

# 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.

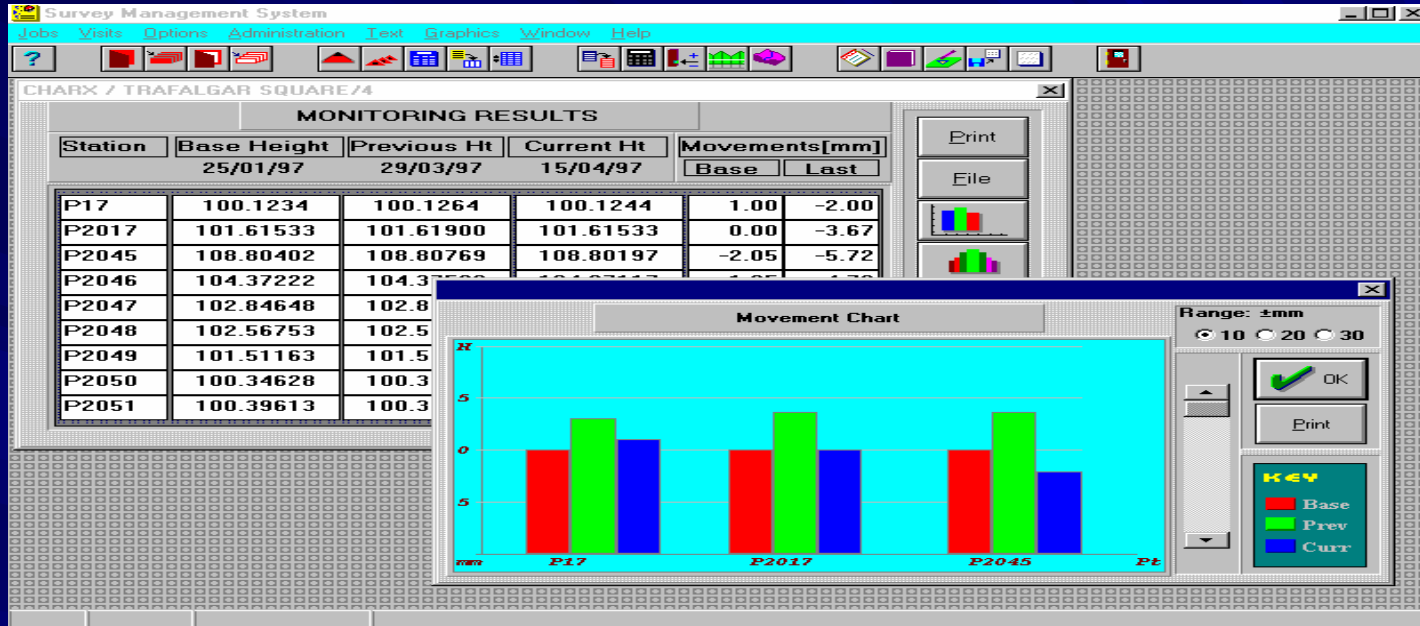


Fig. 7-1

- 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.

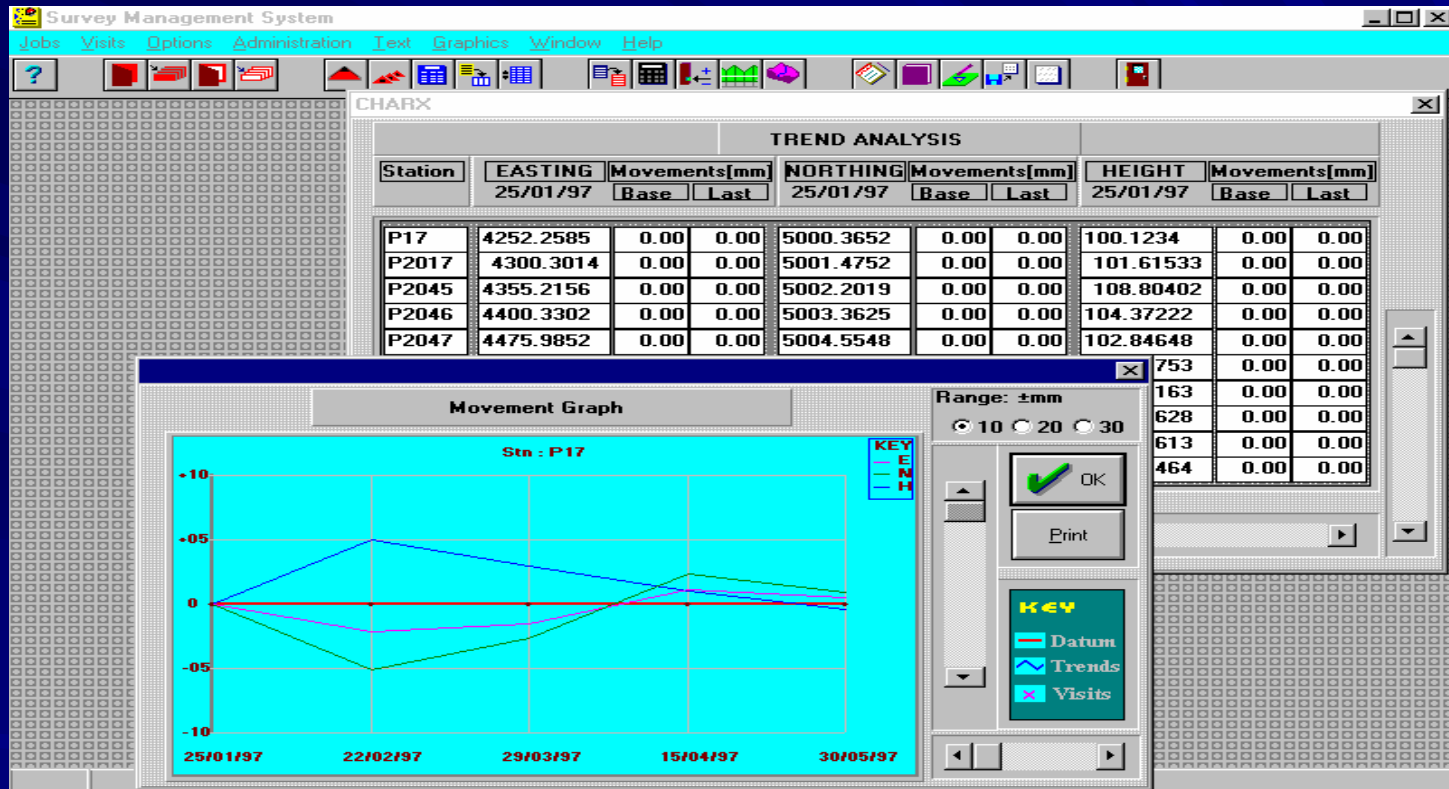


Fig. 7-2

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

# SMS Applications

...Applications - Monitoring Contd.

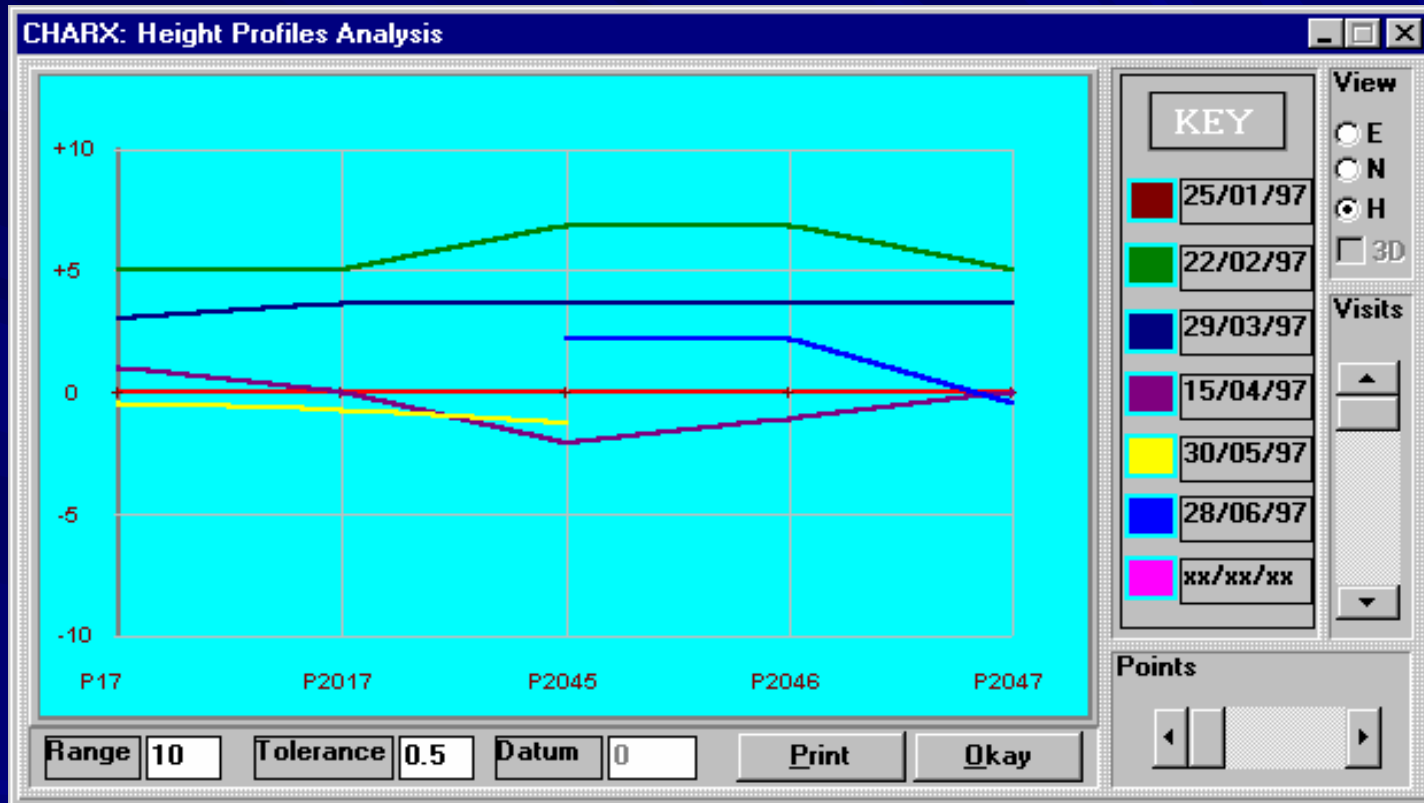


Fig. 7-3

- 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.

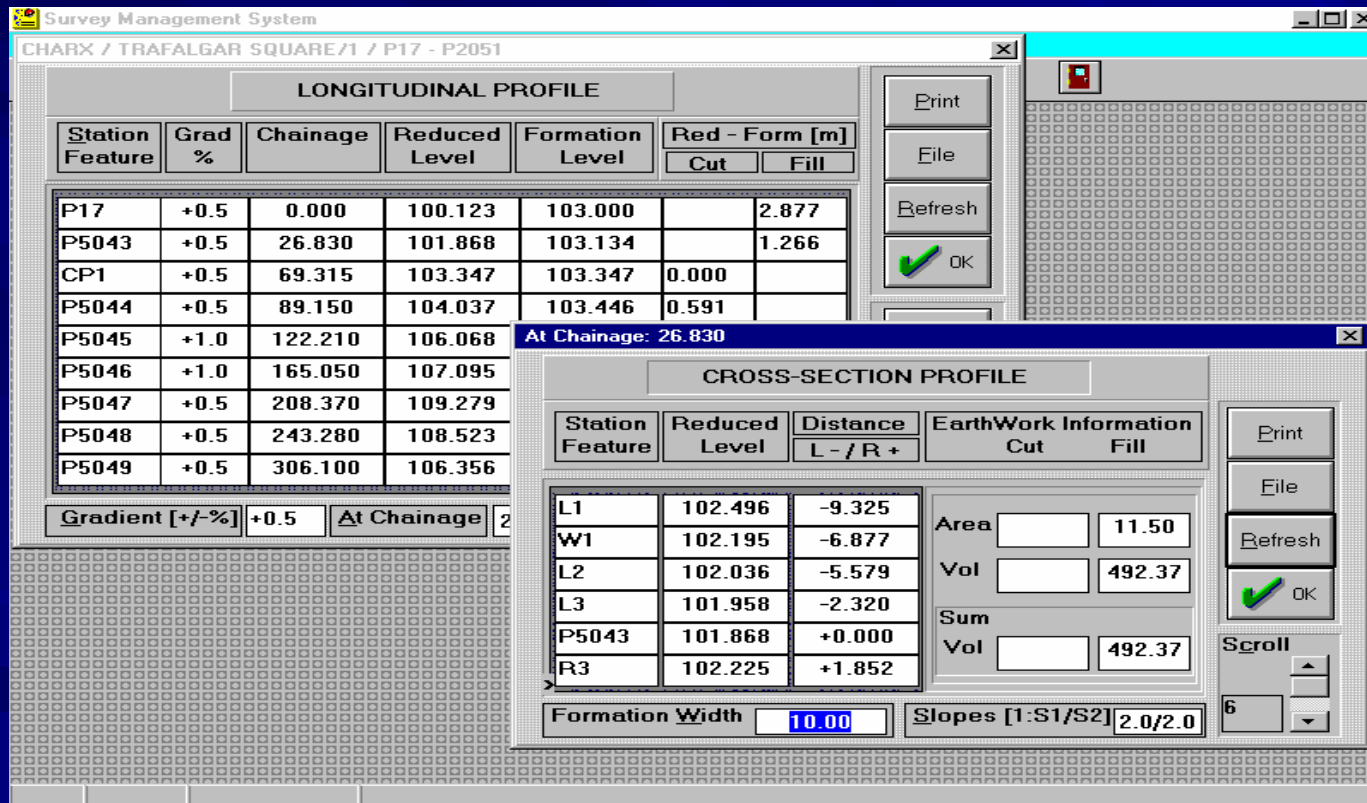


Fig. 8-1



# 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.

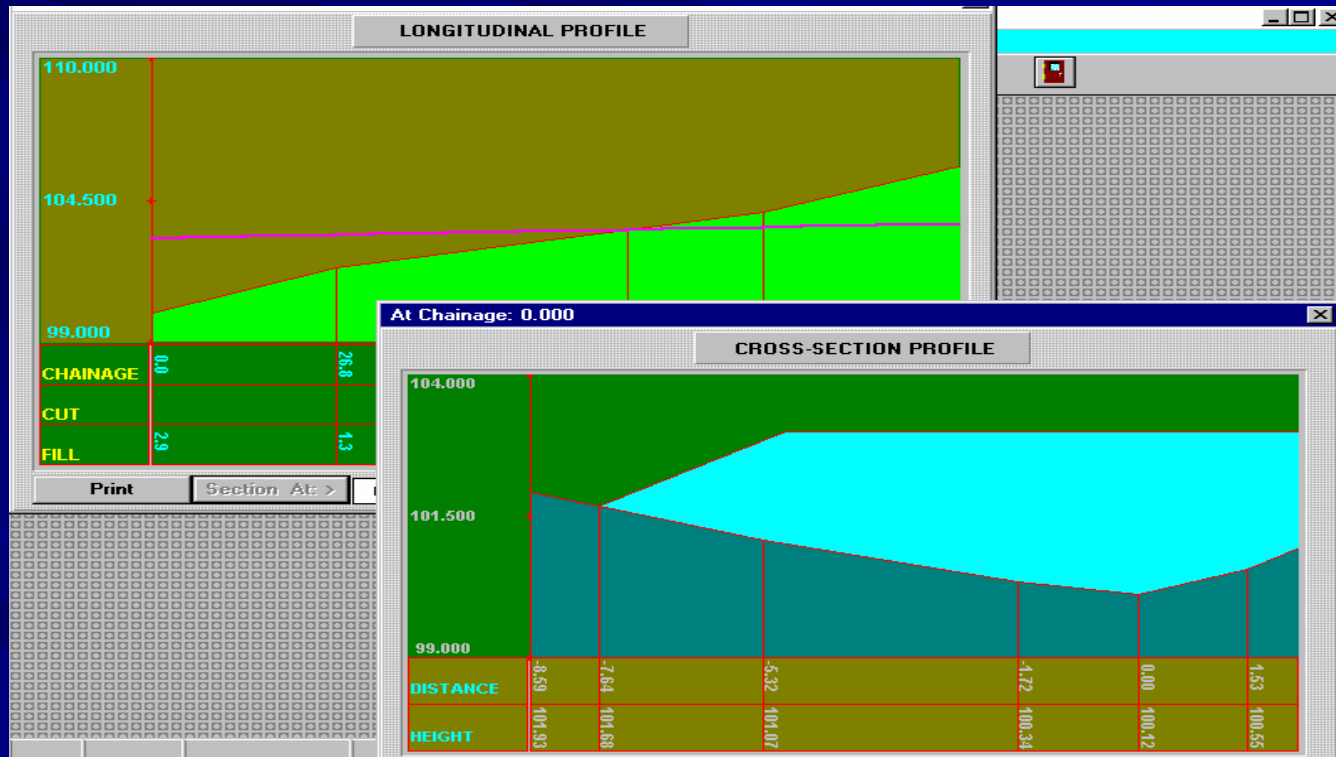


Fig. 8-2

# 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.

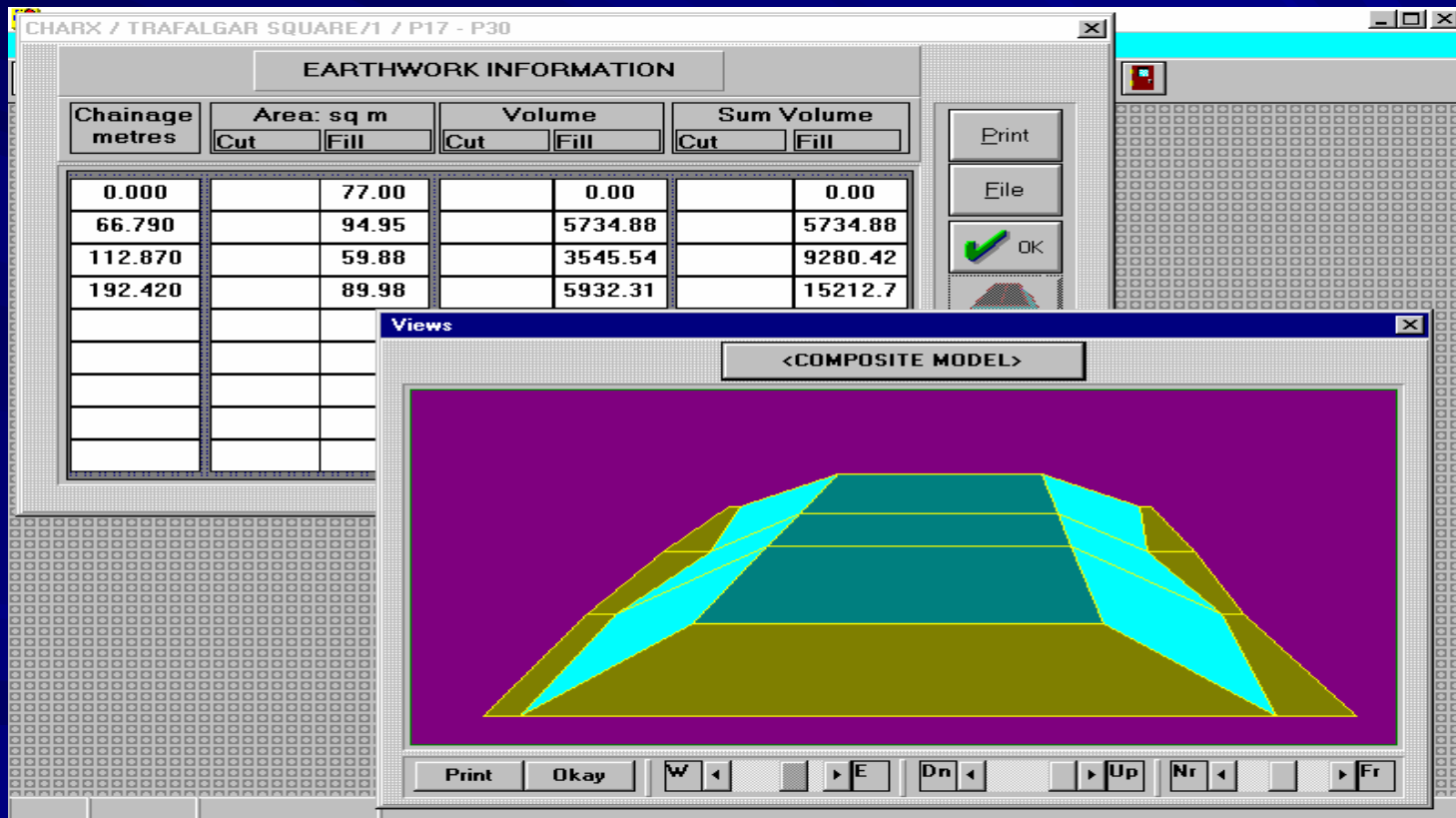


Fig. 8-3

# 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.

The screenshot shows a software window titled "LOGISTIC: Input-Edit" with a sub-window "POST-SURVEY EDIT". The main area contains a table with 10 columns labeled LN 1 through LN 10 and 9 rows labeled FX 1 through FX 9. The table contains numerical values representing dredge quantities. Below the table is a control panel with a "Status" label, a checked "Use" checkbox, a "Ceiling Set All" option with a diamond icon and an empty input field, and buttons for "Apply", "Load", "Save", "Print", and "Okay".

	LN 1	LN 2	LN 3	LN 4	LN 5	LN 6	LN 7	LN 8	LN 9	LN 10
FX 1	12.5	11.5	12.0	11.5	11.0	9.3	12.8	12.2	11.0	9.0
FX 2	12.2	11.6	12.0	12.2	12.4	12.3	12.8	12.5	12.6	12.2
FX 3	13.0	11.8	12.0	12.0	12.5	12.7	12.9	12.7	12.7	13.1
FX 4	11.7	12.0	11.9	12.0	12.6	12.9	12.9	12.7	12.7	13.0
FX 5		12.2	12.0	12.1	13.1	12.9	12.7	12.8	12.7	13.0
FX 6		12.2	12.4	12.3	12.2	13.1	13.0	12.9	12.7	12.1
FX 7		11.8	12.4	12.4	13.0	13.0	13.0	12.7	12.7	12.3
FX 8		11.5	12.1	12.3	12.6	12.7	12.6	12.7	12.7	12.2
FX 9		11.8	11.8	12.0	12.6	13.0	12.6	12.8	12.9	12.5

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.

The screenshot displays the ODIDI software interface. The main window contains a data entry form with the following fields:

Job Ref	LOGISTIC	Surveyor	Geomatics
Location	Delta	Address	Warri
Area	23500.00	Grid Extension	<input type="checkbox"/> Apply
Volume	25922.50 cu m	Data	Soundings -> Dredge

Below the form, there are two panes: "Information" (empty) and "Figure" (displaying a 3D terrain model). At the bottom, there is a toolbar with buttons for "Pre-Survey", "Post-Survey", "Post-Editor", "Volumes", "Graphics", "New", "Save", "Revert", "2", navigation arrows, "Delete", "Print", and "Okay".

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.*

The screenshot displays the NSLGA software interface. At the top, the title bar reads "NSLGA". The main window is divided into several sections:

<b>Plot</b>	MG 152/76	<b>Owner</b>	MR G. E. UGWU
<b>Location</b>	12 University Road Nsukka ENUGU STATE	<b>Address</b>	Family Compound Amahor Ede-Oballa Nsukka L.G.A.
<b>Size</b>	1565.166 SQ M	<b>Vocation</b>	Public Service

Below the table are two panels: "Information" (currently empty) and "Plan". The "Plan" panel shows a green field with a light blue polygon representing the plot. The vertices of the polygon are labeled with coordinates: CG18798 (top), CG18801 (left), CG18800 (bottom), and CG18799 (right).

At the bottom of the window is a control panel with the following buttons and elements:

- Buttons: **Data**, **Header**, **Footer**, **Offsets**, **View**, **Joins**
- Page indicator: 2 of 3
- Buttons: **New**, **Save**, **Revert**, **Delete**, **Print**, **Okay**
- Navigation arrows: left, right, and a central square button.

Fig. 9-1

# SMS Applications

## Applications – Land Information Contd.

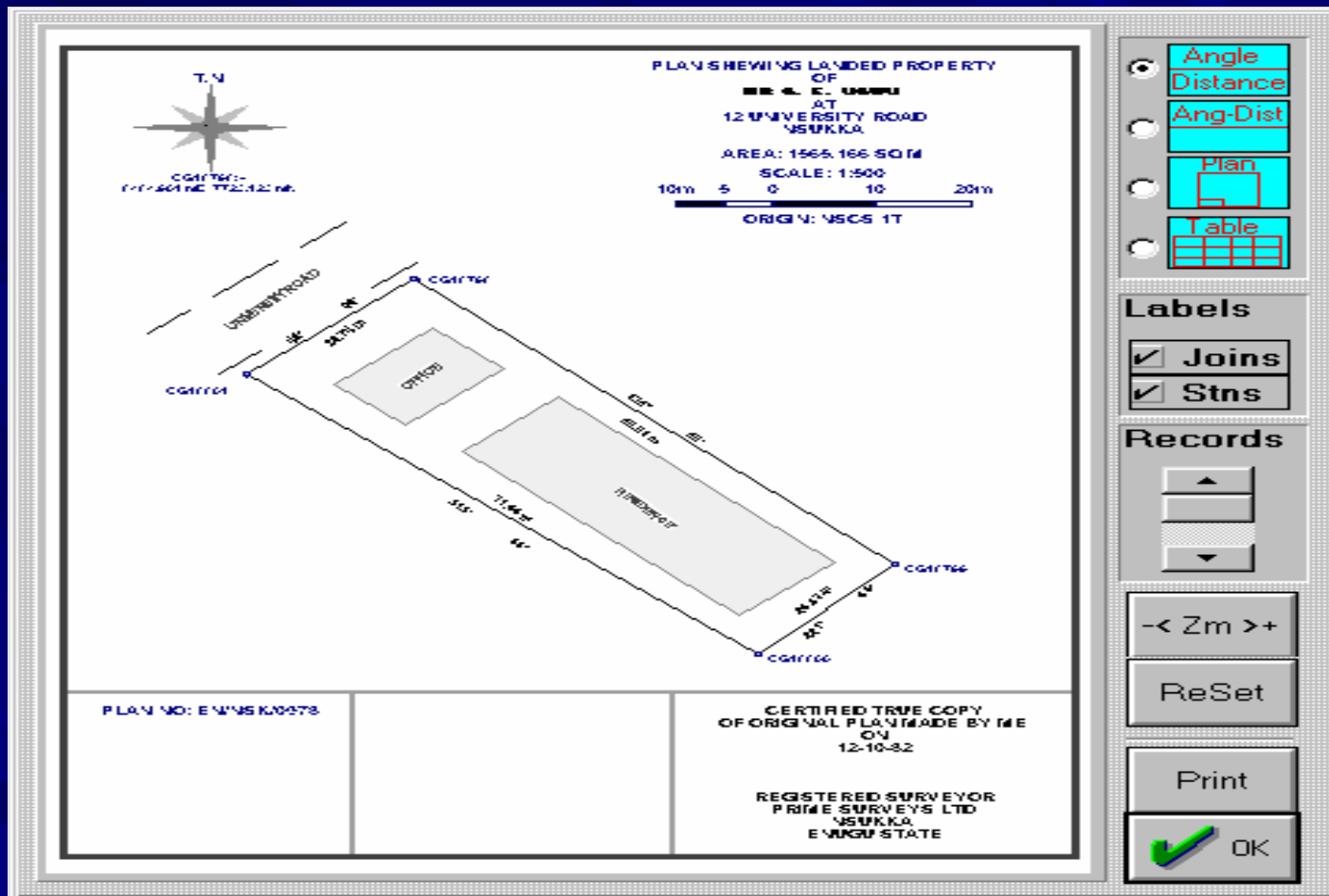


Fig. 9-2



# 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.

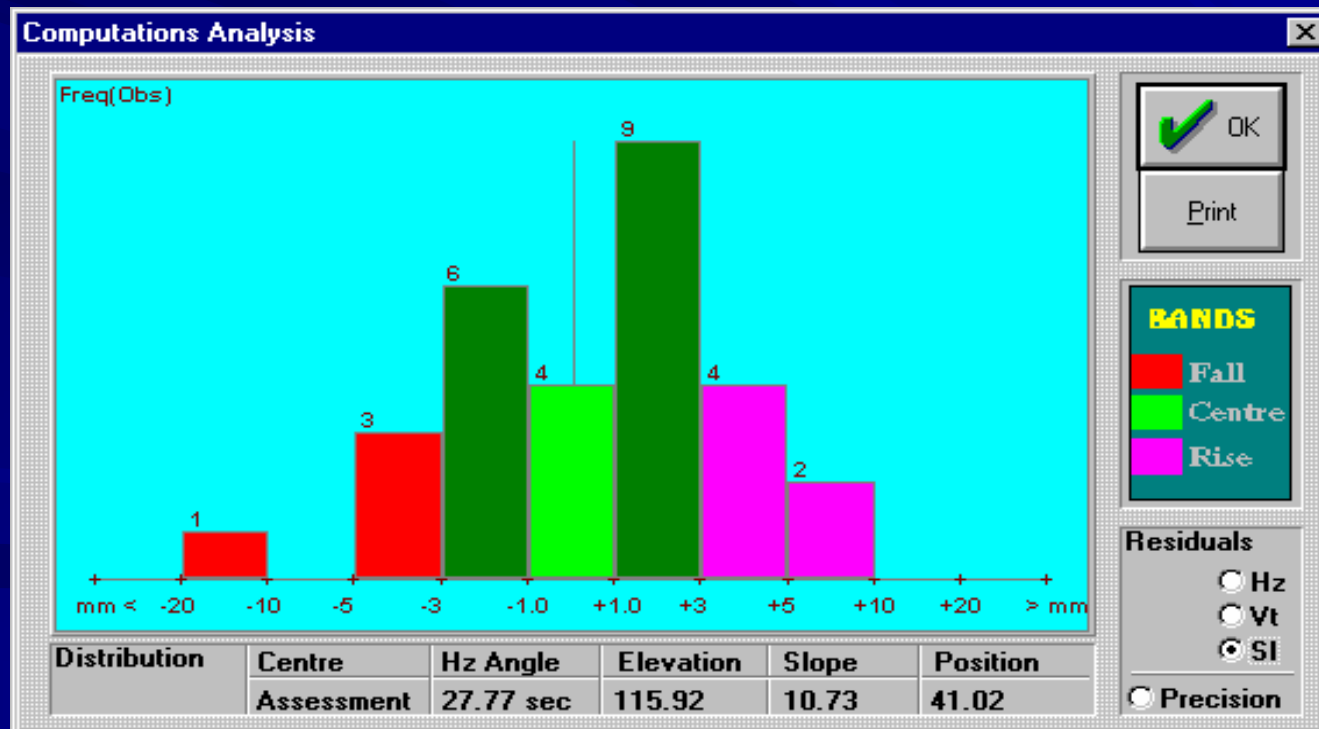


Fig. 10-1

# 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.

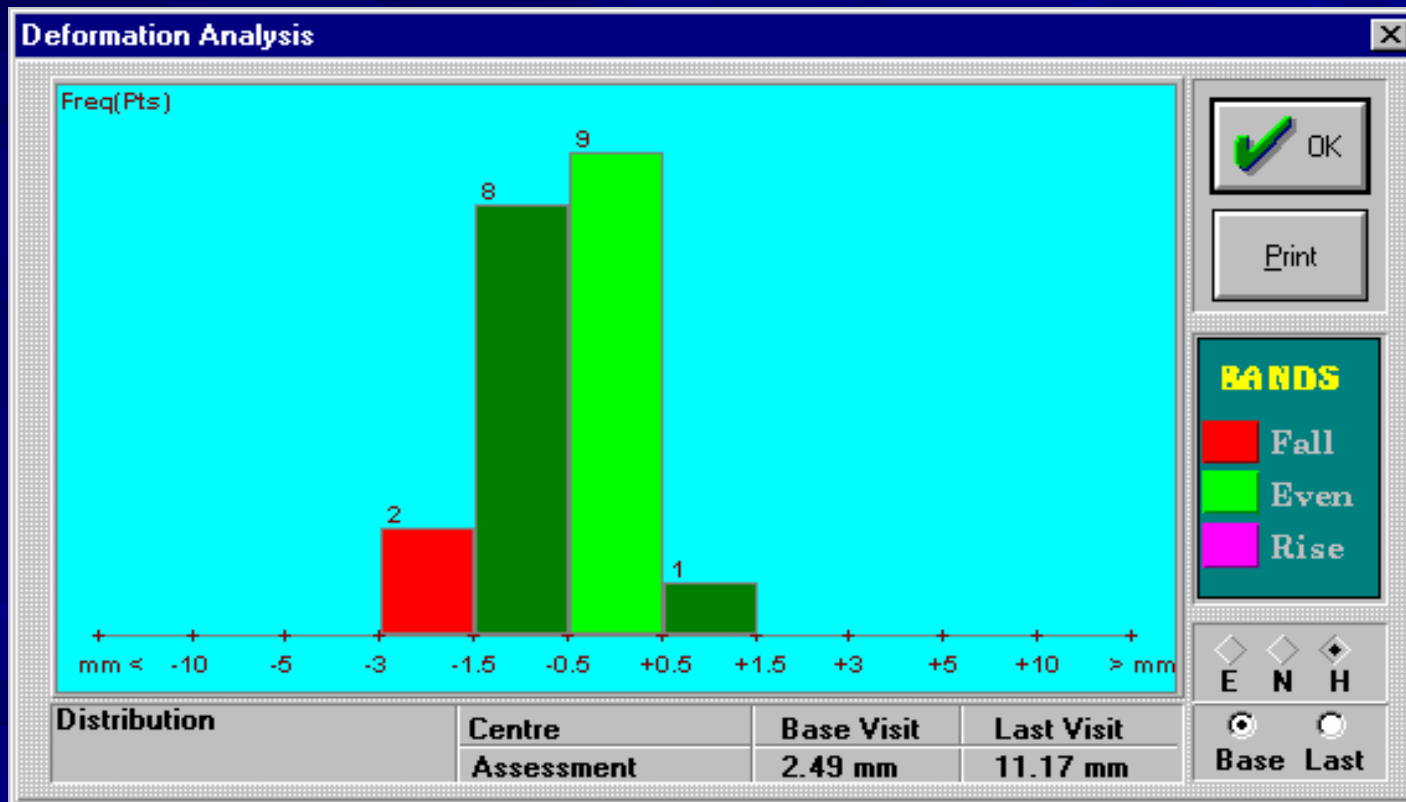


Fig. 10-2

# 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](mailto:peca@pecaconsult.com)