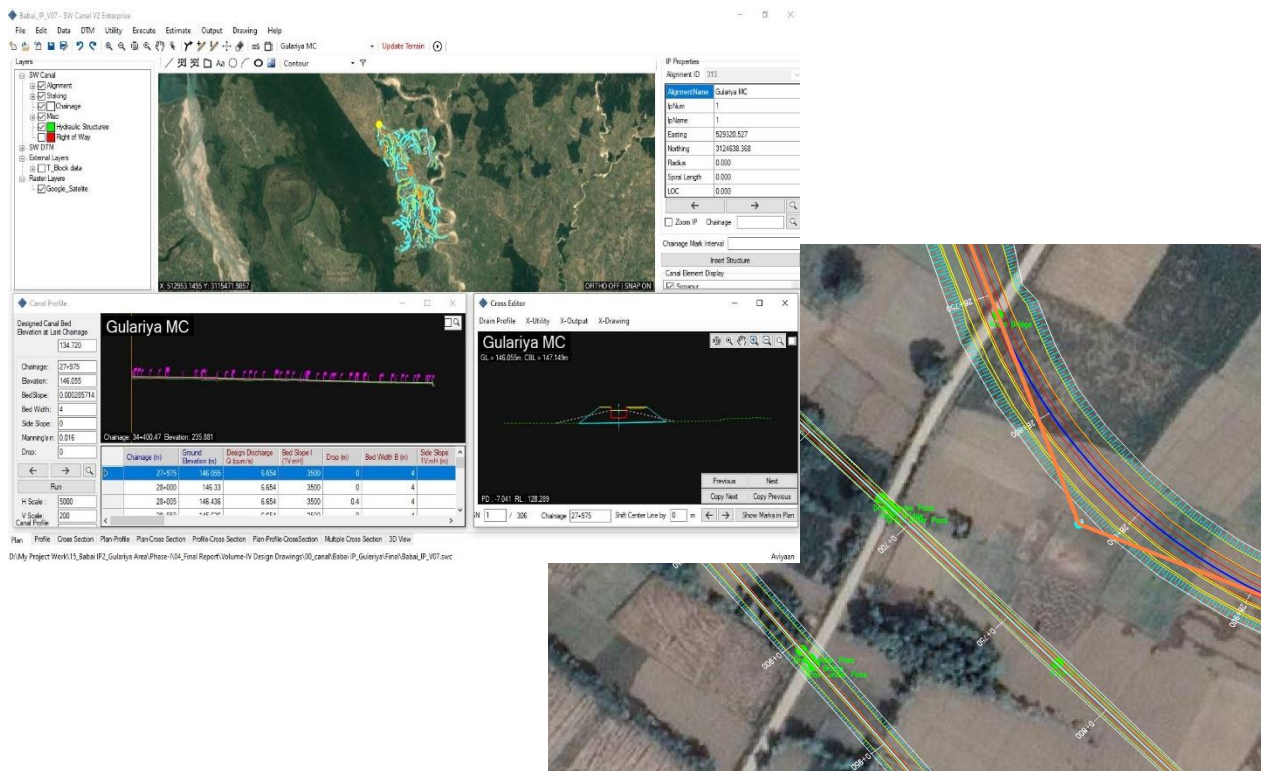


SW Canal V2

Canal Design/Drawing/Quantity Estimation Software

Operation Manual

(Version 2.0.7.0)



June, 2022

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About SW CANAL V2

The SW CANAL was developed in 1993 by WELINK Consultants during the implementation stage of the Sunsari-Morang Irrigation Project (SMIP). The initially developed canal design software was based on excel based calculation. Later, it was built as separate professional canal design software with the name SW_Canal_2004. SW_Canal_2007 is more comprehensive than the SW_Canal_2004 version.

This SW CANAL V2 is a significant upgrade to the previous version of SW CANAL 2007. It includes multicore parallel processing, better graphics, higher computation speed, designing of multi-alignment canals, handling of background imageries, and quantity estimation. The version is self-updating such that the user gets an automated update notice.

SW_Canal has been used in many irrigation projects in Nepal and successfully implemented. Department of Irrigation, Nepal, and almost all divisional and sub-divisional irrigation departments of Nepal are using this software. Numbers of private consulting and contractors are also using this software for canal design and construction.

The SW CANAL V2 comes with five variants of deployment:

- a) Learning Version: Intended for learning purposes and provided free of cost. It is of the same capability as Professional Version but limited to design up to 1.0 Km at a time.
- b) Professional Version: It is an upgrade to the previous version of SW CANAL 2007 and is available to all previous users of SW CANAL.
- c) Enterprise/Professional Version: It has additional tools for hydraulic calculation of structures e.g. hydraulic design of aqueduct, siphon, drops, etc.
- d) Server Version: It is targeted at firms and has Professional Version operating under a central database with multiple licenses with concurrent design capability.
- e) Cloud Version: It is intended for departments/canal agencies/projects for managing and maintaining numerous design works including monitoring of the construction and maintenance works in the cloud.

Development Credits

Avinab Malla - Avinna Malla - Kabindra K Shrestha - Lav Maharjan - Prashant Malla – Ramesh Dumar - Sachin Shrestha – Sanjog Shakya

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Specification

- Built-in tool, DTM for topo map preparation.
- Plan/Profile/ Cross-Section can be viewed in the same window.
- Support online tile imagery and offline images for background reference.
- Support Digital Elevation Model for design.
- Export drawing in print-ready format.
- Export detail quantities for cost estimation reporting.

System Requirement

Operating System: Windows-based OS (Windows 10 Recommended)

Supported OS: Windows 7 with SP1, Windows 8.1, Windows 10

Microsoft .NET Framework 4.8

Processor: 2.5 GHz (3+ GHz recommended)

Memory: 4 GB (8GB recommended)

Disk space: 2.0 GB.

DirectX 10

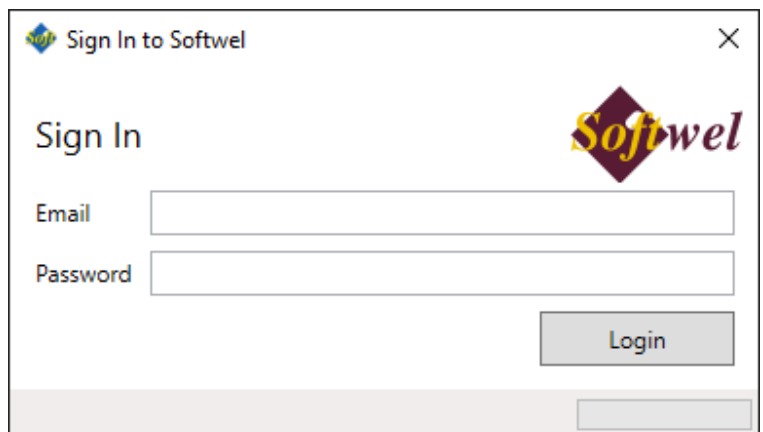
Installation Note

1) Setup Instructions for SW Canal V2 Professional

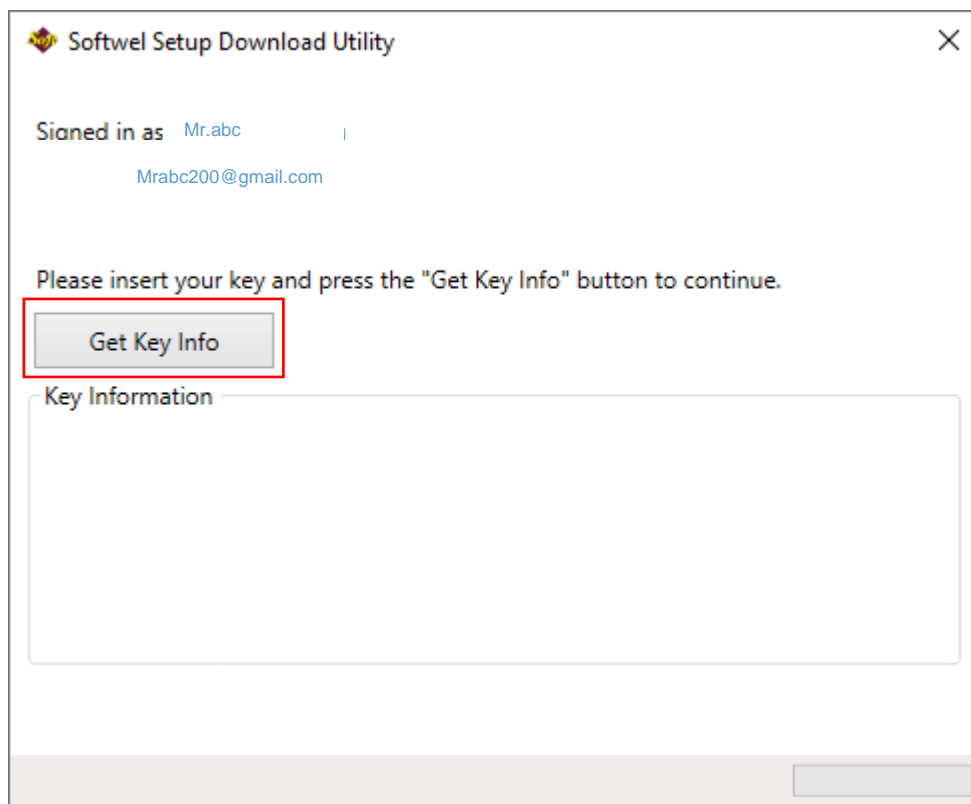
Follow the instructions below if you are upgrading from SW Canal 2010 or earlier, or if you just purchased a new key.

Note: Microsoft .NET Framework 4.8 is required to run SW Canal V2. You can download it from the Microsoft official page.

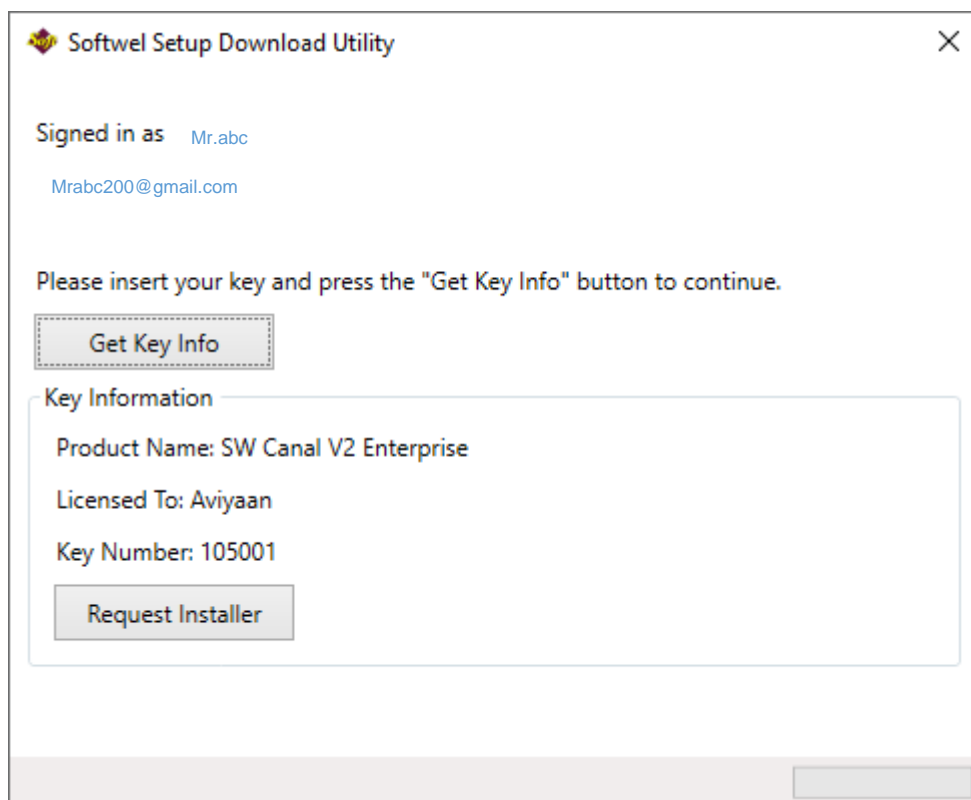
- Register an account at Softwel. You can register an account from Softwel's official page.
- Once you register, an e-mail will be sent to you containing the activation link. Click on the link to sign in and activate your Softwel account.
- Go to <https://downloads.softwel.com.np/Download/SwCanal> page of Softwel
- Download the SW Canal V2 Setup Download Utility.
- Run the Setup Download Utility.
- Enter your Softwel account email and password to sign in.



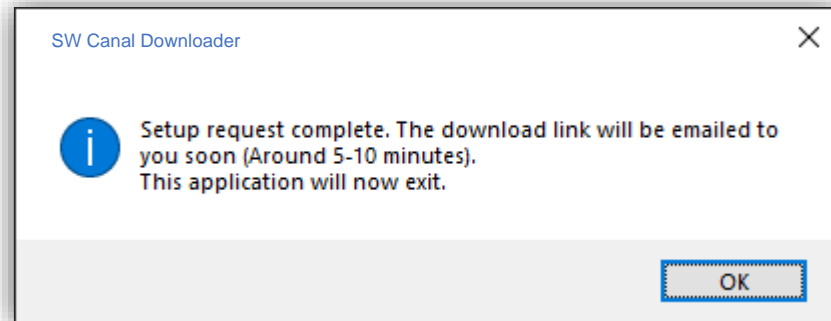
- Once logged in, make sure the key is inserted into your USB port.



- Press the "Get Key Information" button.
- Verify the key information and then press the Request Installer button.



- Softwel will now prepare your installer and you will receive the download link and your product key in your email. This may take up to 10 minutes. The download link will only be valid for 24 hours.



- Download the setup from the link e-mailed to you and run it.
- The setup will ask for a product key. The product key has the format XXXXX-XXXXX-XXXXX-XXXXX-XXXXX. Enter the complete product key, including dashes.
- Once installed, you can start SW Canal V2 from your desktop or the Start menu. The USB key needs to be connected to your computer all the time and the program will stop working if the key is removed.

Note: If this key is to be used in another computer by another user, the registered user should give the same credential information to the another user while downloading and installing the software.

Table of Content

1	INTRODUCTION (USER INTERFACE)	1
1.1	Main Window (Plan Window)	1
1.2	Main Toolbar	1
1.3	Draw Toolbar	2
1.3.1	Layers Panel	3
1.3.2	IP Properties:	4
1.3.3	Insert Structure:	4
1.3.4	Alignment Display:	5
1.3.5	Navigation Tab:	5
1.4	Profile Window	5
1.5	Cross-Section	6
1.6	Plan-Profile	7
1.7	Plan – Cross Section	7
1.8	Profile-Cross Section	8
1.9	Plan-Profile-Cross Section	8
1.10	Multiple Cross Section	9
1.11	3D-View	9
2	MAIN MENU	10
3	FILE	11
3.1	New Project	11
3.2	Open Project	11
3.3	Import Project	11
3.4	Save Project	11
3.5	Save As Project	11
3.6	Project Details	11
3.7	Merge Project	12
3.8	Create Backup	12
3.9	Open Project Folder	12
3.10	Recent Projects	12
3.11	Exit	12
4	EDIT	13
5	DATA	14
5.1	Alignment	14
5.1.1	Data Editor	14
5.1.2	Data Properties	16
5.1.3	Alignment Intersection	16
5.2	Existing Profile	16
5.3	Design Profile	17
5.4	Cross Section	18
5.5	Hydraulic Structures	18
5.6	Right of Way	19
5.7	Soil Data	19
5.8	User Chainage	20
5.9	Canal Bank	20
5.10	Canal Berm	20
5.11	Canal Lining	21
5.12	Canal Bed Layers	21

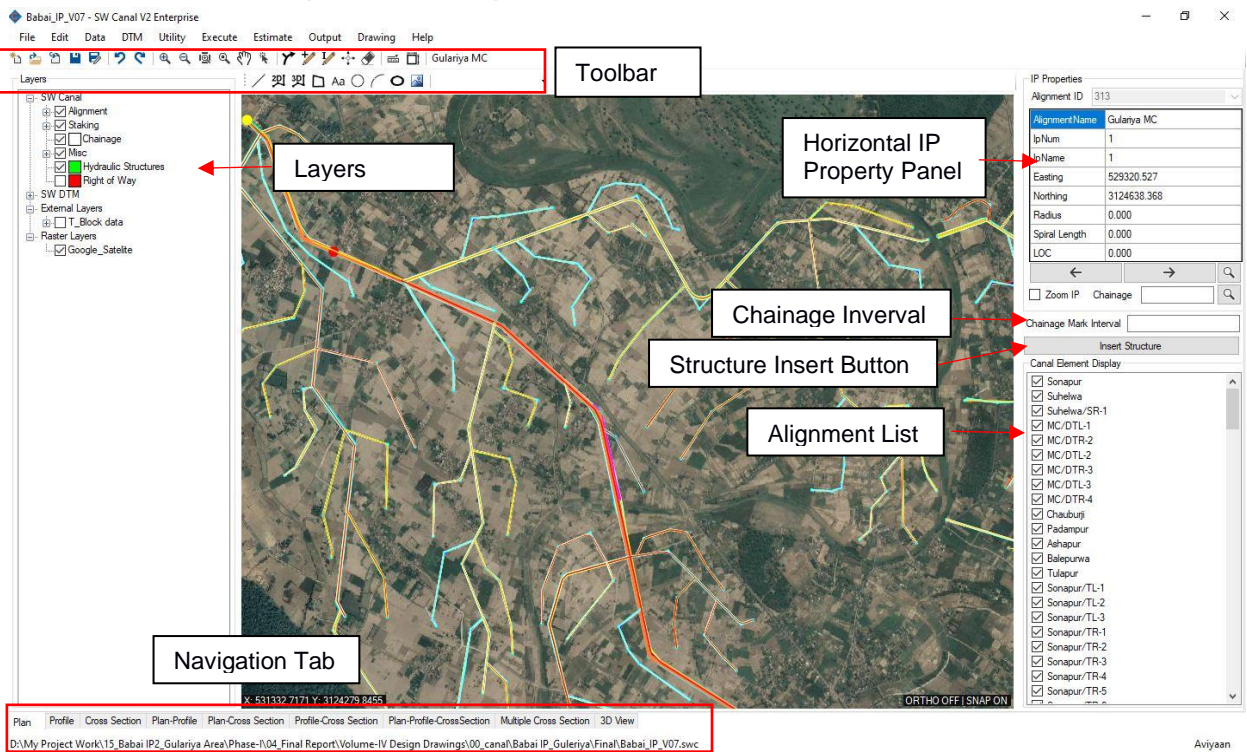
5.12.1	Canal Base.....	21
5.12.2	Canal SubBase	22
5.13	Canal Stripping Data	22
5.14	Set Default Value	22
5.15	Option23	
6	DTM	24
6.1	Terrain Model	24
6.2	Update Terrain	24
6.2.1	Data Extraction.....	25
6.3	Import SW Survey Data	25
6.4	Points25	
6.4.1	Add Point.....	25
6.4.2	Import Points from File	25
6.4.3	Set Point Block Scale	26
6.4.4	Delete Point Range	26
6.4.5	Export Points	26
6.5	Draw26	
6.5.1	Add Boundary.....	26
6.5.2	Auto Boundary.....	26
6.6	Triangles	26
6.6.1	Draw Triangles	26
6.6.2	Erase Triangles	26
6.7	Grid 26	
6.7.1	Show Grid Extents.....	26
6.7.2	Erase Grid Extents	26
6.8	Contours.....	26
6.8.1	Draw Quick Contour	26
6.8.2	Draw Round Contour.....	27
6.8.3	Contour Annotation.....	27
6.8.4	Erase Contour	27
6.9	Generate DTM.....	27
6.10	Show Errors.....	27
6.11	Delete DTM Layers.....	28
6.12	Import Drawing	28
6.13	Export DTM	28
6.14	Open AutoCad SW DTM	28
7	UTILITY	29
7.1	Shift Chainage.....	29
7.2	Reverse Alignment	29
7.3	Ground Excavation	29
8	EXECUTE	30
8.1	Execute Design	30
8.2	Update X-Sections.....	30
8.3	Link Computation	30
8.4	Reposition Hydraulic Structures.....	30
8.5	Compute Right of Way	30
8.6	Execute Staking	30
8.7	Remove Staking	30
9	ESTIMATE.....	31
9.1	Quantity Estimate	31

10 OUTPUT	32
10.1 Horizontal Curve Data	32
10.2 Design Profile Data.....	32
10.3 Hydraulic Structure Data	32
10.4 Right of Way.....	33
10.5 Cross-Section Points.....	33
10.6 Property-line coordinate	34
10.7 Slope Length of Cut Fill Lines.....	34
10.8 Export All.....	34
10.9 Export Data Items.....	34
10.10 Export KML / Geopackage /Shape	35
11 DRAWING	36
11.1 Alignment	36
11.1.1 With Viewport	36
11.1.2 Without Viewport:	37
11.1.3 Schematic:	37
11.1.4 Stripe Plan:.....	37
11.2 Profile37	
11.3 Cross-Section.....	38
11.4 Edit Plan Template	39
11.5 Edit Cross Template	39
11.6 Change Editing App.....	39
11.7 Restore Template.....	39
12 HELP	40
12.1 Search (Ctrl+F).....	40
12.2 Download	40
12.3 Check For Updates.....	40
12.4 Contact Softwel	40
12.5 About40	
13 MENU IN CROSS-EDITOR.....	41
13.1 X-Utility.....	41
13.1.1 Assign Materials	41
13.1.2 Import Structure Settings.....	41
13.1.3 Export Structure Settings.....	43
13.1.4 Edit shoulder	43
13.1.5 Compute Staking.....	43
13.1.6 Overwrite Design Item Wise	43
13.1.7 Copy Design Chainage Wise.....	43
13.1.8 Copy Structures (Ctrl+Shift+C)	43
13.1.9 Add/Remove Structures (Ctrl+Shift+A")	43
13.1.10Insert Structures (Ctrl+Shift+I)	44
13.1.11Find and Replace Structure (Ctrl+Shift+F).....	44
13.1.12Trace Quantity.....	44
13.1.13Mass Haul Diagram.....	45
13.1.14Favourite Structure.....	45
13.1.15Customize Structures	45
13.1.16Customize Gabion Box Count	46
13.1.17Options.....	46
13.1.18Always on Top.....	46
13.2 X-Output.....	47

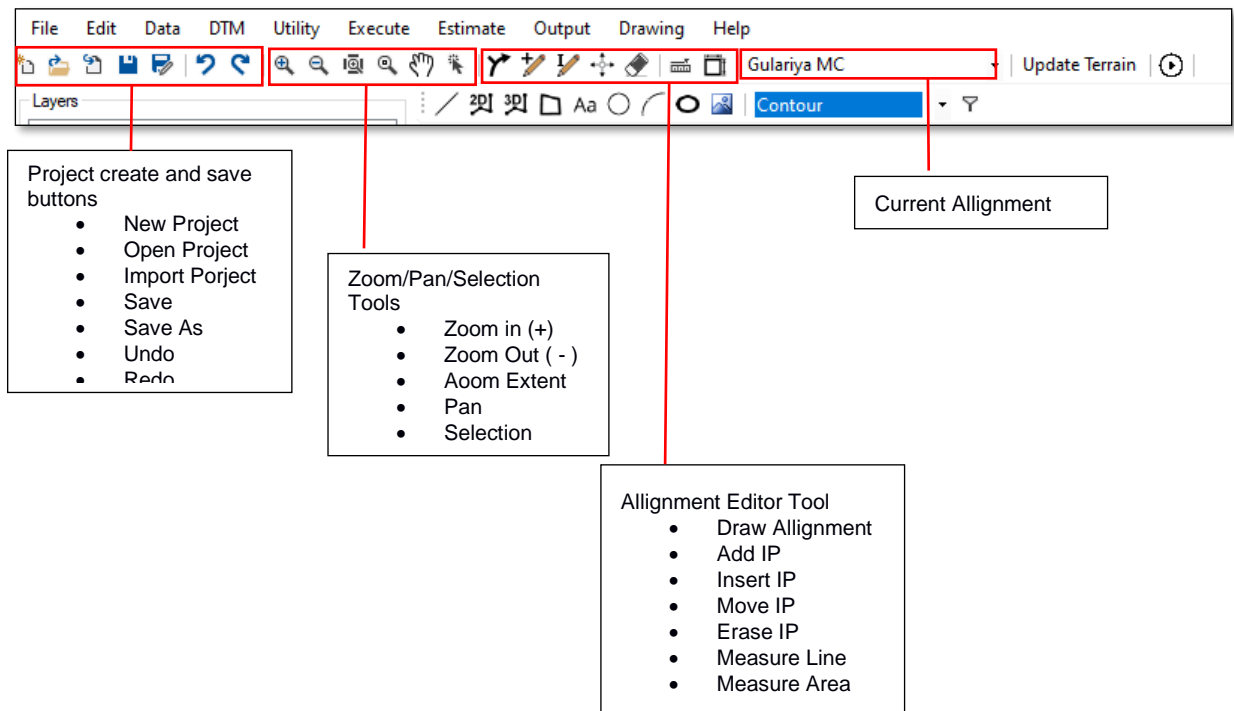
13.2.1 Slope Length of Cut Fill Line.....	47
13.2.2 Quantities	47
13.3 X-Drawing	47
13.3.1 Draw Current.....	47
13.3.2 Draw All.....	47
14 NEW IN SW CANAL V2.....	48
14.1 Improved Computational Speed	48
14.2 Added Mouse Navigation Control	48
14.3 Compatible with the previous version of the software	48
14.4 Support background imagery.....	48
14.5 3-D Visualization	48
14.6 Left side layer panel	48
14.7 Compatible with GIS Shapefile (*.shp), Geo package (*.gpkg)	48
14.8 Right Side multiple Alignment Display control.....	49
14.9 Compatible with multiple alignments.....	49
14.10 Support DEM terrain.....	49
14.11 Auto-Calculation of curves.....	49
14.12 Terrain Menu (Integrated SW DTM)	49
14.13 Reverse Alignment	49
14.14 Drain Profile.....	49
14.15 Cross-Editor	49
14.16 Warning for insufficient Ground profile.....	50
14.17 Multiple cross-section Editing	50
14.18 Drawing in Print Ready Format.....	50
14.19 Quantity.....	50
14.20 Export To Google Earth.....	50

1 INTRODUCTION (USER INTERFACE)

1.1 Main Window (Plan Window)



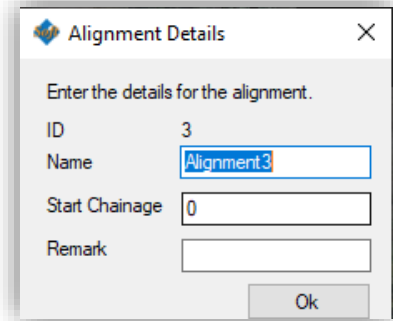
1.2 Main Toolbar



1. Draw New Alignment



It is used to draw new horizontal alignment. If the Plan window is active, it draws a new horizontal alignment. If plan and profile or Plan-Profile-CrossSection windows are active, it works on the Plan window. While drawing new horizontal alignment, the canal name and start chainage of the canal has to be defined before the start of the new alignment. While drawing a new alignment, the appropriate radii are auto-assigned. **To finish adding IP, the user has to right-click on the mouse.**



2. Add IP

This tool adds the IP at the end of the active alignment.

3. Insert IP

This tool inserts new IP between the two nearest IPs of the active alignment. It works on Plan and Profile windows.

4. Move Vertex

This tool is used to move or edit the position of the IP. It works on Plan and Profile windows.

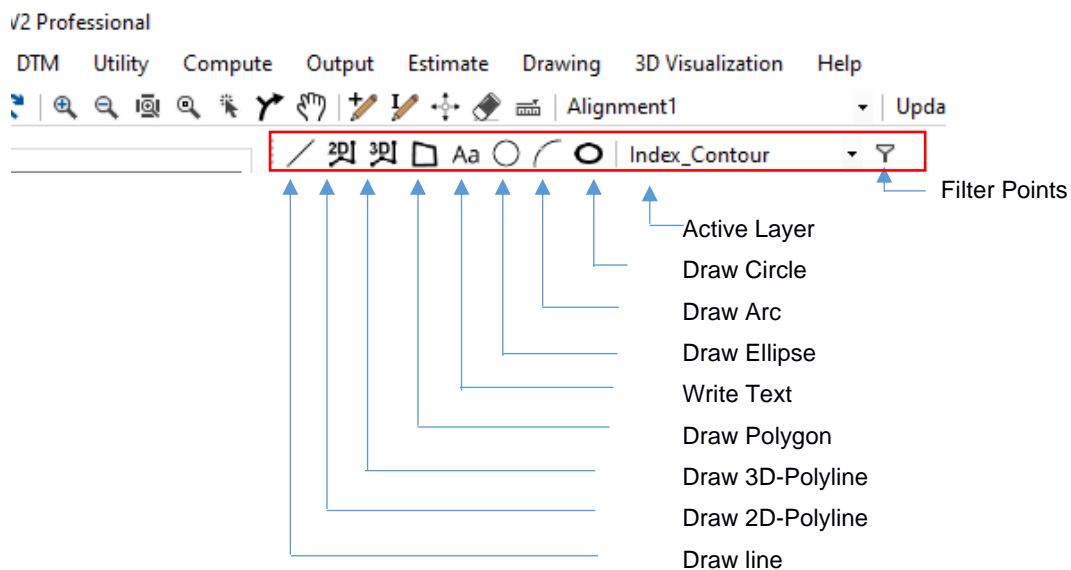
5. Erase IP

This tool is used to erase unnecessary IPs in Plan and Profile.

6. Switch Active Alignment

This drop-down is used to switch the active alignment.

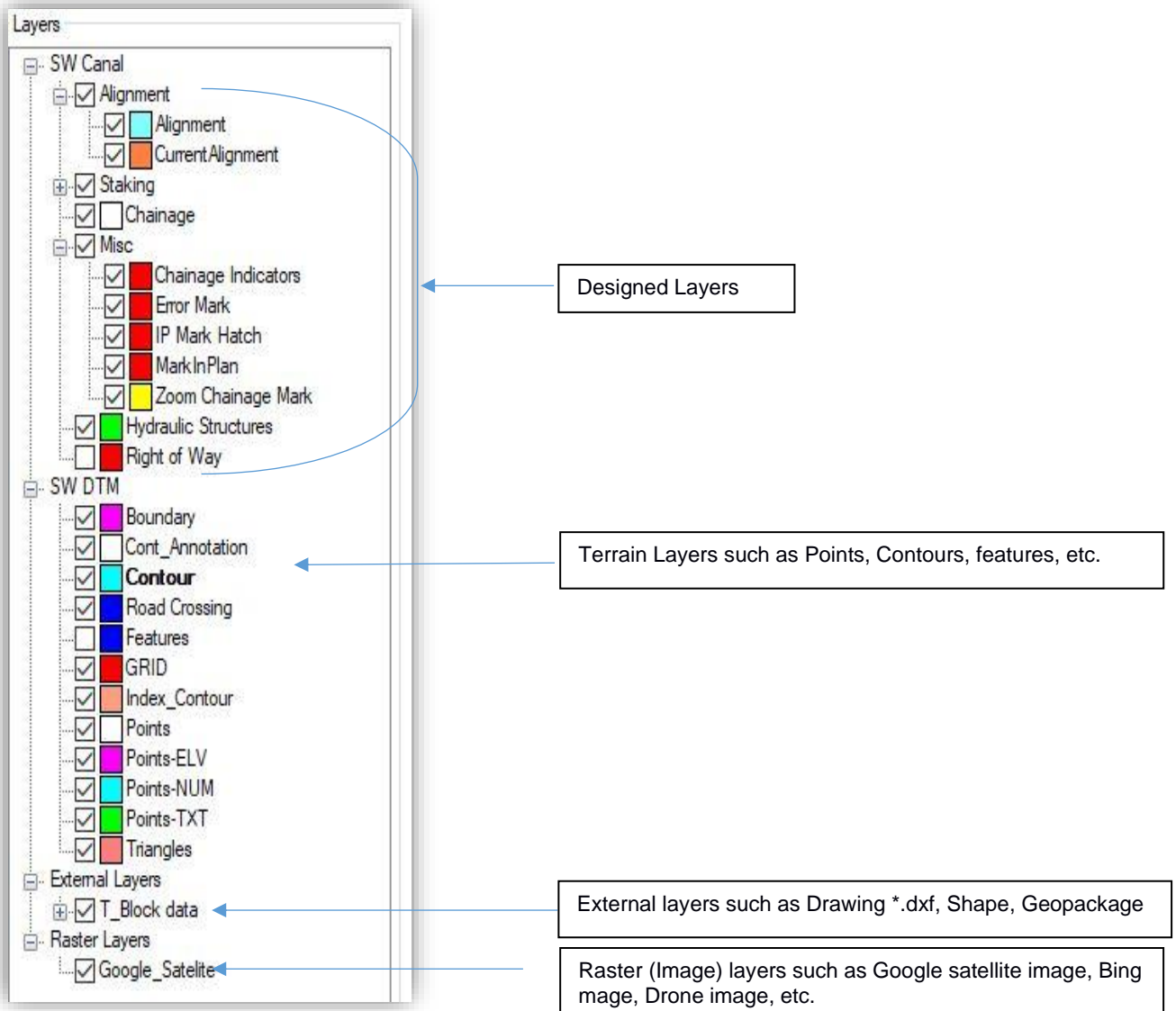
1.3 Draw Toolbar



- While using “Draw Toolbar”, the **mouse right-click completes the command, keyboard “Backspace” key undo the inserted vertex.**
- “Draw 3D-Polyline” is used to draw the 3d-features that indicate the terrain undulation such as canal edge, steps in terrain, cutting edge, etc.
- All the drawn features are added under the active layer. So the user has to change the active layer as per requirement.

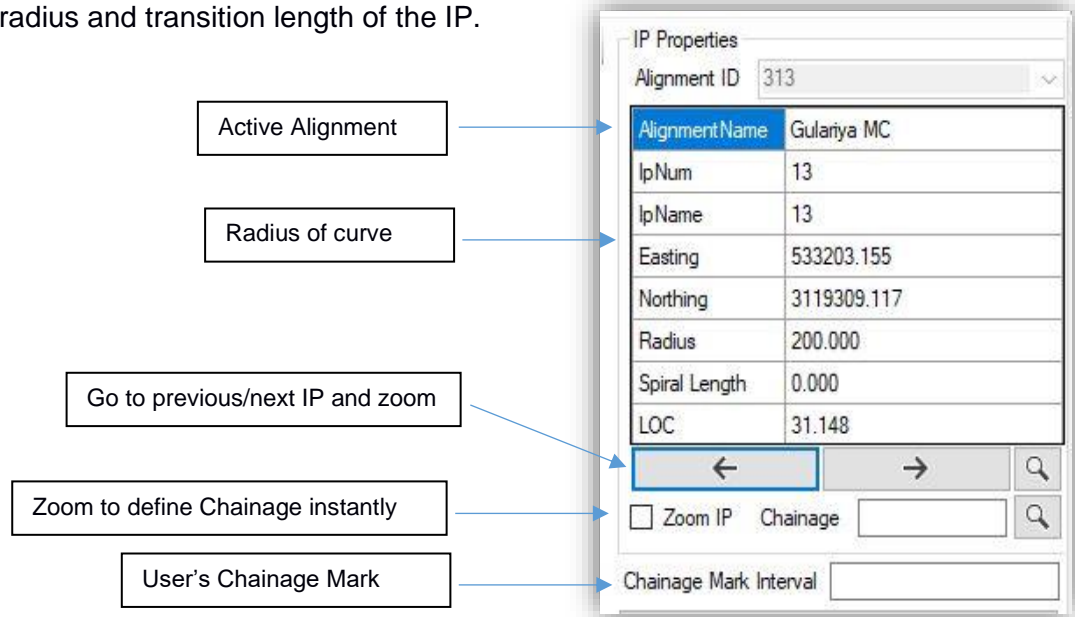
1.3.1 Layers Panel

It controls the display of all the designed layers (canal width, chainage, extra widening, etc), drawn terrain layer (Points, features, contours, etc), imported external layers (drawing file (*.dxf), shape (*.shp), geo package (*.gpkg), etc) and imported raster layers (satellite imagery, topographic map, drone images in *.tif or *.mbtiles format).



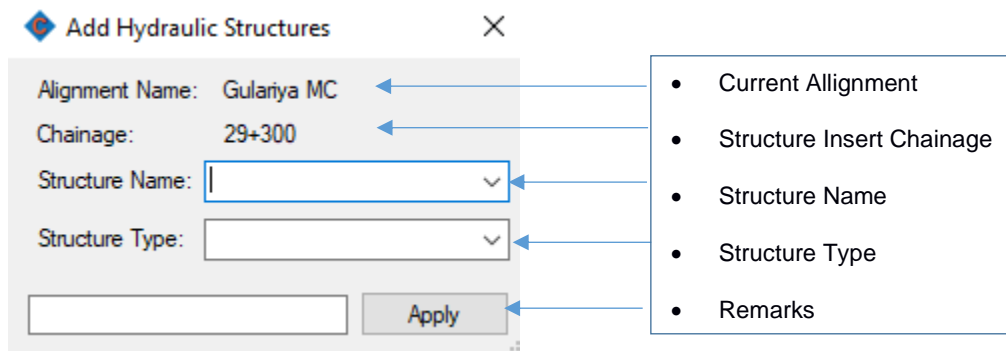
1.3.2 IP Properties:

It is used to display the properties of the selected Horizontal IP. It is the place to assign and modify the radius and transition length of the IP.

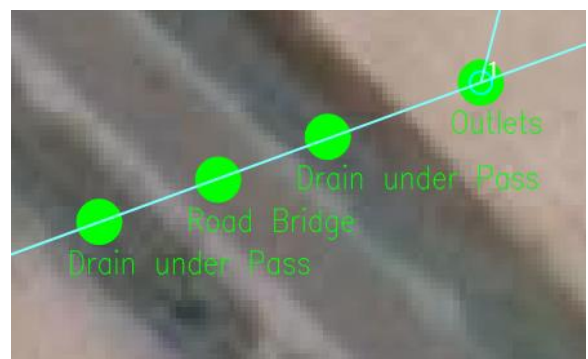
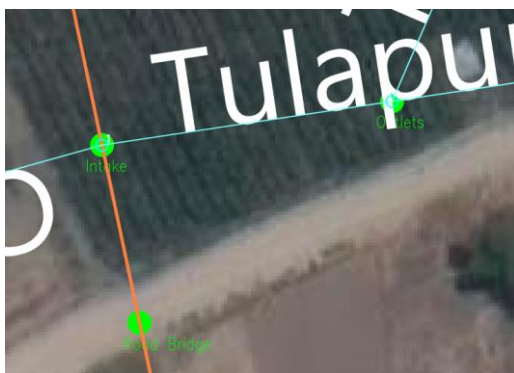


1.3.3 Insert Structure:

Insert structure button at the middle of right panel box in plan window is used to define canal structures in the current alignment. To insert structure on current alignment, click on the "Insert Structure" button and pick pint (to be clicked on current alignment) will be asked. On clicking the pick point, Then following dialogue box will appear

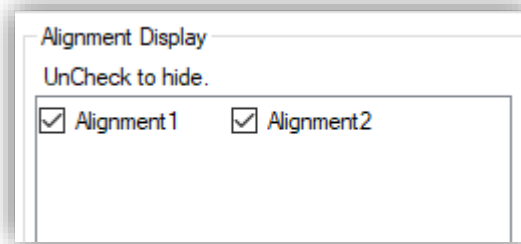


It is allowed to insert listed structures only. If it is required to insert other than the listed one, it is recommended to select other and put remarks. After assigning the appropriate structure, click on the "apply" button. Then there will be seen structure name in the plan window.

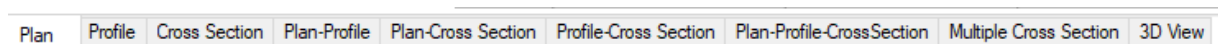


1.3.4 Alignment Display:

It is used to hide and unhide the design component of alignment such as canal width, bank line, berm line, cut fill line, etc of respective alignment. The alignments remain visible even after turning off this layer. The visibility of alignment can be turned off from the Alignment property Manager. (Menu bar>Data>Alignment>Properties).

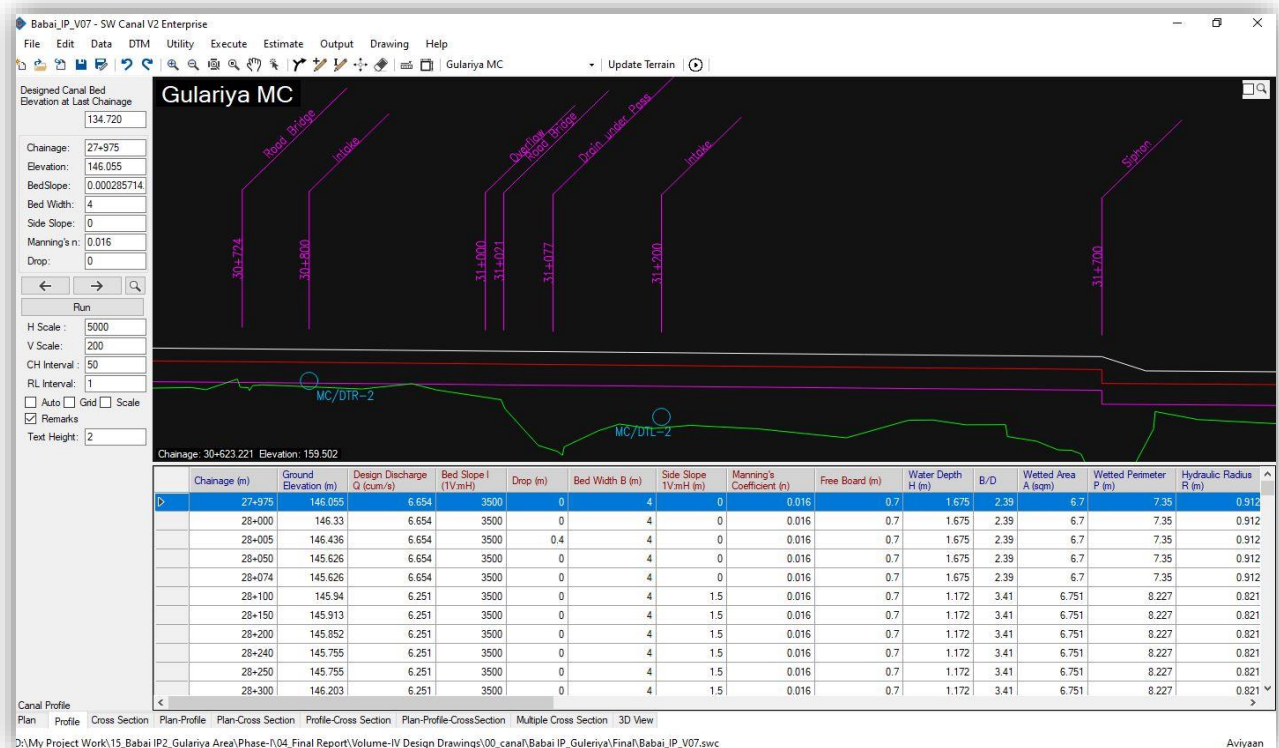


1.3.5 Navigation Tab:



Navigation Tab is used to quickly switch between the various window. The main windows available are Plan, Profile, and Cross Section. These windows can be arranged in a different configuration to make the designing job comfortable. The job will be more comfortable if the user uses multiple monitors for parallel referencing.

1.4 Profile Window



This is the default profile window, used to design the longitudinal profile of the canal. Right-Click option will give “Model View”, “Data View”, “Model-Data View” with grid and scale. Red text columns are the engineering inputs and blue text columns are the calculated values. The hydraulic calculation is based on Manning’s equation. The left panel box gives editable canal profile design data of a specific chainage.

Designed Canal Bed
Elevation at Last Chainage

134.720 ← Design Canal Bed Level

Chainage: 28+800 ← Specific Chainage

Elevation: 145.869 ← Ground Level of Specified Chainage

Bed Slope: 0.000285714 ← Inverse Value of 1:3500

Bed Width: 4 ← Proposed Bed Width

Side Slope: 1.5 ← Canal cross-sectional slope that define section Geometry

Manning's n: 0.016 ← Manning's co-efficient for Concrete Lining Material

Drop: 0 ← Canal Drop Value

← → 🔍 ← Previous/Next Chainage and zoom to specified Chainage

Run ← Design calculation button for specific chainages after edit

H Scale: 5000 ← Horizontal Profile drawing view scale

V Scale: 200 ← Vertical Profile drawing view scale

CH Interval: 50 ← Chainage interval for view

RL Interval: 1 ← Defined vertical level interval

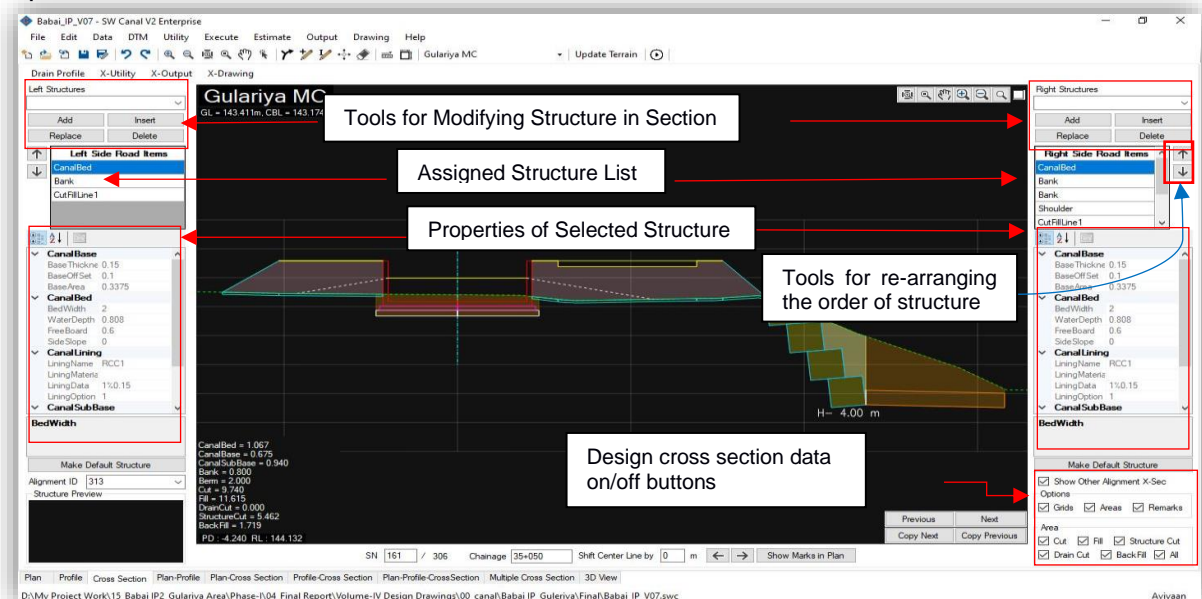
☐ Auto ☐ Grid ☐ Scale ← Interval auto set, Grid, scale and remarks on/off buttons

☒ Remarks

Text Height: 2 ← Display text sizing cell

1.5 Cross-Section

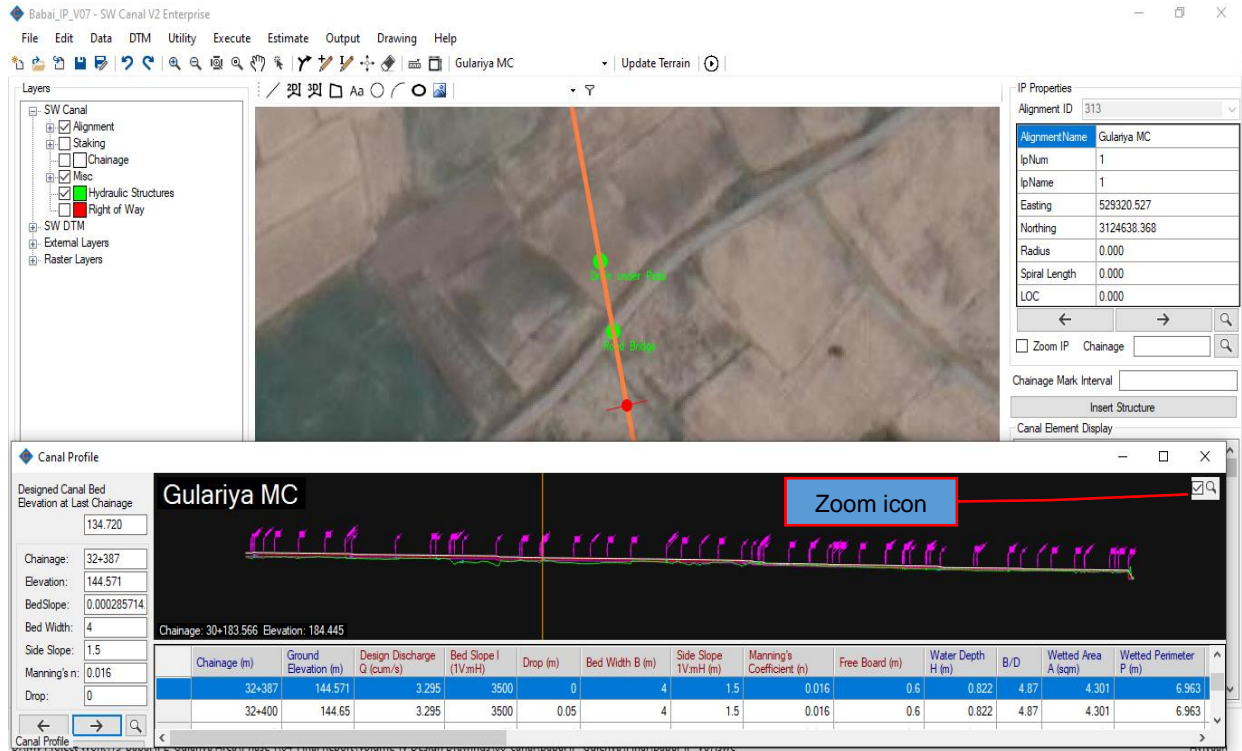
This window is used to design the cross structures such as Retaining wall, breast wall, cut/fill slope, drainage, etc. The cross-section menu has been discussed in detail in a separate chapter.



1.6 Plan-Profile

The profile window is detachable in this view. If the user has multiple monitors, it can be viewed separately.

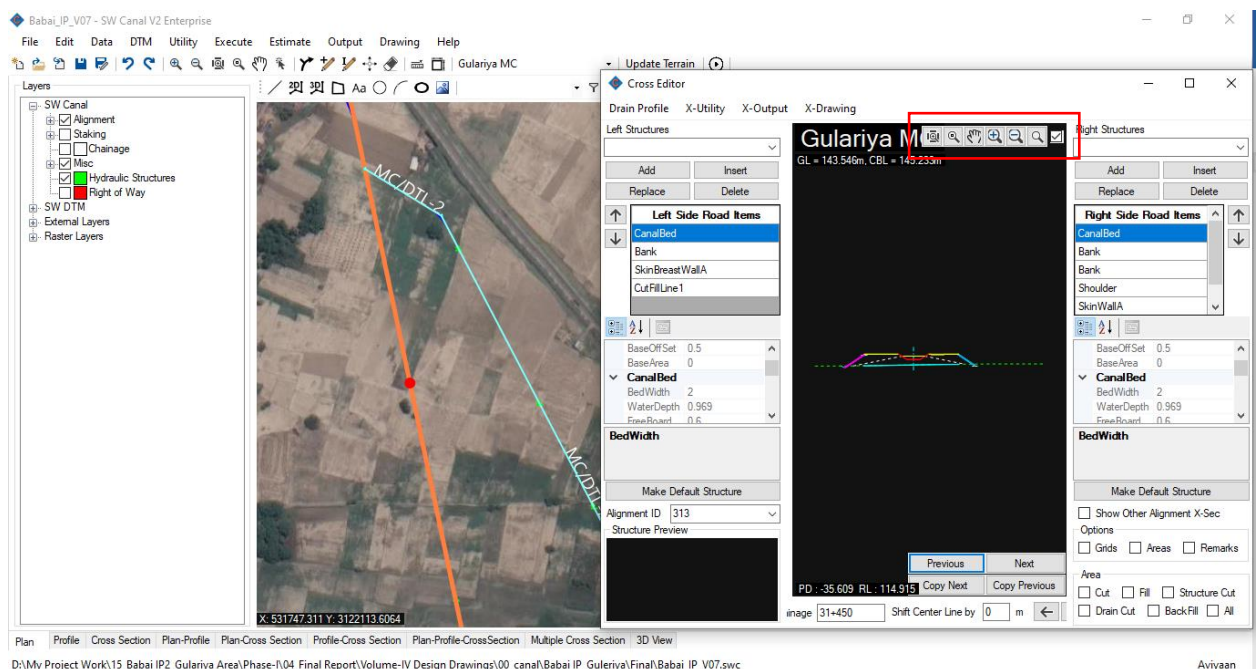
Tick mark on the “zoom icon” button in the profile window will move and zoom automatically to the highlighted chainage in the plan.



1.7 Plan – Cross Section

The cross-section is detachable in this view. If the user has multiple monitors, it can be viewed separately.

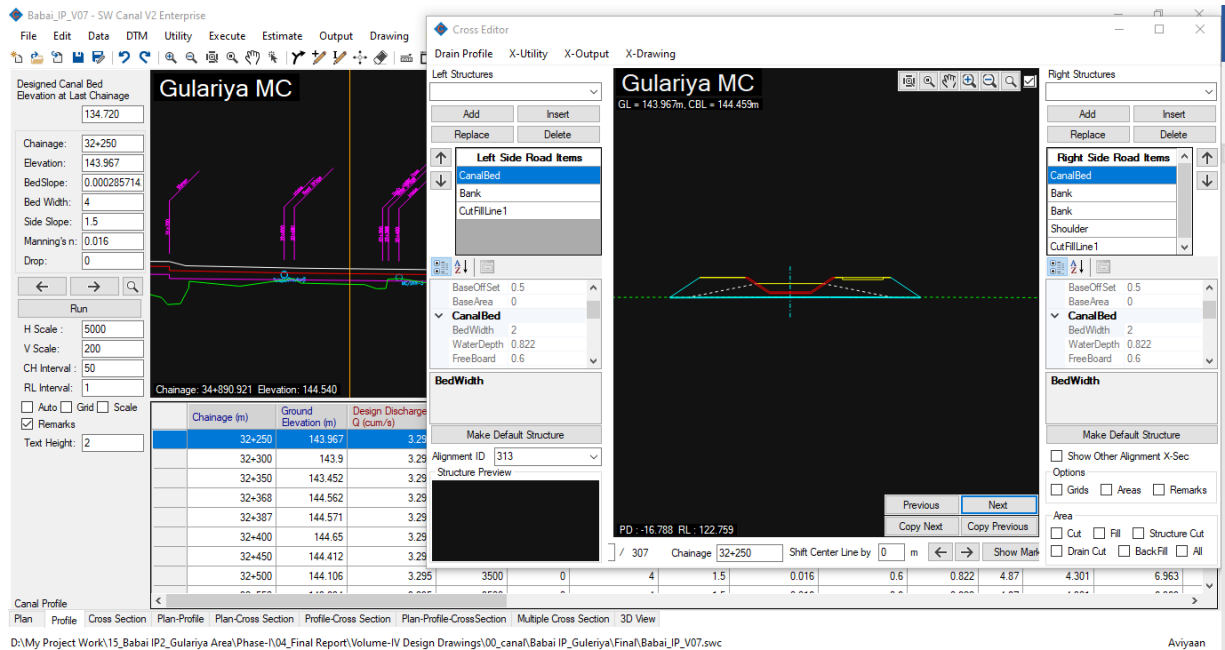
Tick mark on “zoom icon” button in cross-section window will move and zoom automatically to the section chainage in the plan.



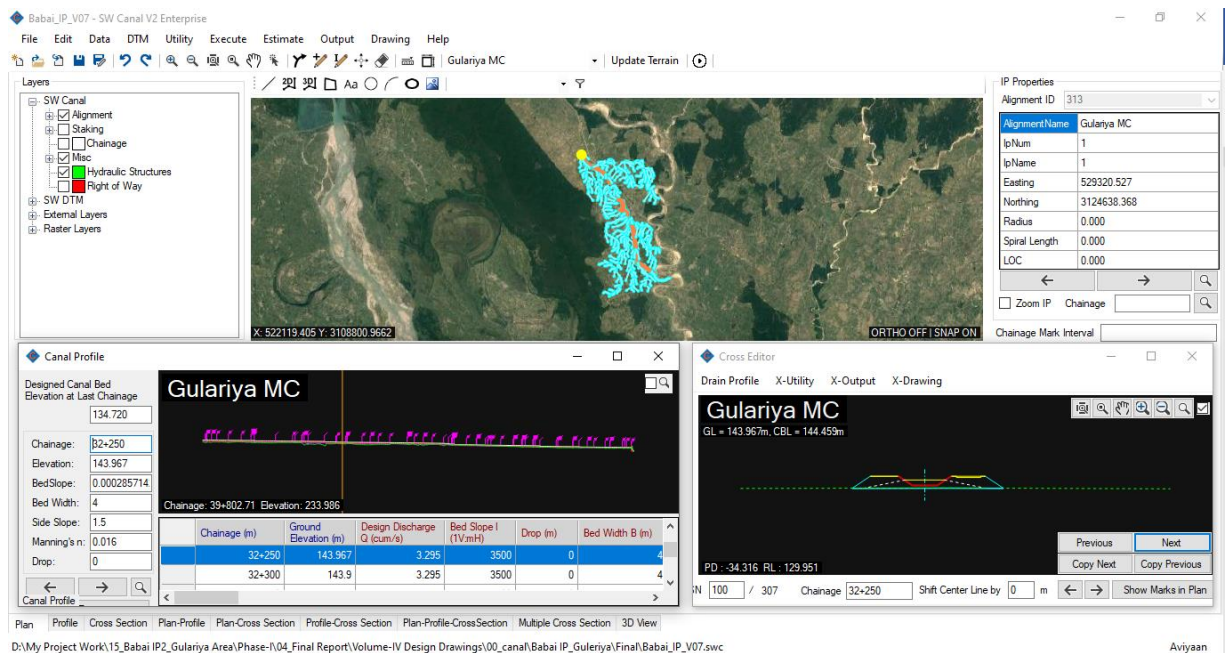
1.8 Profile-Cross Section

The cross-section is detachable in this view. If the user has multiple monitors, it can be viewed separately.

Tick mark on “zoom icon” button in cross-section window will move and zoom automatically to the section chainage in profile and vice versa.

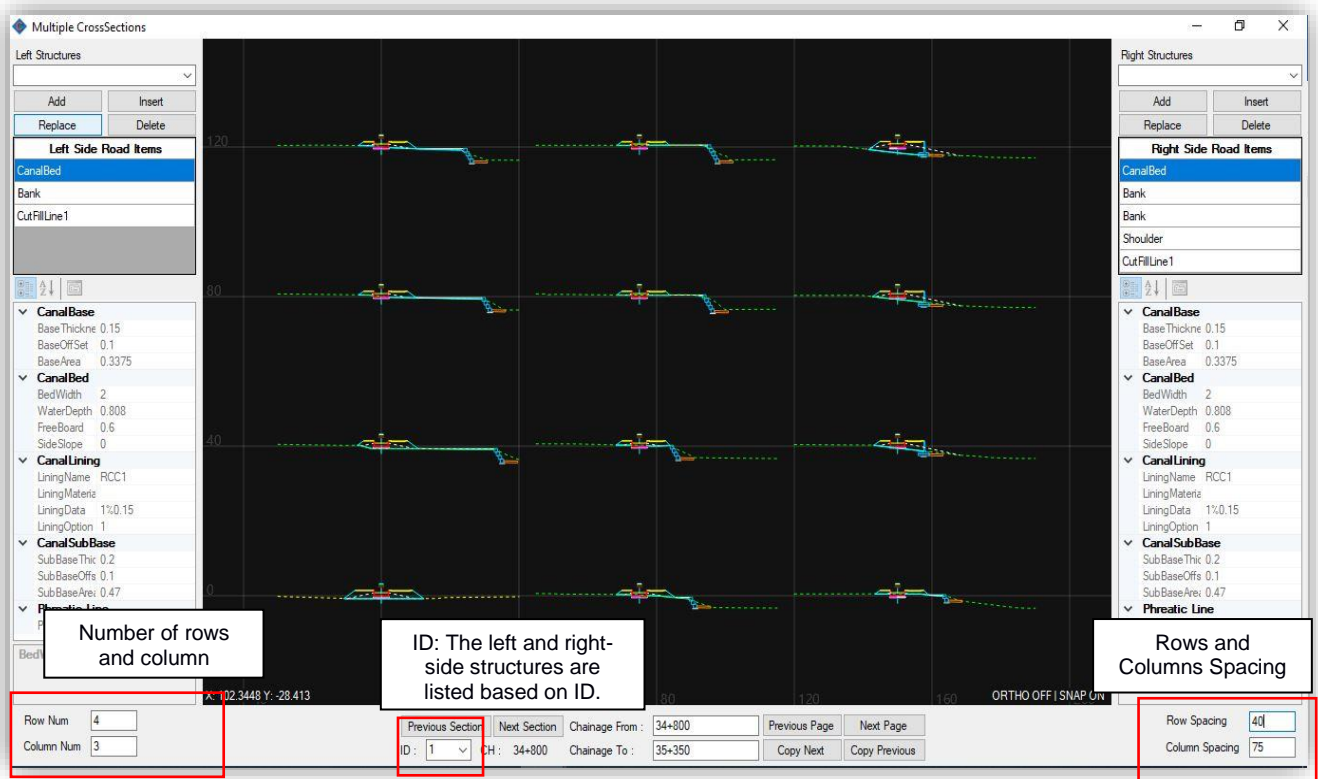


1.9 Plan-Profile-Cross Section



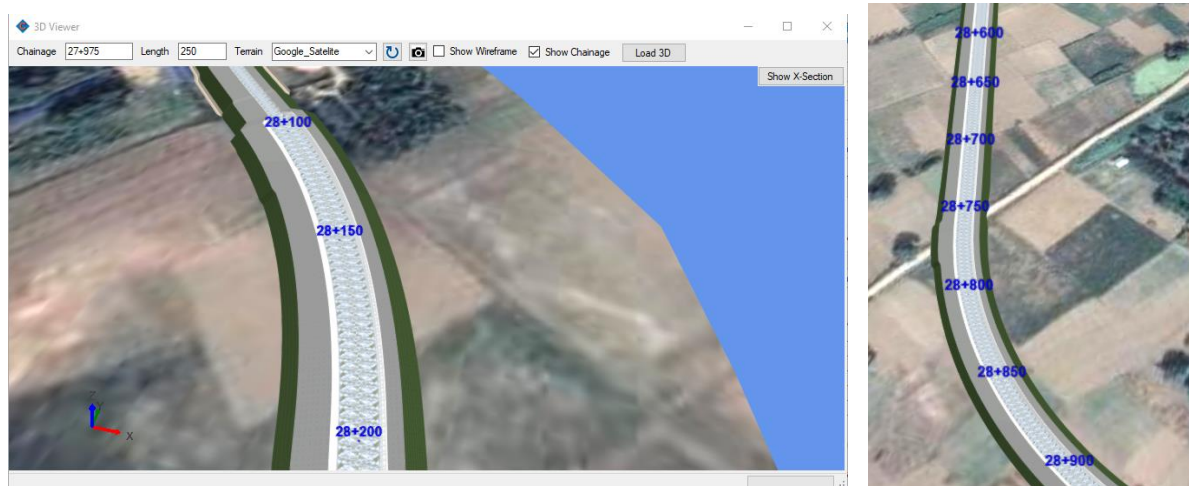
1.10 Multiple Cross Section

This window can be used to design multiple cross-sections at once. Multiple cross-sections are displayed and action taken will apply for all the displayed sections.



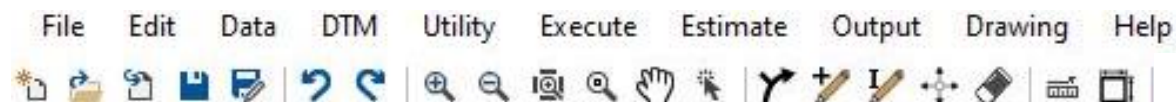
1.11 3D-View

3D-model can be viewed either with background terrain or without background. A longer stretch of view needs more memory. So, it is recommended to view a short stretch at a time (around 250 m or as per the processing speed of the system) and regenerate another stretch for the next view.



2 MAIN MENU

The entire system is grouped into menus based on their similarity of functions. The following table provides the summary of the menus and the sub-subsequent section provides details of each of the menus and the sub-menus



Menus	Description
File	Allows users to create a new project, import project from (*.swc) file format and import settings from another project, create a backup copy of the project, save and exit.
Edit	Alignment drawing and editing by move/insert/erase IPs are facilitated in this menu.
Data	Most of the data that is required for the designing canal is entered here. Design Parameter like design discharge, bed slope, canal geometry type ground profile and cross-section data, right of way, soil type data, Canal bank, berm, lining, canal bed layers, stripping. Besides these, Set default value and option for basically setting background display color has been facilitated in the data menu.
DTM	Surveyed points are processed, contours and terrain surfaces are generated. The source of terrain file required for the design is selected whether the source is internal DTM, external DTM, or Grid.
Utility	Shift the chainage, reverse the alignment and ground excavation, cad tool for printing large numbers of sheets in AutoCAD and mobile app tool for data interchange from computer to mobile and vice versa works can be performed within this menu.
Execute	Recalculate the design criteria based on a user-defined design table.
Estimate	Estimate and prepare the bill of quantity of the project
Output	Export the design data, and design entities to KML, Geo package, and shapefile
Drawing	Export Design Drawing (Plan, Profile, and Cross-Section)
Help	About the system.

3 FILE

The file menu has been divided into the following sub-division.

3.1 New Project

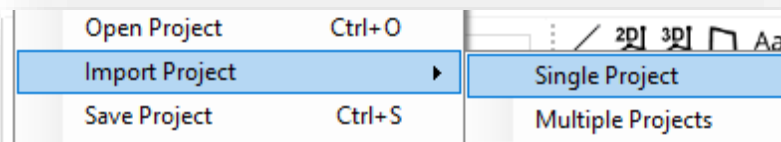
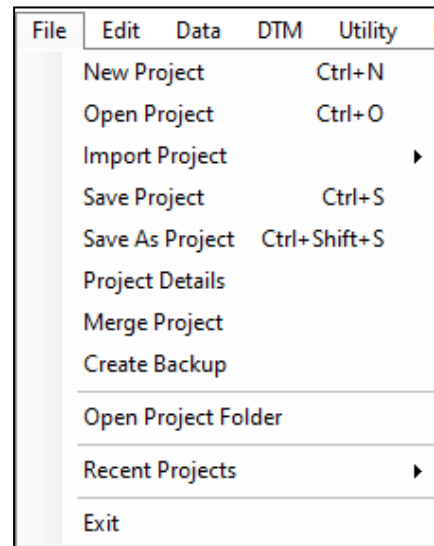
Create a new project with default settings. Users can do nothing without creating a project.

3.2 Open Project

This sub-menu will open the existing project

3.3 Import Project

If the old version of the canal design project was created by SW_Canal 2007 (*.irr extension). is to be open in this software, the" Import Project" sub-menu is helpful. A single project or multiple projects file can be imported.



3.4 Save Project

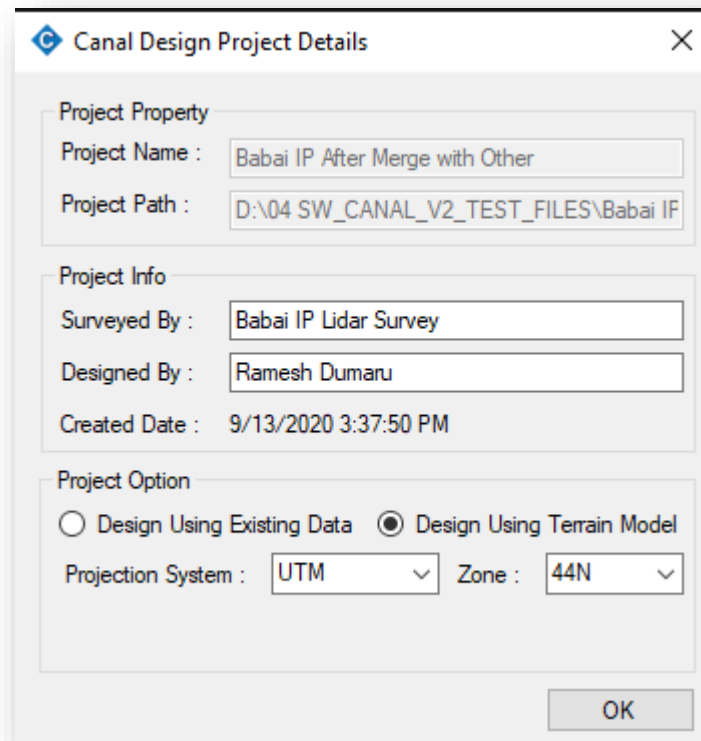
Save the project

3.5 Save As Project

Save the project in a new copy and continue in it.

3.6 Project Details

The project properties, information, and projection system are displayed. The projection system can be changed from here.



The image shows a software dialog box titled "Canal Design Project Details". It is divided into three sections: "Project Property", "Project Info", and "Project Option".

- Project Property:** Contains two text input fields. "Project Name" is filled with "Babai IP After Merge with Other". "Project Path" is filled with "D:\04 SW_CANAL_V2_TEST_FILES\Babai IP".
- Project Info:** Contains three text input fields. "Surveyed By" is filled with "Babai IP Lidar Survey". "Designed By" is filled with "Ramesh Dumar". "Created Date" is filled with "9/13/2020 3:37:50 PM".
- Project Option:** Contains two radio buttons. "Design Using Existing Data" is unselected, and "Design Using Terrain Model" is selected. Below them are two dropdown menus: "Projection System" is set to "UTM" and "Zone" is set to "44N".

An "OK" button is located at the bottom right of the dialog box.

3.7 Merge Project

To merge another project in the currently opened project.

3.8 Create Backup

Save another copy of the project in the same directory of the project file.

3.9 Open Project Folder

To open the folder location of the currently opened project.

3.10 Recent Projects

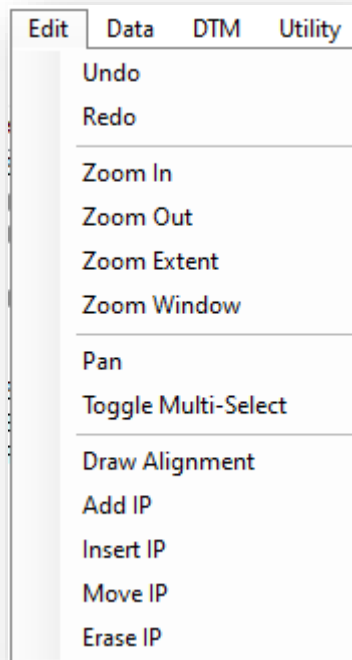
Display the list of the recently opened project for quick opening of the project file.

3.11 Exit

Exit the project file.

4 EDIT

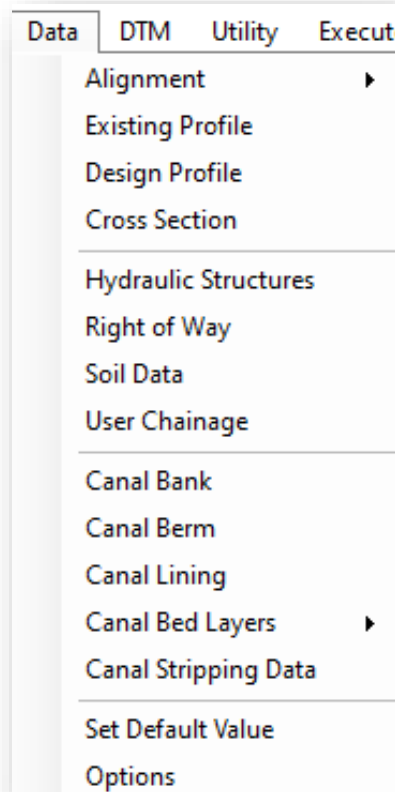
This section follows tools to handle editing of objects and working views.



The commands present in this menu are used to handle views such as zooming, panning, and multi-select as well as editing Horizontal IPs such as adding, inserting, moving, erasing.

5 DATA

Before proceeding to canal design, the design requirement and criteria need to be entered. In this menu, all the design requirements and criteria are entered. The Data menu is subdivided into the following sub-menu.



5.1 Alignment

The first and basic design parameter is alignment. The alignment design data required is the coordinates of the alignment IPs in the projected coordinate system.

5.1.1 Data Editor

Drawing new alignment can be of the following cases;

- a) If we have IPs co-ordinates arranged in an excel file
- b) If we have the topographic map to draw alignment

Case: a) If we have IPs co-ordinates arranged in an excel file

If we have the coordinate arranged in order of IP-name, x,y, radius, transition length in columns as shown below in the excel file (*.xlsx), we can import those coordinates.

Sakraul Branch				
IP-Name	Easting (X)	Northing (Y)	Radius (m)	Transition Length (m)
1	653355.8918	2976769.312	0	0
2	653078.822	2976699.402	0	0
3	652545.4755	2976564.03	0	0
4	652466.3951	2976543.87	0	0
5	652365.48	2976518.946	0	0
6	652301.8341	2976501.961	0	0
7	652247.195	2976478.662	0	0
8	652236.148	2976472.993	0	0
9	652221.5672	2976463.989	0	0
10	652208.5082	2976452.247	0	0
11	652175.6236	2976418.512	0	0
12	652104.8402	2976340.659	0	0
13	652031.7001	2976259.37	0	0
14	651985.9535	2976207.976	0	0
15	651919.6344	2976135.133	0	0

To import so arranged co-ordinate, click on the “Data Editor” sub-menu, and the following dialogue box will appear.

First, click on the “Add” button. This will clear table if there exist alignment data of another canal alignment. Then click on the “Import” button, give alignment name, start chainage and select the excel file in which alignment coordinates are arranged.

Note: These are the list of sheets on selected excel file. It will allow only one sheet at a time


Sakraul Branch				
IP-Name	Easting (X)	Northing (Y)	Radius (m)	Transition Length (m)
1	653355.8918	2976769.312	0	0
2	653078.822	2976699.402	0	0

With a click on the “OK” button, above “Excel Sheet Details” dialogue box will appear. Check on excel sheet name, Alignment Name Included, and Header Included and proceed.


The simple way is to “copy (ctrl+C)” copy command in excel and paste it into the above alignment dialogue box.


5.1.2 Data Properties


This sub-menu will provide to manage the alignment properties. Following buttons are facilitated in the alignment properties manage dialogue box.

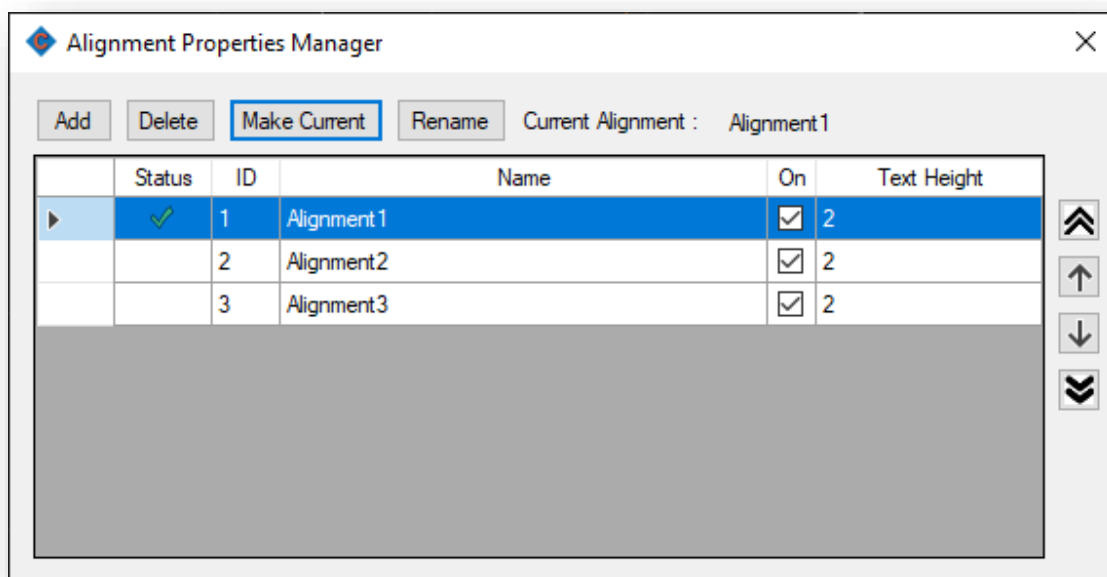
Add  Will add alignment offset to a specified distance of specified alignment.

Delete  Will delete the selected alignment other than the current alignment.

Make Current  Will put the selected alignment in current for design.

Rename  Will help to change the name of alignment.

Arrows in the Right panel  Will move the selected alignment in sequence order.

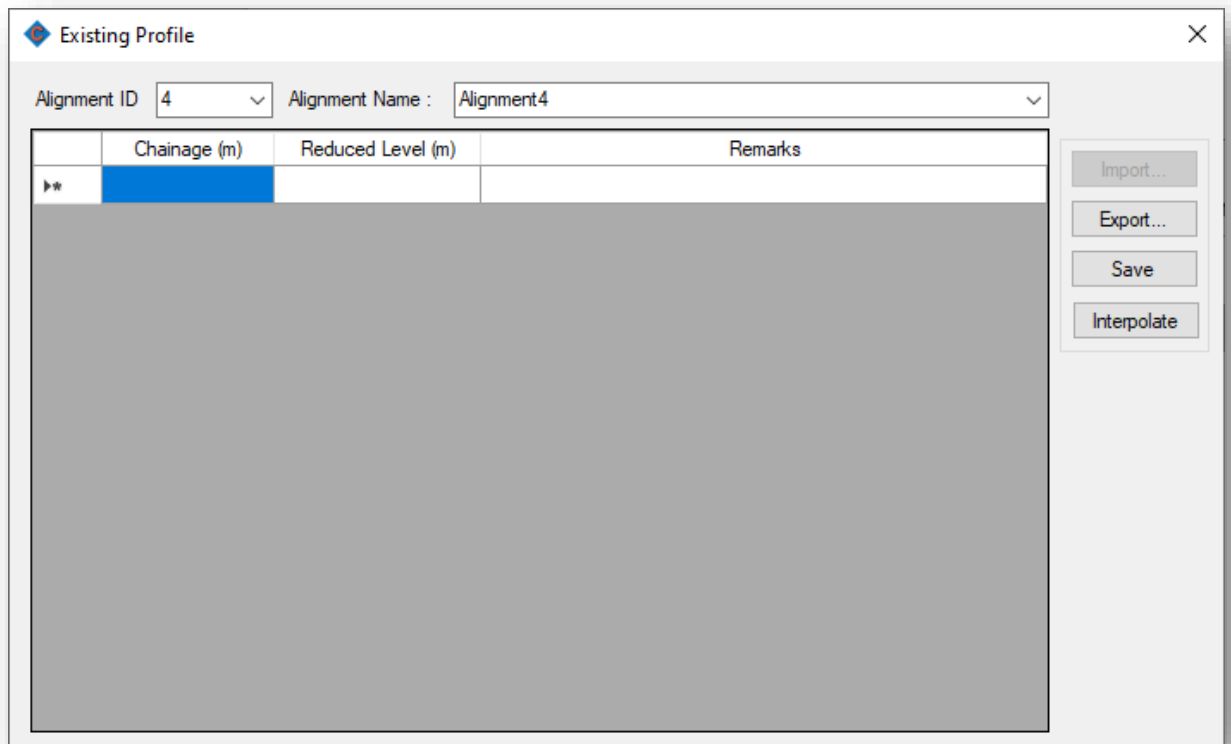


5.1.3 Alignment Intersection

The alignment intersection button has the objective to give the output of smooth line in staking lines at the point of intersection.

5.2 Existing Profile

Existing Profile refers to the ground profile elevation along the alignment. On click with the “Existing Profile” sub-menu, the following dialogue box will appear.



The 'Existing Profile' dialog box is used for inputting existing profile data. It features a title bar with a close button (X). Below the title bar, there are two dropdown menus: 'Alignment ID' (set to 4) and 'Alignment Name' (set to Alignment4). The main area contains a table with three columns: 'Chainage (m)', 'Reduced Level (m)', and 'Remarks'. The first row of the table is highlighted in blue and contains a blue square icon. To the right of the table, there are four buttons: 'Import...', 'Export...', 'Save', and 'Interpolate'.

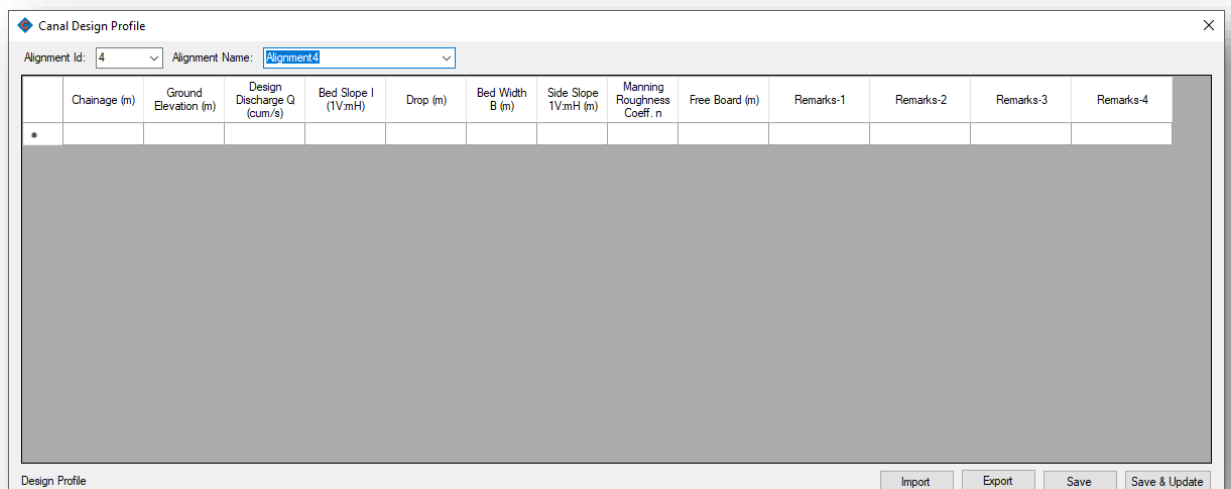
Chainage (m)	Reduced Level (m)	Remarks
▶*		

If there is ground profile survey data in an excel file arranged in column order of Chainage, Reduced level, and Remarks, copy all data from excel and paste in the first cell and save.

If there is a terrain model of a topographic map, this data can automatically be filled.

5.3 Design Profile

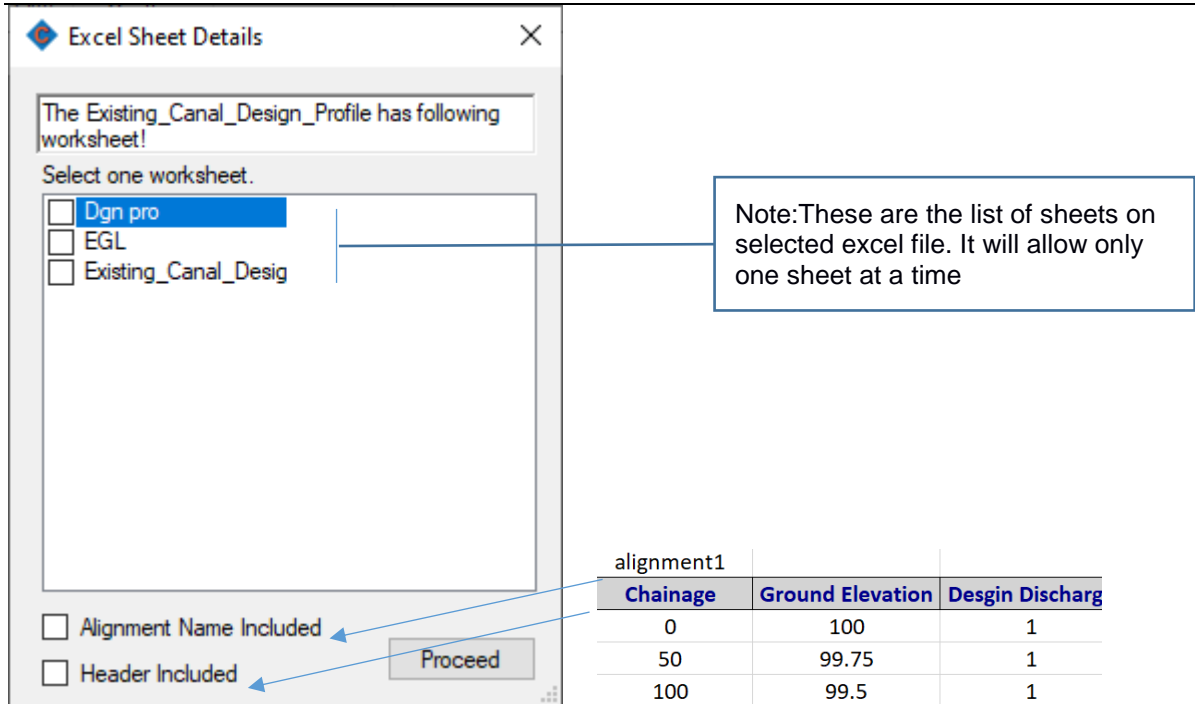
Design Profile refers to the hydraulic profile design of canal alignment. On click with “Design Profile” sub-menu, following dialogue box. This box is for the engineering data input by the designer.



The 'Canal Design Profile' dialog box is used for inputting design profile data. It features a title bar with a close button (X). Below the title bar, there are two dropdown menus: 'Alignment ID' (set to 4) and 'Alignment Name' (set to Alignment4). The main area contains a table with 13 columns: 'Chainage (m)', 'Ground Elevation (m)', 'Design Discharge Q (cum/s)', 'Bed Slope I (1V:mH)', 'Drop (m)', 'Bed Width B (m)', 'Side Slope 1V:mH (m)', 'Manning Roughness Coeff. n', 'Free Board (m)', 'Remarks-1', 'Remarks-2', 'Remarks-3', and 'Remarks-4'. The first row of the table is highlighted in blue and contains a blue square icon. To the right of the table, there are four buttons: 'Import', 'Export', 'Save', and 'Save & Update'.

Chainage (m)	Ground Elevation (m)	Design Discharge Q (cum/s)	Bed Slope I (1V:mH)	Drop (m)	Bed Width B (m)	Side Slope 1V:mH (m)	Manning Roughness Coeff. n	Free Board (m)	Remarks-1	Remarks-2	Remarks-3	Remarks-4
*												

If there is data arranged in excel to fit in the above dialogue box, the data can be imported with a click of the “import” button. With the click of the “import” button, it will seek the excel file location and on selecting the file, the following dialogue box will appear.



Copy-paste is the simple way to fill the tabular data.

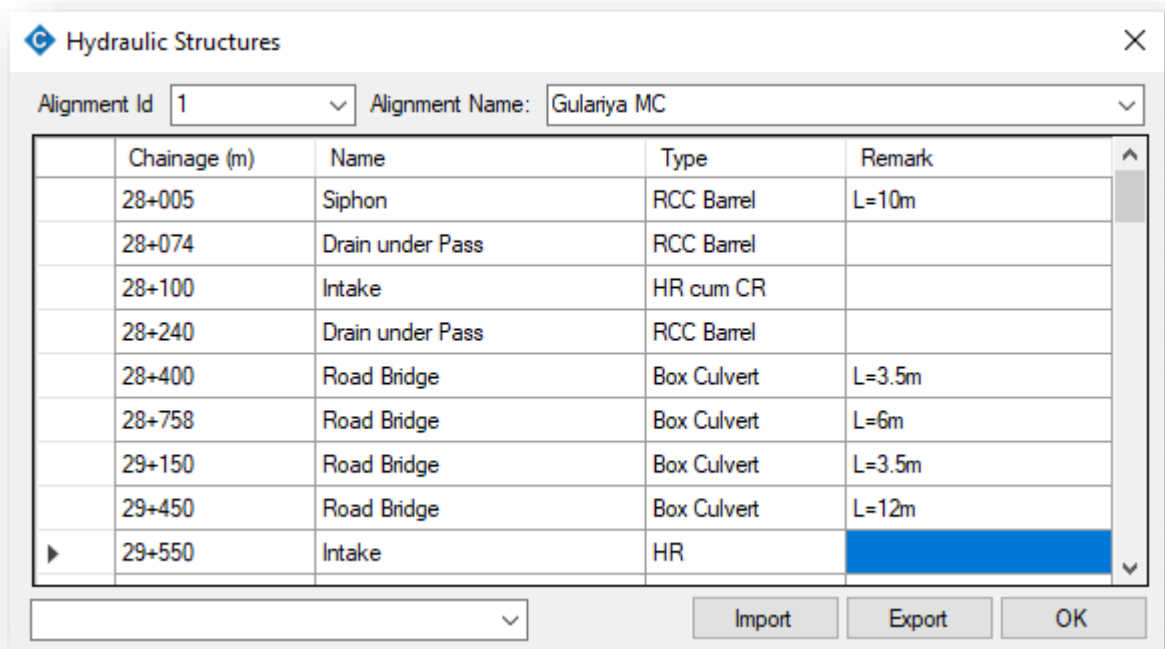
Data in the “Canal Design Profile” dialogue box will be filled automatically with an update of terrain from the “DTM” menu. In this method, the automatically filled data are the default ones and need to modify as per the need of design.

5.4 Cross Section

The “Cross Section” sub-menu in the “Data” menu refers to the ground elevation data measured from the center of the specific chainage.

5.5 Hydraulic Structures

This window displays all the hydraulic structures inserted in the plan view via the “Insert Structure” command.



5.6 Right of Way

To have the variable Right of Way for a canal alignment to be displayed in the plan view, the data should be inserted in this window mentioning chainage from, chainage to, left ROW, right ROW as shown in the picture below.

Right of Way

Alignment ID: 1 Alignment Name: Gulariya MC

	Chainage From	Chainage To	Left ROW (m)	Right ROW (m)
▶	28+000	28+100	12.5	12.5
	28+100	41+150	15	15
*				

Canal Right of Way

Import Export OK

5.7 Soil Data

Soil type according to the chainage is defined in this field. Before defining the chainage, soil code has to be generated. This can be done by clicking the “View Code” button. This opens a form “Soil-Type Allocation”. Soil codes are the abbreviated form of the soil types defined in a manner that, when needed, they can be called by their abbreviated form. Similarly, cut, fill and foundation cut slopes are also defined in the code segment. Provision for importing the soil code is also available from the previously defined project from the excel file.

Soil-Type Allocation

Alignment ID: 1 Alignment Name: Alignment 1

	Chainage From (m)	Chainage To (m)	Soil Code	Soil Description	Cut [1V:mH]	Fill [1V:mH]	Foundation Cut [1V:mH]
	0+000.000	0+500.000	OS	OS=70%, HS=30%	0.33	1.5	0
▶	0+500.000	1+000.000	OS				
*			OS				
			Rocky				

Import... Export... Save Save & Update View Code

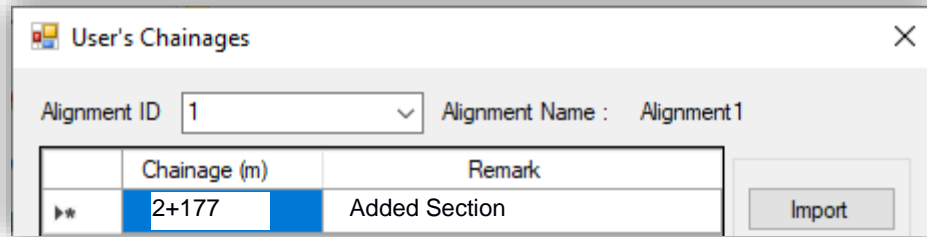
Code for Soil-Type

	Soil Code	Soil Type	Cut Slope (1V:mH)	Fill Slope (1V:mH)	Foundation Cut (1V:mH)
	OS	OS=70%, HS=30%	0.33	1.5	0
▶	Rocky	OR=50%, MR=30%, HR=20%	0.17	1.5	0
*					

Import Export Save Hide Code

5.8 User Chainage

When cross-section is required at the chainage other than the multiple of data extraction interval then user chainage is defined. For eg: if the data extraction interval is 10 m and we need a section at chainage 2+177. Then define chainage in user chainage and while updating terrain (Menu>Utility>Update Terrain), check the box “Include User’s Chainage”. Then the cross-sections will include this new section as well.

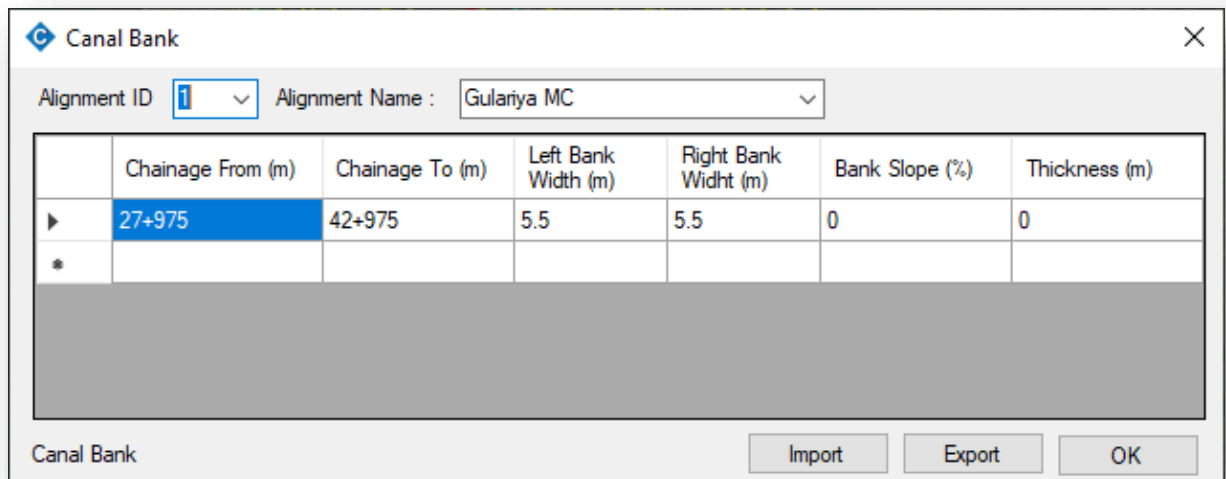


The 'User's Chainages' dialog box shows 'Alignment ID' set to 1 and 'Alignment Name' as 'Alignment1'. It contains a table with columns 'Chainage (m)' and 'Remark'. One entry is visible: chainage 2+177 with the remark 'Added Section'. An 'Import' button is located to the right of the table.

Chainage (m)	Remark
2+177	Added Section

5.9 Canal Bank

The canal bank to be inserted in the design for a specific canal alignment is through the following window.

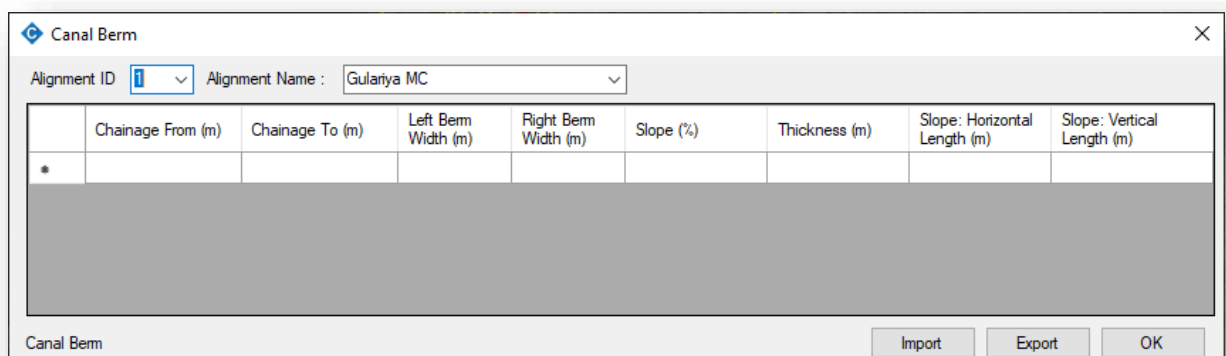


The 'Canal Bank' dialog box shows 'Alignment ID' set to 1 and 'Alignment Name' as 'Gulariya MC'. It contains a table with columns: 'Chainage From (m)', 'Chainage To (m)', 'Left Bank Width (m)', 'Right Bank Width (m)', 'Bank Slope (%)', and 'Thickness (m)'. One entry is visible: Chainage From 27+975 to 42+975, with Left Bank Width 5.5, Right Bank Width 5.5, Bank Slope 0, and Thickness 0. 'Import', 'Export', and 'OK' buttons are at the bottom.

Chainage From (m)	Chainage To (m)	Left Bank Width (m)	Right Bank Width (m)	Bank Slope (%)	Thickness (m)
27+975	42+975	5.5	5.5	0	0

5.10 Canal Berm

The canal berm to be inserted in the design for a specific canal alignment is through the following window.



The 'Canal Berm' dialog box shows 'Alignment ID' set to 1 and 'Alignment Name' as 'Gulariya MC'. It contains a table with columns: 'Chainage From (m)', 'Chainage To (m)', 'Left Berm Width (m)', 'Right Berm Width (m)', 'Slope (%)', 'Thickness (m)', 'Slope: Horizontal Length (m)', and 'Slope: Vertical Length (m)'. The table is currently empty. 'Import', 'Export', and 'OK' buttons are at the bottom.

Chainage From (m)	Chainage To (m)	Left Berm Width (m)	Right Berm Width (m)	Slope (%)	Thickness (m)	Slope: Horizontal Length (m)	Slope: Vertical Length (m)
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5.11 Canal Lining

The canal lining to be inserted in the design for a specific canal alignment is through the following window. Different materials such as RCC, PCC, Earthen, etc can be used for canal lining.

Canal Lining

Alignment ID: 1 Alignment Name: Gulariya MC

Left Lining Data

Chainage From (m)	Chainage To (m)	Lining Type	Material
27+975	28+050	RCC1	0.2m Thick Con...
28+100	29+350	RCC1	0.15m Thick Co...
29+400	29+500	RCC1	0.2m Thick Con...
29+500	34+100	RCC1	0.15m Thick Co...
34+150	35+650	RCC1	0.2m Thick Con...
35+700	42+000	RCC1	0.15m Thick Co...

Right Lining Data

Chainage From (m)	Chainage To (m)	Lining Type	Material
27+975	28+050	RCC1	0.2m Thick Con...
28+100	29+350	RCC1	0.15m Thick Co...
29+400	29+500	RCC1	0.2m Thick Con...
29+500	34+100	RCC1	0.15m Thick Co...
34+150	35+650	RCC1	0.2m Thick Con...
35+700	42+000	RCC1	0.15m Thick Co...

Buttons: Import, Export, Set Lining Type, OK, Go to Base

5.12 Canal Bed Layers

The “Canal Bed Layers” menu in the “Data” menu is divided into “Canal Base” and “Canal SubBase” menus.

5.12.1 Canal Base

The canal base to be inserted in the design for a specific canal alignment is through the following window. The canal base appears below the canal bed lining.

Canal Base Layer

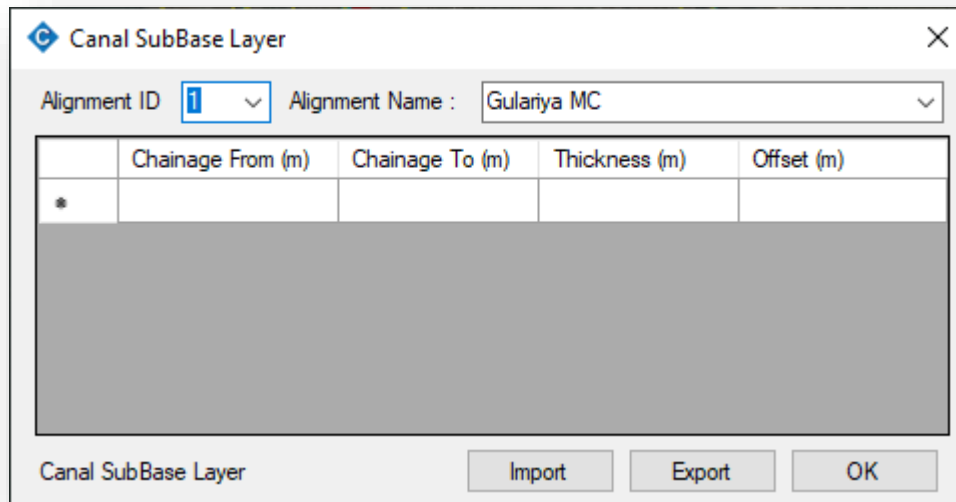
Alignment ID: 1 Alignment Name: Gulariya MC

Chainage From (m)	Chainage To (m)	Thickness (m)	Offset (m)
*			

Buttons: Import, Export, OK, Go to SubBase

5.12.2 Canal SubBase

The canal subbase to be inserted in the design for a specific canal alignment is through the following window. The canal subbase appears below the canal base.

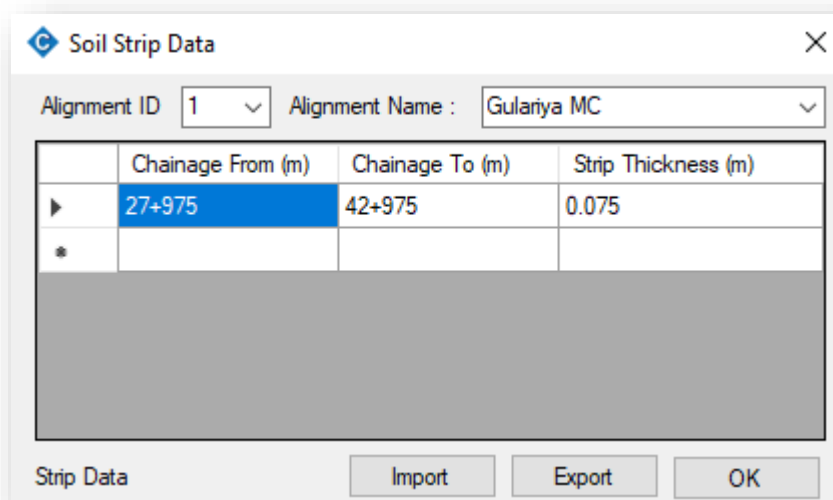


The dialog box titled "Canal SubBase Layer" contains the following fields and controls:

- Alignment ID:** A dropdown menu with the value "1" selected.
- Alignment Name:** A text field containing "Gulariya MC".
- Table:** A table with 5 columns: an index column, "Chainage From (m)", "Chainage To (m)", "Thickness (m)", and "Offset (m)". The first row has an asterisk (*) in the index column. The rest of the table area is shaded grey.
- Buttons:** "Import", "Export", and "OK" buttons at the bottom right.

5.13 Canal Stripping Data

The canal stripping layer to be inserted in the design for a specific canal alignment is through the following window. This layer appears below each canal cross-section element which causes a fill section.

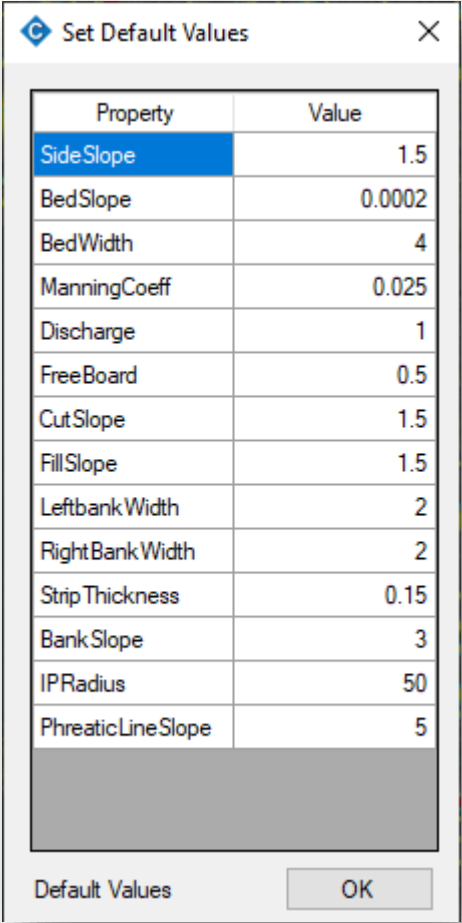


The dialog box titled "Soil Strip Data" contains the following fields and controls:

- Alignment ID:** A dropdown menu with the value "1" selected.
- Alignment Name:** A text field containing "Gulariya MC".
- Table:** A table with 4 columns: an index column, "Chainage From (m)", "Chainage To (m)", and "Strip Thickness (m)". The first row has a right-pointing triangle (▶) in the index column with values "27+975", "42+975", and "0.075". The second row has an asterisk (*) in the index column. The rest of the table area is shaded grey.
- Buttons:** "Import", "Export", and "OK" buttons at the bottom right.

5.14 Set Default Value

Various parameters used in the Profile design of a canal alignment are controlled from the following window. These values are set as default values and the initial canal profile design is carried out based on the following values.

A screenshot of a software dialog box titled "Set Default Values". It contains a table with 15 rows of properties and their default values. The "SideSlope" row is highlighted in blue. At the bottom, there is a "Default Values" label and an "OK" button.

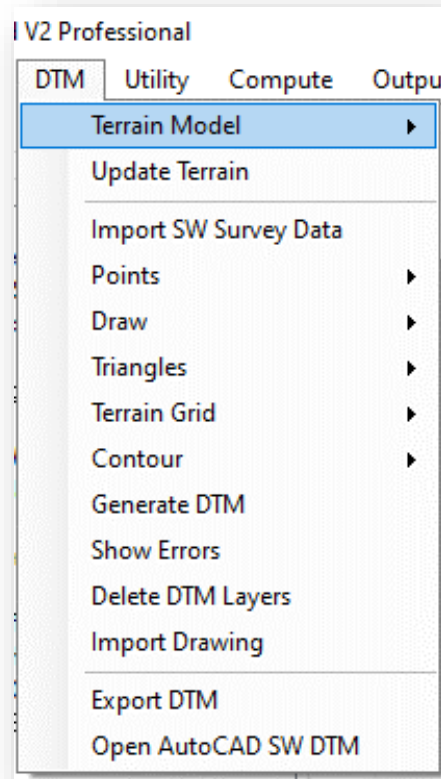
Property	Value
SideSlope	1.5
BedSlope	0.0002
BedWidth	4
ManningCoeff	0.025
Discharge	1
FreeBoard	0.5
CutSlope	1.5
FillSlope	1.5
LeftbankWidth	2
RightBankWidth	2
Strip Thickness	0.15
Bank Slope	3
IPRadius	50
PhreaticLineSlope	5

5.15 Option

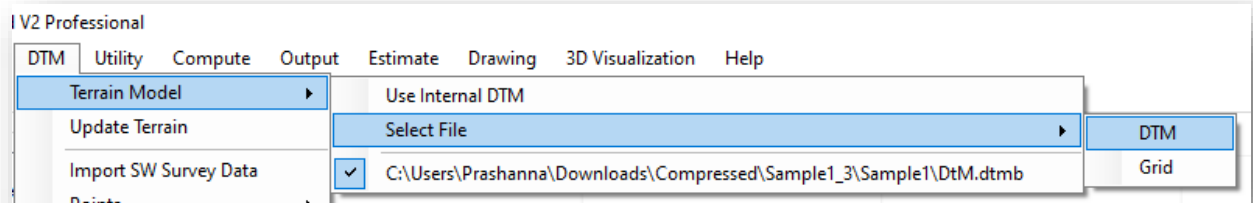
It is the option for changing the chainage interval display option and other miscellaneous design options.

6 DTM

It is the built-in tool for the generation of a topographic map and terrain model. The available tools in the Terrain menu are as shown in the figure.



6.1 Terrain Model



This sub-menu specifies the terrain file to be used for design. The terrain file may be an internal DTM or an external DTM/Grid file. If the data is processed and dtm is created within the SW Canal, the "Internal Dtm" can be used. Otherwise, external dtm or Grid can be imported for the terrain data.

.Dtm is the old format of the digital terrain model generated by SW-DTM software. Now Grid (.tif) is also supported by the current version. Users can import terrain from different DEM sources such as SRTM, Palsar, etc.

6.2 Update Terrain

When data of the terrain is changed during the design process, to mark the change, use this sub-menu. The path for the terrain file is defined at *Menu>Terrain Model>Use internal DTM/Select File*. It generates profile and cross-sections of the alignment at an interval specified in the "Data Extraction Interval".

Profile & Cross-Sections Generation

Data Extraction
Interval: 2.5
Left Distance: 15
Right Distance: 15

Options
☐ Include curve BC, MC, EC
☐ Include User's Chainages

Select Alignments
ALIGNMENT
☐ Alignment1

Select Layers For Remarks
LAYER
☐ Points-TXT
☐ Points
☐ 0
☐ Index_Contour
☐ Contour
☐ Cont_Annotation
☐ Spot_Height

Process **Select All** **Deselect All** **Select All** **Deselect All**

Time Elapsed : 0 sec

OUTPUTS

The cross-section data are extracted at an interval specified in “Interval”. “Left Distance” and “Right Distance” are the maximum distance from the center that will be extracted for the cross-section.

Option: Include curve BC, MC, EC

When it is “checked”, cross-section will be generated at the beginning of the curve, mid of curve, and end of the curve as well.

Option: Include user's Chainage

When it is “checked”, cross-section will be generated at user-defined chainage as well. User chainages can be defined at *Menu>Design Table>User Chainage*.

Select Layers for Remarks

When remarks need to be displayed at the cross-section, check the necessary layers. This list of layers is generated from imported drawing layers or layers created in “SW-DTM” at the “Layers” panel in Plan.

After setting all required options and data, press on “Process” for data extraction.

6.3 Import SW Survey Data

It imports the data from the “SW Survey” Mobile App.

6.4 Points

This sub-menu deals with the points data. It may be the surveyed data or generated data.

6.4.1 Add Point

It adds points with user-defined elevation.

6.4.2 Import Points from File

It imports the surveyed points from *.csv format. The data format should be Serial Number, Easting, Northing, Elevation, and Remark.

	A	B	C	D	E
1	S.No	Easting	Northing	RL	Remark
2	1	642635.415	3063265.047	1343.921	BS
3	2	642635.415	3063265.047	1343.921	GPS1
4	3	642577.776	3063200.045	1342.821	REB
5	4	642569.628	3063192.760	1342.754	REB
6	5	642562.104	3063185.387	1342.636	REB
7	6	642574.555	3063202.678	1342.841	REB
8	7	642564.412	3063193.196	1342.793	REB

6.4.3 Set Point Block Scale

It Changes the display scale of the point in plan view.

6.4.4 Delete Point Range

It deletes the points based on the user-defined point number range.

6.4.5 Export Points

It exports the points to *.csv format.

6.5 Draw

6.5.1 Add Boundary

It creates a boundary line around the survey data for the triangulation of points.

6.5.2 Auto Boundary

It detects the data and creates boundary lines around the survey data automatically.

6.6 Triangles

6.6.1 Draw Triangles

It draws the triangles obtained after triangulation.

6.6.2 Erase Triangles

It erases the drawn triangulation.

6.7 Grid

6.7.1 Show Grid Extents

It displays the extents of the grid terrain in Plan.

6.7.2 Erase Grid Extents

It erases the extents of the grid terrain from Plan.

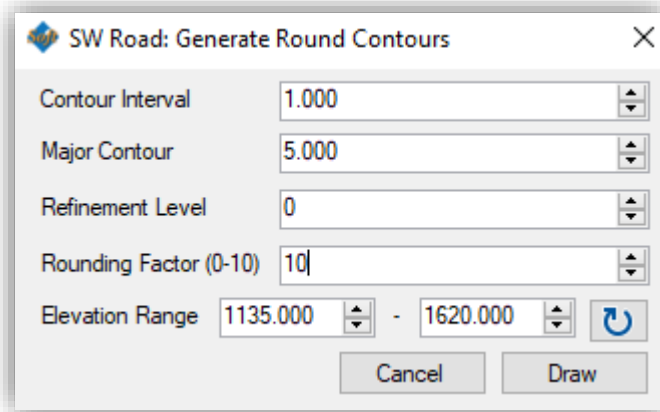
6.8 Contours

6.8.1 Draw Quick Contour

It allows the user to draw contours with the specified interval.

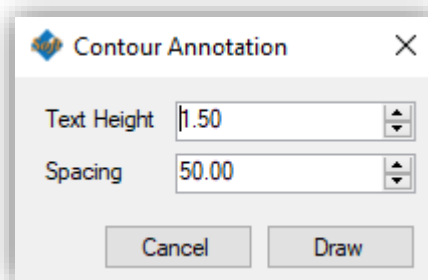
6.8.2 Draw Round Contour

It allows the user to draw smooth and round contours with the specified interval. Option for refinement level and rounding factors are provided in the form. Users can modify it as per requirement. Higher the refinement level and rounding factor, smoother will be the contour with longer processing time.



6.8.3 Contour Annotation

It allows the user to annotate the elevation of contour at a specified distance.



6.8.4 Erase Contour

It erases all the contours in DTM layers (not from imported external layers).

6.9 Generate DTM

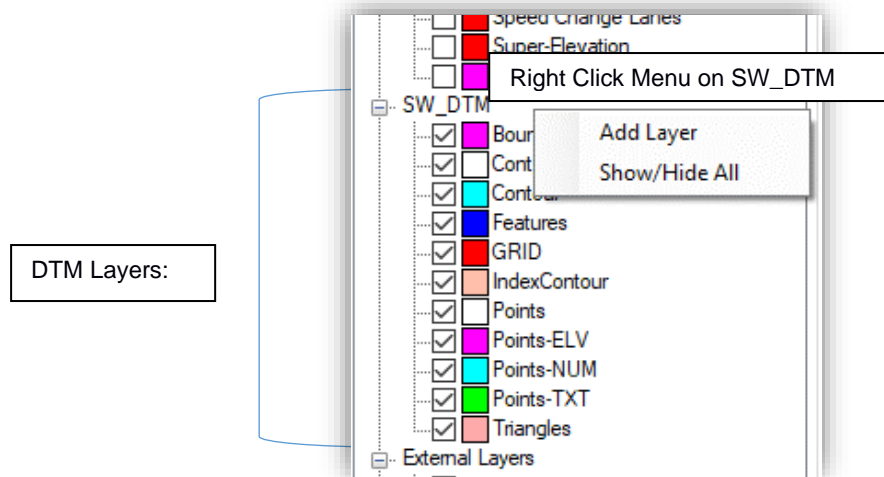
It processes all the points and features and generates a dtm file which will be used as an internal dtm while updating terrain. This function is equivalent to "Points>Process Points" and "Triangle>Triangulation" in SW Dtm.

6.10 Show Errors

While generating dtm, the system may encounter errors due to features intersections. These errors can be viewed from this sub-menu.

6.11 Delete DTM Layers

It deletes the layers under SW_DTM. If the layers are default layers in SW_DTM, only objects in these layers are deleted.



6.12 Import Drawing

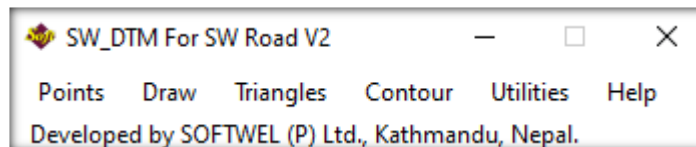
When surveyed data is processed outside the SW Canal, all the features need to be imported into SW Canal. This sub-menu imports such drawings including points, features, etc. These drawings can be further processed and modified within SW Canal unlike the "Import dxf" in the layer panel which cannot be edited.

6.13 Export DTM

It exports the generated dtm file in the format *.dtmb so that the same terrain file can be used in another project.

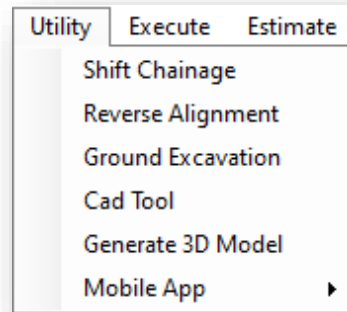
6.14 Open AutoCad SW DTM

It is an improved and more efficient SW DTM that works on Autocad for data processing.



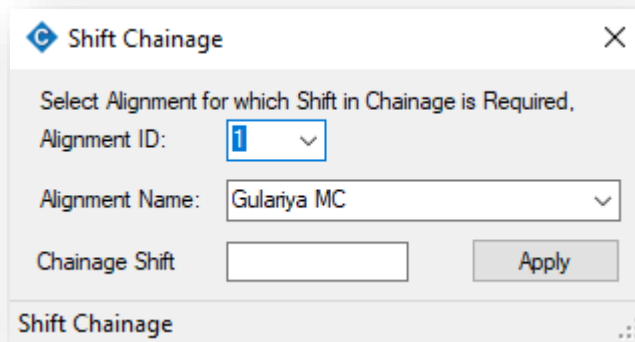
7 UTILITY

Utility Menu has been divided into the following sub-menu.



7.1 Shift Chainage

When the start chainage of the design needs to be changed, this tool is used. The shift value can be either positive or negative. The process is non-reversible. So, a backup copy will be made in the project directory.



7.2 Reverse Alignment

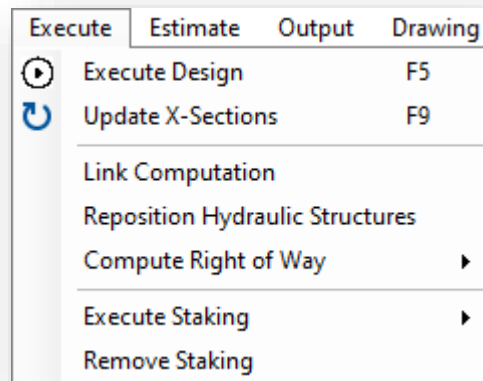
When the start point of alignment is needed to be switched with the endpoint, this tool is used. The process is non-reversible. So, a backup copy will be made in the project directory.

7.3 Ground Excavation

This tool is independent of the currently running project. This tool is helpful for the calculation of the excavation in the construction site. Multiple ground data (New and Old ground) can be imported in the Ground excavation windows interface and the quantity of excavation and fill is computed in this tool. Similarly, the quantity and drawing can be exported in spreadsheet and dxf format respectively.

8 EXECUTE

This menu is used to re-calculate the various canal elements. Following canal elements can be computed from this menu.



8.1 Execute Design

It updates the longitudinal profile of alignment and also updates the design elevation in each cross-section.

8.2 Update X-Sections

It updates the cross-section components.

8.3 Link Computation

It updates links between various canal alignments.

8.4 Reposition Hydraulic Structures

It updates the position of all the hydraulic components after the canal alignment has been altered.

8.5 Compute Right of Way

It updates the ROW of the canal alignment as per the ROW Data used.

8.6 Execute Staking

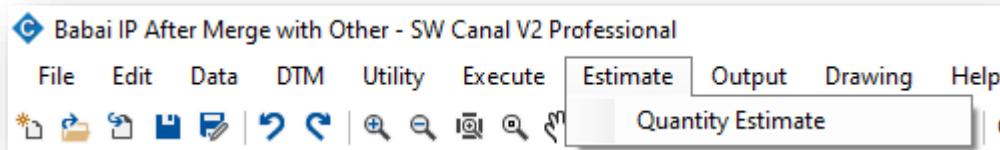
Computation of staking is required to display all the structures used in each cross-section of current alignment in the plan, so this will help to give an overall idea about the structures on the plan of the canal.

8.7 Remove Staking

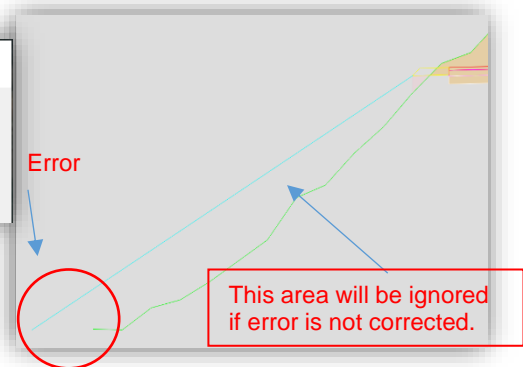
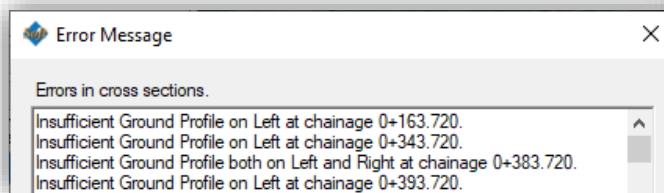
This command removes the staking from the plan view as well as from the database.

9 ESTIMATE

9.1 Quantity Estimate



This sub-menu is used for quantity estimation. It exports all the quantity of works. While exporting quantities, error messages may be displayed stating that “Insufficient ground profile on”. Users have to review that specified chainage. We can correct it by adding ground section data or by modifying the design. If we ignore it, some areas will be missed from quantity calculation.



Quantity extraction has different options.
Export All: It will export all the quantities in detail.

Export Range: It will export quantity only within the range specified in “Start Chainage” and “Final Chainage”

Export Summary: It export quantities in a summarised format. Earthwork will be calculated at the interval specified in “Earthwork Chainage Interval”.

Export Abstract: It exports on abstract of quantity.

Summary of Cost: It displays a summary of the cost of the project.

Summary of Cost in Range:

It displays a summary of the cost of the selected range.

Chainage Options

Start Chainage: 27+975 Final Chainage: 41+175

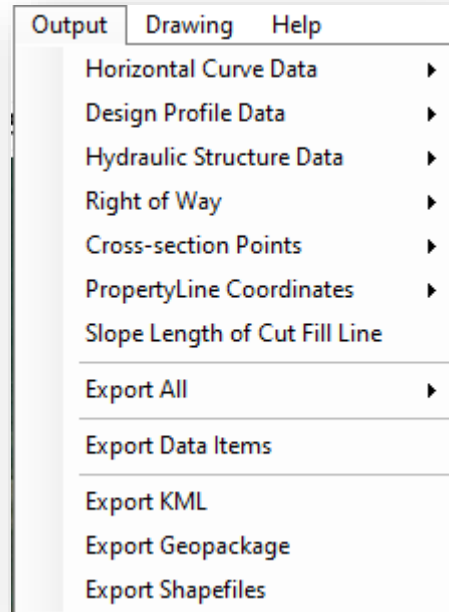
Earthwork Reporting Chainage Interval : 500

Description	Quantity	Unit
CanalBed	0.000	
Bank	0.000	
Cut	8,545.432	M3
Fill	333,331.500	M3
DrainCut	108.750	M3
StructureCut	1,678.217	M3
BackFill	296.132	M3
Stripping	19,960.190	M3
Drain	0.000	
MasonryRetainingWall	0.000	

Quantities Computed!

10 OUTPUT

After completion of the design, the design data can be exported from this command. Following data can be exported from this command.



10.1 Horizontal Curve Data

It generates designed horizontal curve data.

Gulariya MC															
IP (Num)	COORDINATE		Cum. Dist. (m)	WCB (deg)	Def. Angle (deg)	Tangent Length (m)	HORIZONTAL CURVE DATA TABLE								
							Spiral Curve Data		Simple Curve Data			CHAINAGE			
	X (m)	Y (m)					Length (m)	Shift (m)	Radius (m)	Apex Dist (m)	Length of Curve (m)	BC of Spiral Curve (m)	BC of Simple Curve (m)	MC (m)	EC of Simple Curve (m)
1	529320.527	3124638.368	27975	131.2149	0	0	0	0	0	0	0	27+975	27+975	27+975	27+975
2	529449.617	3124525.299	28146.607	160.108	28.89312	51.525	0	0	200	6.53	100.856	28+095.082	28+095.082	28+145.51	28+195.938
3	529687.391	3123868.17	28845.431	112.7598	47.34821	87.686	0	0	200	18.378	165.276	28+755.552	28+755.552	28+838.19	28+920.828
4	530346.916	3123591.476	29560.646	114.3329	1.573088	2.746	0	0	200	0.019	5.491	29+545.611	29+545.611	29+548.357	29+551.102
5	530990.034	3123300.653	30266.464	131.8714	17.53851	30.852	0	0	200	2.366	61.221	30+223.323	30+223.323	30+253.933	30+284.544

10.2 Design Profile Data

It generates the design profile data.

Gulariya MC													
Chainage (m)	Ground Elevation (m)	Design Discharge (cum/s)	Bed Slope (1V:mH)	Drop (m)	Bed Width (m)	Side Slope (1V:mH)	Manning's Coeff.	Free Board (m)	Water Depth (m)	Wetted Area (sqm)	Wetted Perimeter (m)	Hydraulic Radius (m)	Mean Flow Velocity (m/s)
27+975	146.055	6.654	5000	0	4	0	0.016	0.7	1.911	7.644	7.822	0.977	0.87
28+000	146.33	6.654	5000	0	4	0	0.016	0.7	1.911	7.644	7.822	0.977	0.87
28+005	146.436	6.654	5000	0.6	4	0	0.016	0.7	1.911	7.644	7.822	0.977	0.87
28+005	146.436	6.654	5000	0.6	4	0	0.016	0.7	1.911	7.644	7.822	0.977	0.87
28+050	145.626	6.654	5000	0	4	0	0.016	0.7	1.911	7.644	7.822	0.977	0.87

10.3 Hydraulic Structure Data

It generates the details of hydraulic structures inserted in the designed canal.

Gulariya MC							
Hydraulic Structure Data Table				Hydraulic Structure Summary Data Table			
Chainage (m)	Name	Type	Remarks	Name	Type	Count	
28+005	Siphon	RCC Barrel	L=10m	Siphon	RCC Barrel	2	
28+074	Drain under Pass	RCC Barrel		Overflow	Weir Type	2	
28+100	Intake	HR cum CR		Intake	HR	2	
28+240	Drain under Pass	RCC Barrel		Intake	HR cum CR	6	
28+400	Road Bridge	Box Culvert	L=3.5m	Drain under Pass	RCC Barrel	18	
28+758	Road Bridge	Box Culvert	L=6m	Outlets	Teriary Outlet	6	
29+150	Road Bridge	Box Culvert	L=3.5m	Outlets	Field Outlet	3	
29+450	Road Bridge	Box Culvert	L=12m	Road Bridge	Box Culvert	27	

10.4 Right of Way

It generates the coordinate of the left and right-side ROW of the designed canal.

Gulariya MC			
Right of Way Data Table			
Chainage From (m)	Chainage To (m)	Left ROW (m)	Right ROW (m)
28+000	28+100	12.5	12.5
28+100	41+150	15	15

10.5 Cross-Section Points

It exports all the X-coordinate, Y-coordinate, and elevation of cross-section points.

Gulariya MC					
Cross Section Points					
S.N.	Chainage (m)	X (m)	Y (m)	Z (m)	Remarks
1	27+975	529339.567	3124660.106	145.924	
1	27+975	529338.613	3124659.017	145.944	
1	27+975	529325.18	3124643.681	145.942	
1	27+975	529323.615	3124641.893	145.979	
1	27+975	529320.527	3124638.368	146.055	
1	27+975	529314.062	3124630.987	146.213	
1	27+975	529304.732	3124620.335	146.428	
1	27+975	529303.615	3124619.06	146.469	
1	27+975	529302.787	3124618.114	146.648	
1	27+975	529301.392	3124616.522	147.029	
1	27+975	529300.941	3124616.007	147.026	
1	27+975	529299.791	3124614.694	147.049	
1	27+975	529298.135	3124612.803	147.073	
1	27+975	529296.814	3124611.295	147.184	
1	27+975	529295.742	3124610.071	147.12	
1	27+975	529294.172	3124608.278	146.971	
2	28+000	529359.1	3124644.463	146.484	
2	28+000	529353.879	3124638.503	146.464	
2	28+000	529353.566	3124638.146	146.489	

10.6 Property-line coordinate

It generates the coordinate of the left and right-side extremities of the designed canal.

PROPERTY LINE COORDINATES												
Left Extreme Point				Center Point					Right Extreme Point			
X (m)	Y (m)	Z (m)	Partial Dist. (m)	Chainage (m)	Easting (m)	Northing (m)	Design Level (m)	Cross Bearing (deg)	Partial Dist. (m)	X (m)	Y (m)	Z (m)
529331.7797	3124651.215	145.943	17.078	27+975	529320.527	3124638.368	146.771	221.214862	16.34	529309.7609	3124626.076	146.3120526
529346.4149	3124629.981	146.603	10.748	28+000	529339.333	3124621.896	146.766	221.214862	11.015	529332.0753	3124613.61	146.4693433
529351.2482	3124627.911	146.788	12.375	28+005	529343.094	3124618.601	146.765	221.214862	12.79	529334.6669	3124608.98	146.5808121
529385.6169	3124598.852	145.786	13.161	28+050	529376.945	3124588.952	146.156	221.214862	13.949	529367.7547	3124578.459	145.3926407
529422.7025	3124564.856	146.222	12.087	28+100	529414.517	3124555.962	146.146	222.6237248	15.628	529403.9344	3124544.463	145.7015177
529457.0828	3124524.626	146.071	12.369	28+150	529446.716	3124517.88	146.136	236.9476696	15.481	529433.7401	3124509.437	145.7650157

10.7 Slope Length of Cut Fill Lines

The slope length of the cut-fill line and other lines used in all the cross-sections of the canal can be exported from this command.

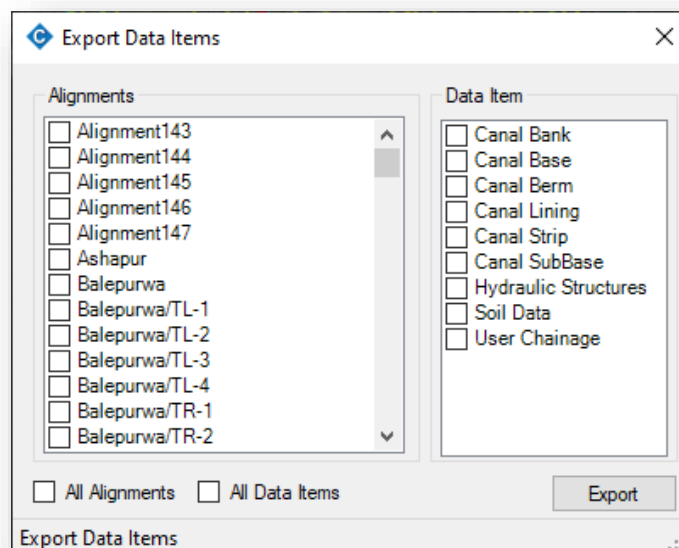
Slope-Length Data						
Chainage	Left			Right		
	Line Item	Slope(1V:mH)	Length(m)	Line Item	Slope(1V:mH)	Length(m)
0+000.000	CutFillLine1	0.33	4.111	CutFillLine1	0.33	4.728
0+003.720	CutFillLine1	0.33	4.022	CutFillLine1	0.33	5.131
0+013.720	CutFillLine1	0.33	4.068	CutFillLine1	0.33	4.583
0+023.720	CutFillLine1	0.33	3.463	CutFillLine1	0.33	4.274
0+033.720	CutFillLine1	0.33	2.235	CutFillLine1	0.33	3.834

10.8 Export All

It exports Horizontal curve data, design profile data, hydraulic structures data, ROW data, property line coordinate, and cross-section points data in a single spreadsheet file.

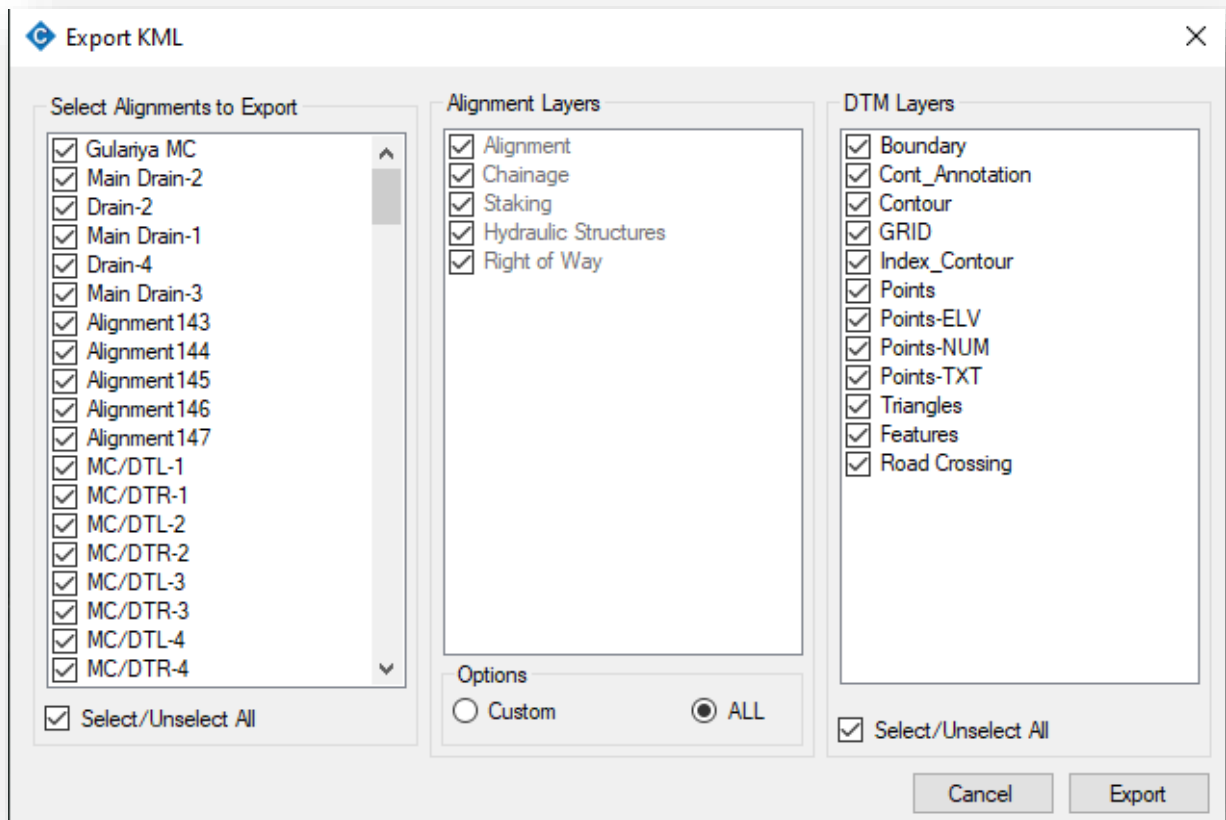
10.9 Export Data Items

This command exports all the selected data table that has been used for the design of the canal.

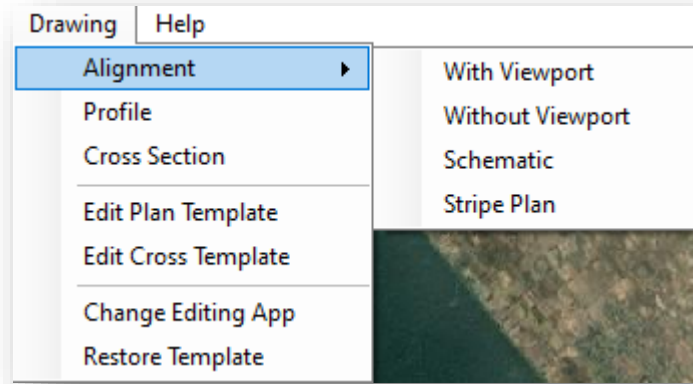


10.10 Export KML / Geopackage /Shape

This tool exports the designed layers to Keyhole Markup Language (*.KML), Geo package (*.gpkg), and GIS Shapefile (*.shp) format to view in Google Earth or GIS software such as Qgis, Arcmap, etc.



11 DRAWING



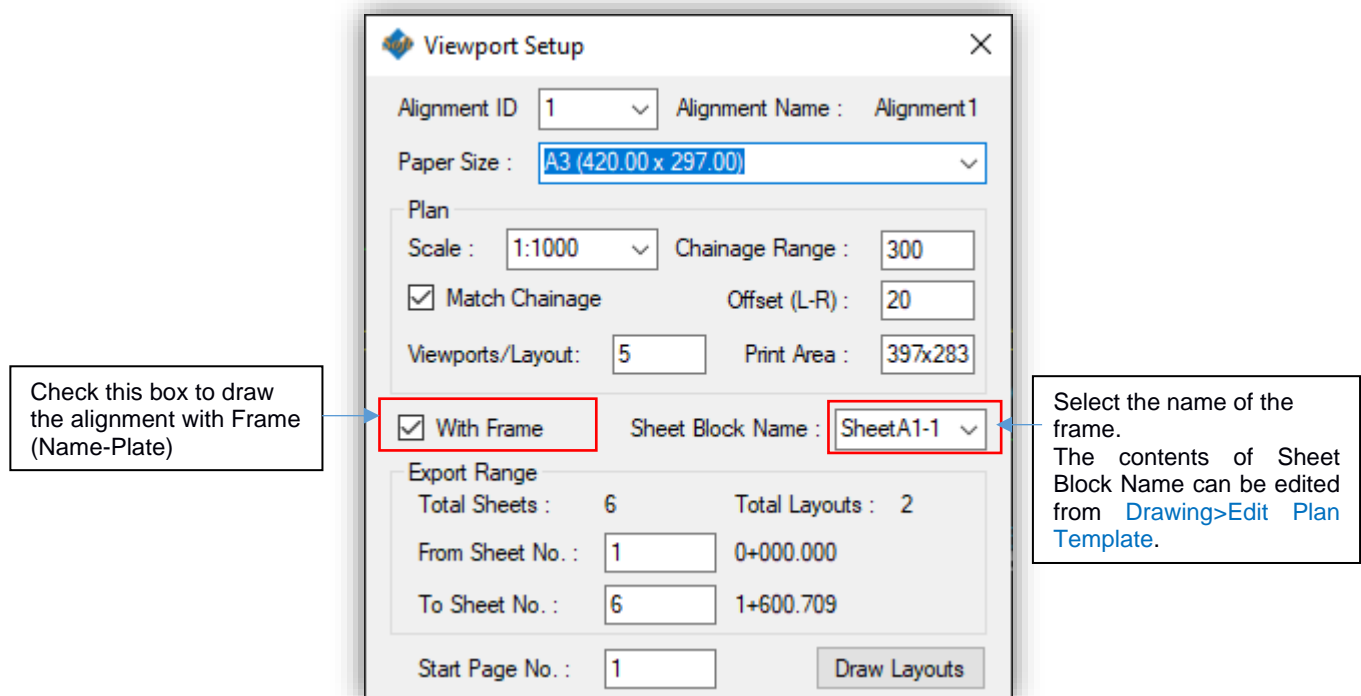
The design drawing can be exported to *.dxf format which can be further opened with many drafting software such as Autocad, NanoCad, Draftsight, Intellicad, etc.

11.1 Alignment

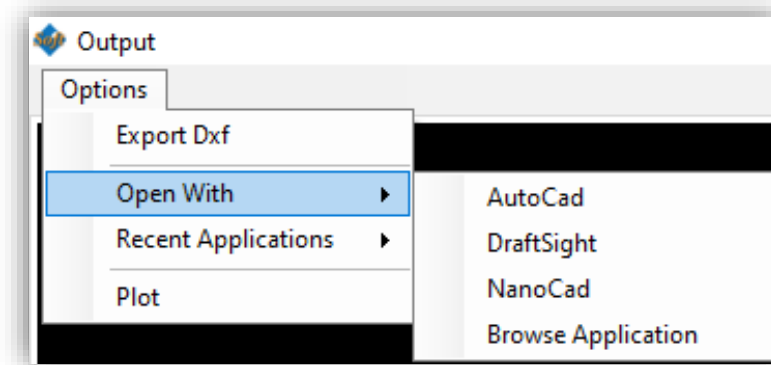
Alignment can be exported with the viewport, without the viewport and stripe plan. For reporting, alignment with viewport is appropriate whereas for overall viewing the alignment “Without Viewport” is suitable. Stripe plan is suitable for viewing the structure along the alignment which can further be used for canal inventory.

11.1.1 With Viewport

With this command, the user can export plans with viewport and frame. To export the plan with the frame, users have to check “With Frame” and specify the sheet block name. Then press on the “Draw Layouts” button.



After pressing this button, the output window will open with the “Options” menu. Then the user can either export the drawing to *.dxf or open directly on drafting software for further editing. The behavior and options in “Output window is the same for other drawings output (profile, cross-section, stripe plan)



11.1.2 Without Viewport:

With this command, the user can export plans without viewport and no frame. It is a basic export of plan for viewing the overall plan of the design canal.

11.1.3 Schematic:

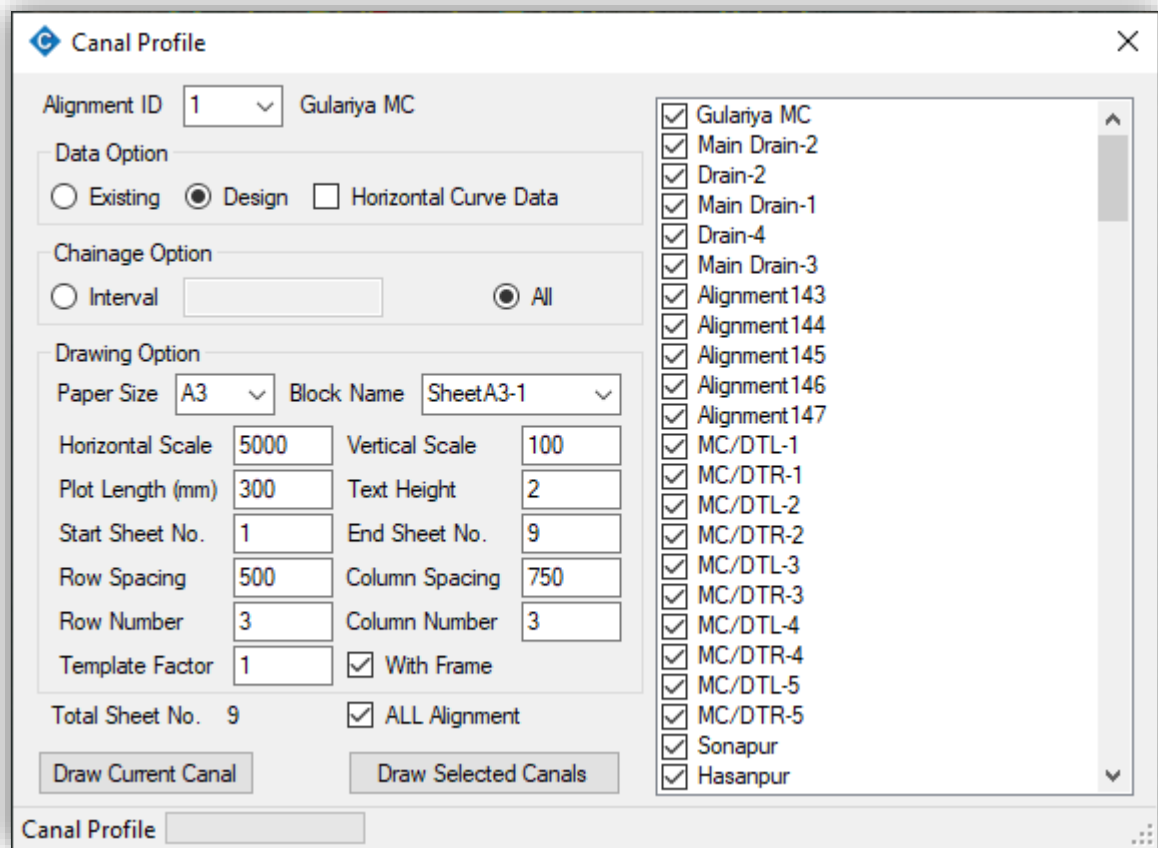
With this command, the user can export a schematic view of a plan without a viewport and no frame. It is a basic export of plan for viewing the overall plan of the design canal in a schematic form.

11.1.4 Stripe Plan:

It is the overview of assigned structures shown in a straight path. It can be used during the inventory of canals.

11.2 Profile

With this command, the user can export Design Profile. On clicking Drawing>Profile, a dialogue box with multiple options will open.



Canal Profile

Alignment ID: 1 Gulariya MC

Data Option
☐ Existing ☒ Design ☐ Horizontal Curve Data

Chainage Option
☐ Interval ☒ All

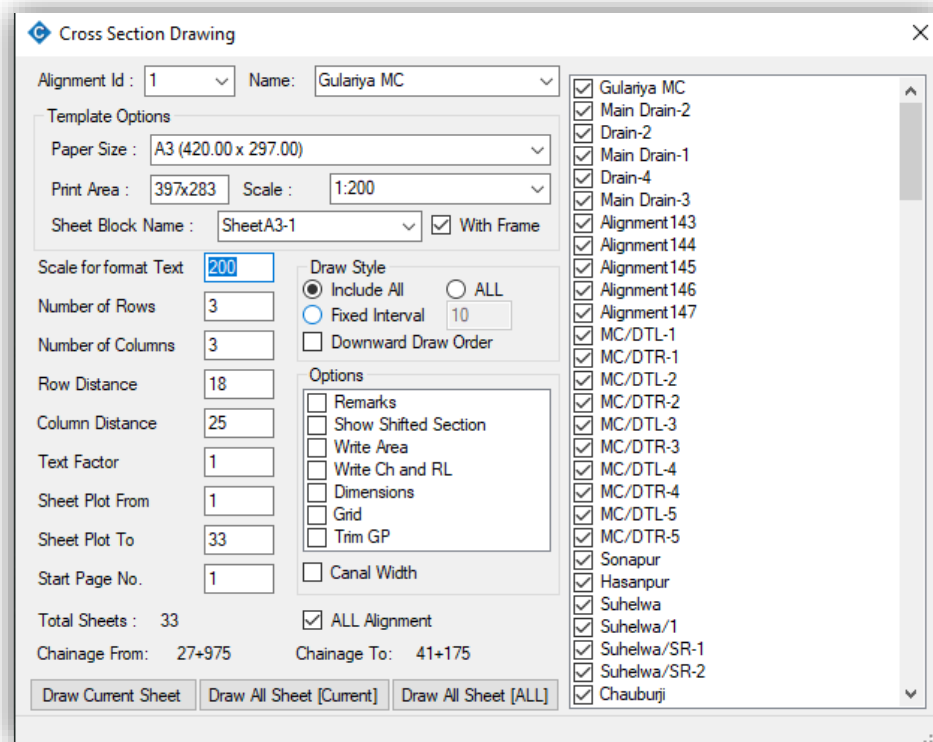
Drawing Option
 Paper Size: A3 Block Name: SheetA3-1
 Horizontal Scale: 5000 Vertical Scale: 100
 Plot Length (mm): 300 Text Height: 2
 Start Sheet No.: 1 End Sheet No.: 9
 Row Spacing: 500 Column Spacing: 750
 Row Number: 3 Column Number: 3
 Template Factor: 1 ☒ With Frame
 Total Sheet No.: 9 ☒ ALL Alignment
 Draw Current Canal Draw Selected Canals

Canal Profile

- ☒ Gulariya MC
- ☒ Main Drain-2
- ☒ Drain-2
- ☒ Main Drain-1
- ☒ Drain-4
- ☒ Main Drain-3
- ☒ Alignment 143
- ☒ Alignment 144
- ☒ Alignment 145
- ☒ Alignment 146
- ☒ Alignment 147
- ☒ MC/DTL-1
- ☒ MC/DTR-1
- ☒ MC/DTL-2
- ☒ MC/DTR-2
- ☒ MC/DTL-3
- ☒ MC/DTR-3
- ☒ MC/DTL-4
- ☒ MC/DTR-4
- ☒ MC/DTL-5
- ☒ MC/DTR-5
- ☒ Sonapur
- ☒ Hasanpur

11.3 Cross-Section

Users can export design cross-sections from this menu. On clicking “Cross-section”, it opens a window for exporting all cross-sections.



Cross Section Drawing

Alignment Id: 1 Name: Gulariya MC

Template Options
 Paper Size: A3 (420.00 x 297.00)
 Print Area: 397x283 Scale: 1:200
 Sheet Block Name: SheetA3-1 ☒ With Frame

Scale for format Text: 200
 Number of Rows: 3
 Number of Columns: 3
 Row Distance: 18
 Column Distance: 25
 Text Factor: 1
 Sheet Plot From: 1
 Sheet Plot To: 33
 Start Page No.: 1
 Total Sheets: 33 ☒ ALL Alignment
 Chainage From: 27+975 Chainage To: 41+175
 Draw Current Sheet Draw All Sheet [Current] Draw All Sheet [ALL]

Draw Style
☒ Include All ☐ ALL
☐ Fixed Interval 10
☐ Downward Draw Order

Options
☐ Remarks
☐ Show Shifted Section
☐ Write Area
☐ Write Ch and RL
☐ Dimensions
☐ Grid
☐ Trim GP
☐ Canal Width

- ☒ Gulariya MC
- ☒ Main Drain-2
- ☒ Drain-2
- ☒ Main Drain-1
- ☒ Drain-4
- ☒ Main Drain-3
- ☒ Alignment 143
- ☒ Alignment 144
- ☒ Alignment 145
- ☒ Alignment 146
- ☒ Alignment 147
- ☒ MC/DTL-1
- ☒ MC/DTR-1
- ☒ MC/DTL-2
- ☒ MC/DTR-2
- ☒ MC/DTL-3
- ☒ MC/DTR-3
- ☒ MC/DTL-4
- ☒ MC/DTR-4
- ☒ MC/DTL-5
- ☒ MC/DTR-5
- ☒ Sonapur
- ☒ Hasanpur
- ☒ Suhelwa
- ☒ Suhelwa/1
- ☒ Suhelwa/SR-1
- ☒ Suhelwa/SR-2
- ☒ Chauburji

Users can export cross-sections with a nameplate (frame).

11.4 Edit Plan Template

This sub-menu opens the template file for plan and profile in AutoCAD. Users can modify the template files as per requirement and save them with different names. The saved template files can be then used while exporting plans with viewports.

11.5 Edit Cross Template

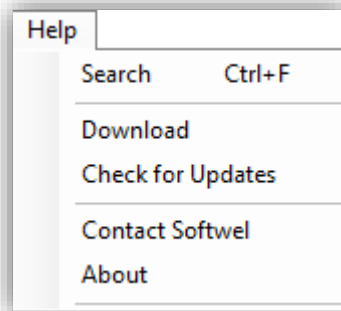
It is similar to “Edit Plan Template”. This sub-menu opens the template file for cross-section in AutoCAD.

11.6 Change Editing App

This command changes the editing app (*.exe) for the template file (*.dxf).

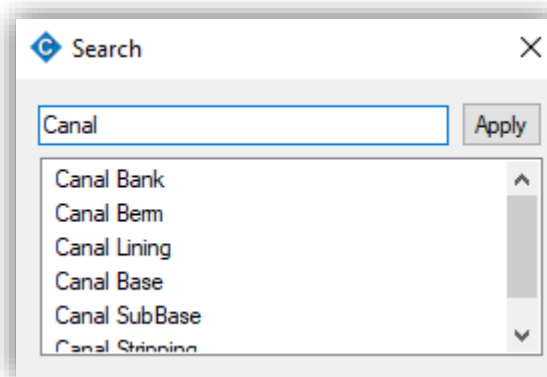
11.7 Restore Template

This command restores both plan-profile and cross-section template files (*.dxf) to the original state.



12.1 Search (Ctrl+F)

Users can search and open a form for data entry. On entering the text, the result will be shown instantly. Then selecting a result and pressing apply will open the corresponding form dialogue box. Users can access this command through a keyboard shortcut (Ctrl+F) as well.



12.2 Download

It opens the website for downloading the free utilities from Softwel.

12.3 Check For Updates

It checks whether the update is available or not. If an update is available, the user can log in to the Softwel Account and download the updates.

12.4 Contact Softwel

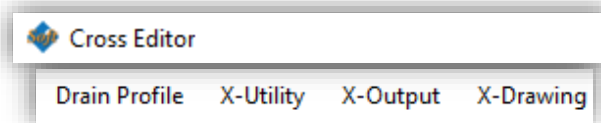
It opens a window where users can send a message directly to developers of SW Canal.

12.5 About

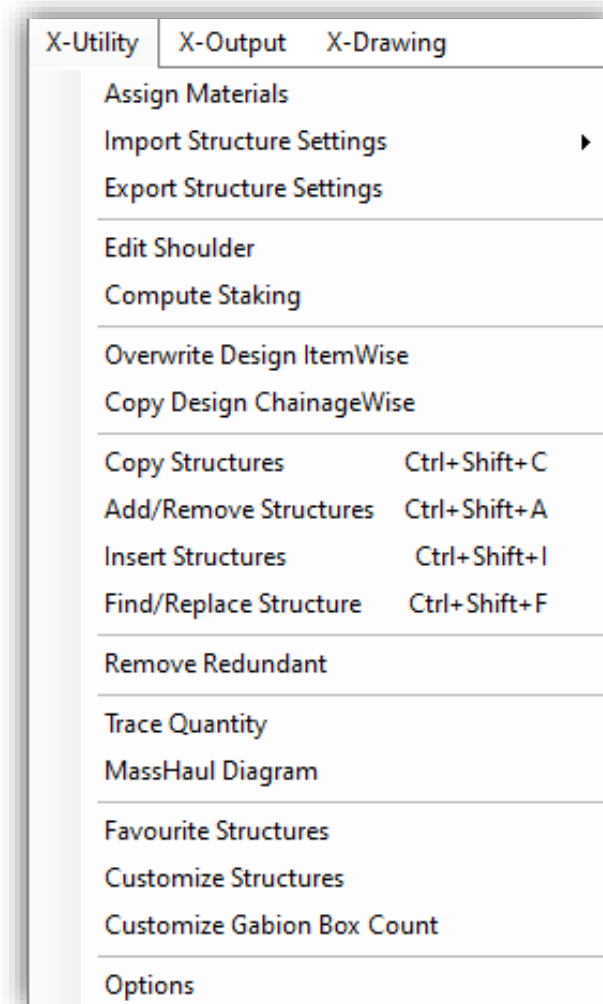
It displays the information about the software.

13 MENU IN CROSS-EDITOR

Besides the main menu, there is another menu in cross-editor.



13.1 X-Utility

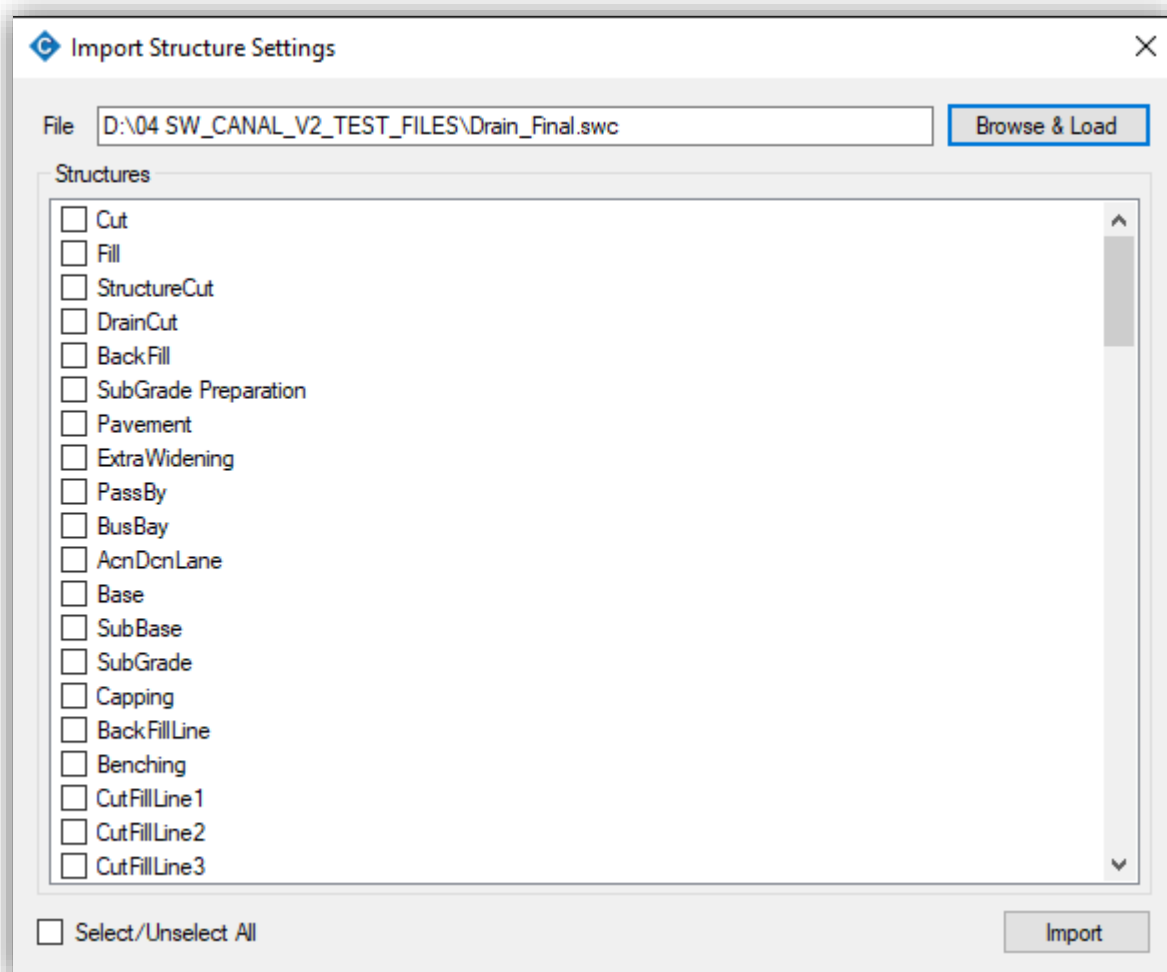


13.1.1 Assign Materials

It is used to assign materials to each part of the structure. Material has been assigned to all the structure components by default. However, if the user wishes to edit the materials and norms used for rate analysis, it can be done from this form.

13.1.2 Import Structure Settings

The structure properties once edited can be imported from this tool. It can be imported either from the structure setting file or from the project file.

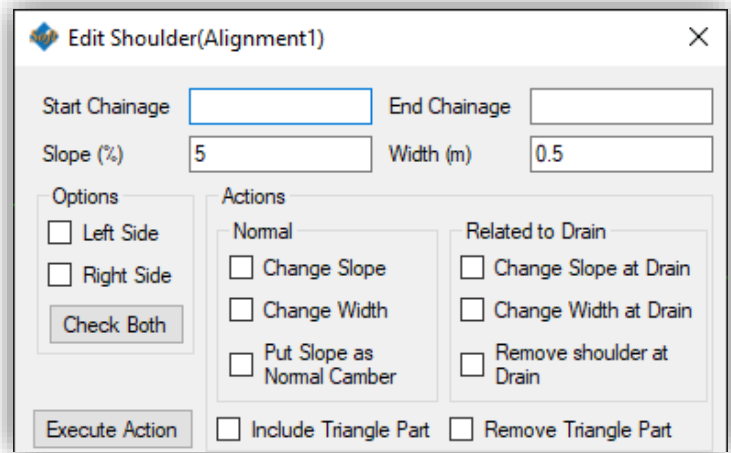


13.1.3 Export Structure Settings

The structure properties once edited can be exported from this tool.

13.1.4 Edit shoulder

The shoulder once assigned to the cross-section can be easily edited with this tool. There are multiple options for edit and users can use them as per requirement.



The 'Edit Shoulder(Alignment1)' dialog box contains the following fields and options:

- Start Chainage:** [Empty text box]
- End Chainage:** [Empty text box]
- Slope (%):** [5]
- Width (m):** [0.5]
- Options:**
 - ☐ Left Side
 - ☐ Right Side
 -
- Actions:**
 - Normal:**
 - ☐ Change Slope
 - ☐ Change Width
 - ☐ Put Slope as Normal Camber
 - Related to Drain:**
 - ☐ Change Slope at Drain
 - ☐ Change Width at Drain
 - ☐ Remove shoulder at Drain
- Execute Action:**
 - ☐ Include Triangle Part
 - ☐ Remove Triangle Part

13.1.5 Compute Staking

Computation of staking is required to display all the structures used in each cross-section of current alignment in the plan, so this will help to give an overall idea about the structures on the plan of the canal.

13.1.6 Overwrite Design Item Wise

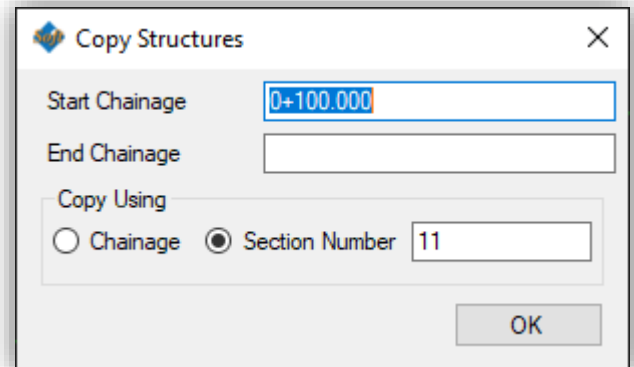
This command is used to copy the structure from another project file based on the section ID regardless of section chainage.

13.1.7 Copy Design Chainage Wise

This command is used to copy the structure from another project file based on section chainage.

13.1.8 Copy Structures (Ctrl+Shift+C)

This command is used to copy sections to a range of chainages. The user has to define source section chainage or section Number and chainage range to paste the structure.

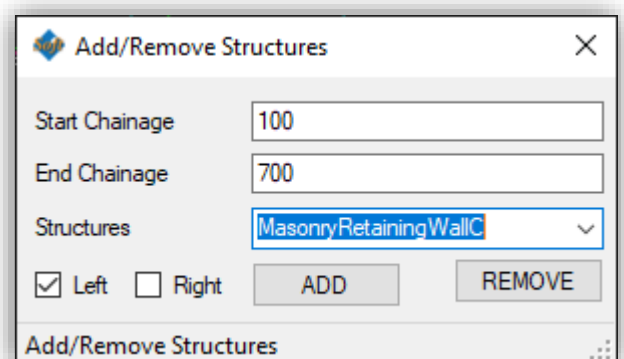


The 'Copy Structures' dialog box contains the following fields and options:

- Start Chainage:** [0+100.000]
- End Chainage:** [Empty text box]
- Copy Using:**
 - ☐ Chainage
 - ☒ Section Number
- Section Number:** [11]
- OK:** [Button]

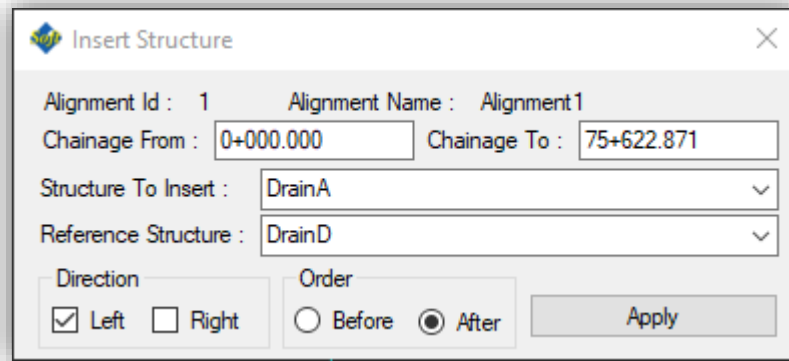
13.1.9 Add/Remove Structures (Ctrl+Shift+A)

This command is used to add or remove a certain structure at a defined chainage range at the defined side. The shortcut for this command is "Ctrl+Shift+A".



The 'Add/Remove Structures' dialog box contains the following fields and options:

- Start Chainage:** [100]
- End Chainage:** [700]
- Structures:** [MasonryRetainingWallC] (dropdown menu)
- Left:** ☒ **Right:** ☐
- ADD:** [Button]
- REMOVE:** [Button]
- Add/Remove Structures:** [Footer text]



Insert Structure

Alignment Id : 1 Alignment Name : Alignment1

Chainage From : 0+000.000 Chainage To : 75+622.871

Structure To Insert : DrainA

Reference Structure : DrainD

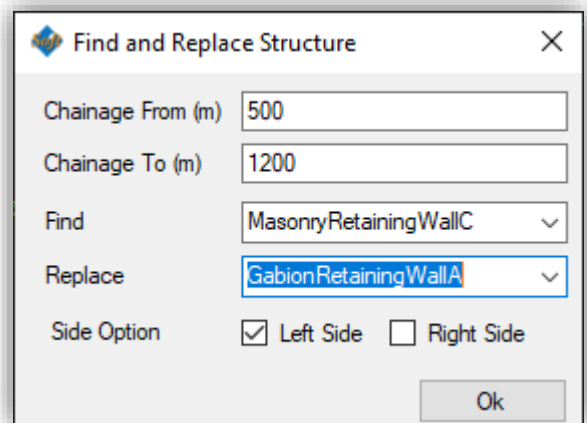
Direction: ☒ Left ☐ Right Order: ☐ Before ☒ After

Apply

This command is used to insert a structure before or after any other structure. The shortcut for this command is “Ctrl+Shift+I”.

13.1.11 Find and Replace Structure (Ctrl+Shift+F)

This command is used to search certain structures and replace them with another structure. The shortcut for this command is “Ctrl+Shift+F”.



Find and Replace Structure

Chainage From (m) : 500

Chainage To (m) : 1200

Find : MasonryRetainingWallC

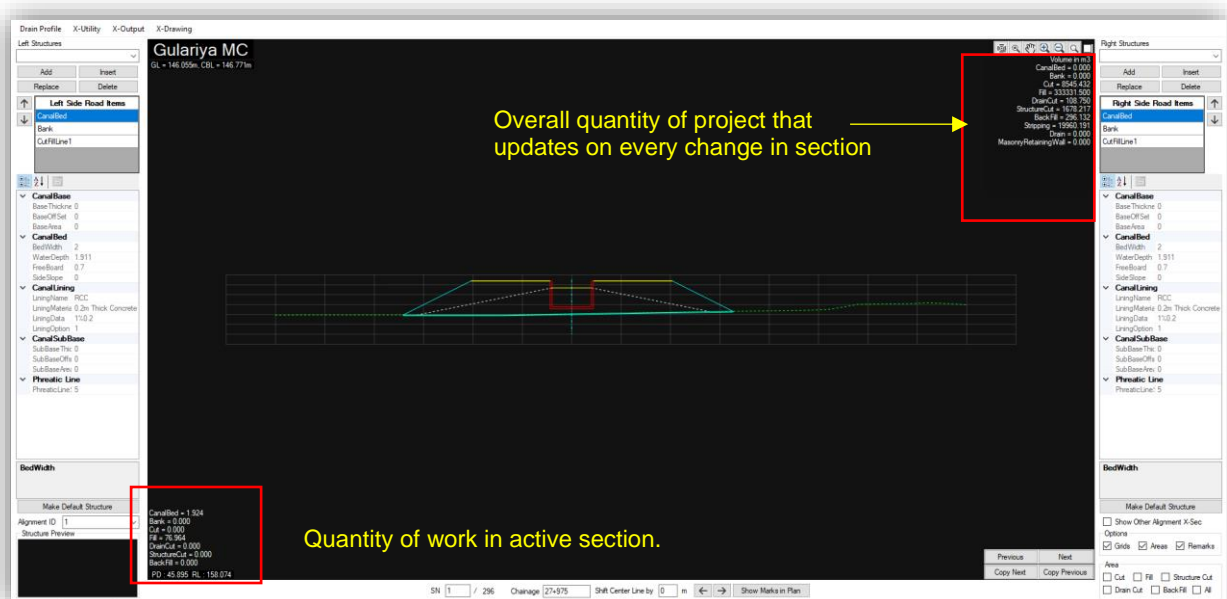
Replace : GabionRetainingWallA

Side Option: ☒ Left Side ☐ Right Side

Ok

13.1.12 Trace Quantity

This command is used to trace the quantity of work till the current time. On updating or editing the structure section-wise, the quantity also updates at the same time.



Overall quantity of project that updates on every change in section

Quantity of work in active section.

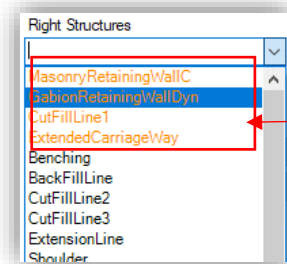
The screenshot displays the software interface for the 'Gulariya MC' project. The central area shows a cross-section of a canal with a structure. The left and right panels show the 'Left Side Flood Road Items' and 'Right Side Flood Road Items' respectively, with a list of structures and their quantities. The bottom panel shows the 'Structure Preview' for the selected structure, displaying its dimensions and quantities. A red box highlights the 'Structure Preview' section, and a yellow box highlights the 'Overall quantity of project' section.

13.1.13 Mass Haul Diagram

This tool draws a mass haul diagram. Users can export it to dxf format and do further planning for an economic mass movement.

13.1.14 Favourite Structure

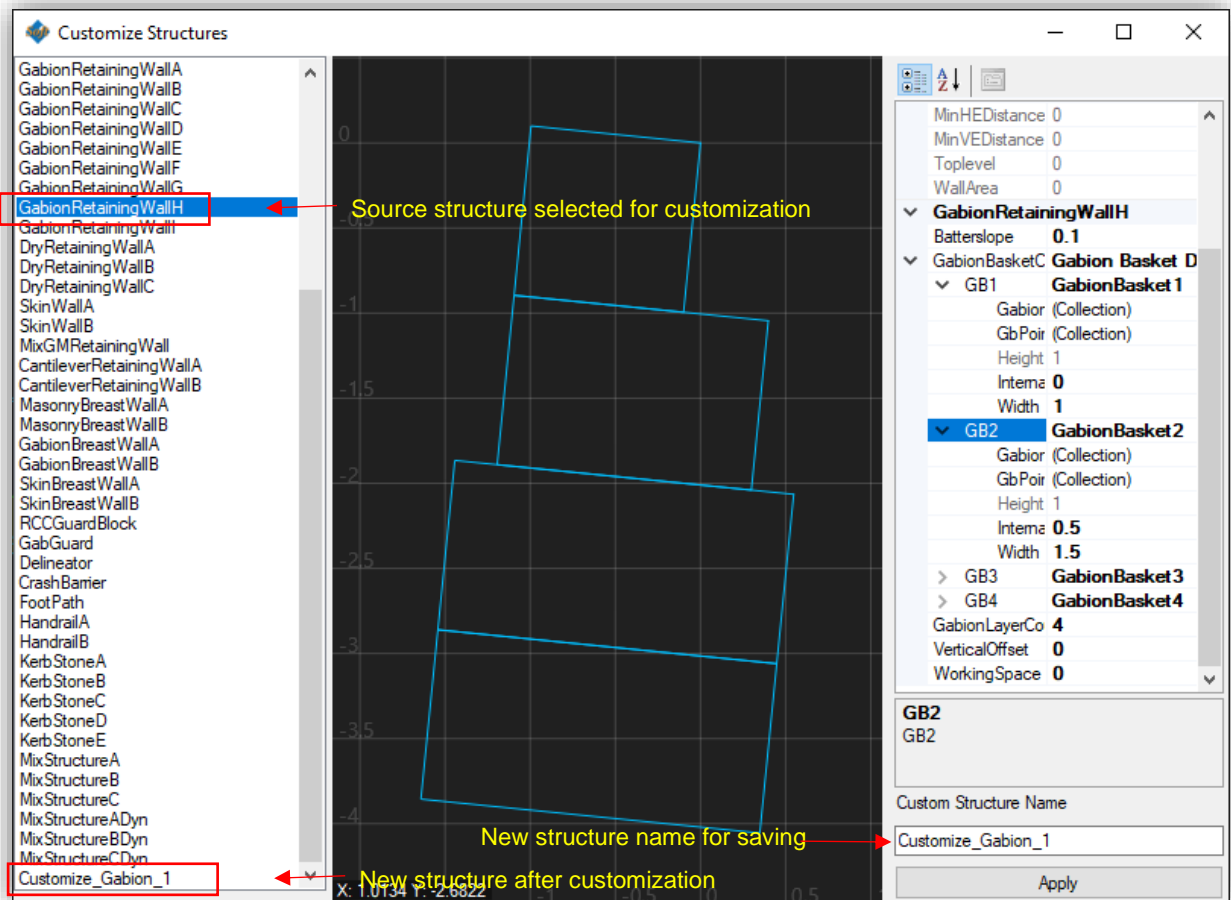
There are too many structures on the list. So, to keep some specified structures at top of the list, this tool is used.



Favourite Structures at top of the list in different colour.

13.1.15 Customize Structures

It is the tool for customization of the existing structure and saving as new structures. This new structure will also be listed in the structure list for assigning to cross-section.



13.1.16 Customize Gabion Box Count

It is counting of gabion boxes of different sizes while using on the section. A default counting is provided in the form. Users can modify as per requirement. It is used for quantity calculation of gabion mesh area.

	Height	Width	1.5m Width	2.0m Width	3.0m Width	Status
1	1	0	0.5	0	Correct	
2	1.5	1	0	0	Correct	
3	2	0	1	0	Correct	
4	2.5	1	0.5	0	Correct	
5	3	2	0	0	Correct	
6	3.5	1	1	0	Correct	
7	4	0	2	0	Correct	
8	4.5	3	0	0	Correct	
9	5	2	1	0	Correct	
10	5.5	1	2	0	Correct	
11	6	0	3	0	Correct	
12	6.5	3	1	0	Correct	

13.1.17 Options

Different options for design are available in this form.

Cut/Fill Lines updated based on slope assigned on Soil Type Data. But **It will not be updated by Compute All or Compute Force unless "Update Cut Fill Lines Slope" is checked.**

Shoulder will **not be updated by Compute All or Compute Force unless "Update Shoulder" is checked.**

It controls the grid interval in cross editor and exported cross section drawings.

These are the criteria govern the height of dynamic wall.

13.1.18 Always on Top

This keeps the cross-editor always on top of other forms.

13.2 X-Output

13.2.1 Slope Length of Cut Fill Line

It exports the slope data to excel format. The exported data contains slope length and adopted cut and fill slope of Cut/Fill line and Benching line.

13.2.2 Quantities

This sub-menu is used to export the number of works. For detail refer to section 9.1.

13.3 X-Drawing

13.3.1 Draw Current

It exports the current cross-section displayed in cross-editor.

13.3.2 Draw All

For detail refer to section 11.3

14 NEW IN SW CANAL V2

14.1 Improved Computational Speed

The Computational speed has been improved drastically.

14.2 Added Mouse Navigation Control

Mouse wheel control has been added. Now users can easily zoom in and zoom out. For zoom extent, users can double click on the middle wheel.

14.3 Compatible with the previous version of the software

With the new version of the software, a new improved file format (*.swc) has been introduced. For opening the old format file, the user has to import the file. The software will convert into a new format. Multiple old format files can be now combined importing multiple project files at once.

14.4 Support background imagery

Background images can be imported for the reference base map. Geo Tiff (*.Tif) and Mbtiles (*.Mbtiles), tiff file can be imported as background from local drive and XYZ-tiles can be imported online. Users have to input once the URL link for the tiles and it will be saved until the software is uninstalled. URL links of XYZ tiles for different imagery services can be found easily on the internet. Some sample links for tiles has been provided below;

SN	Image	URL Link
1	Open Street Map	http://tile.openstreetmap.org/{z}/{x}/{y}.png
2	Open Topo Map	https://tile.opentopomap.org/{z}/{x}/{y}.png

14.5 3-D Visualization

SW Canal can now 3D view of the design canals. Each structure assigned can be viewed in a 3D model with real terrain and background view. So the design can be optimized with this feature. No extra tedious effort is required for this task.

14.6 Left side layer panel

The user interface has been improved. The right side panel has been divided into the left and right side panels.

- Details from Dwg File

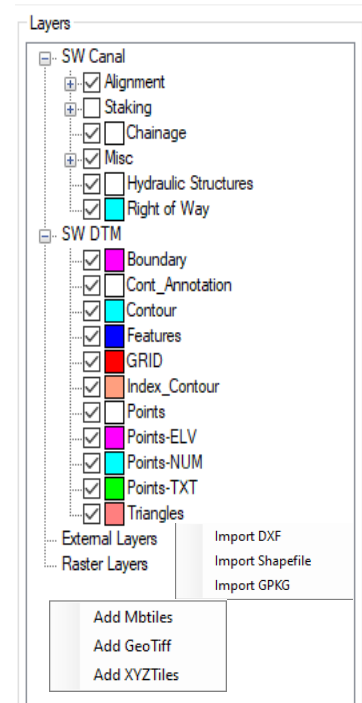
Now the software imports *.DXF file instead of *.Dwg file. It has been placed under “External Layers” in the layers panel. Right-click on “External Layers” has the menu for importing *.dxf file. The layers of the imported DXF file will be listed under “External Layers”.

- Canal Element

The design canal elements have been placed under the left side layers Panel.

14.7 Compatible with GIS Shapefile (*.shp), Geo package (*.gpkg)

Users can import shapefiles and geo package files for background reference with UTM or MUTM projection system. It is placed under “External Layers”. It can be imported the same as the DXF file.



14.8 Right Side multiple Alignment Display control

As the canal support multiple alignments, a list of alignments will be displayed at the right-side panel. The visibility of the design canal elements of the corresponding canal can be switched from this panel.

14.9 Compatible with multiple alignments

Users can design multiple alignments in the same project. Design parameters can be set for all the alignment separately as per requirement.

14.10 Support DEM terrain

SW Canal now supports the DEM terrain layer. SRTM, Alos Pulsar, Aster, etc dem can be used (*.tif format) for designing canals. This feature may be helpful while undertaking a feasibility study of the canal.

14.11 Auto-Calculation of curves

- Radius of curve

The software now inputs the best fit radius of the curve in all horizontal IP while drawing new alignment.

- Calculate spiral length

The software now calculates the transition curve at every horizontal IP where applicable. It calculates the spiral length by double-clicking on the spiral length input field. It can be calculated for all the IPs from the “Alignment Editor” form.

14.12 Terrain Menu (Integrated SW DTM)

SW Canal has a built-in SW DTM that works in the SW Canal environment. Autocad is no more compulsory software for preparing terrain files and background references. However, the terrain and map prepared in AutoCAD are still supported in the current version. All the functions included in SW-DTM have been integrated into this version. “Contour Annotation” feature has been Improved that needs no manual input as the previous version of SW DTM does.

Besides this, a separate SW-DTM is also included which works on Autocad. The processing speed has been improved with options of drawing refined and smoothen contours.

14.13 Reverse Alignment

Users can reverse or flip the alignment as per requirement without any cumbersome effort.

14.14 Drain Profile

Users can view the drain profile along with the longitudinal profile and drain profile data can be exported easily.

14.15 Cross-Editor

- Keyboard and mouse control added for selecting and deleting structures
- Many types of structures have been added such as a dynamic retaining wall, Breast Wall, Benching, Mixed wall, a Covered drain, a Guard block, a Crash barrier, a Handrail, Delineator, Composite wall, etc.
- The order of assigned structures can be re-order.

- The assigned structures can be grouped and named with a user-friendly name. This name is listed in the structure list and all the structures in the group can be assigned easily as any other structure.
- Customize Structure

Users can now modify the existing structure and give a unique name. This name can further be used for assigning structure.

- Export and import Structure Setting

Users can now export all the structure settings and import these settings on another project. So users do not have to modify structures in every project.

- Copy Structures

Users can copy structures assigned in a section to a range of sections easily.

- Trace Quantity
Users can now trace the total quantity while designing the canal. This feature updates the total quantity instantly when the cross-section or structure is changed.
- Favourite Structures
In the list of structure, the user can put the structures at the top of the list which is going to be used frequently.
- Customize Gabion Box Count
Users can customize the gabion count as per requirement based on the size of the gabion box.

14.16 Warning for insufficient Ground profile

When ground data is insufficient in cross-section, the exported quantity may not include the whole quantity. In such a case, there will be an error in quantity. So the software will warn you in cross-section and while exporting the quantity. The users have to rectify it to get the full quantity.

14.17 Multiple cross-section Editing

A separate window has been added to work on multiple cross-sections. Users can assign structures in multiple sections at once.

14.18 Drawing in Print Ready Format.

Plan and profile can be exported in the viewport with a single command. Cross-section drawings can be exported with frames.

14.19 Quantity

Quantity export in detailed and summary format.

14.20 Export To Google Earth

User can now export their design directly to KML format to view in google earth.