SDR Mapping & Design

The integrated surveying and engineering solution.

SDRmap - The System

SDR Mapping and Design software provides a complete solution for the surveyor and civil engineer. Individual modules integrate around one common database and graphical interface, making it cost effective, quick to learn and easy to use. Every day, this comprehensive software system is used worldwide in applications such as:

- Land subdivision
- Cadastral surveying
- Mining and earthworks
- Mapping
- Highway design
- Road reconstruction
- Monitoring surveys
- Site surveys
- GPS survey processing
- Quality assurance

Development by software specialists, and experienced surveyors and engineers with close links to users, has enabled continual enhancement of the system since first release in 1984. After a decade of development SDR Mapping and Design is very reliable, meeting a wide range of requirements and keeping pace with advances in computer and survey technology.

SDR Mapping and Design's ease of use enables you to be more productive from day one, yet it is one of the most sophisticated and powerful survey and engineering software systems available. SDR Mapping and Design has the solution to all of your surveying and engineering tasks.

SDRmap is the base of the system, onto which any combination of modules can be added. Take SDRmap and choose the combination of modules you need for your customized solution.

• SDRcad	Full CAD functionality
• SDRcalc	Survey computations
• SDRcontour	Surface modeling
• SDRprofile	Vertical sectioning and plotting
• SDRvolume	Volume computations
• SDRdesign	Road design
• SDRdigitize	Digitizer interface
• GPSmap	GPS data management

Typical system configurations include:

• SDRmap, cad, calc	Cadastral surveys
• SDRmap, cad, contour, profile, volume	Mining and earthworks quantities
• SDRmap, cad, contour, profile, volume, design	Highway design
• SDRmap, cad, contour, calc, profile, volume, design, digitize	Land subdivision and development

SDR Mapping & Design also provides very strong country specific customisation including:

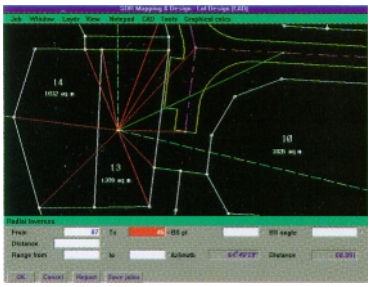
- Local language
- Units of measure
- Coordinate display order
- Local map projections

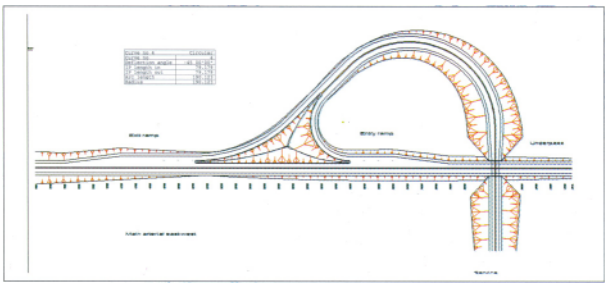
To maximize productivity it is essential that software works the way you want to work with input and output to your specification. SDR Mapping and Design allows you to define your own:

- Feature code libraries
- Grids
- Plotting formats
- Symbols
- Raw data entry formats
- Reporting formats
- Plan forms
- ASCII data transfer
- Highway design parameters
- Line types
- Long and cross section styles

SDRmap & CAD

Field-to-finish survey software.





SDRmap is the base module of the SDR Mapping and Design system. It is the complete field data processing module giving you automatic reduction of raw data to coordinates and automated mapping from sophisticated analysis of feature codes entered during data collection. Literally, the push of a button takes you from raw data to finished hard copy plan. Data reduction features include:

- Two-way data communications with a wide range of electronic field books and instrument data cards
- Flexible raw data editor
- Reduction of survey observations onto local projections including:
  - Plane
  - Mercator
  - Transverse Mercator
  - Lambert Conformal (1 and 2 parallel)
  - Cassini
  - Rectified Skew Orthomorphic
- Least squares adjustment of traverse networks, resections and intersections

Plot processing features include:

- User feature code definition
- Graphical plan form editor
- Graphical symbol and line editors
- Graphical plot editor
- Interactive sheet layout for multiple sheet definition
- High quality drawings direct to plotters, printers or plot files
- DXF files for transfer to Autocad or other CAD systems

SDRmap's fully featured graphical database editor enables fast and precise manipulation of coordinate data including:

- Datum transformations
- Elevation adjustment
- Rotation, scaling and translation
- Database to database comparison for quality assurance and as-built reporting

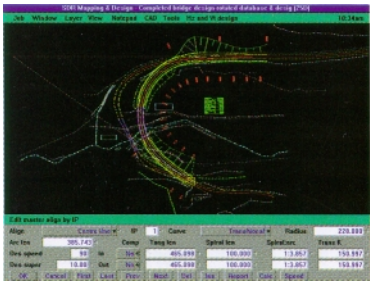
- Completely customisable read/write ASCII translator
- Merging of two separate job databases

The SDRcad module provides instant CAD functionality throughout the SDR Mapping and Design system. SDRcad includes many features not available in general purpose CAD systems, including:

- Integration with design and survey processing allowing drafting while designing
- Browsing of any graphical entity to display associated database information
- Direct selection of existing entity attributes for association with new entities-just point and click
- Multi layer support
- Full text manipulation, and auto line and curve annotation

SDRdesign

New horizons in civil engineering design.



SDRdesign adds another dimension to your SDR Mapping and Design system providing the tools to carry out the full range of civil design work-from basic rural roads to suburban streets and multi-lane highways.

Full integration with the SDR Mapping & Design system ensures flexible provision of pre-design data and a smooth transition between surveyor and designer. This integration also ensures that a completed design can be efficiently supplied to field staff for setting out purposes.

SDRdesign allows you to predesign all commonly used design components and store them in libraries for future use:

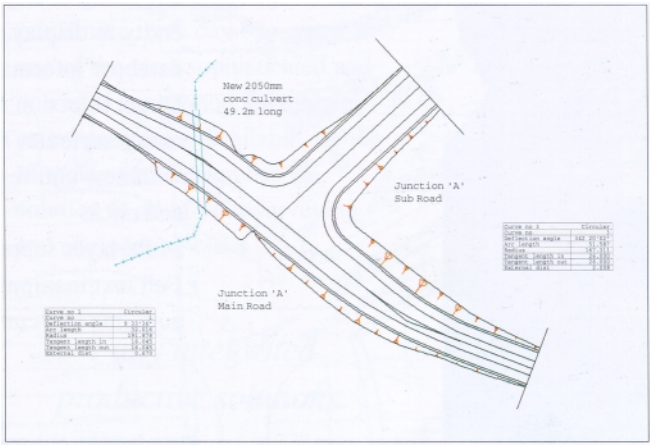
- Multiple natural surface definitions including shrinkage and bulking, excavation costs, maximum batter slope and material suitability
- Multiple design material definitions
- Libraries controlling common features of interest such as seal edge and top of curb, and their plot representation
- Templates
- Superelevation tables
- Full user definition of reporting formats for volume and quantity reports

By taking advantage of the interactive graphics interface and breaking the design process into components, SDRdesign gives you full control over the entire procedure. Components can be trialled and altered at any stage. Alignment definition is made easy by full graphic interaction in both horizontal and vertical views. Any changes are instantly displayed enabling 'check as you go' designing.

- Definition of alignment either manually or automated based on pre-defined design elements and safety factors
- Up to 75 sub-alignments per master alignment
- Comprehensive editing of elements and shifting of elements
- Automatic application of superelevation and widening from table libraries
- Superelevation displayed graphically to simplify table customisation
- Full reporting of alignment and road summary reports

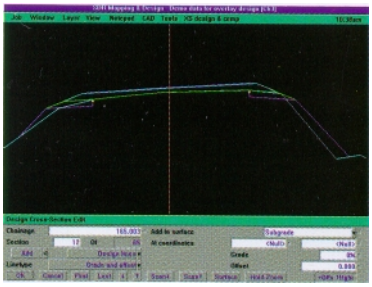
Complex templates can be created that represent the road cross-section. Options include:

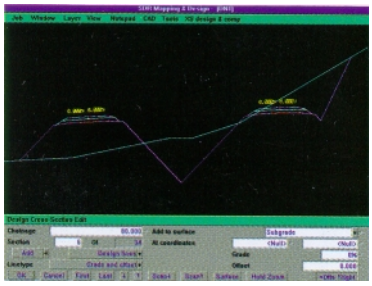
- Multiple layers within templates
- User definable decision elements enabling intelligent template response
- Automatic batter creation controlled by user specified grades or maximum material batter grades

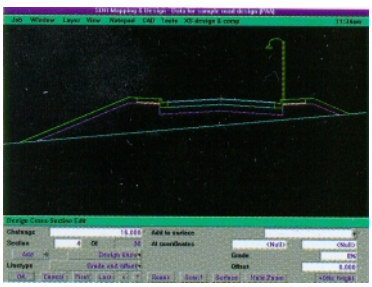


SDRdesign

Intelligent automation for design.







- Chaining of templates to enable template construction as a series of building blocks
- Templates can be tested and trialled in isolation before application to a design

The comprehensive, automated reporting features include:

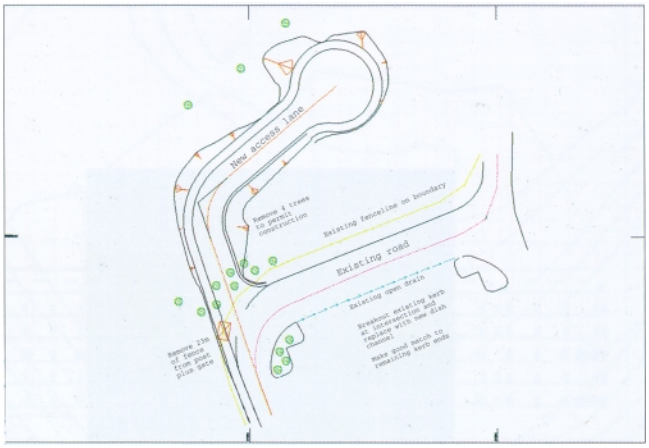
- Setout reports for any nominated feature
- Cut/fill volume for each natural material
- Lengths of construction materials
- Areas of construction materials
- Volume of construction materials
- Cost of materials at user definable rates

SDRdesign provides simplified production of contract drawings that include:

- Plans with all design line-work generated automatically
- Profile plots including geometry schematics, superelevation and widening
- Cross-section plots
- Combined plan and profile plots
- Mass-haul plots

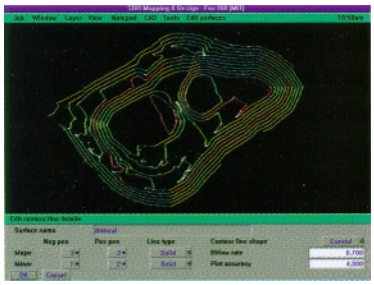
SDRdesign gives you the power and flexibility to carry out a wide range of projects. Some examples of its scope are:

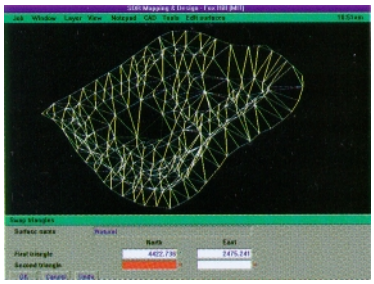
- Dual carriageway design using multiple sub-alignments
- Design templates that include curb and channel, footpath and street furniture
- Interchange design using multiple alignments to define individual roads in a design
- Vertical design of roundabouts, intersections and cul-de-sac heads using multiple subalignments
- Road reconstruction and rehabilitation of existing roads including shape correction and curb replacement
- Widening of an existing carriageway, and providing sliplanes or passing bays
- Using multiple sub-alignments and templates to compute a minimum overlay for a failing pavement, incorporating shoulder undercutting and strengthening with a cheaper material for cost effectiveness
- Stopbank design including upgrading of existing banks
- Civil projects including site earthworks, building platforms, canals, channels and dams

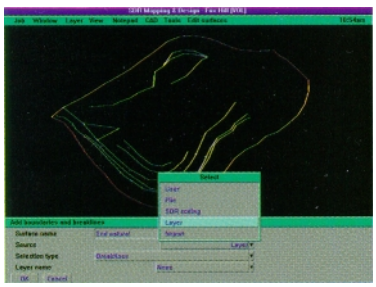


SDRcontour

Comprehensive contouring software.







SDRcontour is the complete ground modelling software module that provides the real world basis for your design work.

Using the proven Triangular Irregular Network (TIN) calculation method, SDRcontour produces a digital terrain model from XYZ database coordinates. The terrain model can be used for:

- Height interpolation for points created throughout SDR Mapping and Design
- Long and cross-section interpolation in SDRprofile
- Surface to surface volume calculation in SDRvolume
- Civil engineering design in SDRdesign

User control over terrain model creation is provided by:

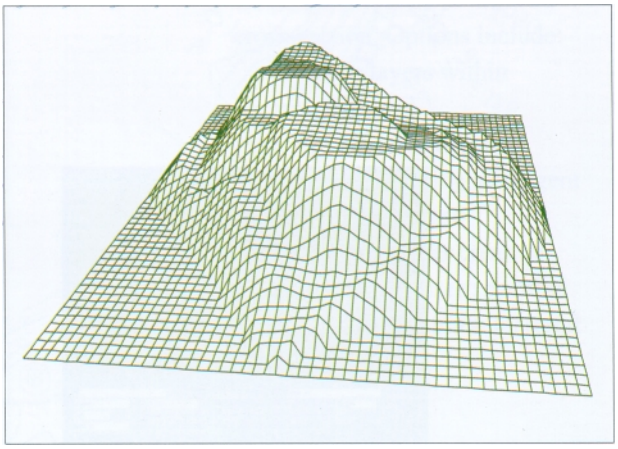
- Point selection for each surface based on layer, code, point number, or other database attribute
- User defined boundary and breaklines ensuring accurate terrain representation
- Individual triangle editing directly on the formed model
- Exclude/include of points from an existing model
- Merging of surfaces to create a single combined surface
- Contour smoothing by triangle swapping

SDRcontour provides full plot functionality with user control over:

- Contour interval
- Surface subset plotting specified by contour range
- Pen color or thickness, and linetype for major and minor contours
- Differentiation between positive and negative contours
- Label sizes, intervals and pens
- Curve smoothing

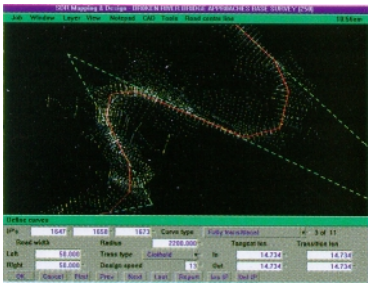
Plotting options include:

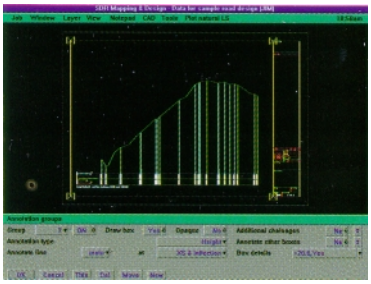
- Integration with SDRmap to provide composite drawings of contours and plan detail
- Plotting of multiple surfaces simultaneously
- Perspective view plotting
- 3D model plotting to AutoCAD DXF files with:
  - Contours as 3D polylines
  - Surveyed points as 3D points
  - Terrain model as 3D faces for shading and perspective viewing in AutoCAD

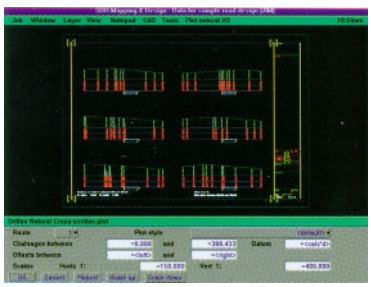


SDRprofile

Full sectioning of modelled and surveyed surfaces.







SDRprofile is designed for the creation and plotting of natural surface long-sections and cross-sections through roads, rivers, stockpiles, tunnels, mines - virtually anywhere that requires sectional viewing of data.

Profiles can be created in a number of ways:

- Spreadsheet entry of level and tape type information
- Automatically generated by feature coding
- Interpolated directly from a terrain model produced by SDRcontour
- Import from ASCII file

SDR Mapping & Design's feature coding techniques provide an excellent means of data collection, reduction and plotting. Feature codes require very little user input after data collection, and provide a powerful tool for sectioning.

SDRprofile also allows simple to very complex routes to be defined along which sections can be interpolated, for example, routes can be straight lines for stockpiles, or transition curves for road geometry.

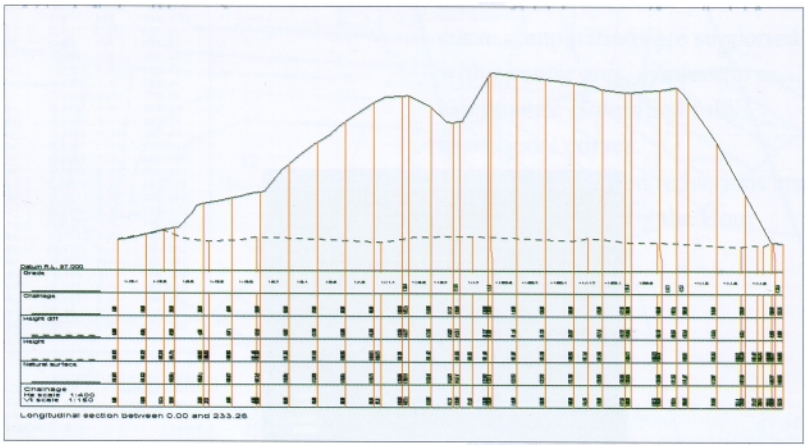
SDRprofile gives you full control over your plotting styles with user defined:

- Plan forms
- Annotation grouping
- Scales - both horizontal and vertical
- Numbers of rows and columns of sections
- Section labels, positions, pens and sizes
- Multiple sheet selection

All drawing amendments can be viewed on screen and once defined, your styles can be saved and recalled for future use.

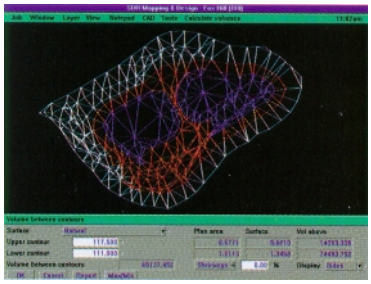
SDRprofile's plotting functions include:

- Multiple profiles at the same section
- Automatic plotting of multiple sheets
- Direct to plotter or DXF file creation
- Integration with SDRmap to produce combined plan/ longsection plots



SDRvolume

Earthworks, tunnel and dam volume software.



SDRvolume is the general purpose volume calculation module suitable for a wide range of computational tasks such as:

- Open cast mining excavation and spoil quantities
- Waste disposal surveys
- Stockpile volumes
- Coastal and river erosion computations
- Progress payment computations on large projects
- Lake and dam volume
- Landscaping earthworks balances
- Tunnelling quantities

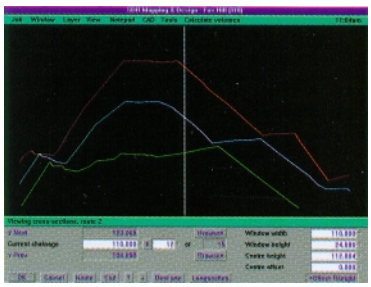
SDRvolume provides a very systematic approach to volume computations with clear reporting and good provision for independent calculation checks giving a high degree of integrity. Volumes are calculated using either digital terrain models or field cross-section data. A range of computational methods are available to suit individual needs and provide cross checking on results, including:

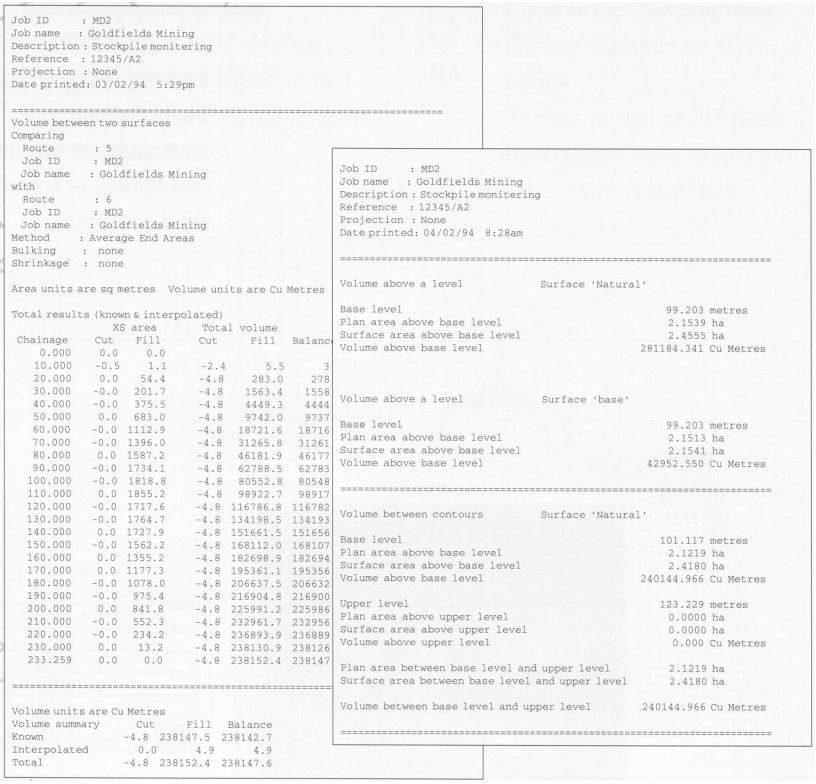
- End area sectioning
- Prismoidal sectioning
- Volumes above a specified level surface
- Volumes above an irregular or sloping base
- Volumes between two contours
- Void volume between two surfaces

All methods allow you to apply shrink or bulking factors to results.

SDRvolume also provides functionality for the generation of design surfaces using simple templates with specification of platform width and grade to natural surface. Applications include surfaces for:

- Channels
- Stopbanks
- Simple dams





```
Job ID      : MD2
Job name    : Goldfields Mining
Description : Stockpile monitering
Reference   : 12345/A2
Projection  : None
Date printed: 03/02/94  5:29pm

================================================================================
Volume between two surfaces
Comparing
  Route       : 5
  Job ID      : MD2
  Job name    : Goldfields Mining
with
  Route       : 6
  Job ID      : MD2
  Job name    : Goldfields Mining
Method      : Average End Areas
Bulking     :  none
Shrinkage   :  none

Area units are sq metres  Volume units are Cu Metres

Total results (known & interpolated)
                XS area        Total volume
 Chainage     Cut    Fill      Cut      Fill   Balanc
    0.000     0.0     0.0
   10.000    -0.5     1.1     -2.4       5.5        3
   20.000     0.0    54.4     -4.8     283.0      278
   30.000    -0.0   201.7     -4.8    1563.4     1558
   40.000    -0.0   375.5     -4.8    4449.3     4444
   50.000     0.0   683.0     -4.8    9742.0     9737
   60.000    -0.0  1112.9     -4.8   18721.6    18716
   70.000    -0.0  1396.0     -4.8   31265.8    31261
   80.000     0.0  1587.2     -4.8   46181.9    46177
   90.000    -0.0  1734.1     -4.8   62788.5    62783
  100.000    -0.0  1818.8     -4.8   80552.8    80548
  110.000     0.0  1855.2     -4.8   98922.7    98917
  120.000    -0.0  1717.6     -4.8  116786.8   116782
  130.000    -0.0  1764.7     -4.8  134198.5   134193
  140.000     0.0  1727.9     -4.8  151661.5   151656
  150.000    -0.0  1562.2     -4.8  168112.0   168107
  160.000     0.0  1355.2     -4.8  182698.9   182694
  170.000     0.0  1177.3     -4.8  195361.1   195356
  180.000    -0.0  1078.0     -4.8  206637.5   206632
  190.000    -0.0   975.4     -4.8  216904.8   216900
  200.000     0.0   841.8     -4.8  225991.2   225986
  210.000    -0.0   552.3     -4.8  232961.7   232956
  220.000    -0.0   234.2     -4.8  236893.9   236889
  230.000     0.0    13.2     -4.8  238130.9   238126
  233.259     0.0     0.0     -4.8  238152.4   238147

================================================================================

Volume units are Cu Metres
Volume summary      Cut      Fill   Balance
Known            -4.8  238147.5  238142.7
Interpolated      0.0       4.9       4.9
Total            -4.8  238152.4  238147.6
```

```
Job ID      : MD2
Job name    : Goldfields Mining
Description : Stockpile monitering
Reference   : 12345/A2
Projection  : None
Date printed: 04/02/94  8:28am

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Volume above a level              Surface 'Natural'

Base level                                          99.203 metres
Plan area above base level                           2.1539 ha
Surface area above base level                        2.4555 ha
Volume above base level                        281184.341 Cu Metres



Volume above a level              Surface 'base'

Base level                                          99.203 metres
Plan area above base level                           2.1513 ha
Surface area above base level                        2.1541 ha
Volume above base level                         42952.550 Cu Metres

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Volume between contours           Surface 'Natural'

Base level                                         101.117 metres
Plan area above base level                           2.1219 ha
Surface area above base level                        2.4180 ha
Volume above base level                        240144.966 Cu Metres

Upper level                                        123.229 metres
Plan area above upper level                          0.0000 ha
Surface area above upper level                       0.0000 ha
Volume above upper level                             0.000 Cu Metres

Plan area between base level and upper level         2.1219 ha
Surface area between base level and upper level      2.4180 ha

Volume between base level and upper level      240144.966 Cu Metres

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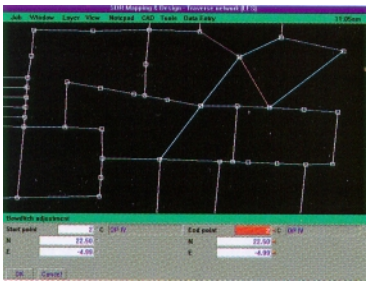
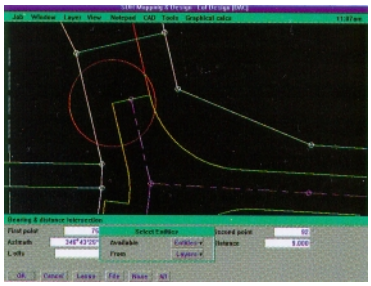
SDRcalc

Extensive survey calculation software.





SDRcalc performs all of your coordinate geometry calculations both graphically and interactively with the database. Applications include:

- Cadastral calculations
- Subdivision design
- Roading layout
- Stormwater network layout

All calculations are based on an interactive graphical editor so you easily can view and check computations. Where necessary, data is displayed textually to supply complete information for computation decisions.

SDRcalc is very easy to use. Simply point and click to enter information, and as soon as SDRcalc has the minimum of data to perform a calculation the result will be displayed on screen for checking. Where sufficient information is present, all calculations will compute height values for newly created points.

Topographic data reduction is supported for a wide range of stadia and EDM techniques.

Traverse data can be entered and displayed graphically during the data entry process, or accepted automatically from a range of popular data recorders. Network adjustments are provided by:

- Least Squares
- Bowditch
- Transit

A full selection of tools for subdivision design calculations are provided using:

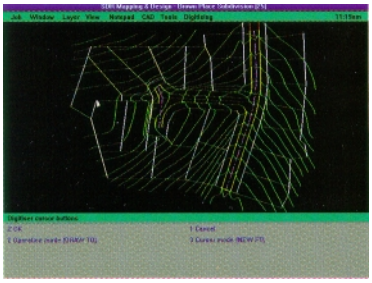
- Intersection calculation by two bearings, bearing and distance, two distances
- A full range of arc calculation routines including compound curves
- Inverse calculations that will produce data collector files for field setout
- Offset calculations
- Automatic line and arc subdivision
- Comprehensive area calculation including adjustment to pre determined area
- ARC-INFO formatted output for lot information
- Object definition for commonly used design elements such as cul-de-sac heads, street intersections and building envelopes
- Direct access to plotting

SDRcalc also provides horizontal road alignment computations which compute all chainage intervals and road side points. Full curve computations are supported with circular arcs, symmetric or asymmetric curves and fully transitional curves.

Solar observation reductions are also provided for by the Hour Angles method.

SDR Communications

Your link to industry standard devices and software.



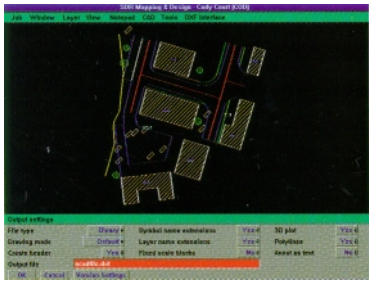
One of the very important functions of any specialist software is the ability to communicate and pass information onto external devices and other associated software. The SDR Mapping & Design system has several specialist modules for this type of communication.

SDRdigitise

SDRdigitise interfaces directly to a wide range of digitisers including ADI format, to provide a quick and practical method of data entry from existing plans, maps and charts.

Using the standard SDR Mapping and Design graphical interface SDRdigitise provides an instant visual check on digitised elements and also the facilities to edit as you go. Functionality includes:

- Point digitising and linework construction as you digitize
- Tracing of curves and lines
- Lot and area calculations
- Arc calculations
- Line and point editing features
- Full CAD functionality
- Automatic and manual zooming and panning
- Assignment of point/line attributes to puck buttons for quick application



DXF Interface

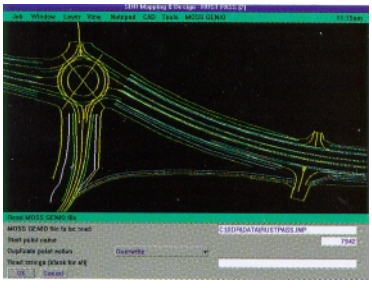
AutoCAD DXF files have become the industry standard in transferring drawing information. SDR Mapping and Design recognises the importance of having good facility for import and export of DXF files with the DXF Interface module.

DXF interface provides a very flexible system with a high degree of user input into the import and export of DXF files. Features include:

- Complete control over mapping between AutoCAD and SDRmap for:
- Layers
- Linetypes
- Colours
- Control of point symbols as ACAD blocks, points or separate vectors
- Automated removal of duplicate points
- Customisable DXF header information
- Creation of AutoSketch compatible files
- Creation of DXF files in either ASCII or Binary format

SDR Communications

Off-the-shelf modules for data exchange.



MOSSlink

MOSSlink enables the import and export of MOSS GENIO formatted data to and from the SDR Mapping and Design system.

Features include:

- Transfer of full 3D coordinate information
- Retention of MOSS 'stringing'
- User definition of layers, line types and codes associated with MOSS string names
- Automatic export of contours as MOSS contour strings

GPSmap

The GPSmap module enables the importing of kinematic GPS data collected using Trimble Navigation Ltd Series 4000(TM) receivers.

Rather than operating as a separate module, GPSmap adds GPS functionality throughout the SDR Mapping and Design software to enable you to use GPS data seamlessly with conventional data. Features include:

- Transformation of GPS data to your local coordinate system including both three and seven parameter transformations
- Transformation of ellipsoidal heights to geoidal heights
- Full reporting on transformations
- Auto point classification to enable point tracking
- Reporting of point coordinates as XYZ or Latitude, Longitude and Elevation
- Planar transformations
- Heighting adjustments

MPS2 Link

The MPS2 Link module is specifically designed to interface to the MPS2 photogrammetric stereo-plotter from Adam Technology Ltd.

This interface enables you to take 3D coordinates and line data directly from a stereo ground model in the MPS2 into an SDR Mapping and Design database.

Features include:

- User control over symbols, linetypes, colours and sizes
- Line data as either straights or smooth curves
- Direct creation of breaklines for use in SDRcontour
- Automatic gridded point creation

ASCII Translations

The SDR Mapping and Design database editor provides a powerful system for reading and writing ASCII files for data transfer.

Any database attribute can be written to a file, or extracted from a file, in a wide variety of formats. The system is provided with a set of definitions that can be used to read and write many common ASCII formats. It is also possible to modify these definitions, or create new definitions, so that virtually any ASCII file can be processed.

The SDR Commitment

To ensure that SDR Mapping and Design remains a world leader in surveying and civil engineering software, we are committed to providing continued support and development worldwide.

This is achieved through a global network of distributors assisting users around the world. These distributors are experts in survey and engineering technology and are committed to providing quality service and advice. This regular contact between distributor and user also provides invaluable information in further development of the system to meet new requirements.

If your local SDR Mapping and Design distributor is not listed below, please contact Datacom Software Research Ltd direct for further details.

Technical Specifications

Software Requirements

- MS-DOS version 5.0 and later or compatible
- NOVELL Netware version 3.0x if operating on a rnulti-user network

Hardware Requirements

	Minimum	Optimal
• CPU	386	486
• RAM	4Mb	16Mb
• Hard drive	40Mb	200Mb
• Monitor	VGA	SVGA
• Parallel port	Required	
• Mouse	Required	

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