uCross_Editor

USER MANUAL

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Preface

Overview of uCross_Editor

uCross_Editor is a road designing software package developed to undertake the concern of different layers of road pavement for the road construction. This has provision for accounting of the sub grade, sub base, base and surface layer individually. The uCross_Editor act as a powerful tool for the calculation of the quantities of different items of the road cross section and generates precise drawings of the same.

The software uses the input data from the Excel sheet and generates the drawing in the AutoCAD. uCross_Editor is simply the cross editor of the SW_ROADS except that it takes in the account for the different pavement layers.

CHAPTER-I

DATA

uCross_Editor is a software package developed with consideration of the different layers of the pavement. This editor is same as that under the SW_Roads 2005, except for that it accounts for the different layers of pavement which is not accounted in the cross editor of the SW_Roads. All the data related to the drawing of the different layers has to be provided in the respective sheets of the excel template file. Thus it is important to note that to generate the cross sections through the uCross_Editor, the data in the excel sheet must be correct and should truly follow the format.

Excel Template Sheet

The excel template sheet named "**Sample_Cross**" is provided in the template folder which can be accessed after installing the SW_ROADS_2005 program to the hard drive. The template sheet when opened will show with the different worksheet as below.

Fig No.: 1.1

A) CROSS_cons

The cross section data obtained from the site are entered in this worksheet. This sheet contains the columns to enter data for chainage, partial distance, reduced levels, remarks, extra reduced levels and extra chainages.

	A	B	C	D	E	F	G	H	I	J	K
1											
2			Cross Section Data							Cross Section Data	
3											
4											
5			Existing Cross Section							Extra Cross-section data	
6			Chainage	Partial Distance	Reduced Level	Remarks	Reduced Level-1	Reduced Level-2		Partial Distance	Reduced Level
7											
8			[1]	[2]	[3]	[4]	[5]	[6]		[2]	[3]
9			0+000.00	-15.000	995.870	Tree	995.860	995.840			
10				-2.840	998.220		998.200	998.000			
11				-0.650	999.330		999.130	999.030			
12				0.000	1000.000		999.800	999.700			
13				1.730	1000.700		1000.500	1000.400			
14				3.290	1000.440		1000.240	1000.140			
15				4.950	1000.000		999.800	999.700			
16				10.000	999.270		999.070	998.970			
17				15.000	998.980		998.780	998.680			

Table No.: 1.1

The Reduced Level-1 and Reduced Level-2 are the extra reduced levels than can be entered, if any, for the particular chainage and at same partial distance as that of the present data. This is helpful in showing the difference in terrain nature usually developed due to elapse of the time. The Extra Cross-section data provides a powerful backup for viewing the alternate cross section data with different partial distance, which in general is a regular case in the field, but for the same chainage.

A range has to be defined i.e. selected, to make the program understand the no. of cross sections to be considered for the uCross_Editor. This is done by selecting the four columns – Chainage, Partial Distance, Reduced Level and Remarks. The selection in terms of rows is based on the requirement of the no. of cross sections. Select as many cross sections as it is desired for appearing in the uCross_Editor.

B) SubGrade

This sheet contains the data for the sub grade layer. This includes the design levels at the right and left of the road sides depending on the desired slope.

External Data from Third Party Programs

Extra Width Slope
0.05

Design Parameters for cross-section obtained from site									
Chainage	Design Levels			Road Width		Cut Fill Slope		SE Calculated	
m	Centre	Left	Right	Left	Right	Cut	Fill	Left	Right
[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
0+000.00	1000.15	999.99	999.99	5.50	5.50	1.00	1.25	3.00%	3.00%
0+020.00	999.04	998.88	998.88	5.50	5.50	1.00	1.25	3.00%	3.00%
0+040.00	998.92	998.76	998.76	5.50	5.50	1.00	1.25	3.00%	3.00%

Table No.: 1.2

C) SubBase

This sheet contains the data for the sub base layer. The structure of the sheet is same as that of the sub grade sheet.

D) Base

This sheet contains the data for the base layer. The structure of the sheet is same as that of the sub grade and sub base sheet.

E) Finished_Level

This sheet contains the data for the finished level or the pavement layer. All the design parameters for the finished level like super elevation, extra widening, pass by, shoulder etc. are entered in this sheet. If the data is not required for particular field, leave that field blank. The shoulder slope provision is present at the top of the table as shown below.

External Data from Third Party Programs

Shoulder Slope
5.00%

Design Parameters for cross-section obtained from site															
Chainage	Design Level	Road Width		Super Elevation		EW		Pass-By		Pavement	Shoulder		Cut/Fill slopes		
		Left	Right	Left	Right	Left	Right	Left	Right		Width	Thickness	Cut	Fill	Structure Cut Slope
[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
0+000.00	1000.38	5.500	5.500	2.63%	2.96%					0.1	0.5	0.2	1	1.5	0.5
0+020.00	999.27	5.500	5.500	3.50%	1.87%		0.8			0.1	0.5	0.2	1	1.5	0.5
0+040.00	999.15	5.500	5.500	3.50%	1.58%			1.8		0.1	0.5	0.2	1	1.5	0.5

Table No.: 1.3

CHAPTER-II

COMMANDS

Commands of uCross_Editor:

❖ File:

File menu is used to access the old files as well as for creating the new files. File saving option also comes under this menu. The various sub menus under the File menu are listed below:

Fig No.: 2.1

1. New:

This command allows the user to create new project file. When clicked, the program will ask for the location and the file name where the new file is to be saved.

2. Open:

When the previously created project has to be opened, this command is used. When clicked, the program will ask for the location and file name of previously worked project.

3. Save:

The command allows saving the project. This is also facilitated by the use of Ctrl+S key.

4. Save as:

This allows users to save the project with different name. This is also facilitated by the use of F11 key.

5. Exit:

This is the command to exit the program. This is also facilitated by the use of Ctrl+Q key.

❖ Data:

The Data menu is used as the mean of dumping the data of Slope Length of CutFill Line and Earthwork Quantities.

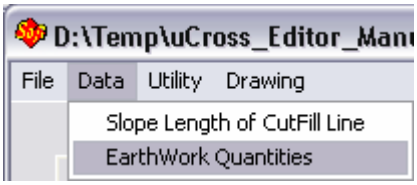


Fig No.: 2.2

1. Slope Length of Cut Fill Line:

When the slope length of the cut and fill lines are desired, this sub menu is clicked. Doing so will ask for the location on your computer where it should save the excel format file.

2. Earthwork Quantities:

This sub menu is for dumping the quantities in excel. This includes the quantities of earthworks, quantities of drains; quantities of different structures in different tab of excel etc. Clicking this sub menu will ask the location on your computer where it should save the excel format file.

- **Utility:**

The different sub menus under this menu are as follows:

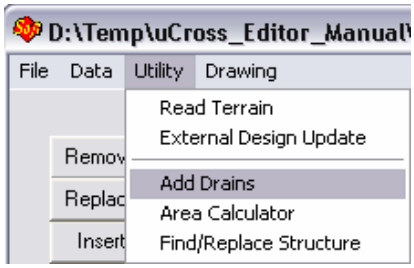


Fig No.: 2.3

1. Read Terrain:

This command lets the program to read the data contained in excel tab "**CROSS_cons**". This command is useful to record the changes in the data.

2. External Design Update:

When the design parameters for the cross section like the design levels, pass by, extra widening etc. are altered in the respective sheets of excel, to record the changes, this sub menu is used.

3. Add Drains:

The drains when are to be applied in certain reach or throughout the sections, this is sub menu is used. The fields to be provided are the starting and the end chainage of drain, side on which the drain is to be placed, and the name of the drain from the drop down menu at the right side.

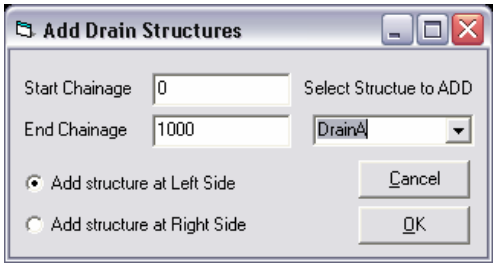


Fig No.: 2.4

4. Area Calculator:

This sub menu is used to calculate the area in the AutoCAD.

5. Find/Replace Structure:

When once applied structures to the cross-sections have to be replaced by the other type of structure, this sub-menu is used.

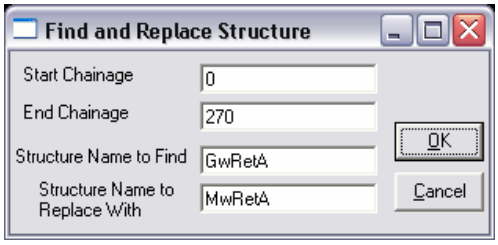


Fig No.: 2.5

❖ **Drawing:**

This menu helps to obtain the works of uCross_Editor in AutoCAD file. The different sub menu under this menu is as follows:

1. Draw Current:

This enables drawing the current cross section on the cross editor window in the AutoCAD.

2. Draw ALL:

This is the sub-menu which when clicked will draw the entire cross sections as seen in the cross-editor to the AutoCAD.

CHAPTER-III

PROCEDURE

PROCEDURE:

Initialization

Upon double clicking the uCross_Editor.exe, the program will be launched.

Fig No.: 3.1

Before starting to work with a project, first a project has to be created. This is done from the file menu with clicking "**New**" or if the project has been created earlier then with "**Open**". The excel file containing the data for sub grade, sub base, base and finished level has to be opened and the proper range of data must be selected before proceeding.

When "**New**" is clicked, a pop up window asking for the location where the file for the project is to be saved is asked.

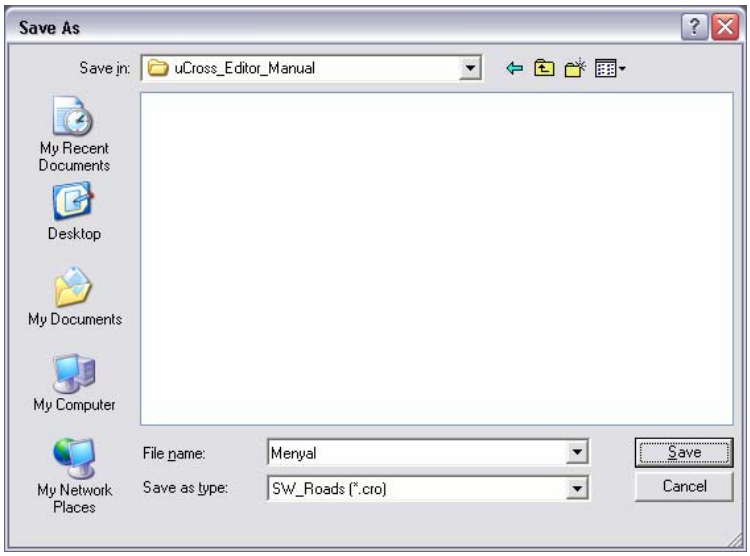


Fig No.: 3.2

Provide the file name in which the data is saved. Select the range for the cross section. If the data in the "**CROSS_cons**" is not selected, a warning message is generated.

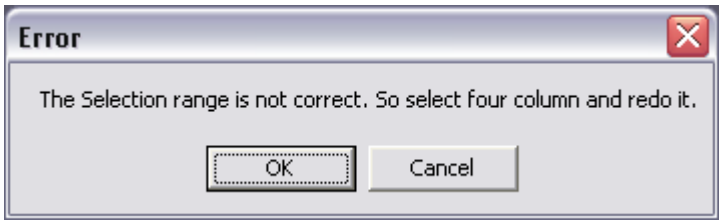


Fig No.: 3.3

Select the required range, and then press "**OK**". The main window of cross editor with the cross section of first chainage is displayed.

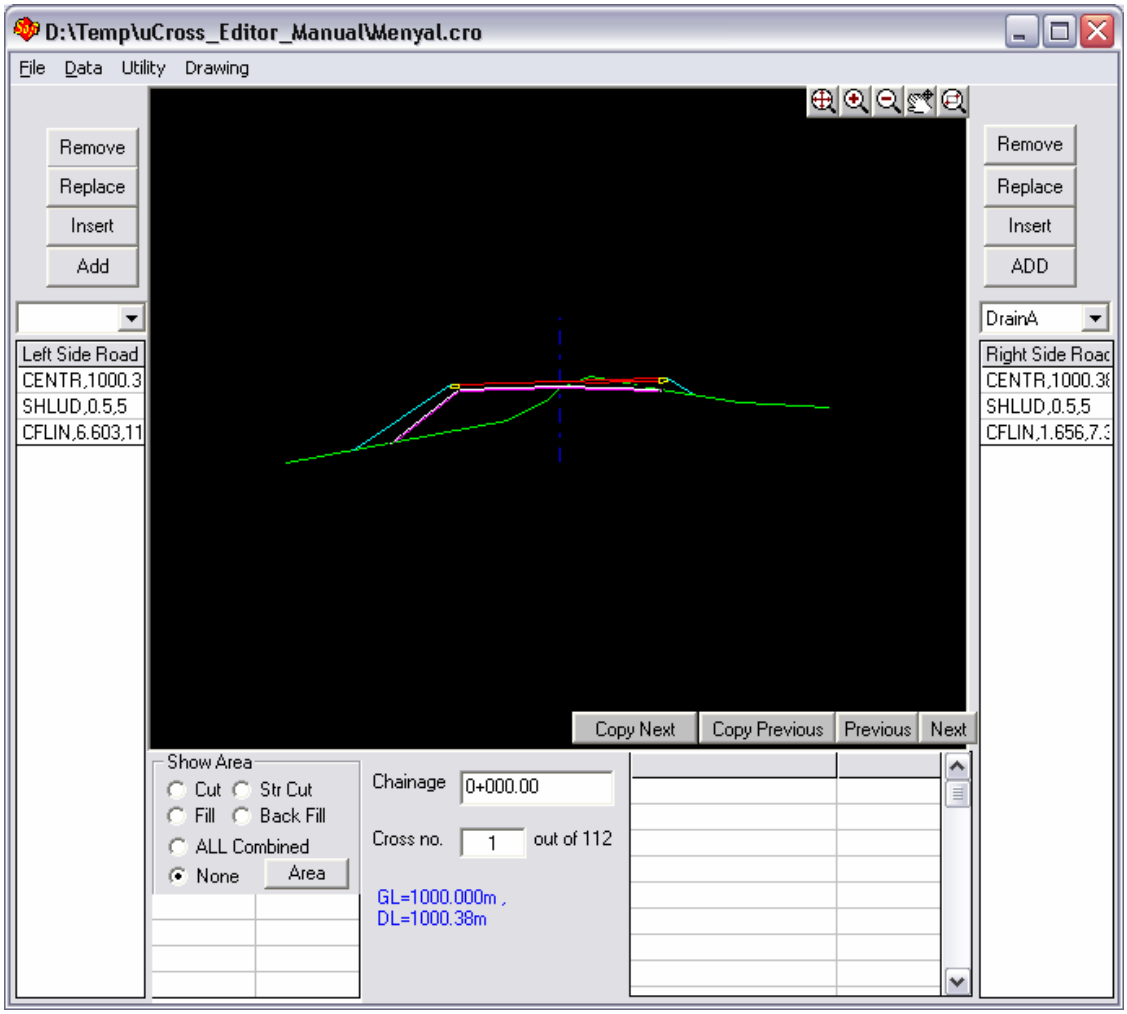


Fig No.: 3.4

Features in uCross_Editor

The different features available in the Cross-Section Editor are as follows:

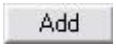
- Add button
- Replace button
- Insert button
- Delete button
- Previous and Next Buttons
- Copy from Previous and Copy from Next Buttons
- Roadside Items
- Chainage and Cross-Section No.
- Shift Center Line by
- Input data
- Area calculation
- Structures
- Different Zoom Functions

The various functions of the Cross-section are defined below:

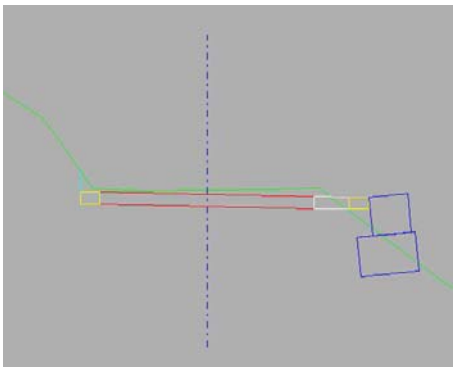
Delete commands allows the user to remove the unnecessary structures. Highlight the component that has to be removed and click command.

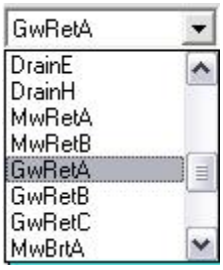
Replace command allows replacing the structure. Pick the structure from the menu as shown in the figure and also highlight the structure to be replaced and click the button.

Insert command allows the user to insert the structures. A Gabion Retaining Wall of Type A is inserted in the figure. Location of the structure to be inserted is given by clicking preceding items.



Add allows the user to add structures in the roadside. Required structure can be selected from the pull down menu as shown in figure.





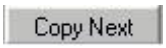
Previous and Next Buttons:

Previous command allows viewing the immediate previous cross-section.

Next command takes to the new cross-section.

Copy Previous and Copy Next:

If structures for the cross-section required are similar to the structure of the previous cross section then it can be provided by clicking the command Copy Previous.



If structures for the cross-section required are similar to the structure of the next cross-section then it can be provided by clicking the command Copy Next.

Roadside items:

In cross section drawing, the various structures or items of the road can be placed, edited and edited. For ease, the center line of the road divides the whole cross editor into two halves. To edit the road side elements on each of side, select the list from the respective side. Data of the cross-section appeared in screen is shown as road items with respect to the centre line.

The Roadside items are defined below:

In default mode of cross-section, the left side road items and right side road items are given in the screen. In both sides of road items, centre line, shoulder and cut fill line are given. When the user

highlights an item then program will provide the properties of the item selected. When selected, a cyan color is seen for the clicked parameter. Some of the frequently occurring roadside items are described below.

Cut and Fill Line (CFLIN):

The cut fill line is represented by abbreviation **CFLIN** in the program. The cutting and the filling slope is the main property displayed in the display window. One can edit the cut and fill slopes as per the demand of the cross section, the initial value being the one provided through soil types in the main data from **Data > Design Data > Soil Type**. The various property displayed in cut fill line is as shown. The slope length, Partial Dist., RL that are shaded are not allowed to change.

CutFiLL	Value
Slope Length	0.08
Partial Dist.	3.306
RL	752.780
Cut Slope 1V:	1.00
Fill Slope 1V:	1.50

Carriageway:

The centerline of the road is represented by **CENTR** in the program. Clicking this will show the details of the carriageway property of the respective clicked side of the road. As all the values are shaded, it informs the user that none of the field can be edited in this category.

Carriage Way	Value
Centre RL	752.724
Road Width	2.75
Slope %	0.00

Shoulder:

The shoulder on each side of the road is represented by **SHLUD** in the program. Clicking this will show the properties of shoulder that are provided through design data.

Shoulder	Value
Width	0.50
Slope %	0.00

Chainage and Cross-Section No.

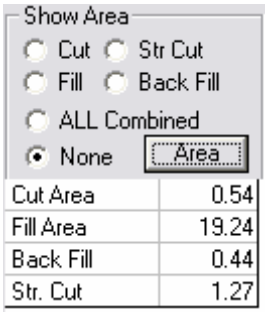
Chainage: 

This field shows the chainage at which the cross section is displayed by the cross editor. It is also useful for viewing the cross section of desired chainage. For this simply type the chainage at which cross section is desired and press enter. The cross editor will show you the cross section for the chainage you have typed.

Cross-Section No.: 

This field shows the cross section number in terms of total cross sections. This also serves as method of jumping to the desired cross section. Simply provide the no. of cross section to be viewed and press enter. The cross editor will show you the cross section for the cross section no. you have typed.

Area calculation:



For the ease in visual judgment, the program has provisions to show area of cut, fill, structure cut, back fill or all combined in graphical form. After placing the structures and cut fill lines, the area is found by clicking "**Area**" button located on the left side of cross editor. The desired area i.e. cut, fill, structure cut, back fill or all combined is then checked to have graphical look in the cross editor. The value is displayed at the same window. A sample of the graphical display is as below.

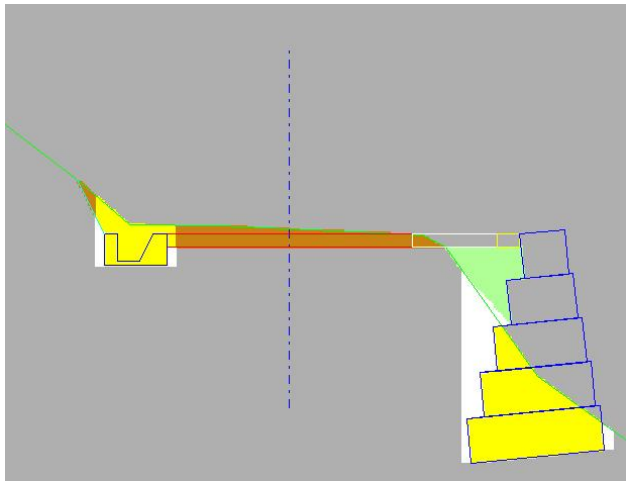


Fig No.: 3.5

Color Coding:

The different colors used in the program for representing the area in cross editor are as follows:

a) Light Brown
This color represents the cut area in the cross section.

b) Yellow
This color represents the structure cut area in the cross section.

c) Light Green
This color represents the fill area in the cross section.

d) White
This is the color to represent the backfill.

View Options:

The view options for the cross editor is located on the upper right corner of the cross editor. Originally, the cross section is always viewed with Zoom Extents.

To magnify the cross section, click on zoom-in (+) and use zoom-out (-) to reduce the magnification. To pan the cross sections use the pan button. Incase, to view a certain portion of the selected cross section click on zoom window button and then click and drag with the left mouse button pressed on, for a rectangular window covering the portion to view. Release the mouse button, to view the portion of the selected Cross Section.

Structures:

The different structures acquired by the program can be added according to the requirement. Different types of retaining structures, Drain, Pass By, GW and many more other structures can be accrue from the combo box as shown in figure. When a project is formed, the program by default makes a folder named “Structures” in the project folder. All the properties of the individual structures can be found in that folder.

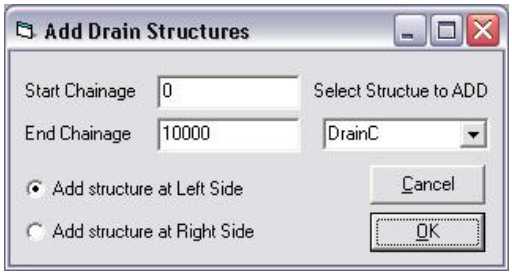
All the structure's parameter has a default value assigned by the program. One can change the values of parameters by directly editing in the property box for individual cross section or for all cross sections. Whenever the structure is desired to be changed for entire project, the editing is done in the text file contained in "**Structure**" folder located at the location where the project has been saved.

The different abbreviated forms of the structures are as follows:

1. **CFLIN** Cut Fill Line
2. **ExtCW** Extra Carriageway
3. **EXCFL** Extra Cut Fill Line
4. **BKFL0** Back Fill Line Type 0
5. **BLFL1** Back Fill Line Type 1
6. **PASSB** Pass By
7. **SHLUD** Shoulder
8. **EXSHO** Extra Shoulder
9. **EXTLO** Extension Line
10. **DrainA** Drain Type A
11. **DrainB** Drain Type B
12. **DrainC** Drain Type C
13. **DrainD** Drain Type D
14. **DrainE** Drain Type E
15. **DrainH** Drain Type H
16. **MwRetA** Masonry Retaining Wall Type A
17. **MwRetB** Masonry Retaining Wall Type B
18. **GwRetA** Gabion Retaining Wall Type A
19. **GwRetB** Gabion Retaining Wall Type B
20. **GwRetC** Gabion Retaining Wall Type C
21. **MwBrtA** Masonry Breast Wall Type A
22. **MwBrtB** Masonry Breast Wall Type B
23. **GwBrtA** Gabion Breast Wall Type A
24. **GwBrtB** Gabion Breast Wall Type B
25. **DrRetA** Dry Retaining Wall Type A
26. **DrRetB** Dry Retaining Wall Type B
27. **MxRetA** Mixed Retaining Wall Type A
28. **MxRetB** Mixed Retaining Wall Type B

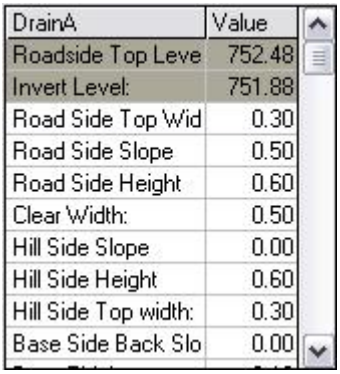
Note: The Mixed Retaining wall is a composite type of wall in which gabion wall is embedded in the masonry wall.

Drains:



There are altogether five different types of drains defined in the program. User can choose the type as per their project requirement and adjust the dimensions. The provision of drains can be made per cross section basis as by adding the required drain to the cross section or provide the drains chainage wise. When drain is to be provided through entire reach or in the range of desired chainage, the placement is done from **Utility > Add Drains**. The adjoining picture clearly shows how the drain can be placed in a certain range of chainage.

Drain Details



DrainA	Value
Roadside Top Leve	752.48
Invert Level:	751.88
Road Side Top Wid	0.30
Road Side Slope	0.50
Road Side Height	0.60
Clear Width:	0.50
Hill Side Slope	0.00
Hill Side Height	0.60
Hill Side Top width:	0.30
Base Side Back Slo	0.00

The drain can be added as other structures from the structure pull down menu. The drains can be added, replaced with other structure or drain itself, deleted as required.

A sample property window of the Drain Type A inserted is shown in the adjoining picture. Except the roadside top level and invert level, all the other properties of the drain can be changed.

While changing drain type or its position or removing / adding drain, the cut area, the fill area, and other various parameters will also change which can be seen in the screen at the same time.

Wall Details

GwRetA	Value
Top Level	736.54
Height	2.00
Gabion Layer Count	2
Batter Slope	0.10
Working	0.20
Horizontal Exposure	0.22
Vertical Exposure D	0.17
Box1	1|1|0
Box2	1|1.5|0.4

Whenever retaining walls or breast walls be required in the cross section, simply click on the pull down menu of structure list and select the type of wall desired. The wall can be replaced, deleted, and added as per the requirement.

A sample property window of the Gabion Retaining Wall Type A inserted is shown in the adjoining picture. Except the top level, all the other properties of the drain can be changed. One can change the height of the wall by increasing the value in “Gabion Layer Count” parameter. The values in Box ”n” parameter corresponds to: Height | Width | Inside offset distance.

While changing type of retaining wall or its height or its position or removing / adding retaining wall, the cut area and the fill area for earthwork as well as the cut area for structure will also change which can be seen in the interactive screen.

CHAPTER-IV

OUTPUTS

(Data & Drawings)

1) Data

All the data obtained from the program are in the excel file format.

A) Slope Length of CutFill Line

The Slope Length of the cut fill lines along with the Backfill lines are obtained from here.

	Left		Right		Left		Right	
	Cutfill				BackFill			
Chainage	Slope(1V:mH)	Length	Slope(1V:mH)	Length	Slope(1V:mH)	Length	Slope(1V:mH)	Length
0	1.5	7.290169	1.5	1.656418	0	0	0	0
20	1.5	2.403701	-1	4.328105	0	0	0	0

Table No.: 4.1

B) Quantities

For the Quantities, when the sub-menu is clicked, the program will automatically open the cross editor. The quantities of the Earthwork, Structures, Pavement, Shoulder and Drains are obtained from the cross editor.

Fig No.: 4.1

The uCross_Editor has provision for breaking the elements of cut and fill for different structures and presenting in different tabs of excel file. This makes the work more simplified and easier.

Fig No.: 4.2

2. Drawings

All the drawings are obtained in the AutoCAD format files.

To draw the cross sections, click **Drawing > Cross-section**. This will lunch the cross editor. The cross section are drawn from the cross editor.

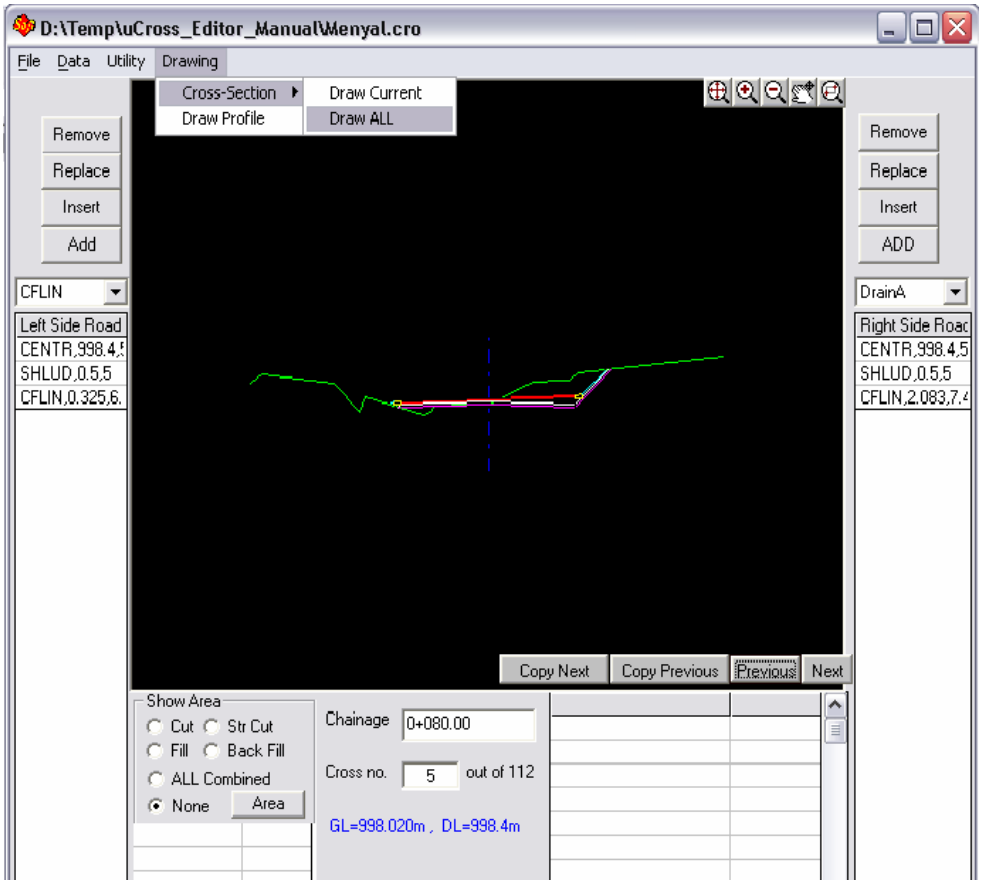


Fig No.: 4.3

Under the Drawing sub menu of the Cross Editor, two options of drawing are available.

i) Draw Current

When a single cross section which appears in cross editor is desired to be drawn in AutoCAD, this sub menu is used. Upon clicking this will ask for the drawing scale in which the drawing is desired in AutoCAD.

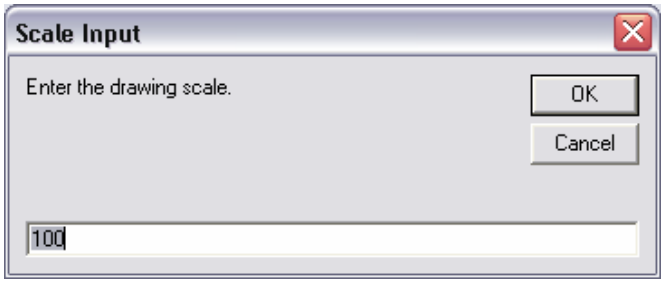


Fig No.: 4.4

If AutoCAD is not previously launched, the program will automatically launch the AutoCAD and draws the cross section. If AutoCAD is open, make sure that the window in which you are about to draw the cross section is active. The program will draw in the AutoCAD window which is active. A sample of drawing is shown below.

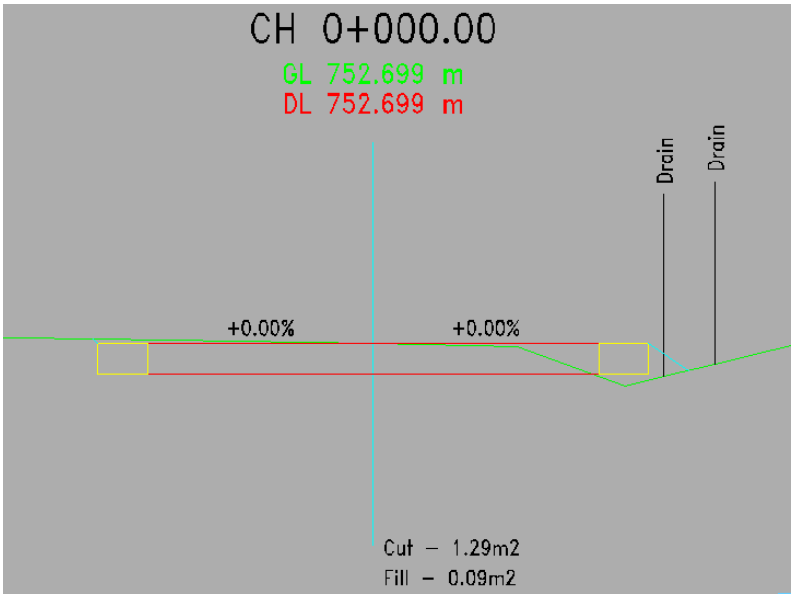


Fig No.: 4.5

ii) Draw All

When all the drawings are to be drawn in AutoCAD, use this sub menu. Upon clicking this will ask for the format in which the cross sections are to be drawn.

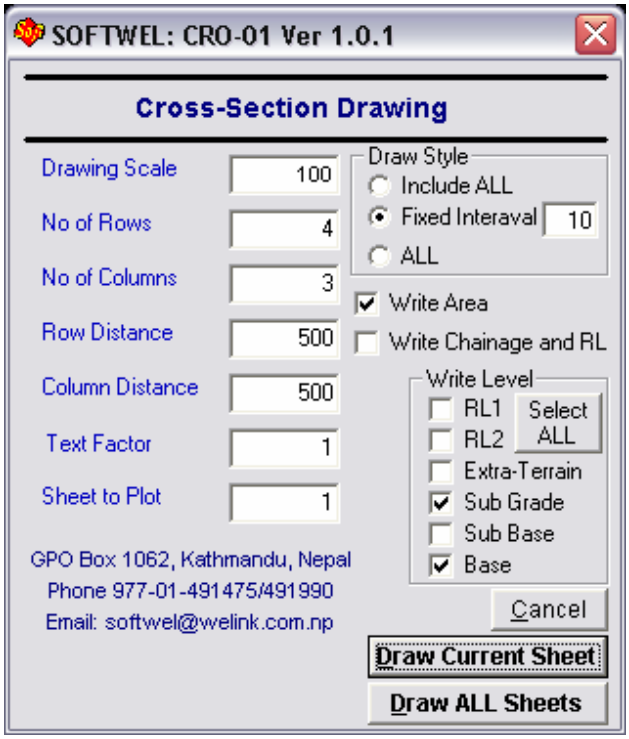


Fig No.: 4.6

The total no. of cross sections is displayed at the bottom of the cross editor. The no. of columns and no. rows in combination represents the no. of drawing to be drawn in one sheet. The row distance and the column distance provide the spacing between the center line of one cross section to the other in vertical and horizontal direction respectively. Drawing of desired interval of cross section is also provided under "**Draw Style**". If the area of cut, fill and structures are to be written in the drawing check "**Write Area**". Further, if the format box comprising of Chainage and RL is desired, check "**Write Chainage and RL**". Level to be written in the drawing is to be customized.

After finalizing the format parameters, the cross sections are drawn in the AutoCAD in two ways. If the no. of cross sections to be drawn is of the order as given in form of no. of rows and columns only, click "**Draw Current Sheet**". If all the drawings are desired, click on "**Draw All Sheets**". This will draw all the sheets in the AutoCAD. This facility provides much ease in printing as one has not to break the sheets for cross sections. A sample is as shown below.

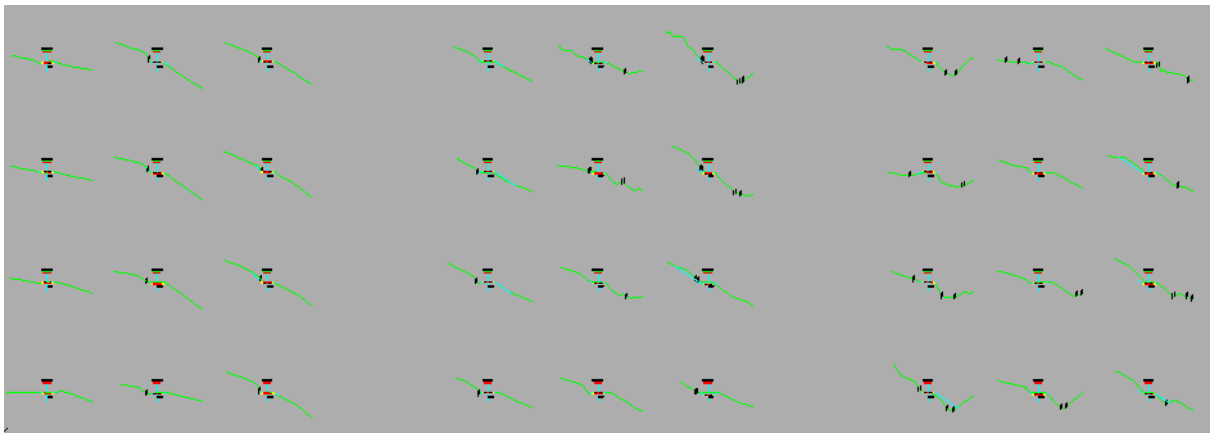


Fig No.: 4.7

Profile:

Besides, the cross section drawing the program has facilitated with the option of drawing profile from the cross section data. This will draw a profile taking into account of the RL of the center of the cross sections. To draw the cross sections, click **Drawing > Draw Profile**.

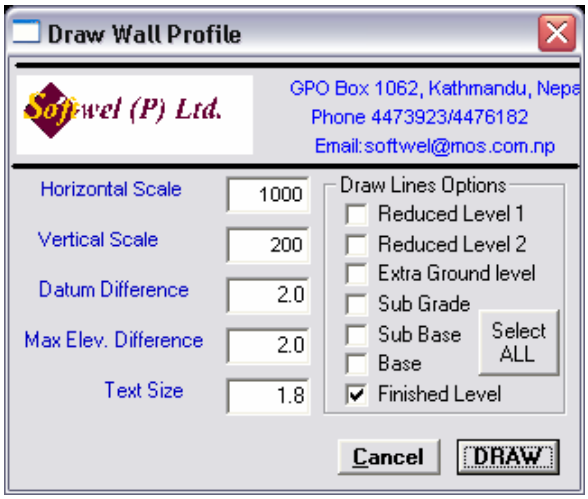


Fig No.: 4.8

Customize the drawing scale, text size and datum differences as per the requirement. Also check the desired lines that are supposed to appear in the drawing.

Now click on "**Draw**". If AutoCAD is not previously launched, the program will automatically launch the AutoCAD. The program will ask in AutoCAD to pick a point as reference for the drawing of profile. Click any point in AutoCAD such that it shouldn't interfere with the other drawings in that window, if any.

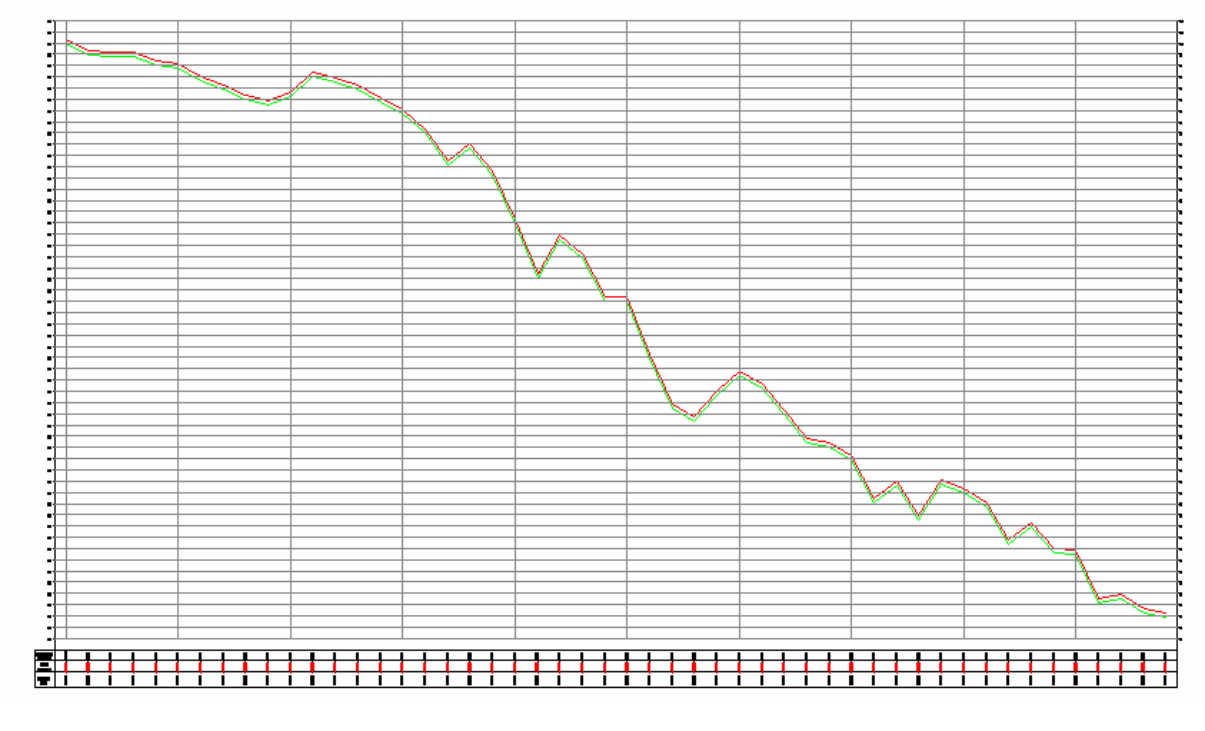


Fig No.: 4.9

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