

# Introduction

*Auto Road is very smart and useful software for Road Construction Units. With this software you can draw X-sections & Longitudinal sections (L-sections) of any type of road. It also includes very useful facility to find out the quantities of Earth Work, PCC, Median Filling and all the layers used in the road construction.*

Some times ago it was very difficult to draw X-section and find out the quantity of Earth work & other activities correctly, Auto Road makes it so easy.

Auto Road is very easy to use. You can prepare your Data files simply in Microsoft Excel. It draw X-sections and L-sections in AutoCAD (.dwg files) and Calculation details / Tables in Microsoft Excel (.CSV) format.

USE IT & ENJOY IT!

Auto Road

# Projects

To Draw X-Section and quantity calculations the first requirement is to define all the criteria for road and to save them with a name of project.

You can work with different types of projects with this package. Due to various specifications of the road we required more than one type of drawing initialization and layer definitions etc. So this is the basic requirement to save the all initializations with different names of the projects.

## Creating New Project

You can create a new project by clicking on “New” icon  on the tool bar or click on the Project menu >> New or press Ctrl+N on the key board. The Save as dialog box will appear on the screen, give a new name of the project and save, your new project will save with \*.arp (Auto Road Project) extension.

After saving the project *you should initialize all the required information* for this new project.

*Note : The name of new project should not be same of any existing project.*

## Opening an Existing Project

To open an existing project click on “Open” icon  on the tool bar or click on the Project menu >> Open or press Ctrl+O on the key board. The Open dialog box will appear on the screen, select the required project and click open. Your selected project will open and you can see on the status bar “ ....(project path)....Loaded”. Now you can work with the selected project.

*Note : Only one project can be loaded at a time.*

## Saving an Existing Project as a New Project

If there is some changes in definition of the road, there is no need to create a new project, the easy way to create a new project that you save any existing project with the different name and change the definitions as required and your new project is ready to use.

For this please open an existing project which you want to save as new project and click “Save” icon  on the tool bar or click on the Project menu >> Save as or press Ctrl+S on the key board. The Save as dialog box will appear on the screen, give a new name of the project and save. Your new project is saved with the initializations and definitions of the existing project now you can change as require.

## Deleting an Existing Project

If you found any project use less for future then you can delete the existing project by clicking Project menu >> Delete option but do this work very carefully because *all Drawing, Calculation and data files (If they are present in project folder) will deleted permanently.* So if you think that these files may be required in future then copy all these files in any other folder before deleting.

# Initializations & Definitions

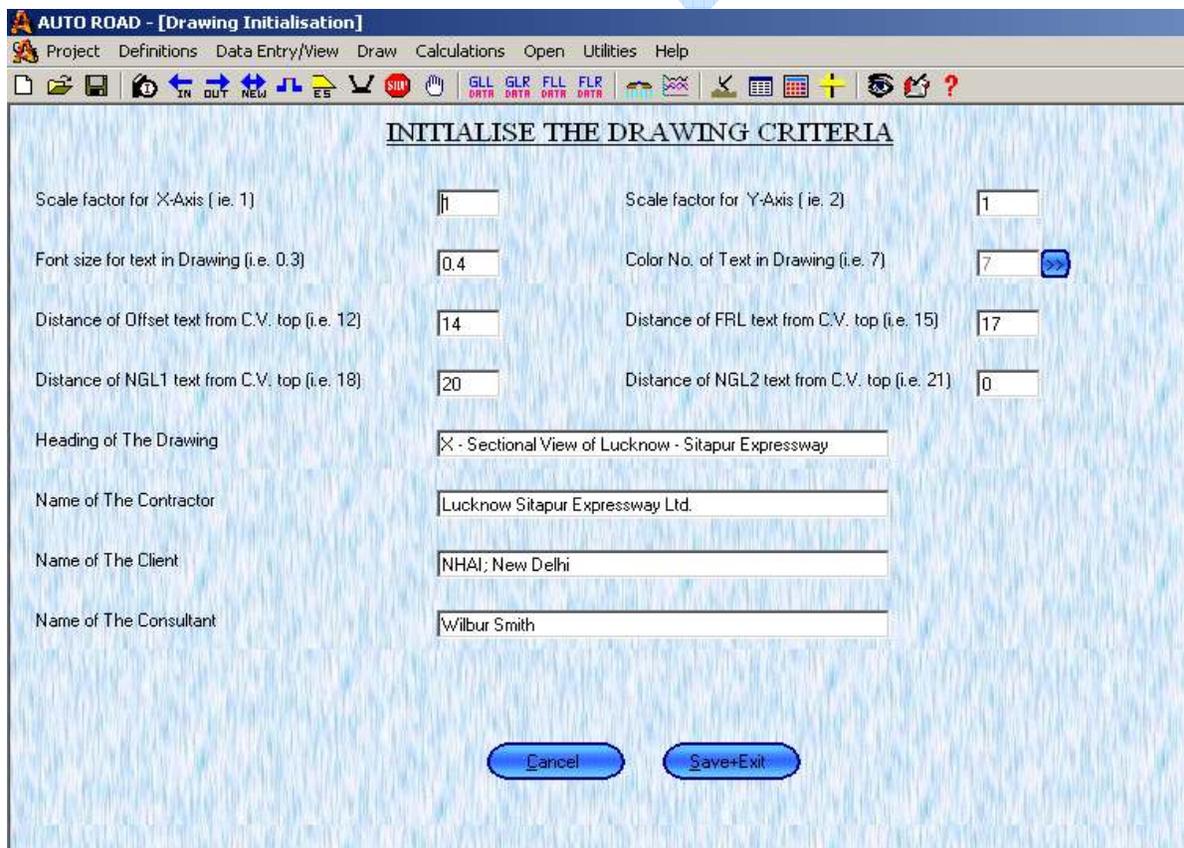
There are different types of specifications, situations and designs in roads. So we can say that every thing is possible in road construction. There may be different types of layers, different thickness of crushed, different design of kerb / median, two lane, four lane, six lane, eight lane roads, road with service road / without service road etc.

So we need to initialize the drawing criteria and required definitions to draw X-Sections and to calculate the quantities. **This is important to fulfill the basic requirement for drawing & calculations.**

**Note :** Without completing the definition section you are unable to draw the X-section & to workout quantities.

## Initialization of X-Section Drawing Criteria

You should fulfill some basic requirement to draw the X – Section drawing in this section. By clicking on icon on  tool bar or Definitions menu >> Initialize Drawing the following window will appear :-



INITIALISE THE DRAWING CRITERIA			
Scale factor for X-Axis ( ie. 1)	<input type="text" value="1"/>	Scale factor for Y-Axis ( ie. 2)	<input type="text" value="1"/>
Font size for text in Drawing (i.e. 0.3)	<input type="text" value="0.4"/>	Color No. of Text in Drawing (i.e. 7)	<input type="text" value="7"/>
Distance of Offset text from C.V. top (i.e. 12)	<input type="text" value="14"/>	Distance of FRL text from C.V. top (i.e. 15)	<input type="text" value="17"/>
Distance of NGL1 text from C.V. top (i.e. 18)	<input type="text" value="20"/>	Distance of NGL2 text from C.V. top (i.e. 21)	<input type="text" value="0"/>
Heading of The Drawing	<input type="text" value="X - Sectional View of Lucknow - Sitapur Expressway"/>		
Name of The Contractor	<input type="text" value="Lucknow Sitapur Expressway Ltd."/>		
Name of The Client	<input type="text" value="NHAI; New Delhi"/>		
Name of The Consultant	<input type="text" value="Wilbur Smith"/>		
<input type="button" value="Cancel"/>		<input type="button" value="Save+Exit"/>	

- 1- Scale factor for X-Axis :- Define the scale factor for X-Axis in X-Section drawing. This will be multiple of X-Axis distances in the drawing.
- 2- Scale factor for Y-Axis :- Define the scale factor for Y-Axis in X-Section drawing. This will be multiple of Y-Axis distances in the drawing.
- 3- Font size for text in Drawing :- Define the font size for all text matter in the X-section Drawing. The Best size suggested 0.3 to 0.6.
- 4- Color No. of text in Drawing :- Click on color button and select color for text shown in drawing.
- 5- Distance of text from CV top :- There will be three tables in the X-Section Drawing :-
  - i) Offset Distance
  - ii) Formation Level
  - iii) Ground Level

If there are two NGL Data (Before Earth removal & After Earth Removal) then there will be four tables in X-Section Drawing but the Earth work calculation will be done from First NGL File.

***Name of second NGL data file should be N2L or N2R.***

***If there is no Second Data File then put “0” in “Distance of NGL2 text from CV top”.***

You can set the tables by giving distance from CV top for the tables, by this you can set the tables up & down position or required distance from drawing portion.

- 6- Heading, Contractor, Client, Consultant's Name :- Enter these comments to appear in the drawing.

## **Definitions of Layers**

### **Inner Widening Layers Definitions**

Widening of an existing / old road to the center line side calls Inner Widening. The layers for pavements used only for inner widening should be defined in inner widening form.

**Note :** If there is no inner widening or you are working for totally new road then at least one dummy layer definition should be enter in this form because no any data file should be blank.

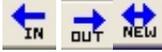
### **Outer Widening Layers Definitions**

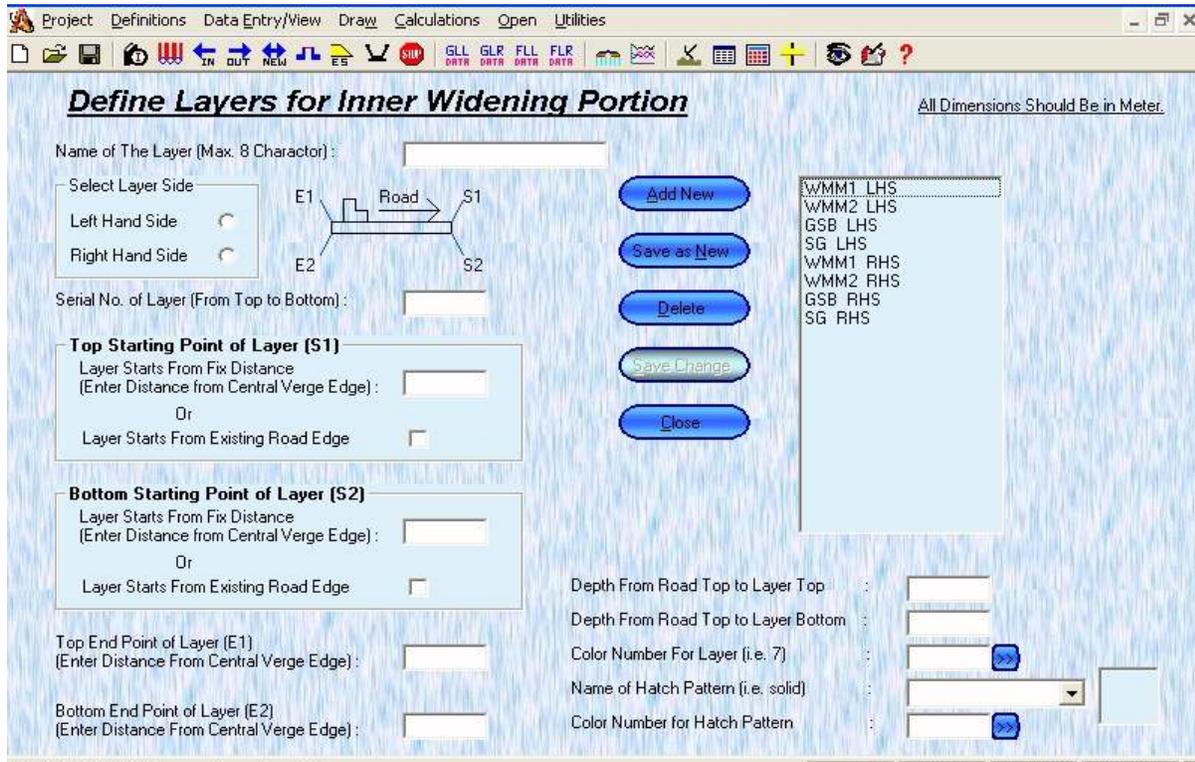
Widening of an existing / old road to Outer (Road Edge) side calls Outer Widening. The layers for pavements used for Outer widening should be defined in Outer widening form.

**Note :** If there is no Outer widening or you are working for totally New Road, in this condition fill the all layers definitions which is being used in New Road.

## New Road Layers Definitions

Where we are working for totally new road or no old road exist in new road location that is totally new road. The layers for pavement used for totally new road should be defined in New Road Layers form.

**Defining The Layers :** By clicking  on icon on toolbar or in Definitions menu >> Inner Widening Layers / Outer Widening Layers / New Road Layers the following window will appear :



**Name of The Layer :** Enter the name of the layer in short, this name will be appear in the legend of the Drawing.

**Select Layer Side :** Select the side of the layer Left Hand Side or Right Hand Side from the center line.

**Serial No. of Layer :** Enter the serial No. of layer from top to bottom, each layer should have different number but layer which have same name should have same number also.

**Starting Point of Layer :** Each layer could be start from one of these two locations-

- 1- Fix Distance from Central Verge Edge – The Layer could be start from any fix distance, so the distance of starting point (Top / Bottom) of the layer will be filled in this field from Central Verge Edge.
- 2- From the Edge of Existing Road – The Layer could be start from the edge of existing road (widening), so check the box of “Layer Starts from Existing Road Edge”.

### What is Central Verge Edge ?

The edge point of the Divider in the center of the road / Central Verge including Safety Width (If present) or the Starting Point of Bituminous Road calls Central Verge Edge and the Distance of this point from Center Line (CL) or 0.00 Point calls Central Verge Distance.

**End Point of Layer :** Enter the distance of Top & Bottom end point of the layer from Central Verge Edge.

**Depth From Road Top to Layer Top :** Enter the depth of top surface of the Layer from the top of the new road.

**Depth From Road Top to Layer Bottom :** Enter the depth of Bottom surface of the Layer from the top of the new road.

**Color Number For Layer :** Select the color for outer line of the layer.

**Name of Hatch Pattern :** Choose the Hatch pattern for Layer, if you don't want to hatch the layer you can choose "No Hatch".

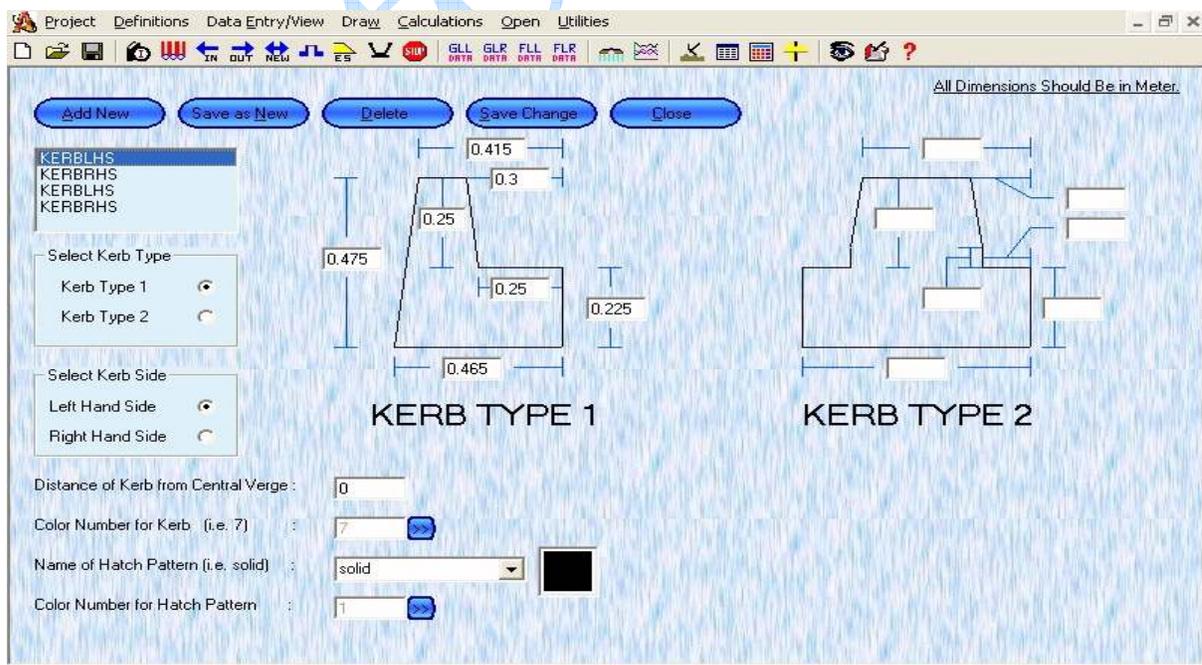
**Color Number for Hatch Pattern :** Select the color for hatching.

### Defining Kerb / Divider

The Kerb / Divider / Separator is the part which separate the different lanes of the Road and facilitate the traffic for moving safely.

Mostly it construct at the edge of Median / Central Verge or between Main Carriage Way & Lay-By / Service Road etc.

By clicking on  icon on toolbar or Definitions menu >> **Define Kerbs** the following window will appear :



**Defining the Kerb / Divider :** As shown in the picture there may be two types of Kerb / Divider so select the type of the Kerb and then fill the dimensions as shown in the picture you can fill any dimensions to give other shape of the Kerb as per requirement. If you want to reverse the shape of Kerb then you can fill the dimensions with Negative (-) signs.

**Distance of Kerb from Central Verge :** Fill the Distance from Central Verge edge to Kerb's safety width edge (In the picture from where all horizontal dimensions are taken).

**Color Number For Kerb :** Select the color for outer line of Kerb.

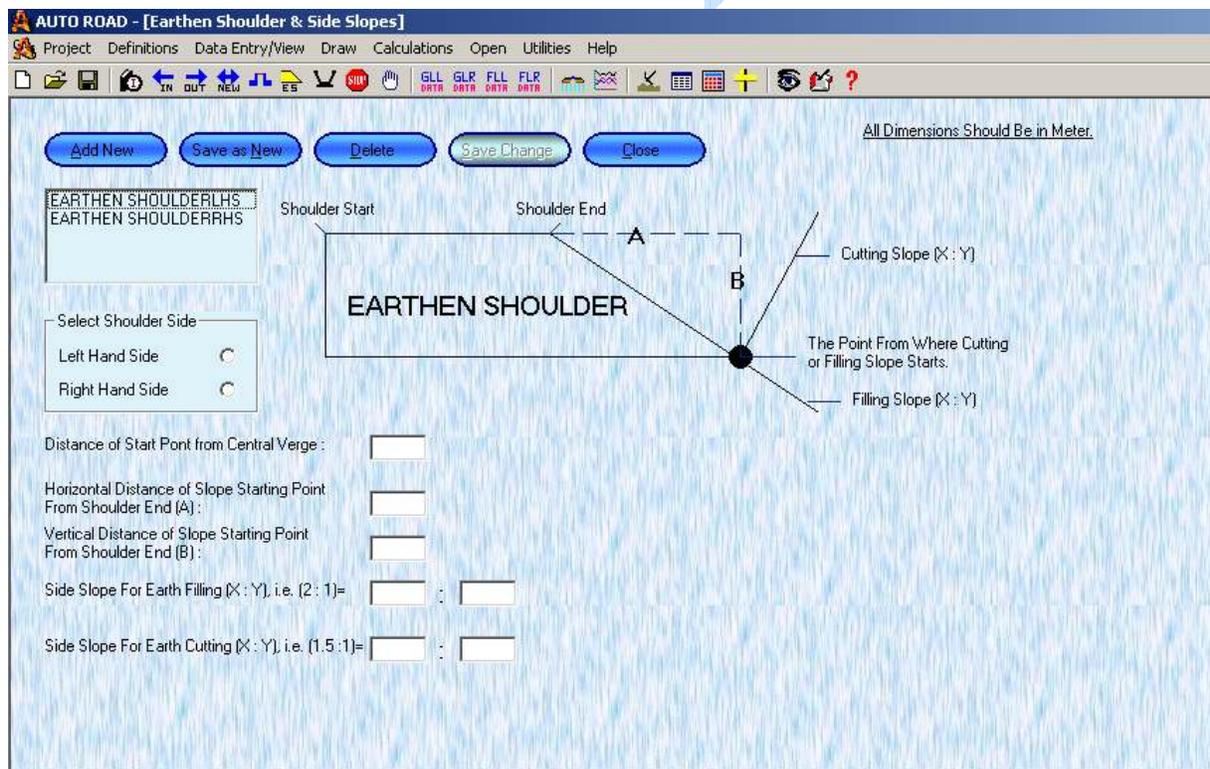
**Name of Hatch Pattern :** Choose the Hatch pattern for Kerb, if you don't want to hatch the layer you can choose "No Hatch".

**Color Number for Hatch Pattern :** Select the color for hatching.

**Note :** If there is no provision of Kerb / Divider then at least one dummy entry for kerb data should be enter in this form because no any data file should be blank.

### **Defining Earthen Shoulder**

By clicking on  icon on toolbar or Definitions menu >> [Earthen Shoulder](#) the following window will appear :



**Distance of Start Point** : Enter the Distance of starting point of Earthen shoulder from Central Verge Edge.

**Distance of Slope Starting Point** : Enter the distance of the point from where the side slope will really start, in the figure this point is shown at the bottom of the shoulder, it means the earth cutting upto shoulder bottom in cutting slope is important. The slope in filling / cutting will appear in the drawing as well as calculation from this point. If the cutting / filling line is below then this point and earth is being cut, then earth will cut in vertical position from this point to cut line.

So enter this point very carefully because the quantity of earth work depends on accuracy of this point.

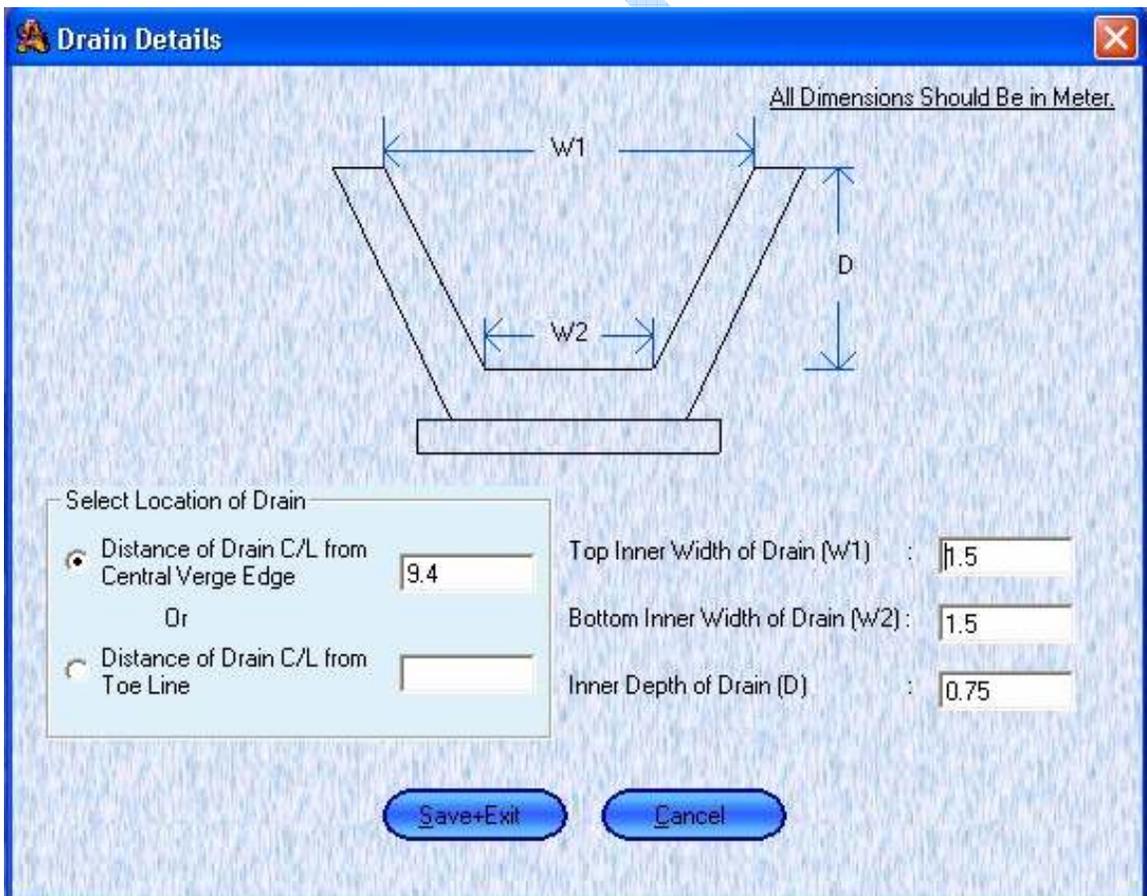
Enter the distance of this point from earthen shoulder edge as shown in above figure.

**Side Slope for Earth Filling** : Enter the side slope value in X : Y format in earth filling portion.

**Side Slope for Earth Cutting** : Enter the side slope value in X : Y format in earth cutting portion.

### **Defining the Drain**

By clicking  on icon on tool bar or Definitions menu >> [Drain Definition](#) the following window will appear :



**Drain Details**

All Dimensions Should Be in Meter.

Diagram showing a trapezoidal drain cross-section with dimensions  $w_1$  (Top Inner Width),  $w_2$  (Bottom Inner Width), and  $D$  (Inner Depth).

Select Location of Drain

Distance of Drain C/L from Central Verge Edge : 9.4

Or

Distance of Drain C/L from Toe Line : [ ]

Top Inner Width of Drain ( $w_1$ ) : 1.5

Bottom Inner Width of Drain ( $w_2$ ) : 1.5

Inner Depth of Drain ( $D$ ) : 0.75

Buttons: Save+Exit, Cancel

The Drain in the Drawing is only symbolic not for measurement.

**Location of Drain :** The Drain may be construct at two locations –

- 1- Any fix distance from central verge edge ( At the road edge of in the central verge etc.)
- 2- Any Fix distance from Toe Line.

So as shown in above figure select the location and fill the distance as required.

**Top Inner Width of Drain :** As shown in the figure inner width of the drain at the top and bottom may be differ, it gives a shape of drain ( U – Type or V – Type ). So the top inner width (W1) to be filled in this field.

**Bottom Inner Width of Drain :** Due to above said reason the bottom inner width (W2) to be filled in this field.

**Inner Depth of Drain :** The depth in the inner side of drain (Distance from top to bottom) should be filled in this field.

### **Retaining of Side Slope**

Due to some reasons as non availability of land or any rigid structure in the side of road, some time we need to retain the side slope of the earth work. For this purpose we construct the retaining wall. This retaining also takes effect to the quantity of earth work. So we create a file for the distance of retaining point from Center Line.

By clicking  on icon on toolbar or Definitions menu >> **Side Slope Retain At** , a file in the Microsoft Excel will open as shown below :

A	B	C
CHN	LHS Dist.	RHS Dist.
0	0	0

In the column “A” we should enter the chainage where the slope is retaining.

In the column “B” we should enter the Distance of retaining object from Center Line for Left hand side. If there is no retaining object fill the distance “0”.

In the column “C” we should enter the Distance of retaining object from Center Line for Right hand side. If there is no retaining object fill the distance “0”.

Note : If there is no any retaining point in the project then fill the “0” in first three fields as shown in figure.

## Fixing Maximum Toe Point

Due to some reasons as non availability of land or any rigid structure in the side of road, some time we need to fix maximum toe distance, in this condition if the normal toe point is less then maximum toe distance then the side slope follows proper ratio of slope and if the toe point is greater then (Outside of) maximum toe distance then the toe point meet at the maximum toe distance without following proper ratio of side slope. This retaining also takes effect to the quantity of earth work.

So we create a file for the distance of maximum toe distance Center Line.

By clicking on  icon on toolbar or Definitions menu >> Fixed Max. Toe Point , a file in the Microsoft Excel will open as shown below :

A	B	C
CHN	LHS Dist.	RHS Dist.
0	0	0

In the column “A” we should enter the chainage where the toe line is fixed.

In the column “B” we should enter the Distance of Fixed Maximum toe point from Center Line for Left hand side. If there is no fixed toe fill the distance “0”.

In the column “C” we should enter the Distance of Fixed Maximum toe point from Center Line for Right hand side. If there is no fixed toe fill the distance “0”.

Note : If there is no any fixed maximum toe point in the project then fill the “0” in first three fields as shown in figure.

# Supplying The Data

After initialize all the points of the project the basic requirement to work is proper supply of data. In the road we require the following data :

1. Ground Levels
2. Formation Levels
3. Camber in road (Road Cross Slope)
4. Slope in Earthen Shoulder
5. Width of Earthen Shoulder
6. Central Verge Distance from Center Line
7. Extra Widening Width (If Required)

**There are Four important Data files to work with the software, all are compulsory.**

**The files should be created in Microsoft Excel and saved as “.CSV” (Comma Delimited) format.**

**All the data files should be present in Project’s “Data” folder.**

All files have two part of name :

1. Initial name
2. Symbol of data files

**1. Initial name:** This part of name is fixed for all types of data file as follows:

- i) **NL** : Specifying the file of Ground Level Data for Left Hand Side.
- ii) **NR** : Specifying the file of Ground Level Data for Right Hand Side.
- iii) **DL** : Specifying the file of Formation Level, Road / Shoulder Slope, Central Verge Distance, Earthen Shoulder Width, Extra Widening Width Data for Left Hand Side.
- iv) **DR** : Specifying the file of Formation Level, Road / Shoulder Slope, Central Verge Distance, Earthen Shoulder Width, Extra Widening Width Data for Right Hand Side.

Note : If the files are being created with the software then no need to give the initial name for file, the software will automatically include the initial name with symbol of data.

**2. Symbol of data files:** This part of the file name indicates the set of data for one group. **This is important that the symbol name of files should be same for all four data files.**

It can be the “chainage” or other symbol depends on user. When you work with the software, it will ask the “symbol of data file” then you type this name only.

## CREATING DATA FILES

**This is important to initialize the Drawing Criteria before creating data files.**

The data file will be created in the Microsoft Excel and should be saved as “.CSV” (Comma Delimited) format. There are two way to create the data files.

1. **Direct from MS Excel :** If you already know about the fields of data files and how to enter the data in the files then you can create the data files direct in the MS Excel by giving the appropriate name of the file.
2. **With the help of software:** By clicking on  icon on toolbar or “Data Entry / View” menu and then an appropriate option for files the following window will be open:-



To create the new data file enter the “Symbol of data file” and click Ok. The selected data file will be created automatically with the empty fields and now you can enter the data as required.

1. **Creating Ground level files (NL / NR):** All the data of ground levels should stored in these files. NL or NR files look like follows:

	A	B	C	D	E	F	G	H	I	J	K
1	CHN	NRE	FRE	CL\ (0 m)	Other Offsets ----->>>						
2											
3	413.2	0	5.8	0	0.6	1.5	3	4.5	5	5.8	6.4
4	413.2	136.116	136.016	136.116	136.106	136.087	136.056	136.042	136.034	136.016	135.696
5	413.21	0	6.4	0	0.6	1.5	3	4.5	5	6.4	7
6	413.21	136.097	135.947	136.097	136.087	136.057	136.015	136.012	136.017	135.947	135.617
7	413.22	0	6.4	0	0.6	1.5	3	4.5	5	6.4	7
8	413.22	136.132	135.956	136.132	136.107	136.077	136.015	135.988	135.987	135.956	134.967
9	413.23	0	7	0	0.6	1.5	3	4.5	5	6.4	7
10	413.23	136.187	135.887	136.187	136.137	136.057	136.007	135.998	135.967	135.947	135.887
11	413.24	0	7.7	0	0.6	1.5	3	4.5	5	6.4	7
12	413.24	136.097	135.906	136.097	136.087	136.097	136.047	135.997	135.997	135.947	135.927

*First Two Rows are for Headings which should be String as shown above. After that one row for offset distances and another for its R.L. as shown above.*

First four columns of this file are reserved as follows:

- i) CHN : For chainage (Should be in Km.)
- ii) NRE :  
(First Row)  
For Nearest road edge distance from center line, if the center line is present on the existing road then this distance will be 0.00 also if there is no existing road then this distance will be 0.00.  
(Second Row)  
For R.L. at the point NRE. If the existing road not present and distance is 0.00 then reduced level of center line should entered here.  
***Note: Distance of Nearest Road Edge (NRE) always should be less than FRE.***
- iii) FRE :  
(First Row)  
For farthest road edge distance from center line if there is no existing road then this distance will be 0.00.  
(Second Row)  
For R.L. at the point FRE. If the existing road not present and distance is 0.00 then reduced level of center line should entered here.  
***Note: Distance of Farthest Road Edge (FRE) always should be greater than NRE.***

- iv) CL(0 m): The offset distance of this point (CL) always will be 0.00 (in the first row) and R.L. at the point of CL should be enter in second column as shown above.

After these four columns you can enter R.L. at all offset distances, i.e. 1.00, 2.00 .....etc.

*Please see the NGL Data entry format shown above carefully, the data file should be like this only.*

**If there are two NGL Data (Before Earth removal & After Earth Removal) then create two more NGL data files naming N2L and R2L. The ground line will be shown in the X-Section but earth work calculation will be done from First NGL File ie NL and NR.**

**Tip: If you want to calculate earth work with both NGL Data then switch the Names of Data files as N2L to NL and R2L to RL also NL to N2L and RL to R2L like this you can calculate the earth work with the both NGL Data.**

**Important:** No any blank cell should be present in the data area.

For details see the NLALL.CSV or NRALL.CSV file in the example project.

2. **Creating Formation Level / Camber Data files (DL / DR):** All other required data as Formation Levels, Road Camber, Shoulder Slopes, Central Verge Distances, Earthen Shoulder Width and Extra widening width should be enter in these files. Seven columns for data are fixed as follows:

- i) CHN : For chainage (Should be in Km.)
- ii) FRL : For Formation Level (Road Top Level ) at central verge edge or Edge of top surface from where top layer starts.
- iii) R SLOPE : For Cross Slope of Road (Camber).
- iv) S SLOPE : For Slope of Earthen Shoulder.
- v) CVD : For Central Verge Distance / Median Width from Center Line. If CVD is not present then enter 0.00.
- vi) ESW : For Width of Earthen Shoulder.
- vii) EXWL : For Extra width of road. Some times road need to be extra widened from its normal width then enter the extra width. If there is no extra with then enter 0.00.

The Figure of the Data file shown below:

	A	B	C	D	E	F	G
1	CHN	FRL	R SLOPE	S SLOPE	CVD	ESW	EXWL
2	413.2	136.261	2.5	3	0.6	2	0
3	413.21	136.251	2.5	3	0.6	2	0
4	413.22	136.242	2.5	3	0.6	2	0
5	413.23	136.232	2.5	3	0.6	2	0
6	413.24	136.222	2.5	3	0.6	2	0
7	413.25	136.213	2.5	3	0.6	2	0
8	413.26	136.203	2.5	3	0.6	2	0

For details see the DLALL.CSV or DRALL.CSV file in the example project.

### Checks for data files :

There are some checks for genuine set of data files:

1. All four data files should be created compulsorily, two for LHS (NL and DL) and two for RHS (NR and DR) if you have only one side data then copy same data file as other side data files.
2. Data files should be created in project's data folder.
3. No any blank cell should be present in data area.
4. Total number of Rows in NL or NR files should be double of DL and DR files.
5. All data files should be saved in “.CSV” (Comma Delimited) format.

### Tips:

- 1- If you have an old data file then you can save that file as another file with different symbol in the same directory and change the data with MS Excel.
- 2- You also can open and view the existing data files with the software or MS Excel.

# To Draw The Drawings

## DRAWING X-SECTIONS



To draw cross sections click on x-section icon on toolbar or in Draw menu click on X - Section. The following window will appear :

**Select Data File Symbol** [ALL] [Data Import] [Re-Import] [Draw] [Close]

Chn. From: [ ] Chn. To: [ ] Interval: [ ]

Enter Depth of Cut Line From Top (Cut Line May Be Embankment Top, Subgrade Top Or Any Depth From Top) [ ]

Normal Central Verge Slope (%): [ ]

Minimum Depth of Profile Corrective Course (PCC) From FRL: [ ]

Maximum Depth of Profile Corrective Course (PCC) From FRL: [ ]

Maximum Distance of PCC Edge at Central Verge Side (Enter Distance From CV Edge) [ ]

Maximum Distance of PCC Edge at Road Edge Side (Enter Distance From CV Edge) [ ]

Select Side For Drawing: [ ] Left Hand Side [ ] Right Hand Side

Kerb Required [ ] LHS Drain Required [ ] RHS Drain Required [ ]

Select To Draw Grid Lines: [ ] Draw Minor Grid Lines [ ] Draw Major Grid Lines [ ] No Grid Lines [x]

### Form Entry

- 1- **Enter file symbol** : In this field enter the symbol name of data file which is common for a set of data. (Name of the file without NL/NR/DL/DR).
- 2- **Chn. From**: In this field enter the chainage from where you want to start to create drawing files.
- 3- **Chn. To**: In this field enter the chainage upto where you want to create drawing files.
- 4- **Interval**: In this field enter the chainage interval on which you want to create the drawings, if you leave this field empty then drawing will be created on each data set in the file within Chn. From and Chn. To. This is important that data should be available in the file after the interval of chainage.

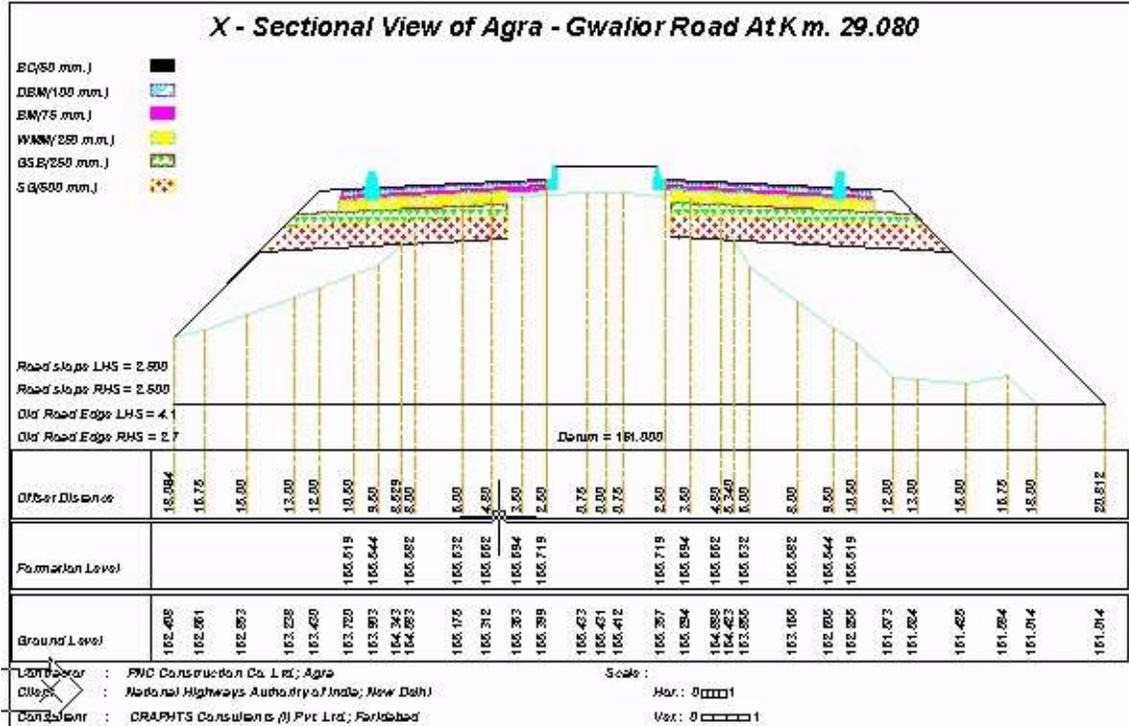
- 5- **Cut line Depth:** In this field enter the depth from top upto where you want to calculate the earth work detail.
- 6- **Normal Central Verge Slope (%):** Enter the slope of earth filling in central verge. If the levels of both side roads are not same then the slope calculation will be as per the condition.
- 7- **Minimum Depth of Profile Corrective Course (PCC) from FRL:** Enter the minimum overlay depth (ie BC is 50 mm and DBM is 60 mm is required compulsorily then it will be 0.11) be sure that if the minimum average depth of overlay not obtained in X-section then the Section will be create as new road and existing road to be removed.  
**If you don't want to remove existing road then put here "0".**
- 8- **Maximum Depth of Profile Corrective Course (PCC) from FRL:** Enter the maximum bottom depth of PCC (Profile Corrective Course) ie. BC is 50 mm and DBM is 60 mm is required compulsorily and maximum depth of PCC can be done upto 250 mm then it will be  $0.05+0.06+0.25=0.36$ . Be sure that if the difference of FRL and maximum average depth of PCC will exceed then in X-section then the Section will be create as new road and existing road to be removed.  
**If you don't want to remove existing road then put here any large number like 20 or 30 etc.**
- 9- **Select Side for Drawing:** If you want to create the drawing only for left hand side from center line then check the Left Hand Side check box. If you want to create the drawing only for right hand side from center line then check the Right Hand Side check box. If you want to create the drawing for both side from center line then check the both check boxes.
- 10- If you require the Kerb / LHS Drain / RHS Drain in the drawing then check the appropriate boxes else leave unchecked.
- 11- **Maximum Distance of PCC at Central Verge Side:** Enter the maximum distance upto where PCC can be done in CV side usually it becomes (-) negative value. ie. If bottom of Kerb is 200mm and offset of PCC after Kerb is 50mm then it will be "-0.250", before this distance PCC will not be calculated.
- 12- **Maximum Distance of PCC at Road Edge Side:** Enter the maximum distance upto where PCC can be done at Road Edge side ie. If total width of paved surface is 9.0 m then there is no need to do PCC after 9.0 m then it will be "9.0", after this distance PCC will not be calculated.
- 13- **Select to Draw Grid Line:** The X- Section Drawings are the graphical presentation of section of road. These drawings are to the scale. Scales are present on the drawing. Although this if you want to draw scaled grid on the drawing then you can select the grid line option there are three option in this manner :
- I) Draw Minor Grid Line:** If you select this option then the minor grid lines ( 1.0m length divided in 10 minor parts ) will be draw on the drawings.
  - II) Draw Major Grid Lines:** If you select this option then the major grid lines ( 1.0 m length 1 Box ) will be draw on the drawings.
  - III) No Grid Lines:** By default this option will be selected. If this option is selected then no any grid lines will appear on the drawings.

**Note:**

- 1- Selection to draw grid line option will increase the time of preparation of drawings.
- 2- The grid lines will appear on the drawing so this is necessary to send the all grid lines back to the drawing objects. For this purpose open the drawing in AutoCAD and off the “0” layer and select all grid lines, in the menu bar press the Tools >> Display Order >> Send to Back. After that make on the “0” layer again.

After filling all the fields and selecting all the required options check once again that all the fields are filled carefully because **once the software will start to generate the drawings then it can't stop till end.** So check all the fields carefully. After that click “Data Import” button and then “Draw” button, the software will start to draw the drawings. The drawings will be created one by one and saved in Project’s Drawing folder. After completing the preparation of drawings, a window will appear to confirming the location of saved drawing files, if you want to see / open the file immediately then you can click on “Yes” button, if you want to open the drawing files later, then click on “No” button. You can also open the drawing files of the current project by clicking on  icon on the toolbar.

You will get the X-Section as shown below:



## DRAWING L - SECTIONS

To draw longitudinal sections go through the following steps : -

- 1- Creating Data File for L – Section:** Create a data file for L – Section as shown below:

	A	B	C	D	E	F
1	CHN	Ground Level	S.G. TOP	G.S.B. TOP	W.M.M. TOP	B.C. TOP
2	32.300	164.032	164.532	165.032	165.532	166.032
3	32.310	164.004	164.504	165.004	165.504	166.004
4	32.320	163.973	164.473	164.973	165.473	165.973
5	32.330	163.950	164.450	164.950	165.450	165.950
6	32.340	163.923	164.423	164.923	165.423	165.923
7	32.350	163.873	164.373	164.873	165.373	165.873
8	32.360	163.826	164.326	164.826	165.326	165.826
9	32.370	163.772	164.272	164.772	165.272	165.772

Row No. 1 is reserve for headings. The headings in this row will appear in the drawing. These headings must be “String”, not “Numeric”.

Column “A” is reserve for Chainage. Chainage must be in Km. format.

How much columns of data you give in the file they all will be drawn in the drawing.

The data files must be saved in “.CSV” (Comma Delimited) format.

You can save the data file anywhere in your hard drive.

- 2- Creating L – Section Drawing:** To draw L - Sections click on L - section icon  on toolbar or in Draw menu click on L - Section. The following window will appear :

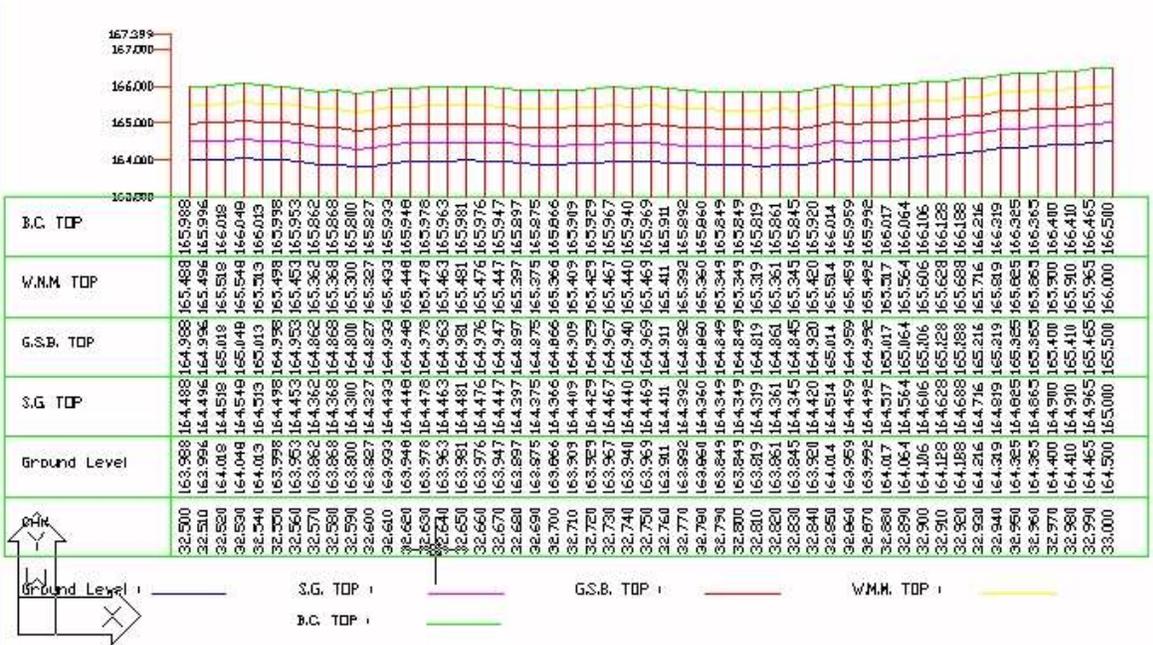
- 1- Data Import From File :** To draw a L-section you should give the file name with full path. You can do this work by clicking on “Data Import From File” button. Click on this button to brows and select the data file and open it. All the data in the file will be

imported automatically and you can read the minimum and maximum chainage and R.L. in the file, at bottom of the window.

- 2- **View the File :** If you want to view or edit the data in the file you imported then click on the “View File” button and the imported file will be open in MS Excel. Observe and edit the file if necessary and save it. **if you made any change in the data file then import the file again.**
- 3- **Selection of Chainage for Drawing:** You can select the chainage from where the L-section drawing should be start and upto where it should be draw. The chainage should be within the range of minimum and maximum chainage shown in the bottom of the window. If you leave these fields empty than the software will draw L-section for all data in the file.
- 4- **Chainage Interval :** Enter the chainage interval at which you want to give the data information in the drawing. It is not necessary that the chainage interval should be multiple of the interval on which data are given in the file, for example if you given data in the file at every 10 m interval even this you can give the data in the drawing at 15 m or 25 m interval, or if you given data in the file at every 50 m interval even this you can give the data in the drawing at 10 m, 15 m or any interval. If you leave this box empty then the software will print the data at the interval which are given in the data file.
- 5- **Datum Level :** Fill the appropriate datum level in this box it should be less then minimum R.L. which is shown in the bottom of the window. If you leave this box empty then the software will set the datum level 1.0 m less then minimum R.L. automatically.
- 6- **Setting the Scales:** You can set the X- scale and Y-scale for the drawing separately. Due to different mode of horizontal distance and vertical distance it is necessary to set the different scale for both axis for good visualization. It is recommended that if X-scale is set 1 : 1 then the Y-scale should be set 1:20 or 1:30 or 1:40 for good visualization.
- 7- **Setting of Grid Lines:** There are option for grid lines in the drawing :
  - i) **No Grid Line:** If you don't want to draw any grid line in the drawing then select this option.
  - ii) **Draw Grid Lines:** If you want to draw both (Horizontal and Vertical) grid lines then select this option.
  - iii) **Draw Vertical Lines:** If you want to draw only vertical line from datum to line of R.L. then select this option.
- 8- **Other Settings:** Other settings are as follows:
  - i) **Y-Interval :** Set the interval for Grid and scale which will be show in the drawing.
  - ii) **Setting of font size:** Set the font size as described in the window for Y-axis scale, table text etc.
  - iii) **Color Settings:** Set the colors for Grid lines, Table Text, Y-axis Text, axis color and Table color.

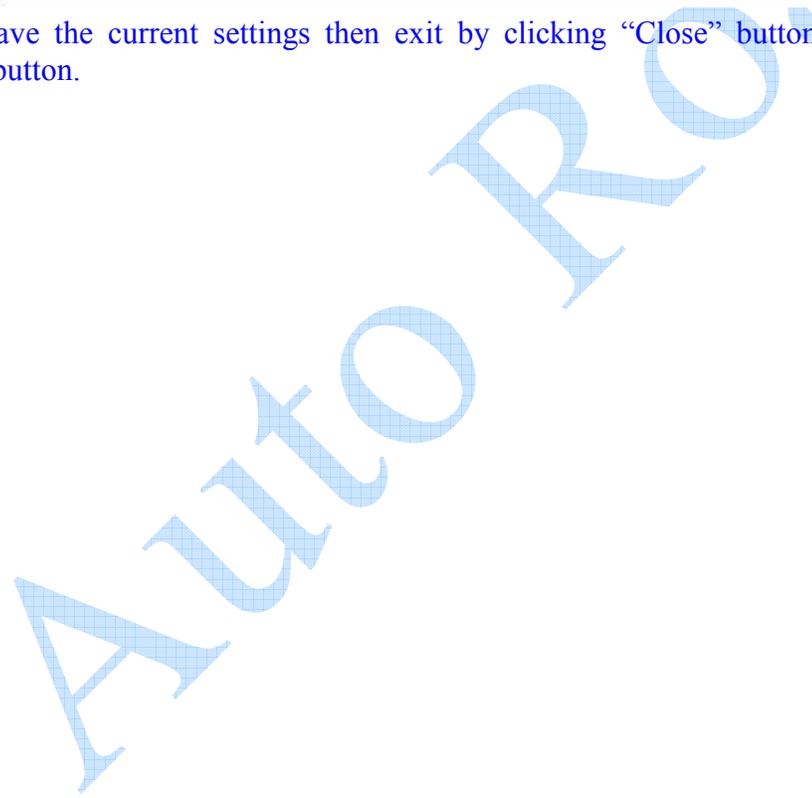
**The color of Different R. L. Lines will be set automatically which you can set as per your requirement in the drawing.**

After setting all these points Click the “Draw” button and the software will draw the Drawing in AutoCAD which you can save separately. The L-Section drawing will draw as shown below:



If you

want to save the current settings then exit by clicking “Close” button else exit by clicking “Cancel” button.



# To Calculate the Quantities

## QUANTITY CALCULATIONS

To calculate the quantities click on  icon on toolbar or in Calculation menu click on any menu. The following window will appear :

**AUTO ROAD - [Area Calculations]**

Project Definitions Data Entry/View Draw Calculations Open Utilities Help

Select Data File Symbol: ALL

Chn. From: [ ]

Chn. To: [ ]

Interval: [ ]

Enter Depth of Cut Line From Top (Cut Line May Be Embankment Top, Subgrade Top Or Any Depth From Top): [ ]

Normal Central Verge Slope (%): [ ]

Minimum Depth of Profile Corrective Course (PCC) From FRL: [ ]

Maximum Depth of Profile Corrective Course (PCC) From FRL: [ ]

Select For Calculation:

- Left Hand Side
- Right Hand Side
- Earth Work Outer \ New
- Earth Work Inner Widening
- Median Filling
- Table of All Layers
- Profile Corrective Course (PCC)

All Dimensions Should Be in Meter. Chainage should be in Km.

Data Import Re-Import Calculate Close

Maximum Distance of PCC Edge at Central Verge Side (Enter Distance From CV Edge): [ ]

Maximum Distance of PCC Edge at Road Edge Side (Enter Distance From CV Edge): [ ]

### Form Entry (Mostly same as X-Section)

- 1- **Enter file symbol :** In this field enter the symbol name of data file which is common for a set of data. (Name of the file without NL/NR/DL/DR).
- 2- **Chn. From:** In this field enter the chainage from where you want to start to create drawing files.
- 3- **Chn. To:** In this field enter the chainage upto where you want to create drawing files.
- 4- **Interval:** In this field enter the chainage interval on which you want to create the drawings, if you leave this field empty then drawing will be created on each data set in the file within Chn. From and Chn. To. This is important that data should be available in the file after the interval of chainage.

- 5- **Cut line Depth:** In this field enter the depth from top upto where you want to calculate the earth work detail.
- 6- **Normal Central Verge Slope (%):** Enter the slope of earth filling in central verge. If the levels of both side roads are not same then the slope calculation will be as per the condition.
- 7- **Minimum Depth of Profile Corrective Course (PCC) from FRL:** Enter the minimum overlay depth (ie BC is 50 mm and DBM is 60 mm is required compulsorily then it will be 0.11) be sure that if the minimum average depth of overlay not obtained in X-section then the Section will be create as new road and existing road to be removed.  
**If you don't want to remove existing road then put here "0".**
- 8- **Maximum Depth of Profile Corrective Course (PCC) from FRL:** Enter the maximum bottom depth of PCC (Profile Corrective Course) ie. BC is 50 mm and DBM is 60 mm is required compulsorily and maximum depth of PCC can be done upto 250 mm then it will be  $0.05+0.06+0.25=0.36$ . Be sure that if the difference of FRL and maximum average depth of PCC will exceed then in X-section then the Section will be create as new road and existing road to be removed.  
**If you don't want to remove existing road then put here any large number like 20 or 30 etc.**
- 9- **Select Side for Calculation:** If you want to create the drawing only for left hand side from center line then check the Left Hand Side check box. If you want to create the drawing only for right hand side from center line then check the Right Hand Side check box. If you want to create the drawing for both side from center line then check the both check boxes.
- 10- **Maximum Distance of PCC at Central Verge Side:** Enter the maximum distance upto where PCC can be done in CV side usually it becomes (-) negative value. ie. If bottom of Kerb is 200mm and offset of PCC after Kerb is 50mm then it will be "-0.250", before this distance PCC will not be calculated.
- 11- **Maximum Distance of PCC at Road Edge Side:** Enter the maximum distance upto where PCC can be done at Road Edge side ie. If total width of paved surface is 9.0 m then there is no need to do PCC after 9.0 m then it will be "9.0", after this distance PCC will not be calculated.
- 12- **Select to Calculation:** As shown above you can select the calculation details which you want:
- i) **Left Hand Side :** Check this if you want to calculate LHS Quantities.
  - ii) **Right Hand Side :** Check this if you want to calculate RHS Quantities.
  - iii) **Earth Work Outer\New:** Check this if you want to calculate the Outer widening or New road Earth filling\Cutting detail and summary table.
  - iv) **Earth Work Inner Widening:** Check this if you want to calculate the Inner widening (Existing Road widening in CV side) road Earth filling\Cutting detail and summary table.
  - v) **Median Filling:** Check this if you want to calculate the Earth Work in Median Portion.
  - vi) **Table of All Layers:** Check this if you want a table\summary of area of all the layers in highway.

- vii) **Profile Corrective Course:** Check this if you want to calculate the area of Profile Corrective Course (PCC).

**Note:** 1- The software will calculate only the X-Sectional area of all the items not volume. Volume should be calculated separately with the help of Area.

2- You can calculate the intersection point distance (where the ground line intersect the cut line) and toe point distance for other calculations with the help of calculation menu.

After filling all the fields and selecting all the required options check once again that all the fields are filled carefully because **once the software will start to generate the drawings then it can't stop till end.** So check all the fields carefully. After that click "Data Import" button and then "Calculate" button, the software will start Calculations. The calculation files will be created and saved in Project's Calculation folder. After completing the calculations, a window will appear to confirming the location of saved calculation files, if you want to see / open the file immediately then you can click on "Yes" button, if you want to open the drawing files later, then click on "No" button. You can also open the drawing files of the current project by clicking on



icon on the toolbar.

# Other Utilities

Some other useful stuffs are attached with this software are:

- 1- **Calculator:** Simply a path of Windows Calculator to facilitate you any time during use of this software.
- 2- **Converter:** A freeware unit converter.
- 3- **Data Converter:** Many time we found the NGL Data from other sources which are not in the format to use with this software you can use this utility of convert that type of file to usable NGL data file.

**Method:** Usually we found the NGL Data files like below:

	A	B	C	D
1	Chainage	Offset	RL	
2	239000	-12.00	282.573	
3	239000	-11.25	282.583	
4	239000	-10.00	282.603	
5	239000	-9.75	282.623	
6	239000	-9.15	282.638	
7	239000	-9.00	282.653	
8	239000	-8.50	282.633	
9	239000	-8.00	282.623	
10	239000	-7.00	282.653	
11	239000	-5.56	282.678	
12	239000	-5.00	282.673	
13	239000	-3.75	282.663	
14	239000	-3.00	282.613	
15	239000	-2.25	282.598	
16	239000	-2.15	282.588	
17	239000	-2.00	282.588	
18	239000	-1.90	282.583	
19	239000	-1.50	282.573	
20	239000	-1.00	282.558	
21	239000	-0.74	282.553	
22	239000	0.00	282.534	
23	239000	0.74	282.48	
24	239000	1.00	282.444	
25	239000	1.50	282.284	
26	239000	2.15	281.984	
27	239000	2.25	281.874	
28	239000	3.00	281.654	
29	239000	3.75	281.554	
30	239000	5.00	281.534	
31	239000	5.75	281.679	
32	239000	7.00	281.634	
33	239000	8.00	281.394	
34	239000	8.50	281.334	
35	239000	9.00	281.314	
36	239000	9.75	281.294	
37	239000	10.00	281.334	

Separate the LHS Data & RHS data in another excel file with CL which becomes 0.00 value and all the offset value should be (+) positive (In above shown data the (-) negative offset value represent LHS data), put RE1 and RE2 for NRE & FRE as shown below:

	A	B	C	D	E
1	Chainage	Offset	RL	Remarks	
2	239000	0	282.534	RE1	
3	239000	0.74	282.48		
4	239000	1	282.444		
5	239000	1.5	282.284		
6	239000	2.15	281.984		
7	239000	2.25	281.874		
8	239000	3	281.654		
9	239000	3.75	281.554	RE2	
10	239000	5	281.534		
11	239000	5.75	281.679		
12	239000	7	281.634		
13	239000	8	281.394		
14	239000	8.5	281.334		
15	239000	9	281.314		
16	239000	9.75	281.294		
17	239000	10	281.334		
18	239000	11.25	281.354		
19	239000	12	281.334		
20	239000	13.25	281.104		
21	239000	14	280.984		
22	239000	16	281.284		
23	239000	18	281.444		

After that in Utility Menu click “Data Convert”, following window will appeared:



Click on “Data Import From File”, Select the Data file which you want to convert then click on “Convert” button.

The file will be converted to usable NGL data file. Rename the file as you want and put it in Projects Data folder.

**“Please check the data file carefully before proceeding.”**

4- **Time Location Chart:** Some time we required a graphical presentation for the work & team movement with time of work & location of work like below:



For this purpose make a data file in Excel like below and save it as “CSV” format.

	A	B	C	D	E	F	G
1	Chn From	Chn To	Item	Date From	Date To	color	thick
2	123.456	124.560	GSB	15-02-08	28-02-08	1	10
3	123.556	124.576	WMM	20-02-08	03-03-08	2	10
4	123.700	123.700	Culvert 123/1	21-01-08	25-02-08	5	20
5							

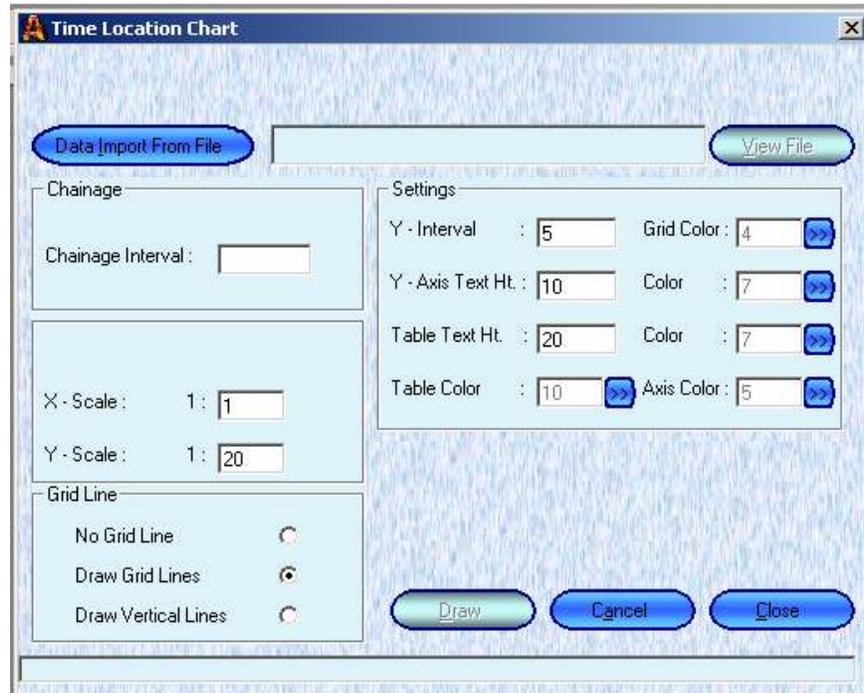
**Data Entry :**

- i) **Chn From:** In this field enter start chainage of work.
- ii) **Chn To:** In this field enter end chainage of work. If the work is a Culvert or small structure then enter the same chainage as “Chn From” like Row No. 4.
- iii) **Item:** In this field enter the name of work (Item as you required).
- iv) **Date From:** In this field enter the start date of Work/Item.
- v) **Date To:** In this field enter the end date of Work\Item.
- vi) **Color:** Enter the color No. as per Auto cad color pattern. It is recommended to use same color No. for same kind of Work\Item to easily identify in the graph.

vii) **Thick:** In this field enter the thickness of Line for the Work\Item.

**Note:** After saving the data file in “CSV” format the date will be changed in the number format.

**Creating the Time Location Chart:** In the utility menu click on “Time Location Chart”, a window will appears like below:



Select the file and fill the required fields then click on “Draw” and you will find the Graphical Time Location Chart as shown above.

**“THANKS FOR YOUR KIND ATTANTION”**  
**Looking forward for your valuable suggestions.**

# Necessary Checks

Please check some necessary thing before continue with the software:

- 1- Intel Pentium 4 or higher processor.
- 2- 512 MB of RAM
- 3- AutoCAD 2000 or 2002 installed in your system. (to work with earlier versions of AutoCAD you have to write a mail to us)
- 4- MS office (Excel) installed in your system.

At least all the data files listed below :

In the Project Folder :

- a) DRAIN.CSV – For drain detail.
- b) DRAWINI.CSV – Drawing initialization file.
- c) ESHOULDER.CSV – Detail of earthen soulder.
- d) FIXTOE.CSV – Detail of toe distance if toe is fixed.
- e) KERBDETAIL.CSV – Detail of Road Kerb.
- f) LAYERIN.CSV – Detail of Inner widening Layers.
- g) LAYEROUT.CSV – Detail of Outer widening Layers.
- h) RETAIN.CSV – Detail of Retaining Wall distance.

In the Project \ Data Folder :

- a) NR....CSV – RHS NGL detail.
- b) NL....CSV – LHS NGL detail.
- c) DR....CSV – RHS FRL and other details.
- d) DL....CSV – LHS FRL and other details.



Q-1 : The software is reflecting the error code & stop working.

Ans-1 :Go to Task Manager, in the Process Tab close the “AutoCAD” and check the data of particular chainage at which the software stopped working.

Q-2 : The software is installed but not working.

Ans-2 :Check you are logged in as “Administrator”, MS Excel is installed in your system and “AutoCAD – 2000 or 2004” is installed in your system.

Q-3 : The software is giving the error “Subscript is out of Range” and stop working.

Ans-3 : Go to Task Manager, in the Process Tab close the “AutoCAD” and check the data of particular chainage at which the software stopped working. Specially the “Fix toe” or “Retaining Wall” data.

If there is any other problem with the software than you are requested to post the problem.

THANKS!!!

Auto Road