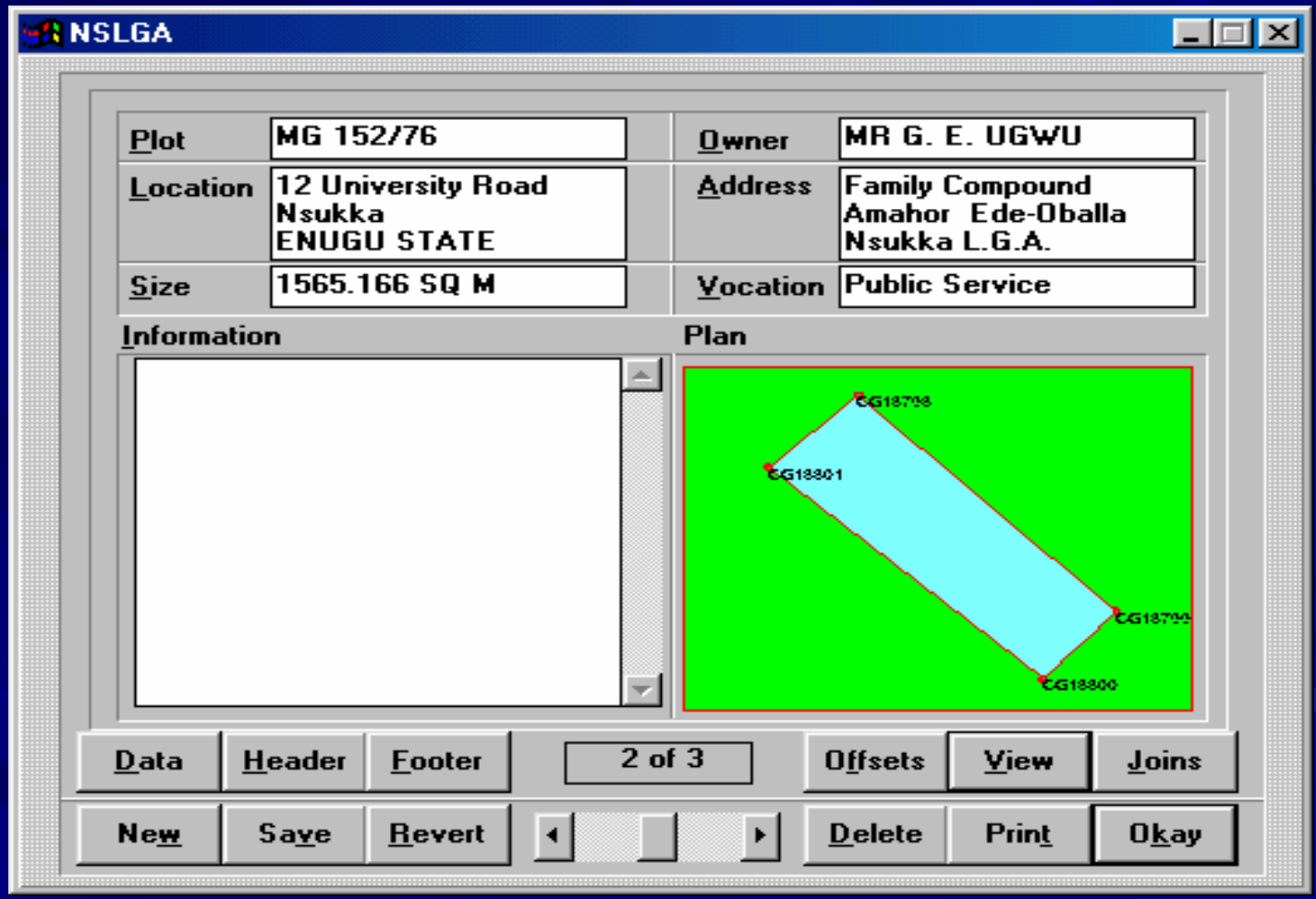

Fig. 9-1

SMS Applications

Applications – Land Information Contd.

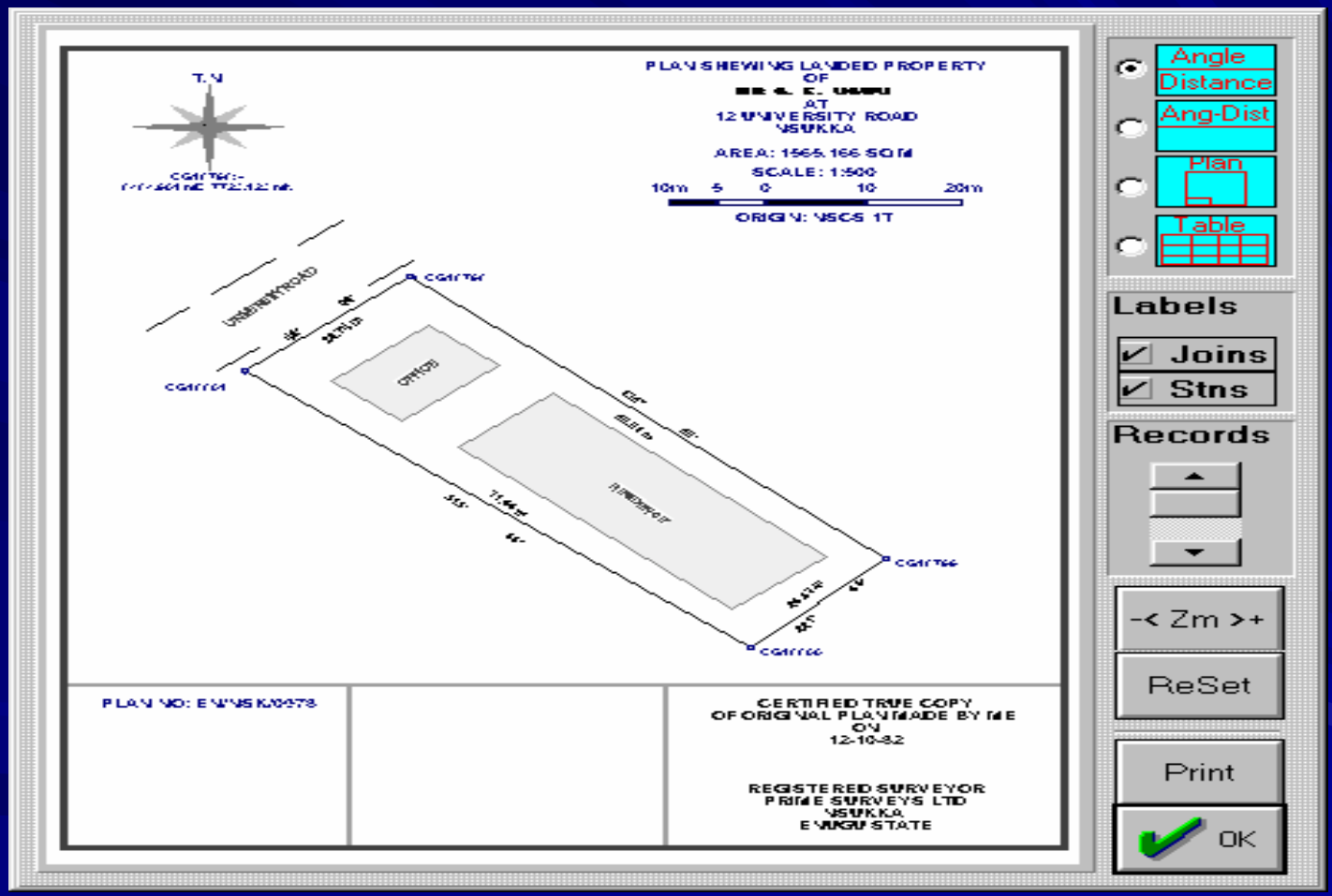

Fig. 9-2

SMS Applications

Quality Assessment

- SMS adopts standard techniques to qualify the reliability of available information.
- The instrument standard error is incorporated in computations to determine the precision of a position.
- Hence, the station may be quoted at this accuracy standard.
- Histograms are included to further assist in analysis, such as in computations, Fig. 10-1.

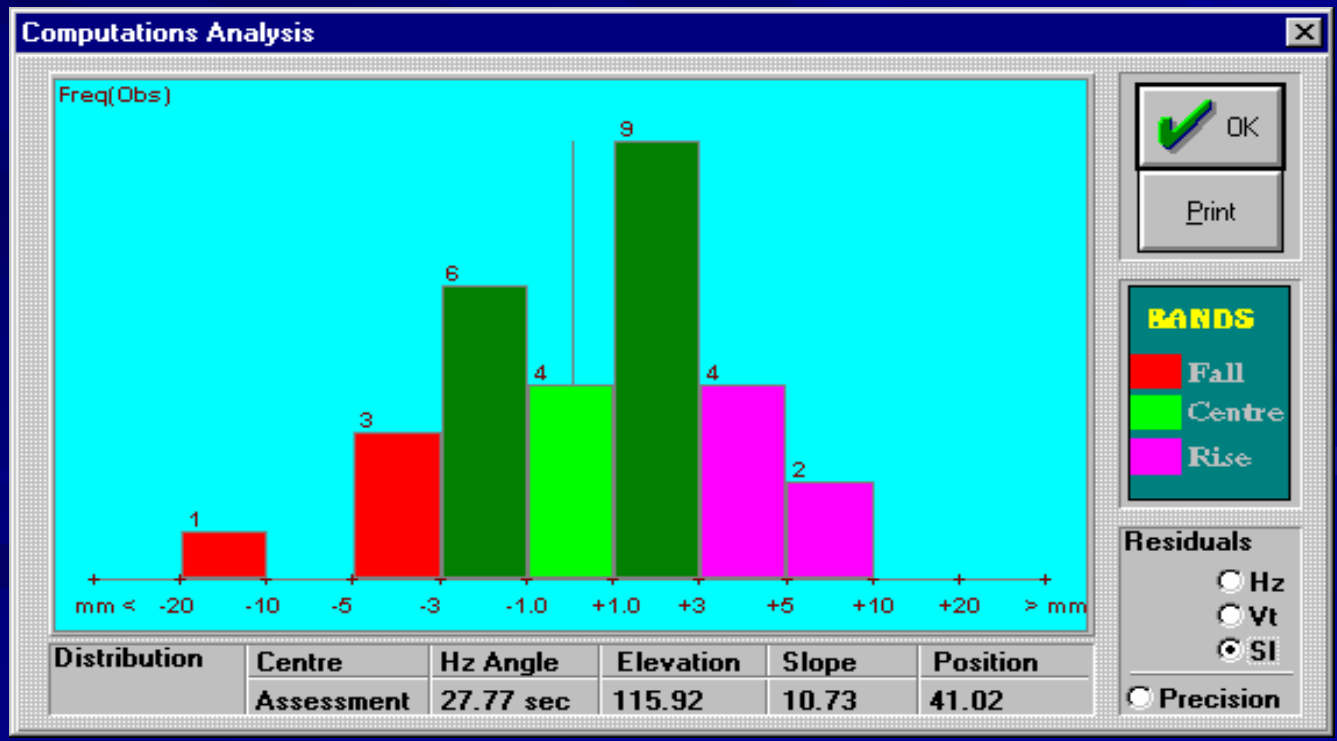

Fig. 10-1

SMS Applications

…Applications - Quality Assessment Contd.

- A useful parameter is assessment representing 99% of distribution.
- It may be used to set tolerance in the projects or qualify movements in deformation monitoring and analysis, Fig. 10-2.

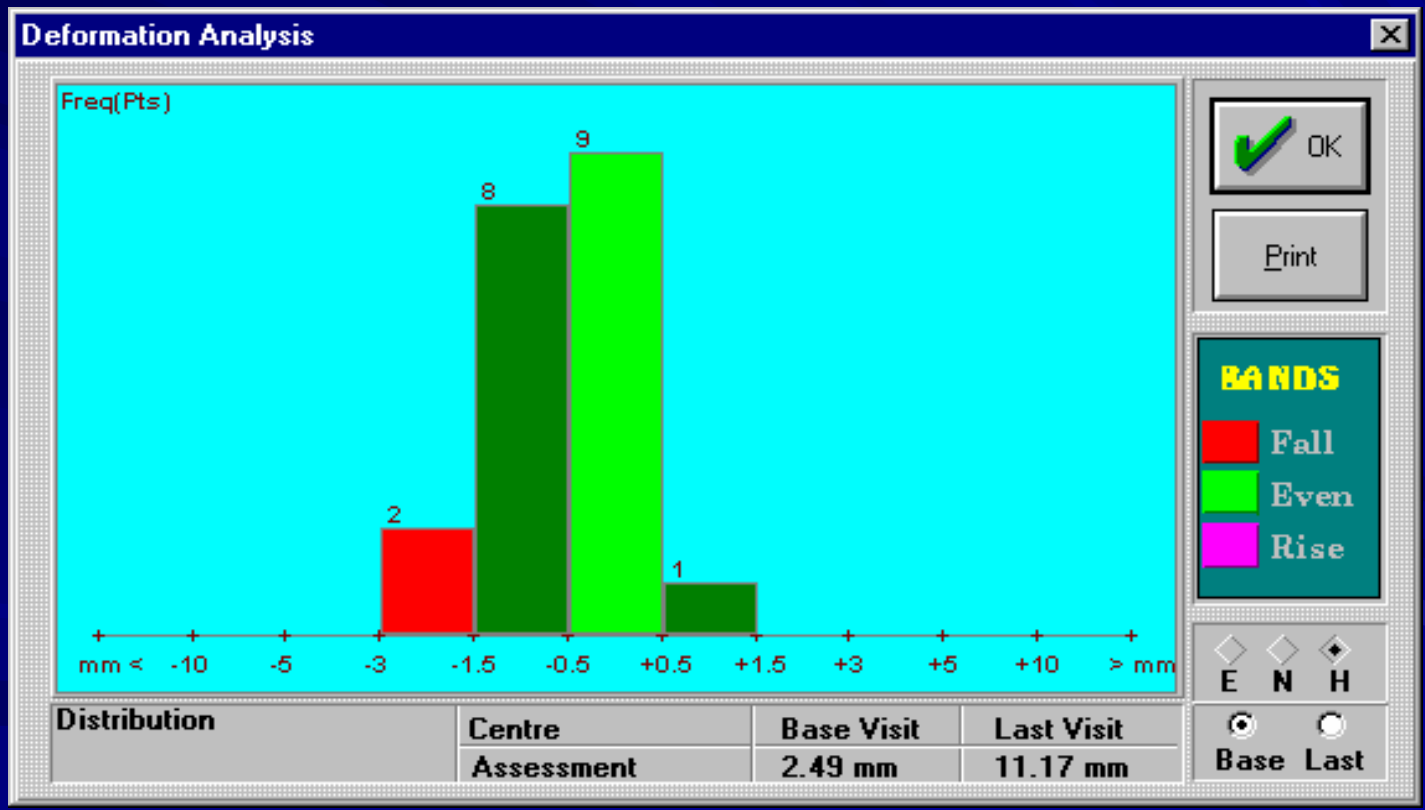

Fig. 10-2

SMS Applications

End of Presentation

- This is the end of the SMS applications presentation.

- SMS Software package is provided as follows:
  - 1. A complete package consisting of all five core programs, fully integrated as follows:
    - *Field Book and Data Interface*
    - *Level Network Analysis*
    - *3-D Traverse Computations and Tachometry*
    - *Subsidence and Deformation Monitoring*
    - *Level Profiles/Section/Volume Computations with Dredge/Sand-Fill Quantities*.
  - 2. A separately stand-alone package consisting of one or more of the programs listed in (1) above.
- Need additional information? Please e-mail peca@pecaconsult.com