ROAD MASTER ™

ROAD QUANTITIES & LAND SURVEY

We have a great pleasure in introducing our new software **Road-Master**. It is a new addition to **ENSOFT 's** successful series of softwares, such as **Build-Master** for Analysis, Design, Drawing and Estimation of Buildings. **Rate-Anly** for Rate Analysis of construction items.

Road-Master software has two modules, one for General Land Survey, Contour, L section plotting and other one for Earthwork quantities of Roads, canals, trenches etc.

1. Land Surveying Module:

Land Surveying module, is useful for doing cumbersome Earthwork calculations, for any general land profile. The Field book and Survey data, such as Change Points, Staff Readings and Tachometry Readings itself can be entered. The Reduced levels are then calculated automatically using this data. Reduced levels can also be entered directly without any staff readings.

Program generates a 3D View of the ground profile, which can be viewed from any angle for easy data checking. Contour Maps can be plotted for any desired height intervals. L sections and Cross sections are also plotted. The cutting and filling quantities involved for the proposed ground profile can be easily calculated.

2. Road-Quantity Module:

Road-Quantity module is useful for calculating the Embankment Earthwork quantities involved in Road Construction. The Reduced level Data shall be entered along the length of the Road, at any desired intervals such as 10 mt, 15mt etc. Data shall be entered giving the levels of Original Ground Level (**OGL**), Hard Rock Top Levels (**HRL**), Soft Rock Top Levels (**SRL**), Black Cotton Soil Top Levels (**BCTL**), Formation Levels **(FNL)** and Progress Levels (**PRL**). Program will graphically draw the section at each chainage and work out the Quantities of Soil Filling, Soil Cutting, Rock Cutting and Black Cotton Soil Cutting. Apart from Earthwork quantities it can also calculate Non-Earthwork quantities such as Bituminous Macadam, CRB, GSB etc.
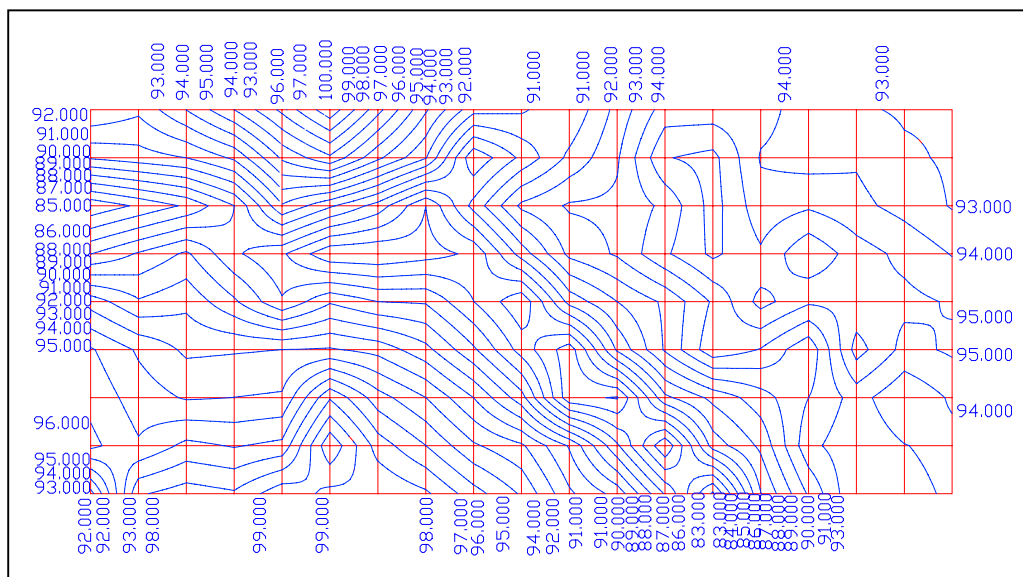
For various standard shapes of Road Profiles like, with Gutter on sides, with Retaining walls, Double Camber etc. program can calculated the progress levels from a formation level value at the center of road. Although the name of software is **Road-Master**, its scope is not restricted to roads only. It can be used for any shape of land profiles such as **Canals, Trenches, Bridge approaches, Railway Track Earth Fillings etc**.

Land Surveying Module:

The plot to be surveyed is first split into number of meshes. If the plot area is a regular rectangle, only one mesh is required. However if plot is having irregular boundaries, it has to be split into number of meshes to ensure that the whole plot area is covered in the mesh system. The spacing of grid lines in each mesh need not be equal.

The Input data is simple, such as Bench Mark **(B.M.)**, Change Points **(C.P.)**, Staff Readings and Tachometry Readings taken during survey. Program then generates Reduced Levels **(R.L.)** values at each grid intersections.

Automatic Contour Drawing

All your tedious work of plotting Contours ends with this software. You can now generate Contours for any required height interval and precision with just click of a mouse. Even if the original levels are taken at a courser intervals say 10 mts. Program can interpolate these levels at smaller intervals for more accuracy of the contours. Thus your Contour Drawing is ready for you in no time.

3 D VIEW

You can now view the complete ground profile in three Dimension from any angle. This 3D View helps in better interpretation of the ground area and for easy data checking.

The mistakes in data entry of levels values can be easily located.

Program generates the sections in both X & Y directions as shown. It has an in-built Grid list from which you can select any number of sections. You can control all the drawing parameters such as section arrangement, ordinates and text size.

L-Section with Original and Proposed Level

DOTTED LINE - ORIGINAL GROUND LEVEL
CONTINUOUS LINE - FORMATION LEVEL

Section for X-10.000
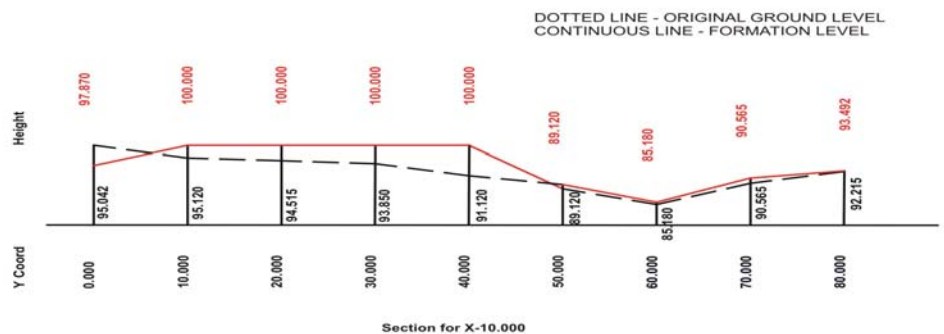
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QUANTITY CALCULATIONS
Datum Height Assumed : 80.000
Volume of Original Profile : 183735.625
Volume of Proposed Profile : 187200.000
Total Excavation : 21511.337
Total Filling    : 24975.712
Net Filling      : 3464.375
```

Sectional Areas

Grid	Original Area	Proposed Area
X:0.0000	A1 : 959.650	A1 : 1040.000
X:10.000	A2 : 945.125	A2 : 1040.000
X:20.000	A3 : 983.300	A3 : 1040.000

```
Trapezoidal formula :
  V = D/2 { A1 + 2A2 + 2A3 + ... 2An-1 + An }
  Original Profile Volume =  183735.625
  Proposed Profile Volume =  187200.000

Prismoidal formula :
  V =D/3{ A1 + 4A2 + 2A3 + 4A4 + 2A5 +...2An-2
      + 4An-1 + An }
  Original Profile Volume =  183947.250
  Proposed Profile Volume =  187200.000
```

Automatic Earthwork Calculations:

User has to specify only the Original and Proposed R.L. values. Program calculates the Earthwork Quantities in the form of Total Excavation and Total filling quantity. If desired, user can then optimize the Proposed land profiles, such that the net **Cutting** & **Filling is equal**.

In Addition to above, the Program has facility of **Interpolating** R.L's from four known corner points and many more interesting features.

This module can be used to calculate the volume of water in a **Reservoir** or the backwater volume for a **Dam** as well.

It can also be used to calculate the earthwork quantity involved in a **Bridge** approach.
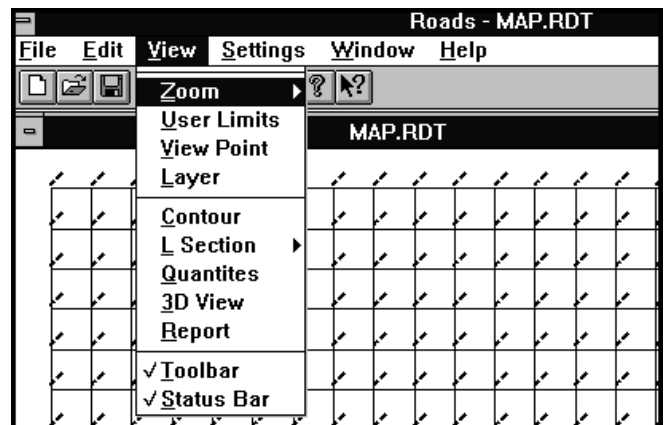
Road-Quant Module:

The data for the Road Sections shall be entered along the length of the Road at various chainages. Usually the chainage value is used in multiples of 5 mts. or 10 mts. The quantities are calculated between each two chainages, by taking the average of the area of cross sections.

Earthwork Embankment Quantities

GOVT. OF ANDHRA PRADESH
IVRCL INFRASTRUCTURE & PROJECTS LTD.
IVRCL INFRASTRUCTURE & PROJECTS LTD.

Chainage : 0

Y-AxisRL In Mt

Line Typ
Red - PRL
Blue - OGL

X-Axis:
Dist In M

Ground Levels
Original [OGL]
Distance In Mt

Progress Levels
[PRL]
Distance In Mt

AREA CALCULATIONS :

	Soil Filling	Soil Cutting
L.H.S. AREA	4.791 Sq.Mt.	2.252 Sq.Mt.
R.H.S. AREA	6.492 Sq.Mt.	0.262 Sq.Mt.
TOTAL AREA	11.283 Sq.Mt.	2.515 Sq.Mt.

Non-Earthwork Layer Quantities

GOVT. OF ANDHRA PRADESH
IVRCL INFRASTRUCTURE & PROJECTS LTD.

Chainage : 0

Y-Axis:RL In Mt

Line Type:
Red - CRBT
Blue - EMBT
Pink - LGBT
Black - UGBT

X-Axis:
Dist In Mt

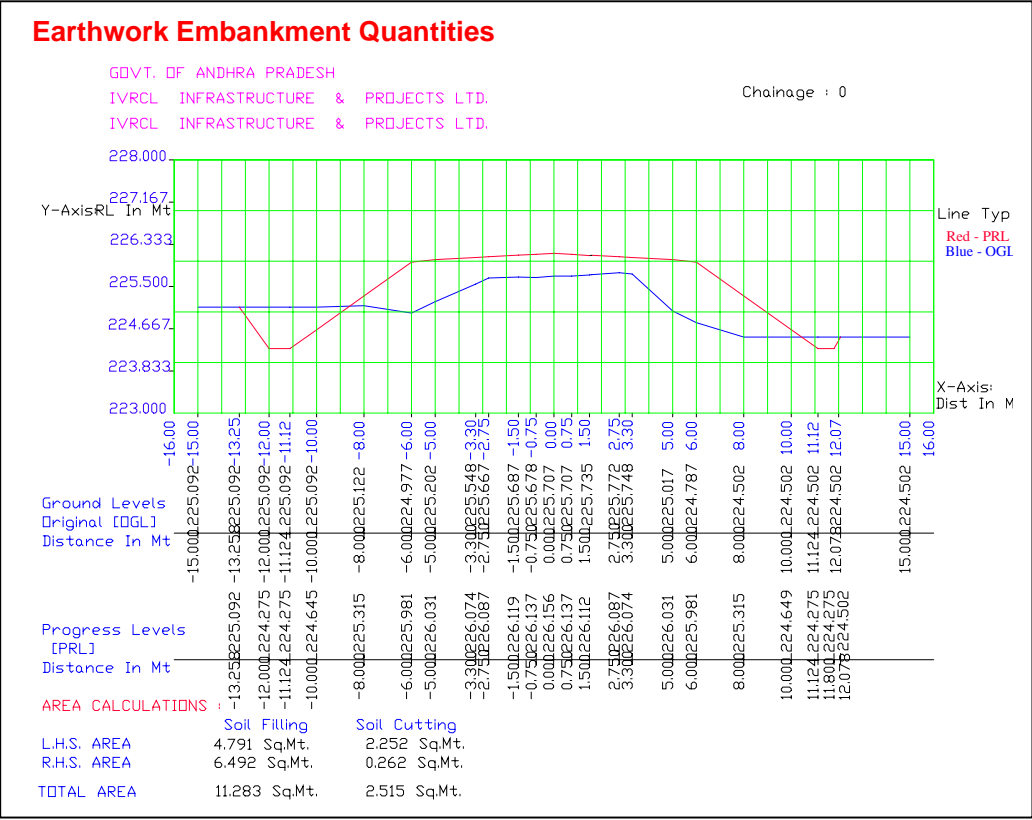CRB TOP Level
CRB
Distance In Mt

UGB TOP Level
UGB
Distance In Mt

LGB TOP Level
LGB
Distance In Mt

EMB TTOP Level
EMB
Distance In Mt

AREA CALCULATIONS :

	CRB	UGSB	LGSB
L.H.S. AREA	1.046 Sq.Mt.	0.962 Sq.Mt.	2.873 Sq.Mt.
R.H.S. AREA	1.045 Sq.Mt.	0.632 Sq.Mt.	3.138 Sq.Mt.
TOTAL AREA	2.091 Sq.Mt.	1.595 Sq.Mt.	6.011 Sq.Mt.

Following levels are entered at each chainage, on both Left and Right sides :

1. **Original Ground levels (OGL)**: The top levels of the original ground profile.

2. **Progress Levels (PRL)**: The levels at various stages, as the work progresses.

3. **Formation Levels (FNL)** : The top most level at the centre of the Road.

4. **Hard Rock Top Levels (HRL)**: If Hard Rock is encountered during excavation.

5. **Soft Rock Top Levels (SRL))**: If Soft Rock is encountered during excavation.

6. **Foundation Level (FDN)**: In case of Black Cotton Soil, the level of good soil.

Program reads these levels and calculates the quantities of Hard Rock Cutting, Soft Rock Cutting, Soil Cutting, Black Cotton Removal and Soil Filling Quantities between each two sections.

These levels are also plotted graphically at each section.

Non- Earthwork layers can also be defined and the level data entered for them. Program will calculate the quantities of these layers.

Road Quantities Sample Output:

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QUANTITY STATEMENT:
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Chainage	Soil Filling			Soil Cutting			Soft Rock Cutting			Hard Rock Cutting			BC Removal		
	Section Area	Mean Area	Qty (CuM)	Section Area	Mean Area	Qty (CuM)	Section Area	Mean Area	Qty (CuM)	Section Area	Mean Area	Qty (CuM)	Section Area	Mean Area	Qty (CuM)
0	177.781	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	178.545	178.163	1781.632	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	173.858	176.201	1762.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	93.385	133.621	917.376	0.052	0.026	0.261	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
40	112.201	102.793	1027.934	0.924	0.488	4.880	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	145.914	129.058	1290.576	0.000	0.462	4.618	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
60	58.856	102.385	894.301	7.558	3.779	37.788	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	17.488	38.172	381.719	10.468	9.013	90.129	9.750	4.875	48.750	4.431	2.216	22.157	0.000	0.000	0.000
80	3.957	10.723	107.226	19.607	15.038	150.376	20.589	15.169	151.694	0.000	2.216	22.157	0.000	0.000	0.000
90	0.553	2.255	22.550	0.000	9.804	98.035	0.000	10.294	102.944	23.974	11.987	119.871	0.000	0.000	0.000
100	32.883	16.718	167.180	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.634	14.804	148.040	0.000	0.000

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Total Qty              8352.512                   385.826                  303.388                  312.225                      0.00
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DETAIL AREA CALCULATIONS:
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Ch No	Offset L to R	PRL	OGL	Depth	Mean Depth	Width	Section Area	Mean Area	Length	Quantity
0	-3.558	100.139	100.139							
	-3.480	100.061	100.140	-0.079	-0.040	0.078	-0.003			
	-2.000	100.105	100.170	-0.065	-0.072	1.480	-0.107			
	0.000	100.165	100.210	-0.045	-0.055	2.000	-0.110			
	2.000	100.105	100.310	-0.205	-0.125	2.000	-0.250			
	3.480	100.061	100.354	-0.293	-0.249	1.480	-0.369			
	3.783	100.363	100.363	0.000	-0.147	0.303	-0.044			
						Total Cutting	0.882			
10	-4.792	99.426	99.426							
	-3.480	100.301	99.817	0.484	0.242	1.312	0.318			
	-3.000	100.315	99.960	0.355	0.420	0.480	0.201			
	-1.000	100.375	99.960	0.415	0.385	2.000	0.770			
	0.000	100.405	100.090	0.315	0.365	1.000	0.365			
	1.000	100.375	100.410	-0.035	0.157	0.900	0.142			
	1.000	100.375	100.410	-0.035	-0.017	0.100	-0.002			
	3.000	100.315	100.390	-0.075	-0.055	2.000	-0.110			
	3.480	100.301	100.392	-0.091	-0.083	0.480	-0.040			
	3.572	100.393	100.393	0.000	-0.046	0.092	-0.004			

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                                                                Total Filling    1.796    0.898    10    8.981
                                                                Total Cutting    0.155    0.519    10    5.189
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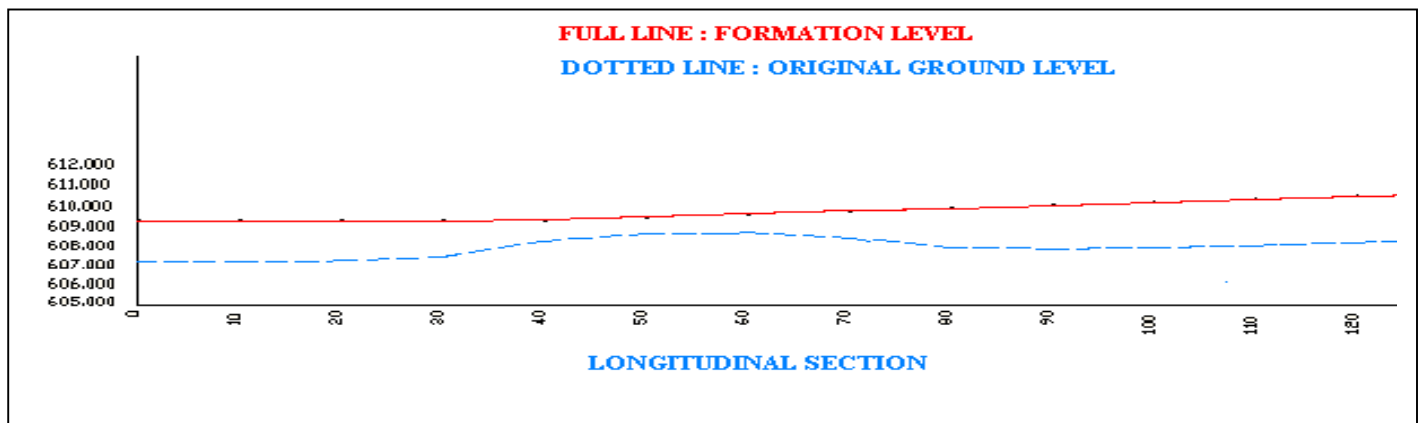

FULL LINE : FORMATION LEVEL

DOTTED LINE : ORIGINAL GROUND LEVEL

LONGITUDINAL SECTION

Easy to Use:

Road-Master is a User friendly package. The menus and dialog boxes of this package are designed for easy learning and use. The descriptive manual which comes with the software, covers all the minute aspects of the software. In addition to this you can avail, the after sales Technical Support from **ENSOFT**, whenever it is required.

Compatibility:

3D view, Contour drawings, L-Sectiosn and Cross Sections generated by **Road-Master** can be saved in DXF format. This format is compatible with **AutoCAD and** most other drafting packages, in which these drawings can be read , edited, printed or plotted.