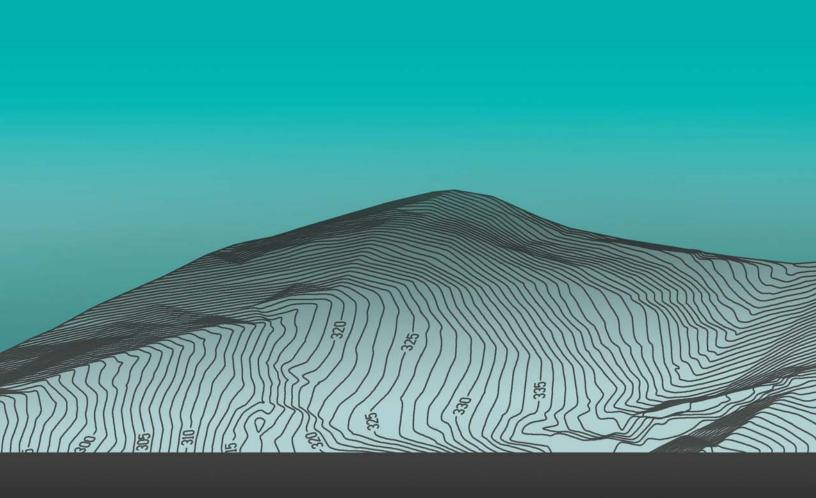
SOKKIA GEOPRO OFFICE



SOKKIΛ

GEOPRO Field Operator's Manual

Part Number 1020509-01 Rev A

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April 2017

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Manual Conventions

This manual uses the following conventions:

Convention	Description	Example
Bold	Menu, or drop-down menu selection	File ▶ Exit (Click the File menu and click Exit)
	Name of a dialog box or screen	From the Connection screen
	Button or key commands	Click Finish .
Mono	User supplied text or variable	Type guest, and click Enter.
Italic	Reference to another manual or help document	Refer to the Sokkia User's Manual.



Further information to note about system configuration, maintenance, or setup.



Supplementary information that can have an adverse effect on system operation, system performance, data integrity, measurements, or personal safety.



Notification that an action has the potential to result in system damage, loss of data, loss of warranty, or personal injury.

Views

The program uses one unique window for all opened files. This window is divided into two parts to list and display the various information:

- **Right part:** called *Specific View*, is used to display the information in the open document in a detailed manner. Each *View* is activated from the node selected in the navigation tree.
- Left part: composed of a navigation tree, with nodes and subnodes, it contains all the information on the open document.

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Document content Document content	🖉 Celei	mo			
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Known points data (0 Group) DL Data (0 Group.)	Full Name:	C/ProgramData/Geopro/Geopro Office/Examples/Celer.gpo			
AD CAD					
	Creation date:	16/02/2017			
Paper spaces	Date of last access:	16/02/2017			
	Last edit date:	16/02/2017			
	Size:	47539 bytes			
	File version:	Geopro Office 1.0			
	State:	OK			
		IPR SNAP ORTO O	SNAP	DIN L	W

Figure 1:

The navigation tree can be expanded or reduced by clicking on the "+" or "-" symbols found alongside the node.

ocument		5 1: JOB1				7 🖬 🖻					
Document content			Codes	Coordinate	81						 -
🕞 🧠 TS data (1 Job.)		Name	Ident.	Temp.	_	9. H.	Notes	N. pt			_
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 (a) 22 TS 3-1-29 (4Pt) (a) 23 TS 3-1-29 (4Pt) 	2	3-1-29		24.000		1,686		4			
E TS 3-1-29 (4Pt)	3	3-1-29		24.000		1,686		4			
(8) TS 3-1-29 (4Pt)		3-1-29		24.000		1.686		4			
E 2 TS 3-1-15 (6Pt)	5	3-1-15		24.000		1.567		6			
E 23 TS 3-1-15 (6Pt)	6	3-1-15		24.000		1.567		6			
B 24 TS 3-1-15 (6Pt)		3-1-15		24.000		1.567		6			
E S 3-1-15 (6Pt) E S 3-1-29 (4Pt)		3-1-15		24.000		1.567		6			
(a) 2 TS 3-1-29 (4Pt)	0	3-1-29		24.000		1,613		4			
(E) TS 3-1-29 (4Pt)		3-1-29		24.000		1,613		4			
(e) 🙀 TS 3-1-29 (4Pt)		3-1-29		24.000		1.613		4			
(8) 🎦 TS 3-1-31 (4Pt)		3-1-29		24.000		1.613		4			
🕀 🎦 TS 3-1-31 (4Pt)	13	3-1-31		24.000		0.223		4			
(a) 20 TS 3-1-31 (4Pt) (a) 20 TS 3-1-31 (4Pt)		3-1-31		24.000		0.223		4			
(i) 2 TS 3-1-30 (8Pt)		3-1-31		24.000		0.223		4			
(8) 15 3-1-30 (8Pt)		3-1-31		24.000		0.223		4			
TS 3-1-30 (8Pt)	17	3-1-30		24.000		0.217		8			
E TS 3-1-30 (8Pt)		3-1-30		24.000		0.217		8			
- 🐟 GPS data (0 Grp.)		3-1-30		24.000		0.217					
Shown points data (0 Group) DL Data (0 Group.)		3-1-30		24.000		0.217		8			
CAD								-			
Profiles											
- Roads											
Reper spaces											

Figure 2:

By expanding the **Document content** node the program's primary views will be listed, which are: **TS Data**, **GPS Data**, **Known points Data**, **DL Data**, **CAD**, **Profiles**, **Roads** and **Paper Spaces**; and each of these may have other subnodes.

TS Data

The **TS Data**, is the display of information inherent in the TS Data acquired through a Total Station.

Depending on the node selected in the navigation tree, the corresponding views are activated; in particular:

Selecting the **TS Data** will activate the view displaying **Jobs**;

2					Geopro	Office - [(Celer.ç	gpo]			
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Document content	^	1	lobs								
B → TS data (1 Job.)		N.	Name	Operator	Instrument	Date	N.St.	N.Pt	Entity set		
8-10 Job JOB1 (20 St.)		1	JOB1 N	ANUELE	SOKKIA	16/07/02	20	104	Topographic (2)		
B-24 TS 3-1-29 (4Pt)									ropographic (c)		
- Ø Pt. 3-1-16											
- 🕐 Pt. 3-1-15											
- • PL 3-1-16											
• Pt. 3-1-15											
😑 🎦 TS 3-1-29 (4Pt)											
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- Ø Pt. 3-1-15											
- Pt. 3-1-16 Pt. 3-1-15											
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B-21 TS 3-1-15 (6Pt) B-21 TS 3-1-15 (6Pt)											
8-21 TS 3-1-15 (6Pt) 8-23 TS 3-1-15 (6Pt)											
E 2 TS 3-1-29 (4Pt)											
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E 2 TS 3-1-29 (4Pt) E 2 TS 3-1-29 (4Pt)											
8-21 TS 3-1-31 (4Pt)											
B - 2 TS 3-1-31 (4Pt)											
R-10 TS 3-1-31 (4Pt)											
8-21 TS 3-1-31 (4Pt)											
B-2 TS 3-1-30 (8Pt)											
(8-29 TS 3-1-30 (8Pt)											
B-2 TS 3-1-30 (8Pt)											
B-2 TS 3-1-30 (8Pt)											
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u can select CAD entities				N 495	6033.429 : E 16	22626 107	-			CHAI SNAF ORT	OSNA DYN LW

Figure 3:

Selecting the **Job** name will activate the view that displays **Stations** archived in the same job;

File Modify View Insert Computation									- 6
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		1: JOB1		Coordinates	_				
⊕ ⊕ 15 data (1 Job) (b) Ø Job JOB (1 Z05 52) (c) Ø Job JOB (2 Z05 5	N. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Name 3-1-29 3-1-29 3-1-29 3-1-15 3-1-15 3-1-15 3-1-15 3-1-15 3-1-29 3-1-29 3-1-29 3-1-29 3-1-29 3-1-29 3-1-29 3-1-29 3-1-29 3-1-29 3-1-29 3-1-15 3-1-29 3-1-29 3-1-29 3-1-29 3-1-31	Ident.	_	Press.	St. H. 1.686 1.686 1.686 1.567 1.567 1.567 1.567 1.567 1.567 1.613 1.613 1.613 1.613 0.223 0.223 0.223	Notes	N. pt 4 4 4 4 6 6 6 6 6 4 4 4 4 4 4 4 4 4 4	
 S - 1-29 (4Pt) S - 1-31 (4Pt) S - 1-31 (4Pt) S - 1-31 (4Pt) 	17	3-1-30		24.000		0.217		8	
B IS 3-1-31 (4Pt)		3-1-30		24.000		0.217		8	
 B TS 3-1-31 (4Pt) B TS 3-1-30 (8Pt) TS 3-1-30 (8Pt) TS 3-1-30 (8Pt) B TS 3-1-30 (8Pt) B TS 3-1-30 (8Pt) B TS 3-1-30 (8Pt) 		3-1-30		24.000		0.217		8	

Figure 4:

Selecting the **Station** name will activate the view that lists the **TS points**;

2				G	eopro Offi	ce - [Celer	.gpo]					-	
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() 😂 🖬 🐘 () 🖄 🖬 🛔 () 🐘 (A 99	1 6 21 33	a 🔬 a 😭 .	0 🖬 🗖 🚳									
			(Job 1: JOB1)										
- 🕑 Document content 🛛 \land	N	leasures Cr	odes Coordinat	85									
TS data (1 Job.)	N.	Description	Name/Num.	Prisma H.	Slope dist.	Vert. Ang.	Horiz, Ang.	Prism Type	Prism Constant	Comment	Notes	Sketch	Photo
8- 💋 Job JOB1 (20 St.)	1		3-1-16	1.427	380.173	100.9069	0.0000	Unknown					
😑 🏭 TS 3-1-29 (4Pt)	<u> </u>		3-1-15	1.472	310.267	100.0746	331.0291	Unknown					
- 0 Pt. 3-1-16	2												
- Ø Pt. 3-1-15	3		3-1-16	1.427	380.174		200.0010	Unknown					
- Ø Pt. 3-1-16	4		3-1-15	1.472	310.267	299.9242	131.0263	Unknown					
Pt 3-1-15													
B- ² TS 3-1-29 (4Pt) B- ² TS 3-1-29 (4Pt)													
8-24 TS 3-1-29 (4Pt) 8-29 TS 3-1-29 (4Pt)													
8-24 TS 3-1-29 (4Pt) ⊕-20 TS 3-1-15 (6Pt)													
B-2 TS 3-1-15 (6Pt) B-2 TS 3-1-15 (6Pt)													
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E-2 TS 3-1-15 (6Pt) E-2 TS 3-1-15 (6Pt)													
8-2 TS 3-1-29 (4Pt)													
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8-21 TS 3-1-29 (4Pt)													
B-2 TS 3-1-31 (4Pt)													
(8-10) TS 3-1-31 (4Pt)													
8-2 TS 3-1-31 (4Pt)													
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8-21 TS 3-1-30 (8Pt)													
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 [®] TS 3-1-30 (8Pt) [®] State (0 Grp.) [®] Snown points data (0 													
 Sign TS 3-1-30 (8Pt) Sign TS 3-1-30 (8Pt)	۲												

Figure 5:

Selecting the **Point** name will activate the view that displays the **TS Point** view;

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B 4 Job JOB1 (20 St.)	Name	3 1 16									
III TS 3-1-29 (4Pt)	Trame	5-1-10									
Ø Pt. 3-1-16											
- @ Pt. 3-1-15	Measures								~		
@ Pt. 3-1-16			075								
@ Pt. 3-1-15	Priom H.		630								
# TS 3-1-29 (4Pt)	Slope dist	360	173								
III 15 3-1-29 (4Pt)											
# 21 TS 3-1-29 (4Pt)	Vert Ang	100.5	069								
🛞 💦 TS 3-1-15 (6Pt)	Horiz Ang	01									
18 💦 TS 3-1-15 (6Pt)	Honz Ang	1									
III 🙀 TS 3-1-15 (6Pt)	Coordinates										
III 🙀 TS 3-1-15 (6Pt)	Coordinates										
III TS 3-1-29 (4Pt)	North	1005344									
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Figure 6:

The **TS Point** view includes two pages: the first is called **General** and describes the point in detail (listing coordinates, measures, etc.); the second is called **GIS Data** and it is here that the user can read and/or change the GIS data associated with the point.

GPS Data

The GPS Data, is the display of information collected through a GPS receiver.

The view is divided into one or more Groups, to which a certain number of measured base points is associated.

Along with the TS Data, depending on the node selected in the navigation tree, the corresponding views are activated; in particular:

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	1	105	CHIODO		58.84016		2*07'00.47143"E	306.8		05.316	1.530	No Sol.		
	2	106	CHIODO		58.79298		2"07'00.41931"E	306.4		04.898	1.530	No Sol.		
@ Pt. 107	3	107	CHIODO		36.25539		2°06'32.33419"E	307.4		05.927	1.530	No Sol.		
	4	108	CHIODO		36.27096		2°06'32.16404"E	308.1		06.629	1.530	No Sol.		
- C Pt 110	5	109	CHIODO		38.00119		2*07'02.36538"E	292.3		90.813	1.530	No Sol.		
	6	110	CHIODO		37.59409		2*07'02.78602"E	292.1		90.650	1.530	No Sol.		
	7	200	CHIODO	42*59	43.89794	"N 1.	2*06'53.92350"E	293.9	25 25	92.395	1.530	No Sol.		
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	11	108	CHIODO	42*59	36.27096	"N 1	2°06'32.16404"E	308.1	59 30	06.629	1.530	No Sol.		
	12	109	CHIODO	42*59	38.00119	"N 1	2*07'02.36538"E	292.3	43 25	90.813	1.530	No Sol.		
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	16	106	CHIODO	42*59	58.79298	'N 1	2°07'00.41931"E	306.4	28 30	04.898	1.530	No Sol.		
- C Pt. 105	<													>

Figure 7:

Selecting the **GPS Data** node will activate the view that lists the **Groups** present, similar to selecting the name of a Group will activate the view that illustrates the measured **Points**.

Selecting the individual point will open the **GPS Point** view composed of two pages.

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Figure 8:

The first displays the data associated with the selected point; the second shows the GIS data associated with the point.

Known points data

The **Known points data** is the display of information on the points (archived in one or more groups) whose coordinates and/or quote are known.

The **Known points data** and Control Points are represented primarily through a grid; each line corresponds to a group or point and an associated characteristic to each column; the grid can be highlighted and resized.

Depending on the node selected in the navigation tree, the corresponding views are activated; in particular:

Selecting the **Known points data** activates the view that displays **Groups**; selecting the name of a Group activates the view that displays the corresponding **Known points data**; finally, selecting the name of a Point activates the view that displays, in extended form, the data of the **Known point**.

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Figure 9:

Selecting the **Control points** node activates the view where the user can insert the coordinate points or noted quotes to be used subsequently in the elaboration of data.

This view includes two pages: **Points** and **Geographic Points** (these last are used in the **Post Processing Calculation**).

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Figure 10:

The **Control points** view is also available for orientation points where the data associated with them are displayed.





DL data

The **DL data** view is the display of information collected using a Digital Level; one or more levels can be archived which contain the data associated with a certain number of measurements run; the views are represented through a grid whose lines represent the **DL data** type (Benchmarks) and the associated characteristic columns.

Depending on the subnode selected in the navigation tree, the corresponding views are activated:

Selecting the **DL data** node will activate the view displaying **Leveling**;

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	3	1			1.652710	13.315	203.277		0.071		
	4	1			1.652690	13.322	203.277		0.071		
	5	1	1.687520			21.926					
	6	1	1.687460			21.928					
	7	1			0.752140	22.067	204.159		0.098		
	8	1			0.752070	22.067	204.159		0.098		
	9	1	1,455370			22.033					
	10	1	1,455380			22.031				_	
	11	1	1.199900		1.347880	21.972	204,213		0.117		
	12	1			1.347890	21.975	204,213		0.117	-	
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	14	1	1.244340			22.010					
	19	2	1.244340		1.312120	22.010	204.092		0.131	_	
	15	-			1.312120	21.997	204.092		0.131		
		2			1.312160		204.092		0.131		
	17	2	1.318200			24.786					

Figure 12:

Selecting the name of a Benchmark activates the view that displays the **Points** where all of the information is inserted for elaborating the measured data.

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Figure 13:

CAD View

CAD View is the representation of a document's graphic information, which, using specific instruments, can be changed.

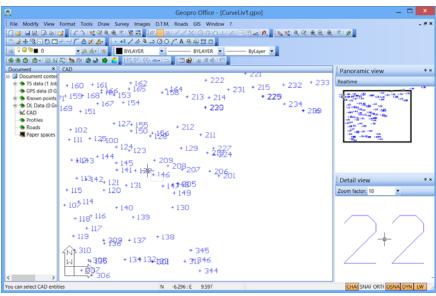


Figure 14:

The Graphic View is used to manage:

- Graphic entities;
- Celerimetric data;
- GPS data;
- Known points data;
- DTM Projects;
- Roads Projects;
- GIS Projects;
- Images.

The following views can be associated to the CAD View using the View menu:

- Property view;
- Commands View;
- Panoramic view;
- Detail view.

These views are described in the CAD View chapter of the Base course.

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Profile View

The **Profiles View** is the graphic or numeric (grid) display of the information associated with a Profile or cross section calculated by the program.

Depending on the node selected in the navigation tree, the following views are activated:

Selecting the **Profiles** node will activate the Profiles view that lists the various profiles and their respective projects;

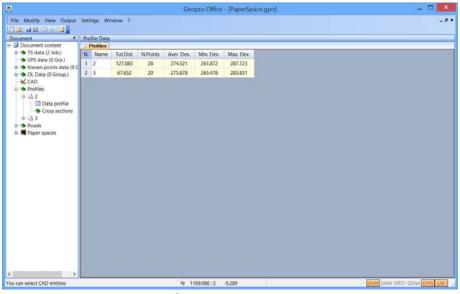


Figure 15:

Selecting the name of the Profile activates the view that graphically displays the terrain profile where the user can change the graphic appearance (scale of lengths or heights), design projects and polylines.

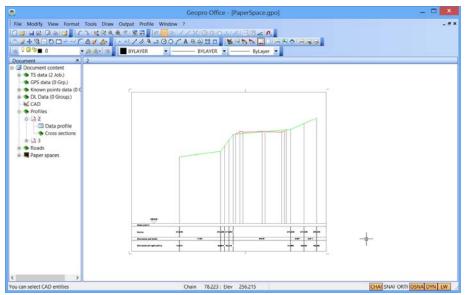


Figure 16:

Selecting the **Data Profile** node will activate the grid view of the numeric data characterizing the Profile; this view may include other pages displaying the data of any projects and polylines associated with the profile.

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K CAD	_						0.603			
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8-2							4.707			
Data profile Gross sections	3		5.309	263.000	1273.290	1051.653				
8 3 3							4.707			
⊖- S Roads	4		10.016	264.000	1269.508	1054.455				
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	1		54.707	275.043	0.000	1233.601	1081.063			
								0.790	66.67%	
	2		55.497	275.570	0.450	1232.967	1081.533			
								0.500	0.00%	
	3		55.997	275.570	0.402	1232.565	1081.831		1	
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	1		44,645	270.955	-0.055	1241.686	1075.072			
								7.350	13.53%	
	2		51.995	271.949	-0.051	1235.781	1079.448			
								0.061	13.53%	
2	3		52.056	271,958	-0.130	1235,731	1079.485			

Figure 17:

Selecting the **Cross Sections** node will activate the **Sections View** that includes the list of the cross section of the selected profile;

R. P. 6.12	Cross secti	ion list							
	Cross see								
5 data (2 Job.)	Name	Chainage	Width	N.Points	Aver.Elev.	Min.Elev.	Max.Elev.		
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L Data (0 Group.) 2	a2b	10.000	20.000	3	263.778	263.556	264.000		
AD 3	a3b	20.000	20.000	3	265.586	265.411	265.847		
ofiles 4	a4b	30.000	20.000	5	267.973	267.030	268.837		
2 Data profile 5	a5b	40.000	20.000	6	270.268	269.322	271.288		
Cross sections 6	a6b	50.000	20.000	8	272.192	270.515	273.523		
3 7	a7b	60.000	20.000	3	275.460	275,420	275.500		
pads 8	a8b	70.000	20.000	8	278.277	276.868	279.845		
	a9b	80.000	20.000	4	279.675	279.067	280.134		
10	a10b	90.000	20.000	5	280.943	280.116	281.600		
11	a11b	100.000	20.000	5	282.551	281,917	283.339		
12	a12b	110.000	20.000	6	284.745	283.915	285.552		
13	a13b	120.000	20.000	5	286.561	285.913	287.389		
14	a14b	127.083	20.000	3	287.385	287.271	287.500		
1 P3 9 sper spaces 9 10 11 12 13	a9b a10b a11b a12b a13b	80.000 90.000 100.000 110.000 120.000	20.000 20.000 20.000 20.000 20.000	4 5 5 6 5	279.675 280.943 282.551 284.745 286.561	279.067 280.116 281.917 283.915 285.913	280.134 281.600 283.339 285.552 287.389		

Figure 18:

Selecting the name of the Section activates the view that graphically displays the cross section profile where the user can change its graphic appearance as well as design polylines;

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Figure 19:

Selecting the **Cross Sections Data** node will open a view that may include one or more pages: the first page includes the information on the section while the other page(s) include information on the additional polylines.

ent X	2->1	a2b: Cros	ss section data	10 C						
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CAD							9.902			
Profiles	2		-0.098	264.000	1269.580	1054.524	10.098			
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8 급 a3b 9 급 a4b 9 급 a5b 9 급 a6b 9 급 a6b 9 급 a7b 9 급 a8b 9 급 a9b 9 급 a10b 8 급 a11b	2->4 / G N. 1	iround P	Chainage -0.012	Elevation 264.080	0.064	1269.528	1054.455		Slope 8.62%	
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8 (a) a3b 9 (a) a4b 9 (a) a5b 8 (a) a5b 8 (a) a5b 8 (a) a7b 8 (a) a8b 8 (a) a9b 8 (a) a10b 8 (a) a11b 8 (a) a12b 8 (a) a13b	2->4 / G N. 1	iround P	Chainage -0.012	Elevation 264.080	0.064	1269.528	1054.455			
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8 ⊕ a3b 9 ⊕ a4b 9 ⊕ a5b 8 ⊕ a5b 8 ⊕ a5b 8 ⊕ a5b 8 ⊕ a7b 8 ⊕ a7b 8 ⊕ a7b 8 ⊕ a10b 8 ⊕ a10b 8 ⊕ a12b 8 ⊕	2->4 / G N. 1	iround P	Chainage -0.012	Elevation 264.080	0.064	1269.528	1054.455			



Roads View

The **Roads View** is the graphic or numeric display of the information associated with a road and its road sections.

Depending on the node selected in the navigation tree, the following views are activated:

Selecting the **Roads** node will activate the Roads View that lists all the roads;

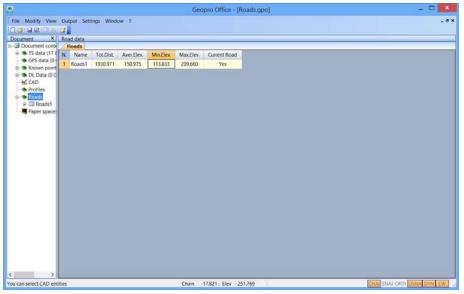


Figure 21:

Selecting the **Road Named** node will activate the road name view graphically displaying the road tracking;

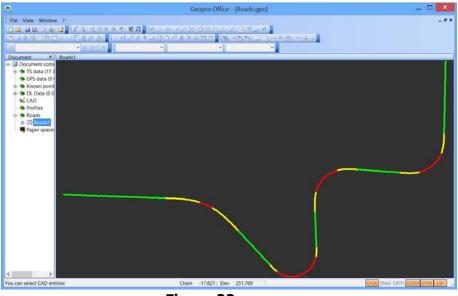


Figure 22:

Selecting the **Altimetry** node will activate the **Altimetry View** where the user can change the graphic appearance of the road and design projects and polylines within it.

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Figure 23:

Selecting the **Altimetry Data** node will open the view, divided into one or more pages, depending on the quantity of projects/polylines designed.

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							0.002					
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Profiles Roads Roads1 Altimetry Altimetry data Road cross section							0.003					
	3		0.006	209.660	161.538	-3.377						
							21.055					
	4		21.060	207.088	160.820	17.666						
Raper spaces							5.647					
	5		26.707	206.415	160.627	23.309						
						_	15.494					
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								0.003	-6.42%			
	3		0.005	209.660	0.000	161.538	-3.377					
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Figure 24:

Selecting the **Roads Cross Sections** node will activate the **Sections View** that includes the list of Road sections;

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Figure 25:

Selecting the name of the Road section activates the view that graphically displays the section where the user can change its graphic appearance as well as design polylines;

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Selecting the **Cross Sections Data** node will open a view that may include one or more pages: the first page includes the information on the section while the other page(s) include information on the additional polylines.

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Figure 27:

Paper Spaces View

The **Paper Spaces View** allows the user to create tables with multiple panes that can includes portions of the **CAD View** as well as the **Profile View**.

The **Paper Space View** lists all the Paper spaces created.

For each paper space created, the program creates a **Cad View** identified by its name where the user can add, change or eliminate the panes.

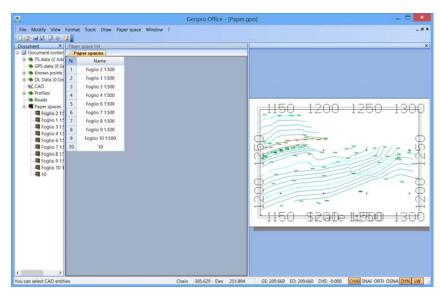


Figure 28:

Meaning of Codes

The program uses a series of codes applied during elaboration of the data or in different phases of the calculation; here following is the description of each of them and their use is outlined in the following chapters.

- HC (Horizontal Control point) The Point "seen" is actually an Orientation Point and will be used by the program to orient the Station from which it is "seen". To be used by the program, the Name/Num field of the Point must be identical in each and every facet (a capital letter is not considered equal to a lower case letter) to the Name field of an Orientation Point. It is also required that at least the Horizontal Angle of the HC Point and the North Coord. and East Coord. fields of the Orientation Point are filled with values valid for the calculation. The Slope Distance and Vertical Angle fields are optional.
- VC (Vertical Control point) The Point "seen" is actually a Quote Point and will be used by the program to quote the Station from which it is "seen". To be used by the program, the Station Height field of the Station from which the point was "seen", the Prisma Height, Slope Distance, and Vertical Angle of the VC Point and the Elevation field of the Orientation Point must all be filled with valid values.
- TR (Transverse) The Point "seen" is actually another Station and will be used by the program to calculate any Polygonals (open or closed). To be used by the program the Name/Num field of the TR Point must be identical in each and every facet to the Name field of a Station. It is also required that at least the Prisma Height, Slope Distance, Vertical Angle and Horizontal Angle of the TR Point are filled with values valid for the calculation.
- **IE** (Inaccessible Elevation) The Point is considered as an inaccessible quote. To be used by the program, the **Vertical Angle** field must be filled with valid data.
- **FI** (Forward Intersection) The Point is used to calculate the forward intersection. To be used by the program, the **Vertical Angle** and **Horizontal Angle** fields must be filled with valid data.
- **OC** (Orientation Created) During the first phase of the elaboration, this type of point is not taken into consideration. Only after calculating the coordinates and quotes of all possible Stations, the program will proceed with calculating the coordinates and quotes of these Points, transforming them into **HC** points. The elaboration is then run again from the beginning to see if, using these Orientation Created Points it can orient or quote other Stations. This process is run again until it is no longer possible to orient or quote other Stations. As such, the user can quote a series of Stations from which shared points were "seen" and from which at least one the coordinates and quote calculation can be done.

Here following is the description of the other Codes managed by the program in other environments or other phases of the calculation:

- **SL** (Start Line) This code, along with the two following, are interpreted during the design phase. All Points (or Stations) beginning with the one containing this code and up to the one containing the EL or CL code will be subsequently connected by dash lines.
- EL (End Line) This is the last in a series of Points (or Stations) connected by dash lines.
- **CL** (Close Line) This has the same meaning as the **EL** code except that this Point (or Station) will also be connected to the **SL** one so as to obtain a closed dash line.
- **NL** (No Line) The Points or Stations with code **NL** are used to indicate that the point falling between the other codes SL, EL, CL must not be considered in the design of the lines.

- **NT** (No Triangles) The Points or Stations with code **NT** will not be considered during the Triangle creation phase.
- NP (No Profile) The Points or Stations with code NP will not be considered during the Profiles calculation using the "by quoted plane" method and with selecting a fascia of inclusion points.
- **NV** (Not Visible) The Points or Stations with code **NV** will not be displayed in Graphic and will not be considered during the Triangle creation phase.
- LD (Line for Description) This code is used to design a polyline that joins it with all of the subsequent points with the same description up to the end of the same Work (Celerimetric Booklet) or the same Group (Noted Pt. and GPS Booklet).
- **NC** (No Computation) This code, if activated, is used to exclude a Celerimetric Station, Celerimetric Point, Base GPS Station or GPS Point from the celerimetric calculation and from projection calculation.

General Options

Using the **General Options** command will open the **General Options** window composed of three pages.

In the **TS data** page, the user can specify whether to work in 2D or 3D and whether to create the Historic file (.STO) where the date and time of the changes applied to the elaborations run are stored.

For this type of selection, the **Save CFG** and **Load CFG** commands are also available whose functionality is described for the **File** page of this window.

General options
TS data Distances Computation Alphabetic codes
СТуре
Survey O 2D i 3D
Save CFG Load CFG
⊂ History file
Produce OYes ONO
Save CFG Load CFG
OK Annulla ?

Figure 29:

The **Distances Computation** page is used to select the method for calculating the Horizontal Distance once the values associated with the Slope Distance and Vertical Angle are known.

In fact, the user can select whether or not to apply the correction due to the refraction index and to the value of the Earth radius.

		General options		×
TS data Dista	nces Computation Alph	nabetic codes		
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	Geoid Reduction			
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Figure 30:

Initially, the field associated with **Consider** for **Sphericity and Refraction** is set at **No**.

Setting this window to **Yes** will allow the user to change the fields associated with the **Refraction Coefficient** and the **Earth Radius** which are initially set, respectively at, 0.14 and 6,372,500 m.

These can be changed even while remaining within the limits indicated in the display; the user can also select whether or not to run the **Geoid Reduction**.

In this case, the user must also insert the value of the **Average Elevation** which is initially set at 0.

Using the **Alphabetic Codes** page, the user can select whether or not to cancel the Alphabetic Codes from the Points and Stations Code field.

The user can cancel the points from the open file or set the option to cancel on all files created with the program's previous versions and those that will open in the future.

The Explicit Codes already converted will remain set and can be changed in the specific pages.

General options ×
TS data Distances Computation Alphabetic codes
The Alphabetic Codes (HC, VC, TR, SL,) will be deleted In current file In all the old files that will be opened in future The Alphabetic Codes will be deleted from the description fields of the various entities. Will remain however the settings of the corresponding Explicit Codes. This Codes can be modified in the appropriate pages.
OK Annulla ?

Figure 31:

First Steps

Presentation

Geopro Office is a topographic program for Computers of Workstations installed with Windows 95/98/ME, NT4/2000/XP/Windows Vista/Windows 7/Windows 8 and Windows 10.

Data can be acquired by the program in various ways:

- •Directly from Total Stations, data registries or digital levels
- •From files imported onto PCs from Total Stations, GPS receivers, data registries or digital levels
- •From .GPF files produced by Geopro Field, the data acquisition program on Sokkia palms
- •From ASCII or DXF files
- •Inserted by keyboard.

When data is imported, the program can recognize the codes that, depending on what the user has set, will allow various functionalities: completion of the description field, tracking the line between points, designing points with symbols and particular characters depending on the code...

The program runs elaboration of the data from Total Stations using a guided procedure that allows the user to analyze the inserted data and check any errors at each step by displaying the discards in reference to the set tolerances. Orientation of the stations can refer to a local system or anchored to orientation points. The following calculation methods are used automatically by the program, depending on the available data: roto-translation (rigid or at minimum squares, with fixed or variable scale factor), Snellius and Ex-centro. For the quotes calculation, the program can also assign a false quote to a station or use benchmarks as reference. The calculation of open or closed polygonals, with associated compensation, is conducted totally in automatic. The user can select the rigorous compensation module for the layout or altimetric calculation.

For data from GPS receivers, the program offers a specific calculation module. First of all, preliminary transformations can be used if the surveys refer to reference systems such as IGS05. The calculation can refer to a local system or it can use orientation points with noted coordinates; it can also run cartographic projections on geodetic systems such as WGS84, ED50 and ROMA40 The calculation can also use the data from the Total Stations if they are anchored to GPS points.

The elaboration, whether from Total Station data or GPS, can also be conducted using the Pregeo software module if the user wants full compatibility with it.

The results of the various elaborations can be displayed graphically within a powerful and complete CAD environment prepared specifically for the program. This allows implementation of functions specific to the topographic environment: calculating fractioning, areas and polar coordinates, transforming graphic points into Stations, celerimetric points or GPS; creating slope lines and frames,...

The CAD environment allows displaying of raster images to overlay on the surveys. These images can be accurately calibrated and georeferenced taking into consideration all of the deformations that the image may undergo.

The program is able to automatically create a mathematical model of the terrain as triangles, using points from surveys run with the Total Station or GPS receiver, or from graphic points or noted coordinates.

Beginning with the mathematical model of the terrain, level curves can be automatically created: the user must only insert the value of the equidistant, the notable equidistant and the rounding factor of the spline.

Calculating the volumes is done using a guided procedure that allows the user to select: whether to run calculation on all of the surveys or a part of them, if the calculation is to be done on the horizontal plane or incline, if a plane of equal excavation and fill is to be identified or a plane of compensation with minimum movement of land or excavation or of minimum absolute movement. The program also allows calculation of volumes for differences with other surveys that may have been done at different times (cables, unloads, ...).

Generating profiles can be done beginning with the triangles in the mathematical model of the terrain, the dash lines or the splines of level curves, or finally from the quoted plane even using a fascia for including points. Viewing the generated profile is automatic and can be customized through selecting the columns, scale, page dimensions, colors, quote jumps, ... It is also possible to plan gradients graphically as well as by inserting appropriate length and slope/drop/quote values.

Finally, there is a complete module for road planning. Road tracking, circular connections and clothoids, curved slopes, gradients, vertical connections can also be inserted. The sections can be calculated on the entire section, on selected sections or individually using selected templates from time to time (whether single or double lane, with or without traffic separator, quay and sidewalk) selecting it from a specific archive housing also the specifications for walls and ditches. Once the project is completed, the user can print a detailed calculation on the earth movement as well as obtain a layout or three-dimensional representation of the road and embankment areas.

Create a TS data

There are two primary methods for creating a TS data:

1.manual insertion

2.inserting data from instrument

Manual Insertion

The first step is to run the **File | New** command. The program opens a new document and assigns it a default name (Document1); **General** is the first displayed view.

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	Size:	Unavailable		
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Figure 32:

Inserting a Job

•The TS data can be organized in one or more Jobs.

•To insert one or more Jobs, the user must activate the **TS Data View** and add one or more lines using the **Insert | Add row** and/or **Insert | Insert row** commands.

•The **Insert | Add row** command is used to insert the first line and, when there are already other lines, it will insert a line under the current one.

•The **Insert | Insert row** command allows the user to insert a line above the current one.

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Figure 33:

In the example above, a **Job** has been added.

Inserting a Station

Jobs in the TS data can be organized in one or more Stations.

To insert one or more Stations, the user must:

•Activate the Job View used to insert the Stations;

•Use the **Insert | Add row** and/or **Insert | Insert row** commands; the functionality of these commands is the same as that for inserting Jobs.

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	13	3-1-31		24.000		0.223		4				
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	15	3-1-31		24.000				4				
	16	3-1-31		24.000		0.223		4				
	17	3-1-30		24.000				8				
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In the example seen on the previous page, three Stations have been associated to the **JOB1** Job.

Inserting a Station Point

•The Stations that compile the Jobs in the TS data can contain multiple points.

•To insert a point, the user must activate the corresponding **Station View** and use the **Insert | Add row** and/or **Insert | Insert row** commands (the functionality of these commands is the same as that for inserting Jobs).

In the example below, various Points have been added with the associated data.

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8 S data (1 Job.)	NL	Description	Name/Num.	Prisma H.	Slope dist.	Vert. Ang.	Horiz Ang.	Prism Type	Prism Constant	Comment	Notes	Sketch	Photo1	Photo		
60. [00 1305 dot. [0] 6	1		3-1-16	1.427	380.173	100.9069	0.0000	Unknown								
(8-22) TS 3-1-29	2		3-1-15	1,472	310.267	100.0746	331.0291	Unknown								
8-21 TS 3-1-29	3		3-1-16	1.427	380.174	299.0936	200.0010	Unknown								
(e) 🏠 TS 3-1-29	4		3-1-15	1,472	310.267	299.9242	131.0263	Unknown								
🛞 🛃 TS 3-1-15																
8 🚰 TS 3-1-15 8 🚰 TS 3-1-15																
8-2153-1-15 8-2153-1-15																
(8-2) TS 3-1-29																
(8-2) TS 3-1-29																
(8-2) TS 3-1-29																
(8-2) TS 3-1-29																
(8-22) TS 3-1-31																
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8-2 TS 3-1-31																
8-2 TS 3-1-30																
(8-2) TS 3-1-30																
(8-2) TS 3-1-30																
B-22 TS 3-1-30																
- 🏀 GPS data (D Grp.)																
® Snown points da																
8 S DL Data (D Group																
- Profiles																
- Roads																
Paper spaces																
)	-									_						
ommands																
	_										_					

Figure 35:

The TS data is associated to each point where the data associated with the point is summarized.

Once the booklet is edited, Orientation Points can be inserted.

These points must be inserted into the **Points** page in the **Control points view** that opens by expanding the node corresponding to the **Known points data** in the navigation tree; the points can be inserted manually using the commands available for inserting data in the TS data.

The **Orientation Points** summary view is also available for these points.

📓 Geopro Office - (Celer.	9po]															-		×
File Modify View Insert Computation Output Settings Window ?													- # ×					
[1] 22 月 風 [2] 名 [2] 月 三 川 月 三 川 月 三 四 四 四 四 四 四 四 四 四 四 四 四 四 四 四 四 四 四																		
	TS Point: 3-1-1	16 (Station: 3-1-29	, Job: JOB1)			_												
Document content	General	GIS data																
State (1 Job.)	BT	- 2 1	11															^
B-20 TS 3-1-29	Inan	ne 3-1	-10															
-Ø Pt. 3-	(
- Ø Pt. 3- Ø Pt. 3-									^									
Ø Pt. 3-			1.427															
B-22 TS 3-1-29			390.173															
8 2 TS 3-1-25 8 2 TS 3-1-25			100.0000															
8 15 J-1-28 8 15 J-1-15	Vert Ang		100.9069															
(8) 🙀 TS 3-1-15	Horiz Ang.		0.0000															
(B) 🔓 TS 3-1-15	Coordinates																	
8 2 TS 3-1-15 8 2 TS 3-1-25	Loordnates																	
(8-2) TS 3-1-29	Noth	4	4995344.364															
(a) 🚰 TS 3-1-29			1624514.019															
8 2 TS 3-1-25 8 2 TS 3-1-31			34,776						~									
(R) 🚰 TS 3-1-31				<					>									
(e) 🙀 TS 3-1-31	Codes																	
8 2 TS 3-1-31 8 2 TS 3-1-30	Description		ПНС В		B DE	Пя	00	S L	EL									
8 🙀 TS 3-1-30																		
8-21 TS 3-1-30	Crudy type	~	□a [INL U	D INT	🗆 NP	□NV	L NC										
(8) 2 TS 3-1-30 — 6 GPS data (0 Grp.)																		
 B S data (p orp.) Known points data 																		
(8- 🏀 DL Data (0 Group																		
- CAD																		
- The Profiles - The Roads																		
Paper spaces	¢								>									
							_	_						_		_	_	_
Commands																		¢ ×
																		0
					-	-	-	-	-		_	_	_	_	_	_	_	_
														CHW	SNAP ORTH	OSNAP	DVN	LW .

Figure 36:

Inserting Data from Instrument

In regard to inserting instrument data, the operations to run are as follows:

1.Create a new document;

2.Select the item **TS Data** from the navigation tree view;

3.Run the Insert | Instrument Data... command.

Using this command will activate a guided procedure where the user can insert all of the information needed for transmitting data from the instrument to the PC and, the option to save the specified profile so as to reuse it again in another transmission.

The image below shows the first window in the procedure.

A more detailed description of this operation can be found in the course instruction on using Geopro Office.

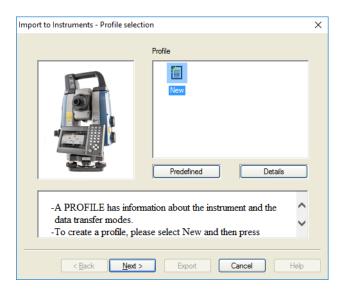


Figure 37:

Change a TS Data

The TS Data data can be changed using the commands found in the Modify menu or in the context menu activated by clicking the right mouse button on the booklet.

			BI 14 24 149	98.4	a <i>v</i> = -	a 🕼 🎽											
Ocument ×		ion 1: 3-1-29 (J	olo 1: JOB1) des Coordinates								_	_	_			_	-
B - S data (1 Job.)			Name/Num.	Prisma H.	Slope dist.	Vert. Ang.	Horiz Ang.	Prism Type	Prism Constant	Comment	Materia	Chatal	Photo I.	50 x 1 x	_	_	
😑 🌔 Job JOB1 (20	IN.	Description	3-1-16	Prisma PL 1.427	380.173	100.9069	0.0000	Unknown	Prism Constant	Comment	rectes	Sketch	Photo 1	Photo			
🖯 🔁 TS 3-1-29	1																
- 🕖 Pt. 3-1			3-1-15	1.472	310.267	100.0746	331.0291	Unknown									
- 🕖 PL 3-1	3		3-1-16	1.427	380.174	299.0936	200.0010	Unknown									
-Ø Pt. 3-1	4		3-1-15	1,472	310.267	299.9242	131.0263	Unknown									
-Ø PL 3-1																	
⊕ 🎦 TS 3-1-29 ⊕ 🎦 TS 3-1-29																	
E TS 3-1-29																	
E S 3-1-29																	
E-2 TS 3-1-15																	
B-2 TS 3-1-15																	
⊕ 🏹 TS 3-1-15								_									
B-2 TS 3-1-29					8 C	tut.											
E 75 3-1-29					Ca 0	opy											
E 75 3-1-29					E P	aste											
E TS 3-1-29						isert copied ce	- 11-										
(a) TS 3-1-31																	
8 🔁 TS 3-1-31					25 A	dd copied cel	ls .										
8 🚰 TS 3-1-31					3% C	ut object											
(a) 🙀 TS 3-1-31					S 0	opy object											
(8) TS 3-1-30						idd object for i											
(8) 🙀 TS 3-1-30																	
(8) 🚰 TS 3-1-30						idd object by o	coordinates										
(8) 🙀 TS 3-1-30					-25 F	ind in data											
- GPS data (0 Grp.)					36, F	ind next											
(e) 🍫 Known points da					10 F	ind in CAD											
(e) 🌰 DL Data (0 Group					-												
-¥ CAD						perations on s	selection										
- Profiles					2↓ S	ort table											
- 🍖 Roads					🧆 F	eorder table											
Reper spaces					<u>6</u> N	Aerge duplicat	e stations										
						isert row											
)					-												
ommands						dd row											1
					100 D	lefete row											





Note that "Description of Modify Menu Commands" on page 47 has a brief description of the various functions included for changing and searching data.

Elaborate a TS Data

The following section describes 2D and 3D elaboration.

2D Elaboration: example Celer2D,gpo

This example shows the elaboration of a layout survey with open polygonal and orientation referring to noted coordinate points.

To elaborate the booklet, the user must select the TS Data from the navigation tree, open the Computation Menu and click on **Automatic Celerimetric**.

The Celerimetric calculation is a guided procedure: the first window displayed is seen here below.

This window is used to select the jobs to be elaborated by clicking on the corresponding box; also, if an elaboration has already been executed, then it must be canceled using the **Cancel the computation** box; pressing the **Next** button will continue the elaboration.

TS data computation - Initial information	×
Job list S N do name Comput M 1 CELER2D Yes Select the Jobs you want to process. Computation of TS data on selected the as a leady been done! To continue, check the box below. Computations performed on the previous selected at the othis!	ously
Settings < Indietro Avanti > Annulla	2
Figure 39:	:

Click on the Options button to check the options for the elaboration associated with automatically recognizing codes and checking tolerances.

This information can be changed only at the beginning of the elaboration.

Computation Options				×
Search Codes	- Tolerances and Check			
Automatic	Check	💽 Yes	🚫 No	
⊙Yes ○No	Duplicated Distances	10.000	[mm] + 1 ppr	n
Points with same name	Duplicated Elevations	10.000	[mm] + 1 ppr	n
Always average	Duplicated Angles	0.0030	[g]	
Only same TS Station	Distance Closed Pol. 1/	6000	* Rad (Sum L²)	
	Angle Closed Pol.	0.0100	[g]	
ОК	Elevation Closed Pol.	5.000	[mm] + 5.000 * n	
Cancel	Comp. Coord. TS Station	500.000	[mm]	
Save CFG	Comp. Coord. TS Point	50.000	[mm]	
	Computation Elevations	50.000	[mm]	
Load CFG	Reflector height min.	1000.000	[mm]	
Originals	Reflector height max.	5000.000	[mm]	

Figure 40:

The second window shows an analysis of the Celerimetric Booklet data (number of stations included, number of points with a certain code and their validity, any presence of duplicate points and/or stations, etc.).

Stations	Present			Identical name
	3			
Points	Present	Valid	Not Valid	Identical name
HC coded	3	3	0	
VC coded	0	0	0	
TR coded	4	4	0	
FI coded	0	0	0	
OC coded	0	0	0	
Without code	50	50	0	
Settings	< Indietro	<u>Avanti ></u>	Annulla	

Here following are the code descriptions that can be assigned to the points and that are used during the celerimetric calculation:

HC (Horizontal Control point) - The Point "seen" is actually an Orientation Point and will be used by the program to orient the Station from which it is "seen".

VC (Vertical Control point) - The Point "seen" is actually a Quote Point and will be used by the program to quote the Station from which it is "seen".

TR (Transverse) - The Point "seen" is actually another Station and will be used by the program to calculate any Polygonals (open or closed).

IE (Inaccessible Elevation) - The Point is considered as an inaccessible elevation.

FI (Forward Intersection) - The Point is used to calculate the forward intersection.

OC (Orientation Created) - During the first phase of the elaboration, this type of point is not taken into consideration. Only after calculating the coordinates and quotes of all possible Stations, the program will proceed with calculating the coordinates and quotes of these Points, transforming them into HC points. The elaboration is then run again from the beginning to see if, using these Orientation Created Points it can orient or quote other Stations. This process is run again until it is no longer possible to orient or quote other Stations. As such, the user can quote a series of Stations from which shared points were "seen" and from which at least one the coordinates and quote calculation can be done.

The next window is **Station Analysis** and, in essence, will display any coordinate calculations that Meridiana can run in association with the inserted orientation points. In the case in question, the calculation run is a roto-translation; given that this is a layout work, there are no quotable stations.

Computable		Total points	
Overall	3	Present	3
With known coordinates	0	Height computable	
Ex-Center computation	0	Overall	0
Snellius computation	0	With known height	0
Roto-Trasl. computation	3	With computable height	0
From other Stations	0	From other Stations	0
No computable		Height no computable —	
Overall	0	Overall	3
Without horiz. angle	0		
HC insufficient point	0		

Figure 42:

At this point, the next window is **Options for the next computations** where the user can make selections that will be used in the next steps of the elaboration. Given that this is a 2D work, the section associated with calculating the quote is deactivated.

ORIEI	NTATION	ELE	ATIONS
From HC points	with print	Computation	
Automatic	⊖ Yes	⊖ Yes	No
With selection	No No	- Manual input	
Roto-translation	with print) Yes	No
Yes	○ Yes	Traverse calc.	Final results
No	⊙ No	No output	No output
		On screen	On screen
Manual input		On printer	On printer
Yes	 No 	STRICT C	
Traverse calc.	Final results	Compensation	with output -
No output	No output	⊙ No	O No output
On screen	 On screen 	Only Planim.	On screen
On printer	On printer	O Planim. + Elev.	On printer

Figure 43:

After pressing **Next** the roto-translation calculation is displayed with its associated discards. The coordinates of the fiducial points can be excluded from the calculation by deselecting the associated box.

Roto-translation con	nputation			×
Roto-Translation ca	arried on Stations:100 - 200 - 300	1		
S Point name OR1 OR2 OR2 OR3	Rel Req North 52 4825179.87 9 4825705.87 9 4825361.999	Req East 2400538.747 2400854.727		
Method Fixed Least square The HC points may I symbol.	Scale factor Rotation angle Maximum residual Average residual computation	106.7160 433.726 184.571	Scale = 1 e corresponding	
Settings	Select all	Deselect all	ılla ?	
	Figure 44:			

The next window shows the coordinates of the calculated stations.

Name	North		Circle c		No.Estim.
100	4825274.427	2400592.393		Rot.Tra	
200	4825234.695				
300	4825289.464	2400461.822	34.0300	Rot. Ira	
lesults of the	elevation computatio	n			
	· · · ·				
Results of the Name	· · · ·	n Elev. ty No.E	stim.		
	· · · ·		stim.		
	· · · ·		stim.		
	· · · ·		istim.		
	· · · ·		istim.		
	· · · ·		istim.		
	· · · ·		istim.		
	· · · ·		istim.		

Figure 45:

To complete the elaboration, press **Completed**. To view the final result, click on the CAD item in the navigation tree.

The computation of the TS data is completed	×
The computation is completed.	
Press 'Complete' to accept the performed computations.	
,	
Settings < Indietro Completed Annulla ?	
Figure 46:	

The final result of the elaboration:

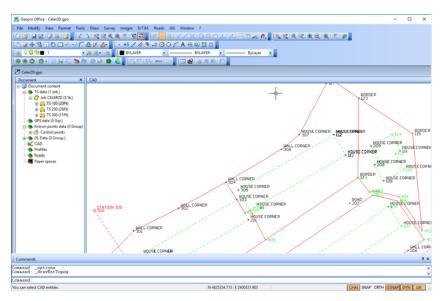


Figure 47:

3D Elaboration: example Countors.gpo

This example shows the elaboration of a plano-altimetric survey with closed polygonal and orientation referring to local coordinates.

The first window that appears is similar to the one described in the 2D elaboration.

TS data computation - Initial information	×
Job list Select the Jobs you want to process. Computation of TS data on selected Jobs has already been done! To continue, check the box below. Computation performed on the previously selected Jobs will be replaced at the end of this!	
Cancel the computation	_
Settings <indietro avanti=""> Annulla ?</indietro>	

Figure 48:

In the **Analysis of data** window the program will mark the stations present, any polygonal wearing (TR) and the detail points in the survey.

	Present			Identical name
Points	Present	Valid	Not Valid	Identical name
HC coded	0	0	0	
VC coded	0	0	0	
TR coded	6	6	0	
FI coded	0	0	0	
OC coded	0	0	0	
Without code	211	211	0	(

Figure 49:

Given that it is not dependent on orientation points and noted quote points, the surveys cannot be oriented or quoted with noted references.

ation Analysis			>
Computable		Total points	
Overall	0	Present	3
With known coordinates	0	Height computable	
Ex-Center computation	0	Overall	0
Snellius computation	0	With known height	0
Roto-Trasl. computation	0	With computable height	0
From other Stations	0	From other Stations	0
No computable		Height no computable —	
Overall	3	Overall	3
Without horiz. angle	0		
HC insufficient point	0		
Settings	< Indietro	<u>Avanti ></u> Annulla	?

Figure 50:

At this point, the user can set the various options for the elaboration.

In our example, we selected Manual Input, which also happens to be the only possible selection.

011121	ITATION		ELEVATIONS				
From HC points	with print	Computation	O				
 Automatic 	⊖ Yes	 Yes 	◯ No				
With selection	. ● No	Manual input					
Roto-translation	with print	• Yes	◯ No				
) Yes	⊖ Yes	Traverse calc.	Final results				
No	No						
		O No output	O No output				
Manual input		On screen	On screen				
	O	On printer	On printer				
	◯ No	STRICT CO	OMPENSATION				
Traverse calc.	Final results	Compensation	with output				
No output	No output	No	O No output				
💿 On screen	 On screen 	Only Planim.	On screen				
🔿 On printer	On printer	O Planim. + Elev.	On printer				

Figure 51:

In the **Manual entry of Station coordinates** window, the user inputs the associated coordinates, the azimuth correction and the quote of a station by following the indicated instruction, for the Station 100 as well as the Station 200.

To assign points to the selected station, the user must press the **Assign Values** button; if the user presses the **Cancel Values** button then the values assigned to the station will be canceled.

Name 100 200 300	Or. Ty Manua Manua Not plan.	North 0.000 0.000	East 0.000 0.000	Circle c 0.0000 0.0000	Elev.t Manua Manua No Elev.	Elev. 10.000 10.000
The entry are select You can in stations for To assign Station, p Press the	fields will be activited in the appropri- not change the co- provinch it is possion the values enter- ress the button [A button [Cancel vittor the coordinates of the	ordinates of the ble rototranslation. ed to the selected ssign values]. alues] to cancel the	Narr Nort East Hori	:h t z. Corr.		2 0.0 0.00 10.0 10.0 yn values rel values

Figure 52:

The next windows display the intermediate results of the elaboration on the layout compensation of the polygonal and the altimetric compensation.

Show intermediate results			Show intermediate results	×	
Planimetric results of trave	rse computations			Elevation results of traverse computations	
Traverse results			^	Traverse results	<u>^</u>
of the Station:10	0 to the Station:200			of the Station:100 to the Station:200	
Name StationNorthing	FINAL VA Easting Az.Cor.	LUES		Name FINAL VALUES StationElev.	
100 300 200	-36.875	0.000 0.0000 10.158 79.9410 0.000 0.0000	Cc	100 10.000 Fixed 300 8.390 Compen 200 10.000 Fixed	sated
Traverse results				Traverse results	
	0 to the Station:100		~	of the Station:200 to the Station:100	¥
<	Expand		>	Expand	>
Settings	< Indietro Avanti >	Annulla	?	Settings < Indietro Avanti >	Annulla ?
		Ei		3.	

Figure 53:

The **Results of the Elaborations** window shows the coordinates and quotes of the stations.

Name	North			Or. Type	No.Estim.
100 200	0.000	0.000	0.0000	Fixed Fixed	
300	-34.270	-5.649		From ot	2
Results of the ele	vation computation				
Name	Elev. Elev	ty No.E	stim.		
100	10.000	Fixed	stim.		
100 200	10.000 10.000	Fixed Fixed			
Name 100 200 300	10.000 10.000	Fixed	stim. 2		
100 200	10.000 10.000	Fixed Fixed			
100 200	10.000 10.000	Fixed Fixed			
100 200	10.000 10.000	Fixed Fixed			

Figure 54:

If the TS data has already been elaborated previously and there are specific entities found in the file, then a window will appear in which the user can select whether to modify the position of these entities (that is, roto-translate them) based in the re-elaboration run on the TS data. A check box is included for each type of entity, used to decide whether or not to roto-translate. For the graphic entities, the user can specify whether to roto-translate all of them or only those included in the non-blocked planes. The deactivated check boxes indicate that there are no entities of the type represented by the check box itself.

Computation of the TS data - Roto-traslation	×
There are entities that can be Roto-Traslate according to changes made in the computation of TS data	
CAD entities	
Roto-Trans. the CAD entities Only entities not in locked layers All entities	
Other entities	
Trans. frames (translation only)	
Roto-Trans. Breaklines and Boundary Roto-Trans. the Triangles	
Settings < Indietro Avanti > Annulla ?	

Figure 55:

Press **Completed** to end.

The computation of the TS data is completed	Х
The computation is completed. Press 'Complete' to accept the performed computations.	
Settings < Indietro Completed Annulla ?	
Figure 56:	

. .gui e

The final result of the elaboration:

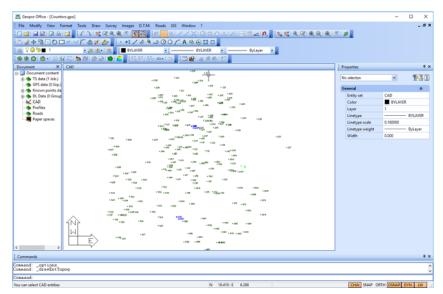


Figure 57:

TS data: output

Once the **TS data** item is selected from the navigation tree, select the Output menu. The procedures in this menu are used to print or transfer to other programs the data found in the TS data and the results of any elaborations executed.

Ceopro Office - (Countors.gpo)	- 0	×
File Modify View Insert Computation Output Settings Window ?		. 83
Document A IS Data	Properties	* >
Jobs Jobs	No selection	31
GPS data (0 Grp.)		
Known points da COUNTORS 0/P1 SORXIA 22/02/96 3 217 Topographic		
8 👁 DL Data (0 Group)		
- h Profiles		
- Seads		
Raper spaces		
Commands		
casand:		
Janand. Ju can select CAD entities N -27.711: E -19.994	CHAL SNAP ORTH OSNAP DYN	
Ju can select CAU enoties N -27.7111E - J9.094	CHAI SNUP OKIH OSNUP DYN	

Figure 58:

Here following is a short description of the primary print functions.

•Output Menu|TS data|Print All Stations: select this to print the measurement booklet of all stations.

•Output Menu|Celerimetric|Print All Stations: select this function to print the results of the celerimetric calculation of all existing stations.

•Output Menu|Free Format|Print All Stations: this function is used to obtain a free format printout of the data found in the TS data and the results of the Celerimetric Calculation. Free Format means that the user is free to decide which data to print, in what order, and with how many decimal numbers. To make these selections, the user must activate the **Settings | Print options** procedure. The user must also ensure that the Celerimetric Calculation has been executed so that the data can be properly printed.

For all of the versions described above, there is also a version to Print Selected Stations: using this command, the program will open the following window allowing the user to select the stations to print.

Print TS Data	?	×
TS Station to print		
100 200 300		
Print	Cancel	

Figure 59:

Create a GPS data

The first step is to run the **File | New** command. The program opens a new document and assigns it a default name (Document1); **General** is the first displayed view.

🖀 Geopro Office - (Docum	ent1]		-		×
File View Window 1					. # ×
1 🗃 🖬 🔍 🖗 🗞					
Document X	General		_	_	_
S data (D Gp.) GPS data (D Gp.) GPS data (D Grp.) Known points da	🖉 Docu	ment1			
8 S DL Data (D Group	Full Name:	Document1			
Profiles Roads	Creation date:	Unavailable			
Paper spaces	Date of last access:	Unavailable			
	Last edit date:	Unavailable			
	Size:	Unavailable			
	File version:	Unavailable			
	State:	0K			
٤ ، ٢					
Commands					ф×
					0
		CHW SNAP ORTH O	NAP DI	IN L	w "

Figure 60:

Inserting a Group

The GPS data can be organized in one or more Groups.

•To insert one or more Groups, the user must activate the **GPS data view** and add one or more lines using the **Insert|Add row** and/or **Insert|Insert row** commands.

•The **Insert | Add row** command is used to insert the first line and, when there are already other lines, it will insert a line under the current one.

•The **Insert | Insert row** command allows the user to insert a line above the current one.

Inserting a Group Point

•Groups that comprise the GPS data can contain multiple points.

•To insert a point, the user must activate the corresponding **Group View** and use the **Insert | Add row** and/or **Insert | Insert row** commands (the functionality of these commands is the same as that for inserting Groups).

🚵 Geopro Office - [GPS.gpo]		- 1	o x
File Modify View Insert Computat	ing Output Setting Window 7		
	K GPS Data		
	Groups Base Station Pla. Coords W0584 Other		
(8) (5) TS data (1 Job.) (8) (6) GPS data (1 Grp.)	N. NE Name Operator Instrument Date N.Pt Tp.Horiz Project. Tp.Vert Project. Entity set		
Group: 100 (224pt)	1 100 224 Plan. Local: Control Points Ellipsoid height Topographic		
- Ch Pt. 106			
- Pt. 200			
-G Pt. 110			
	GPS Data		×
	Groups Base Station [Pis Coord: WUSB4 [Other]		
			_
- C Pt. 107 - C Pt. 108	N. Grp. Name Stat. Name Latitude Longitude CF Devation Ground Devation Antenna H. Notes		
-G Pt. 109	1 100 100 42*59/41.21488*N 12*06/45.92433*E 293.150 291.620 1.530		
- C PL 105			
-Ci Pt. 107			
- G PL 108			
G5, pt 110	×		_
Commands			¢ ×
comand:			
ou can select CAD entities	N -11597.288 : E -61051.644 CHAU SNAL	P ORTH OSNAP OVI	1 1 1 1

Figure 61:

In the example below, various Points have been added with the associated data.

Document content		ıp 1: 100												
(k) TS data (1 Job.)	^ G	iPS Coords.	v/GSB4 Codes	Pla Coords Precisio	n Other									
(8)	N.	Name/Num.	Description	Latitude	Longitude	CF Elevation	Ground Elevation	Antenna H.	Quality	Comment	Notes	Sketch	Photo1	Phot
(i)- T Group: 100 (224pt)	1	105	CHIODO	42*59/58.84016'N	12*07'00.47143*E	306.846	305.316	1.530	No Sol.					
	2	106	CHIODO	42*59/58.79298*N	12*07:00.41931*E	306.428	304.898	1.530	No Sol.					
-Ci Pt. 106	3	107	CHIODO	42*59/36.25539"N	12*06'32.33419'E	307,457	305.927	1.530	No Sol.					
- Ch Pt. 107	4	108	CHIODO	42*59/36.27096*N	12106/32.164041E	308,159	306.629	1.530	No Sol.					
	5	109	CHIODO	42*59/38.00119'N		292.343	290,813	1.530	No Sol.					
- Ca Pt. 109	6	110	CHIODO	42*59/37.59409"N		292,180	290.650	1.530	No Sol.					
	7	200	CHIODO	42*59/43.89794*N		293.925	292,395	1.530	No Sol.					
	1	105	CHIODO	42*59/58.84016*N		295.923	305.316	1.530	No Sol.					
	9	106	CHIODO	42*59/58.79298"N		306.428	304.898	1.530	No Sol.					
	10	107	CHIODO	42*59/36.25539"N		307,457	305.927	1.530	No Sol.					
-Ci Pt. 109	11	108	CHIODO	42*59/36.27096*N		308.159	306.629	1.530	No Sol.					
-Ch Pt. 110	12	109	CHIODO	42*59/38.00119"N		292.343	290.813	1.530	No Sol.					
-G Pt. 200	13	110	CHIODO	42°59'37.59409''N	12"07'02.78602"E	292.180	290.650	1.530	No Sol.					
- Ch Pt. 105	14	200	CHIODO	42*59/43.89794"N	12*06*53.92350*E	293.925	292.395	1.530	No Sol.					
- Pt. 106	15	105	CHIODO	42*59/58.84016"N	12*07:00.47143*E	306.846	305.316	1.530	No Sol.					
-G Pt. 107	16	106	CHIODO	42*59/58.79298*N	12*07'00.41931*E	306.428	304.898	1.530	No Sol.					
-G PL 108	17	107	CHI0DO	42*59/36.25539"N	12106/32.3341916	307.457	305.927	1.530	No Sol.					
	18	108	CHIODO	42*59/36.27096"N		308.159	306.629	1.530	No Sol.					
-G PL 110	19	109	01000	42*59/38.00119'N		292.343	290,813	1.530	No Sol.					
	20	110	CHIODO	42"59/37.59409"N		292,180	290.650	1.530	No Sol.					
- Pt. 105	20	200	CHIODO	42*59/41.89794"N		293,925	292,195	1.530	No Sol.					
-G PL 108	22	105	CHIODO	42*59/58.84016"N		306.846	305.316	1.530	No Sol.					
- C PL 109	23	106	CHIODO	42*59/58.79298"N		306.428	304,898	1.530	No Sol.					
-G Pt. 105	24	107	CHIODO	42*59/36.25539"N		307,457	305.927	1.530	No Sol.					
- G PL 106	25	108	CHI000	42*59/36.27096"N		308.159	306.629	1.530	No Sol.					
-G Pt. 107	26	109	CHIODO	42*59/38.00119"N	12*07'02.36538*E	292.343	290.813	1.530	No Sol.					
- C Pt 108	27	105	CHIODO	42*59/58.84016"N	12107/00.471431E	306.846	305.316	1.530	No Sol.					
		1.4.4											_	

Figure 62:

The **GPS Point view** is associated to each point where the data associated with the point is summarized.

🖀 Geopro Office - (GPS.gpo)									-		×
File Modify View Insert Computation	Output Settings V	Vindow 1									. # ×
	BIA (1) A A 10	74.									
Decument X	GPS Point: 105 (Group:	1001									
Ocument content	General GIS data	,							_		_
® TS data (1 Job.)	General GIS 094								_		_
🙃 🦚 GPS data (1 Grp.)	Manager	105									^
8-T Group: 100 (224pt)	Name :	: 105									
-3 Pt 105											
											_
- 2 Pt 107	Measures						~				
-Ci Pt. 108	Latitude	42'5950.04016'N					î				
	A substa	12'07'00.47143'E									
Pt. 110	Longitude	120/004/1435									
	Elevation	306.846									
	H. Antenna	1.530									
	Description	CH0000									
		0.000									
	Quelty	No Sol. 💌									
	Coordinates										
3 Pt. 200	North	41007.901									
G Pt. 105		-									
-G Pt. 106	East	-62946.420									
	Elevation	305.316					~				
	Levaun		•				>				
-G Pt. 109	Codes										
- 3 Pt. 110	Cooki	□ HC	-vc	Doc D	s. 🗆 EL	Πa					
	Entity style			Loc L	st Ditt	Uu					
	Cristy scyle	NL	□ LD	INT I	NV 🗌 NP	NC					
Ch PL 106											
-G PL 107											
-G PL 109	Notes										
							~				
🔄 Pt. 106											
-G PL 107							~				
🔄 Pt. 108	<						>				
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GA 84.110											~
Commands											₽×
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Connand:											
You can select CAD entities				N -11597.	288:E -63051	.644		CHAN SNAP ORTH	SNUP D	WN I	W.
			_								

Figure 63:

Similar to the TS data, once the GPS data is edited, Orientation Points can be inserted.

Change a GPS data

The GPS data can be changed using the commands found in the Modify menu or in the context menu activated by clicking the right mouse button on the booklet.

ie	Mod	Sify View Insert Computati	on Ou	Aput Settings	Window ?											- 0
1 2	X	Cut Ctrl+X	0011	6 21 (AS 40, 1	a 7 4 .											
cur	24	Copy Ctrl+C		up 1: 100												
	0	Paste Ctrl=V			USSRI LCodes	Pla Coords Precisio	(DBer)									
ş.	25	Insert the copied cells Ctrl+I		Name/Num.	Description	Latitude	Longitude	CF Elevation	Ground Elevation	Antenna H.	Quality	Comment	Notes	Skatch	Photo1	Phot
÷1	25	Add the copied cells Ctrl+G	1	105	CHIODO	42*59/58.84016"N		306.846	305.316	1.510	No Sol.	Comment	THEORY	JACOUCH	FIREWAR	Fines
	±x.	Cut object	1 2	106	CHIODO	42*59/58.79298'N		306.428	304.898	1,530	No Sol.					
	19 日日日日日日日日日	Copy object	1	107	CHIODO	42*59/36.25539"N		307,457	305.927	1.530	No Sol.					
		Add object for measures	1 A	108	CHIODO	42*59/36.27096'N		308,159	306.629	1.530	No Sol.					
	_	Add object by coordinates	5	109	CHIODO	42*59/38.00119"N		292.343	290.813	1.530	No Sol.					
	· · · · · · · · · · · · · · · · · · ·		6	110	CHIODO	42*59/37.59409"N		292,180	290.650	1.530	No Sol.					
		Find not Ctrl+F3	7	200	CHIODO	42*59/43.89794"N		293.925	292.395	1.530	No Sol.					
		Find in CAD	8	105	CHIODO	42"59'58.84016"N	12*07'00.47143*E	306.846	305.316	1.530	No Sol.					
				106	CHIODO	42*59'58.79298''N		306.428	304.898	1.530	No Sol.					
	· · · · · · · · · · · · · · · · · · ·	Delete row F8	10	107	CHIODO	42"59'36.25539"N	12*06'32.33419'E	307,457	305.927	1.530	No Sol.					
		Operations on selection	11	108	CHI000	42*59/36.27096"N	12106/32.164041E	308.159	306.629	1.530	No Sol.					
		Sort table	12	109	CHIODO	42*59/38.00119'N	12*07*02.36538*E	292.343	290.813	1.530	No Sol.					
H	۰	Reorder data	13	110	CHIODO	42*59/37.59409"N	12*07'02.78602*E	292.180	290.650	1.530	No Sol.					
	1	PL 200	14	200	CHI000	42*59/43.89794"N	12*06*53.92350*E	293.925	292.395	1.530	No Sol.					
		Pt. 105	15	105	CHIODO	42"59'58.84016"N	12*07'00.47143*E	306.846	305.316	1.530	No Sol.					
		Pt. 107	16	106	CHIODO	42*59/58.79298"N	12107100.419311E	306.428	304.898	1.530	No Sol.					
		O Pt. 108	17	107	CHIODO	42"59'36.25539'N	12"06'32.33419"E	307,457	305.927	1.530	No Sol.					
		Pt. 109	18	108	CHIODO	42*59/36.27096"N	12*06'32.16404*E	308.159	306.629	1.530	No Sol.					
	12 Ma = 20 K × 21	OB Pt. 110	19	109	CHIODO	42"59'38.00119'N	12*07'02.36538*E	292.343	290.813	1.530	No Sol.					
		- C Pt. 105	20	110	CHIODO	42*59/37.59409"N	12*07*02.78602*E	292.180	290.650	1.530	No Sol.					
		Pt. 106	21	200	CHIODO	42*59/43.89794"N	12*06'53.92350'E	293.925	292.395	1.530	No Sol.					
		Pt. 107	22	105	CHIODO	42*59'58.84016'N	12107100.471431E	306.846	305.316	1.530	No Sol.					
		Pt. 108	23	106	CHIODO	42*59/58.79298"N	12*07'00.41931*E	306.428	304,898	1.530	No Sol.					
		O Pt. 109	24	107	CHIODO	42*59/36.25539'N	12*06'32.33419*E	307,457	305.927	1.530	No Sol.					
		Pt. 105 Pt. 106	25	108	CHIODO	42*59/36.27096*N	12*06'32.16404*E	308.159	306.629	1.530	No Sol.					
		-Ci Pt. 107	26	109	CHIODO	42*59/38.00119'N	12*07*02.36538*E	292.343	290.813	1.530	No Sol.					
		2 Pt. 108	27	105	CHIODO	42*59/58.84016"N	12*07'00.47143*E	306.846	305.316	1.530	No Sol.					
		Pt. 109													_	

Figure 64:



Note that "Description of Modify Menu Commands" on page 47 has a brief description of the various functions included for changing and searching data.

Elaborate a GPS data

The command to elaborate the GPS data is **Computation | Projection computation** activated from the **Groups View**.

This chapter will illustrate the functionality of the procedure referencing as an example "ExampleGps.fw1" in which various phases of the procedure are explained.

The image below shows the first window displayed by the procedure, used to:

-Indicate the Groups on which to run the calculation;

-Request elaboration of the TS data if present.

In this case, given that the GPS data has already been elaborated, to proceed the user must place a check mark in the **Cancel the computation** box and then press **Next>**.

Computation of projection : initial information the G	PS data X
	320 320 340 Honora
GPS data	
The Pr I 100 Yes To cor Compu	the Groups you want to process. ojection of the selected Groups has been done! tinue, check the box below. tations performed on the previously d Groups will be replaced at the end
Compute also the TS data	cel the computation
From File	Annulla ?

Figure 65:

Continuing in the guided procedure, a page will appear in which the user can insert certain options:

-Read from file: placing a check mark in this box will activate the edit box below and the "..." button used to select the file from which to take the values for the calculation.

-Pre-transformation Original Coordinates: if the measured GPS coordinates refer to a system other than WGS84 WGS 84.

-Computation options: placing a check mark in this box will activate the program to search various codes (HC, VC, OC, ...) needed for the elaboration.

-Print Options: placing a check mark in this box the user will have, at the end of the calculation, a printout of the layout calculation results.

In the example, the procedure was only asked to search codes automatically by selecting the specific check box.

1020509-01

Computation of projection : options	×
Pre-transformation of the original coordinates	
Transformation through 7 parameters (eg from IGByy) 🗸 Edit 7 parameter zone	
No transformation	
Transformation through 7 parameters (eg from IGByy) Transformation from a geographic localization points	
Computation options	
✓ Auto search codes	
C Print options	
Print the report of computation	
Save < Indietro Avanti > Annulla ?	

Figure 66:

Press the **Next>** button in the **Planimetric projection** and in the **Vertical projection** windows to respectively select the type of projection whether horizontal or vertical.

Planimetric pr	ojection	×
- Planimetri Type	c localizationPlanimetric localization	Control points
Planimetri Projectio Datum	c coordinate system	····
Save	< Indietro	Annulla ?

Figure 67:

Vertical localization		
Туре	Planimetric localization: Cont	rol points
Vertical coordinate syste	m	
Geoid model	<none></none>	

Figure 68:

Moving forward, a window will appear with the lists of points that have been coded HC automatically or by the user and their horizontal localization will run.

For this type of calculation, at least two GPS points are needed or, for mixed calculation, two celerimetric points whose coordinates are identified in the reference plane where all of the GPS Groups or selected TS Jobs points are to be roto-translated.

S Localization Pt.Name	Reg North	Reg East	Variance
101	-11362.266	-63288.384	448.203
X 101	-11741.339	-62911.415	76.641
☑ 103	-11264.757	-63261.582	405.163
Projection method	Results		
 Orthogonal 	Comp	outation performed	
	Comp	outation performed	6.031844
 Orthogonal 	Mean residual		6.031844

Figure 69:

Next is the vertical localization whose calculation will be run through the window shown below where all of the points coded VC automatically or by the user are listed.

For this type of calculation, at least one GPS point is needed whose quote is identified in the reference system in which the selected GPS Groups points are being calculated.

S Name Pt. Elev. ☑ 101 ☑ 102 ☑ 103	Orig. Elevation 263.000 244.890 258.330	200.120	Variance 7.580 -10.530 2.950
Projection method	Computation Method On a Plane	Results Computation perf	ormed

Figure 70:

Next, the program checks to see if the GPS data has already been elaborated. If so, then it checks for the presence of other entities in the file and displays a window where the user can select whether to change the position of the entities (roto-translate) based on the re-elaboration run previously.

mputation of projection : roto-translation	
There are entities that can be Roto-Traslate ac of GPS data	cording to changes made in the computation
CAD entities	
Roto-Trans. the CAD entities	 Only entities not in locked layers All entities
Other entities	
Trans. frames (translation only)	Recomputation of the Contours
Roto-Trans. Breaklines and Boundarie	Recomputation of the Profiles
Roto-Trans. the Triangles	
Save < Indietro	Avanti > Annulla ?

Figure 71:

At the end of the procedure, a last window will appear where the user must press the **Complete** button to run the real and true calculation of the points.

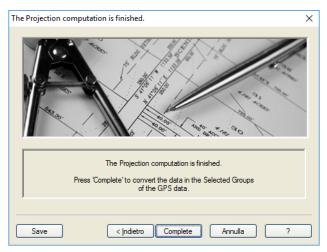


Figure 72:

GPS data: output

Once the **GPS data** item is selected from the navigation tree, select the Output menu. The procedures in this menu are used to print the data found in the GPS data and the results of any elaborations executed.

Geopro Office - [GPS.gpo]													>
ile Modify View Insert Computat							_						- 0
) 🐸 🖬 🖳 🗊 治 🖬 🖕 💷 🛁	16	GPS data		Print all group									
cument	× [Free format	· 🔊	Print with cho	ice of group	p6							
		Course Dave	Castion Pre-	Coords WGSI	M (DBw)							_	-
E - S data (1 Job.)				Instrument		104	To Lincols Reactions	To March Barland	Factor and			_	
E SPS data (1 Grp.)			Operator	Instrument			Tp.Horiz Project.	Tp.Vert Project.	Entity set				
Group: 100 (224pt)	1	100				224	Plan. Local.: Control Points	Vert. Local.: Contr	Topographic				
-G) Pt. 105													
-G Pt. 106													
-G Pt. 107													
-G Pt. 109													
-G Pt. 110													
- G Pt. 200													
- G Pt. 106													
- 3 Pt. 107													
-G Pt. 108													
-G Pt. 109													
-G Pt. 110													
-G Pt. 200													
3 Pt. 110													
	_												
(2), 04, 330	· _					_				 		_	
ommands													
mand:										 			
can select CAD entities							N -11597,288 : E -63051.6	LAA		CHAI SNAP ORTH	OSMAD D	3V84 11	

Figure 73:

Here following is a short description of the primary print functions:

- **Output Menu | GPS data | Print All Groups:** select this to print the measurement of all points.
- **Output Menu | GPS data | Print with Selected Groups:** executing this command the program will open a window allowing the user to select groups to print.
- **Output Menu | Free Format | Print All Groups:** select this to print all points found in the GPS groups.

• **Output Menu | Free Format | Print with Selected Groups:** executing this command the program will open a window allowing the user to select groups to print.

							 Point	Point	Latitude	Longitude	Abs Elev.	Northing	Easting	Elevation		
							 code	name								
							 CH000	108	4215958.79298 1		306.428	-13338.732	-59620-802	203.018		
							 CHICOD	907	4215936.25539 1		307.457	-9079.362	-63701.223	204.647		
							 CHIODO	108	42*5935.27095 1		308.159	-9056.197	-63697.640	205.349		
							 CH000	109	4215938.00119 1		292.343	-13490.707	-63497.255	109.533		
							 CH000	110	42*5937.59409 1		292.180	-13545.901	-63574,692	109.370		
							 CH000	200	4215943.89794 1		293.925	-12369.989	-62366.140	191.115		
							 CHI000	105	4215958.84016 1. 4215958.78298 1.		305.846	-13346.108	-69612203 -69620.802	204.036		
							 04000	100	4210936.25539 1		300.428	-13338.732	-00020.002	203.018		
PS DAT							 04000	107	4215936.27096 1		307.407	-8019.302	-03/01/223	204.04/		
FSDAI	~						 CHICODO	102	4215938-00119-1		292.343	-13490.707	-63497.255	109.533		
							 04000	110	42*5937.59409 1		292.180	-13545.901	-63674.692	109.370		
ĸ		WMARIANGELA/Exchange/CorsoGeopro	Office/Ella/O	PS mo			 01000	200	4215943.00794 5		293.925	-12309.989	-62366 140	191.115		
		in the troub including four source for					 04000	105	4215958.84016 1		305.546	-13340.108	-69612.233	204.036		
Group:		1					CHICODO	108	4215958,79298, 1		306.428	-13338 732	-59620 802	203.018		
							 CH000	107	4215936.25539 1	2'06'32 334 19'E	307.457	-9079.362	-63701.223	204.647		
oup Name:		100					 CH000	108	42*5936.27096 1	2'06'32.16404'E	308.159	-9056.197	-63697.640	205.340		
scription:							 CHICOD	109	42*5938.00119 1	210702.365381E	292.343	-13490.707	-63497.255	109.533		
							 CHICODO	110	4215937.59409 1	2'0702.78602'E	292.180	-13545.931	-63574.692	189.370		
mment							 CHODO	200	42*5943.09794 1		293 925	-12309.989	-62366.140	191.115		
ec.							 CHODO	105	4215958.84016 1		306.846	-13346.108	-59612.233	204.036		
							 CHIODO	108	42*5958.79298 1		306.428	-13338.732	-69620.802	203.618		
nt	Point	Latitude Longitude /	Abs Elev.	Northing	Easting	Elevation	 CHIODO	107	4215936.25539 1		307.457	-9079.362	-63701.223	204.647		
5e	name						 CHODO	108	4215936.27096 1		308.159	-9056.197	-63697.640	205.349		
000	105	4215958.84010 12/07/00.47143/E	305.840		-69612.203	204.030	 CH000	109	4215938.00119 1		292.343	-13490.707	-63497.255	109.533		
	100	4215958.78298 1210700.419311E	305.428	-13346.108	-09012,203	203.018	 CH000	110	42*5937.59409 1		292.180	-13545.931	-63674/692	189.370		
	107	4215936.25539 1210532.3341916	307.457	4079.362	-63701.223	204.647	 CH000	200	4215943.89794 1		293.925	-12369.989	-62366 140	191.115		
	108	4215936.27096 12/0632 16404/E	308.159	-8056.197	-63697.640	205.349	 CH000	105	4215958.84016 1. 4215958.78298 1.		306.846	-13346.108	-89612203 -89620.802	204.036		
	10.9	4215938.00119 1210702.3653816	292.343	-13490.707	-03497,255	189.533	 04000	100			300.428	-13338.732	-69620 802	203.018		
	110	4215937.65409 1210702.756021E	292.180	13545 931	40174-002	189.370	 04000	107	4215936.25539 1. 4215936.27096 1.		307.407	-9019.302	-03/01/223	205.349		
000	200	4215943.89794 1210553.923501E	293.925	-12309.969	-62366 140	191.115	 04000	109	4215938.00119 1		292.343	-13490.707	-03497 255	189 533		
	105	4215958.84016 1210700.4714016	305.545	13346 108	-69612 233	204.036	 CH000	110	4215937.69409 1		292.180	13545.931	-03674.002	189.370		
000	108	4215958 73298 1210700 419011E	305.428	-13330.732	-09020-002	203.018	 CHIODO	200	4215943.89794 1		293.925	12309.989	-62366.140	191.115		Style Format Test Rows Column
	907	421593625539 12106323341916	307.457	-9079.352	-63701.223	204.647	 CHIODO	105	4215958.84010 1		305.545	-13340.108	-69612.233	204,036		Format Text Hows Column
000	108	4215936.27096 1210632.164041E	308.159	-9056.197	-63697.640	205.349	 CHICOD	100	4215958.78298 1		305.428	-13338.732	-69420 802	203.018		Style
000	109	42*5938.00119 12*0702.36538*E	292.343	-13490.707	-63497.255	109.533	 04000	107	4215936.25539 1		307.457	8079.352	49791223	204.047		she
000	110	42*5937.59409 12*0702.78602*E	292.180	-13545.931	-63574.692	109.370	 CHIODO	108	4215936.27096 1		308.159	-9355.197	-63697,640	205.349		Default
	200	42°5943.89794 12'0653.92350'E	293 925	-12369.989	-62366 140	191.115	 CHICODO	109	4215938.00119 1		292.343	-13490.707	-63497,255	189.533		
	105	42*5958.84016 12*0700.47143*E	306.846	-13346.108	-59612.233	204.035	 CHI000	110	4215937.55409 1	210702 796021E	292.180	-13545.931	-03674-092	189.370		Save Rename Delete
	108	42*5958.79298 12*0700.41931*E	306.428	-13338.792	-59620 802	203.618	 CH000	200	4215943.89794 1		293-925	-12309.969	-62366 140	191.115		
	107	42°593625539 12'06'32.33419'E	307.457	-8079.362	-63701.223	204.647	 CHIODO	105	4215958.84018 1	210700.471431E	300.840	-13346.108	-69612.233	204.038		Model
	108	42°59'36.27096 12'06'32.16404'E	308.159	-9056.197	-63697.640	205.340	 CHICODO	108	4215958.78298 1		306.428	-13338.732	-69620.802	203.018		
	109	42*5938.00119 12*0702.36538*E	292.343	-13490.707	-63497.255	109.533	 CHIODO	107	4215936.25539 1		307.457	-9079.362	-63701.223	204.047		Current template
	110	42*5937.59409 12*0702.78602*E	292.180	-13545.901	-63574.692	189.370	 CHIODO	108	4215936.27090 1		308.159	-8050.197	-63697.640	205.349		
	200	42°5943.89794 12'06'53.92350'E	293.925	-12369.909	-62366.140	191.115	 CHIODO	109	4215938.00119 1		292.343	-13490.707	-63497.255	189.533		 Header
	105	42"5958.84016 12"0700.47143"E	305.846	-13346.108	-69612.233	204.035	CHIODO	110	4215937.59409 1		292.180	-13545.931	-63674.692	189.370		
	108	42*5958.78298 12*0700.41901*E	306.428	-13338.732	-69620.802	203.618	 CHIODO	200	4215943.89794 1		293-925	-12309.989	-62366.140	191,115		O Header on all pages
	107	42*5936.25539 12*06'32.33419*E	307.457	-8079.362	-63701.223	204.647	 CHIODO	105	4215958.84018 1		308.848	-13340.108	-69612.233	204.038		 Header only on the first page
	108	42*5936.27096 12*0632.16404*E	308.150	-9056.197 -13490.707	-63697.640 -63497.255	205.340	 CHIODO	100	4215958.78298 1		306.428	-13338.732	-69620.802	203.018		
	109	42°5938.00119 12°0702.35538°E	292.343				CHI000	107	4215936.25539 1		307.457	-8079.362	-63701.223	204.647		 No header
	105	42°5958.84016 12'0700.47143'E 42°5958.78296 12'0700.41931'E	305 540	-13346.108	-69612233 -69623.802	204.036	 CHIODO	108	4215936.27096 1	2*0832.18404*E	308.159	-9050.197	-03097.040	205.349		

Figure 74:

Print Component

Once the printing is activated, a print preview will appear that can be used to customize the printout.

							Point	Point	Latitude	Longitude	Abs Elev.	Northing	Easting	Elevation	 I	
							0000		C11010 7000	12'07'00 41901'E	300.428	-13338 722	-00020.002	203.010		
							0400			12'06'32 334 19'E	307.457	-9079.362	-60701.223	204.647		
							CHOD	0 108	42*69/36 270/96	12'06'32.16404'E	308.159	-9056.197	-63697.640	205.349		
							0400			12'07'02 36538'E	292.343	-13490.707	-63497.255	109.533		
							0400			12'07'02.78602'E	292.180	-13545.931	-63574.692	189.370		
							0400			12'0653.92350'E 12'0700.47143'E	293.925	-12369.989 -13346.108	-82388.140 -89812.203	191.115		
							0400			12'07'00.41931'E	305.428	-10030.722	40420.802	203.018		
							0400			12'06'32 334 19'E	307.457	-9079.362	-60701.223	204.647		
PS DATA							CHOD	0 108	42*69/36 270/96	12'08'32 16404'E	308.159	-9056 197	-63697.640	205.349		
	-						CHOD			12'07'02 36538'E	292.343	-13490.707	-63497.255	109.533		
							0400			1210702.7860218	292.180	-13545.931	-63674/692	109.370		
le:	W	WARIANGELA/Exchange/CorsoGeopro	Office/File/(PS.goo			0400			12'0653.92350'E	293.925	-12369.989	-62366 140 -69612 203	191.115		
Group							0400			12'07'00.4/1431E	305.428	-13346 108	-69620.802	204.036		
							0400			12'06'32 334 19'E	307.457	-9079.352	-60701.223	204.647		
roup Name:	10	0					CHOD	0 108	42*69/36 270/96	12'06'32 16404'E	308.159	-9056.197	-63697.640	205.340		
escription:							CHOD			12'07'02 36538'E	292.343	-13490.707	-63497.255	109.533		
mment							0400			1210702-7860218	292.100	-13545.931	-60574.692	189.370		
							0400			12'06'53 92350'E	293.925	-12369.989	-62366 140	191.115		
ate:							0400			12'07'00.47143'E	305.428	-13346.108	-69612203 -69620.802	204.036		
oint P	oint	Latitude Longitude /	the Eleve	Northing	Easting	Elevation	0400			12'00'32 334 19'E	307.457	-9079.362	40701223	204.647		
	ame	Companye Congrave 7	COS 1. 10-1.	norming	caung	C NO Y GLOUN	0400			12'06'32 16404'E	308.159	-8056.197	-63697.640	205.349		
							0400	0 109	42*59'38.001 19	12107102.365381E	292.343	-13490.707	-63497.255	189.533		
	26	4215958.84018 1210700.471431E	306.840	13346.108	-69612.233	204.038	CHOD			1210702.7860218	292.180	-13545.931	-63674.692	189.370		
	50 27	4215958.78296 1210700.419311E 4215936.25539 1210703.334197E	308.428	-13338.732 -8979.362	-69620.802 -69701.223	203.018 204.047	0400			12'06'53 92350'E	293 925	-12369.909	-62366 140	191.115		
	28	421593627096 1210532 1840416	308.159	4056.197	-63697.640	205.349	0400			12'07'00.47143'E	305.845	-13346.108 -13338.732	-59612.233 -59623.802	204.036 203.618		
H000 1		42"5938.00119 12"0702 36536"E	292.343	-13490.707	-63497.255	189.533	0400			12'07'00 41901'E	307.457	-13338.732	-00020.002	203.018		
H000 1	10	4215937.55409 1210702.786021E	292,180	-13545.931	-03574.092	189.370	0400			2'06'32 16404'E	308.159	-9056 197	-60697.640	205.349		
H000 2		4215943.89794 1210553.923501E	293.925	-12309.969	-62366.140	191.115	СНОО	0 109	4216938.00119	1210702.366381E	292.343	-13490.707	-03497.255	189.533		
	95	42"5958.84016 12"0700.47143%	305.846	-13346.108	-59612.233	204.036	CHOD			12'07'02.78602'E	292.180	-13545.931	-63674.692	189.370		
	96	42*5958.79298 12*0700.41931*E	306.428	-13338 732	-59620 802	203.618	0400			12'00'53.92350'E	293.925	-12309.989	-62366.140	191.115		Style Format Text Rows Column
H000 1	07	42*5936.25539 12*0632.33419/E 42*5936.27096 12*0632.15404/E	307.457	-9079.362	-63701.223	204.647 205.349	0400			12'07'00.47143'E	305.840	-13346.108	-69612.233	204.038		
	20	42"5938.00119 12"0702 26530"E	292.343	-13490.707	-63497.255	109.533	0400			1210700.419311E	300.428	-13338.732	-69620.802 -63701.223	203.018		Style
1 0000		42*5937.55409 12*0702.75502*E	292.180	-13545 901	-63574.692	109.370	0400			12'00'32.18404'E	308.159	-8056.197	40697.640	205.349		Default
4000 2		42°5943.89794 12'0653.92350'E	293,925	-12369.909	-62366.140	191.115	CHOD			12'07'02 36538'E	292.343	-13490.707	-03497.255	189.533		
	95	4215958.84016 1210700.471431E	305 846	-13346.108	-59612.233	204.036	CHOD			12107102.784021E	292.180	-13545.931	-03574-092	189.370		Save Rename Delete
	96 97	42*5958.79296 12*0700.41931*E	306.428	-13338.732	-59620-802	203.618	CHOD			12'00'53.92350'E	293.925	-12309.969	-62366 140	191.115		
	57 58	42*5936.25539 12*0632.33419*E 42*5936.27096 12*0632.16404*E	307.457	-8079.362 -8056.197	-63701.223 -63697.640	204.647	0400			12'07'00.47143'E	305.840	13340.108	-69612.233	204.038		Model
	19	42'5938.00119 12'0702 36536'E	292.343	-13490.707	-63497.255	109.533	CH00			12°07'00,41931'E	308.428	-13338.732 -8079.362	-69620.802 -60701.223	203.018 204.047		Current template
1000 1		42"5937.55409 12"0702.78502%	292.180	-13545.901	-63574.692	109.370	0400			2'00'32 18404'E	308.189	-8056 197	43697.640	205.349		Context and parts
4000 2		42°5943.89794 12'0653.92350'E	293 925	-12369.989	-62366 140	191.115	СНОО			12'0702.36638'E	292.343	-13490.707	-03497.255	189.533		Header
	15	4215958.84016 1210700.471431E	305.846	-13346.108	-69612.233	204.038	CHOD			12'07'02 78602'E	292.180	-13545.931	-63574-692	189.370		
	96	42°5958,79298,12°0700,41931%	306.428	-13338.732	-59620-802	203.018	CHOD			12'00'53.92360'E	293.925	-12369.969	-62366 140	191.115		 Header on all pages
4000 1	97 98	42*593625539 12*063233419*E 42*593627096 12*063216404*E	307.457	-8079.362 -8056.197	-63701.223 -63697.640	204.647	0400			12'07'00.47143'E	308.848	-13346.108	-69612.293	204.038		 Header only on the first page
	10	42*5936.27096 12*0632 16404*E 42*5936.00119 12*0702 36538*E	292.343	-9056.197	-63697.640	205.340	CHOD			12'07'00.41931'E	306.428	-13338.792	-69620.802	203.018		
H000 1		4215958.84016 1210703 471431E	305 846	-13346.108	-69612.233	204.036	0400			12°08'32.334 19'E	307.457	-8079.362 -8056.197	-03701.223	204.047 205.349		O No header
		42"5958 79298 12"0700 41931"E	306.428	-13338 732	-59620 802	203.018	0400			12'00'32 16404'E	292.343	13490.707	-03497,040	109 533		

Figure 75:

The **Style** page allows the user to:

1.select the style;

2.select the model;

3.establish whether to insert the page heading of the document to print and, potentially in what manner.

In regard to the **Format** page, it has the following:

1.allows the user to set the margins (as in the old component) and establish the page orientation.

2.one element more than the old component which is whether or not to activate borders.

The Text page is used to select the various text entities from a navigation tree view and to modify its Font.

The Rows page and Columns page respectively allow the user to change the height of the lines and width of the columns of the entities selected from the navigation tree.

Description of Modify Menu Commands

Cut Function: remove the selection from the active document (selected cells) and insert it into the clipboard; the function is active only if a cell or group of cells has been selected; select the line or cells to be cut, press CTRL+X or click on Cut from the Modify or Context menu.

Copy Function: copy the selection from the active document (selected cells) and insert it into the clipboard; the function is active only if a cell or group of cells has been selected; select the line or cells to be copied, press CTRL+C or click on Copy from the Modify menu.

Paste Function: paste the selection found in the clipboard of the active document, including the original content of the cells; the function is active only if a cell or group of cells has been selected; select the line or cell from where to copy the section of notes, press CTRL+V or click on Paste from the Modify menu.

Insert Copied Cells Function: insert the selection found in the notes in the active document. The original content of the cells will not be included but first a number of lines equal to that stored in the clipboard will be inserted and then the content of the clipboard itself will be copied onto these lines. The function is active only if a cell or group of cells has been selected; select the line or cell to precede the inserted lines and where the section of notes will be copied, press CTRL+I or click on Insert Copied Cells from the Modify menu.

Add Copied Cells Function: add the selection found in the clipboard in the active document. The original content of the cells will not be included but first a number of lines equal to that stored in the clipboard will be inserted and then the content of the clipboard itself will be copied onto these lines. The function is always active even when there are no lines present in the preselected view. If no lines or cells are selected, the new lines will be added to the end of the page, or after the last line found. Or, in the case of having no original lines, the necessary lines will be created. If instead, lines or cells are selected, the new lines will be added after the last selected. In any case, the content of the notes will be copied into these added cells. To execute the function, press CTRL+G or click on Add Copied Cells from the Modify menu.

Cut Object Function: this is used to cut one or more objects to bring them into other jobs/stations or other files. The objects that can be cut are stations and celerimetric points.

Copy Object Function: this is used to copy one or more objects to bring them into other files or jobs/stations. The objects that can be copied are jobs, stations and celerimetric points.

Add Object for Measure Function: this is used to add one or more copied/cut objects into other files or jobs keeping the measures constant. The objects that can be added for measure are jobs, stations and celerimetric points.

Add Object for Coordinates Function: this is used to add one or more copied/cut objects into other files or jobs keeping the coordinates constant. The objects that can be added for coordinates are celerimetric points.

Find in data Function: this procedure is used to find a Point in the data view; activating this function will open a window used to insert the Point Name or Code to search. The search can be done by Name, Code or both. Once the window is confirmed the program will search within the Points archive for the point with the desired characteristics. If the program finds it, it will open the section associated with the Station where the Point belongs and highlight this Point.

Find Next Function: this procedure is used to automatically repeat the search operation on a Point in the data view without having to reopen the window to insert data. This functionality can be very helpful when searching for another Point with the same Point Name and/or Code found previously by means of the Find in data function. This procedure can be launched even by simply pressing the F3 button on the keyboard.

Find in CAD Function: this procedure is used to find a Point in the CAD View. The procedure is activated after selecting the line corresponding to the desired point. The program will open the CAD environment and highlight this point by running a Pan operation, or it will bring the found point exactly to the center of the screen while keeping the previously selected zoom factor. If the CAD environment was already opened in another view, the program will be limited to running the Pan operation.

Delete row Function: this will eliminate lines (and Jobs, Stations or Points depending on the selected view). Once the procedure is launched, the line where the cursor is positioned or the selected lines will be eliminated. To select multiple lines from the grid, just click on the Number "N" field and keeping the left mouse button held down, drag the cursor over the next or previous lines. The selected lines will be highlighted.



Note that if the user attempts to eliminate a Job that includes at least one Station (or a Station that includes various Points) the program will notify the operator and request confirmation to continue. Note that the function can be executed even by pressing the F8 button on the keyboard.

Operation on Selection Function: this procedure is used to run operations or assignments to one or more cells in the data view grid. First of all, the user must select the group of cells to be used in the operations. Then the function to open the window is activated. Using this function the user can select the operation to run. The 4 arithmetic operations are possible, a fill operation and a renumbering operation. If an arithmetic operation is selected then the value to be used in the operation is input. Once the window is confirmed, the program will add, subtract, multiply or divide each value found in the selected cells with the value input into the specific field. The arithmetic operations are possible only in numeric field and not on any alpha-numeric.

If the **Fill** operation is selected, the program will substitute the content of each selected cell with the text inserted into the specific field. This operation is applicable to all fields present. Instead, selecting the Renumber operation, the beginning value must be inserted to be used for launching the renumbering. The program will substitute the content of the first cell selected with the beginning

value inserted and then will fill the selected cells underneath with those present. However, if the field is alphanumeric with the Name or Code, the initial value may also contain letters (ex.: P101); in this last case, the program will increase just the numeric part (ex.: P102, P103, ...).

Sort Table Function: this is used to shuffle the order that the Stations or Points (depending on the selected view) appear in the table. Once the procedure is launched, a window will appear used to insert the options for ordering. In particular, the user can select whether to order the entire table or only those selected lines. Also, the user can select to take into account or not any differences between capitals and lower case. In regard to the real and true ordering, the user can select up to three columns to apply the ordering. The desired fields will be selected for each column. Finally, the user can select whether to order in increasing or decreasing order.

Reorder data Function: this is used to reorder the TS data and/or the GPS data; the user can decide whether to reorder.

- Only the TS data,
- Only the GPS data,
- Both data, determining their priority.

For both data, the user can decide the initial name as well as the Stations (100,1000, 10.000, By choice) and the Points (Stat,+1, By choice); the VRS option is available only for the GPS data. To reorder only one data the user will activate the specific check box, telling the program to rename the entities with the same name as the other data.

Using the **Preview** button will display how the booklet will be changed.

Using the **Run** button will apply the changes shown in the preview.

Join Duplicate Stations Function: this is used to join celerimetric stations with the same name that may also be in different Jobs.

The **Preview** button displays the results from joining the stations.

The **Run** button will finalize the joining of the stations.

TS Data

TS Data Views

The TS Data is structured in one or more jobs associated with the stations with the respective measured points; the jobs are listed under the **Jobs** page and can be activated by selecting the **TS Data** node.

Each job can be associated with the following information:

- NAME (alpha-numeric);
- OPERATOR (alpha-numeric);
- INSTRUMENT (alpha-numeric);
- DATE (alpha-numeric);
- NUMBER of the STATIONS INCLUDED IN THE JOB (numeric);
- NUMBER of the TOTAL POINTS INCLUDED IN THE JOB (numeric).
- ENTITY SET: The **Entity set** are entities grouped by type.

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Figure 76:

Clicking in the "+" alongside the **TS Data** node in the navigation tree will display a list of the jobs included in the document; selecting a job will access the **Jobs** view that includes three pages:

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Figure 77:

- 1. The **Stations** page that includes the following data: station name, identification, temperature, pressure, instrument height and number of points seen by the station.
- 2. The **Codes** page where the first column displays the name of the station and the other columns display the list of codes that may be activated/deactivated using the check box. These codes are used for the celerimetric calculation as well as for other purposes.
- 3. The **Coordinates** that includes the station name, its coordinates and its associated description.

TS data	Distances Computation Alphabetic codes
	Type Survey ② 2D ④ ③ Save CFG Load CFG History file Produce ④ Yes ③ No Save CFG Load CFG
	OK Annulla ?

Figure 78:



Note that in these views the altimetric information (instrumental height for the **Stations** page and quote for the **Coordinates** page) will not be found if the Survey type option of the **Celerimetric** page in the **Options | General Options** command is set at 2D.

Extend the node corresponding to a job to list its stations.

Select the node corresponding to a Station to activate the **Station** view that also includes three pages that will display all of the information associated with the measured celerimetric points.

In particular, the **Measurements** page will display and allow modifications to the following data: name/number, prism height, slope distance, vertical angle, horizontal angle, prism type, prism constant, notes, sketch, photo1 and photo2.

In this case too, the altimetric information (**prism height** and **vertical angle**) will not be displayed if the Survey type option of the **Celerimetric** page in the **Options | General Options** command is set at 2D; besides this, the slope distance will be substituted by the horizontal distance.

ocument X	Sta	tion 1: 100 (Job	1: COUNTORS)														
Document content		Measures Co	des Coordinates														
TS data (1 Job.)	NL	Description	Name/Num.	Prisma H.	Slope dist.	Vert. Ang.	Horiz. Ang.	Prism Type	Prism Constant	Comment	Notes	Sketch	Photo1	Photo			
8 2 TS 100 (75	1	nc	AN	0.000	10.000	100.0000	0.0000	Unknown									
(R) - C1 T5 200 (54	2	S.CAN	101	1.300	8,250	94.7910	348.0170	Unknown									
(8) 5 300 (81	3	S.CAN	102	1.300	6.870	93.8460	321.5100	Unknown									
- 🐟 GPS data (D Grp.)	4	STRA	103	1.300	15.650	94.6510	340.9560	Unknown									
8 The Known points date	5	STRA	104	1.300	11.510	88.5590	294.9180	Unknown									
B . S DL Data (D Group)	6	STRA	105	1.300	13.310	87.3540	257.8370	Unknown									
CAD Profiles	7	STRA	106	1.300	18.020	88.7350	233.6390	Unknown									
- Roads	8	RETE	107	1.300	15.780	88.3960	233.0020	Unknown									
Paper spaces	9	RETE	108	1.300	12,190	86.3290	258.2570	Unknown									
	10	RETE	109	1.300	10.570	87.2690	291,4640	Unknown									
	11	RETE	110	0.000	10.120	95.3580	304.3980	Unknown									
	12	PINO	111	1.310	6.740	94,4830	301.9090	Unknown									
	13	DET.	112	1.310	7,440	93.8790	262.9920	Unknown									
	14	DET.	113	1.310	9.470	93,4110	237.0570	Unknown									
	15	ALB.	114	1.310	13.690	92.9240	222.7290	Unknown									
	16	ALB.	115	1.310	12.750	90.6400	238.7680	Unknown									
	17	ALB.	116	1.310	15.910	95.5410	208.8300	Unknown									
	18	ALB.	117	1.310	18.650	94.8760	210.5330	Unknown									
	19	ALB.	118	1.310	17.340	91.7360	220.7080	Unknown									
	20	ALB.	119	1.310	20.980	91.5650	218.1090	Unknown									
	21	ALB.	120	1.310	10.370	98.0920	196.6930	Unknown									
	22	PALO	121	1.310	8.750	98.9900	195.8790	Unknown									
	23	ALB.	122	1.310	9.500	104.1810	146.2810	Unknown									
	24	ALB.	123	1.310	6.210	107.5460	122.0120	Unknown									
	25	ALS.	124	1.310	3.390	106.0660	125.5180	Unknown									
	26	ALB.	125	1.310	2,440	93.8590	311,4260	Unknown									
	27	ALS.	126	1.310	5.430	99.9090	383.7030	Unknown									
	28	ALS.	127	1.310	4,450	106.6750	40,4220	Unknown									
)	-	_				_					_	_	_	_	_	_	-
ommands																	

Figure 79:

The **Codes** page shows the description and name associated with the point; the following columns though can be used to:

- identify the design model to associate with the point that can be created using the Entity
 Appearance command in the Format menu of the CAD View; if no design model is associated
 the standard one will be used;
- 2. identify the GIS theme created with the commands available in the GIS menu of the CAD View;
- 3. activate/deactivate the codes used by the program for the celerimetric calculation or for other purposes.

vent X	Station 1: 100 (Job	1- COUNTORS)				_									_
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	7 STRA	106													
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\$	9 RETE	108													
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	11 RETE	110													
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	13 DET.	112													
	14 DET.	113													
	15 ALB.	114													
	16 ALB.	115													
	17 ALB.	116													
	18 ALB.	117													
	19 ALB.	118													
	20 ALB.	119													
	21 ALB.	120													
	22 PALO	121													
	23 ALB.	122													
	24 ALB.	123													
	25 ALB.	124													
	26 ALB.	125													
	27 ALB.	126													
>	28 ALB.	127													
					_	_	_								_

Figure 80:

Finally, the **Coordinates** page includes the data obtained from elaborating the measures (using the **Computation | Automatic Celerimetri**c command) including the point coordinates.

In this case too, the altimetric information will not be displayed if the Survey type option of the **Celerimetric** page in the **Options | General Options** command is set at 2D.

	test	Computation	Output	Settings	Window	2				
					See					
Document X		tion 1: 100 (Job 1:								_
B S data (1 Job.)		Measures Coder					 	 	 	_
B D Job COUNTO		Name/Num.	North	East		Description				
🛞 🏠 TS 100 (75		AN	10.000	0.000	11.445					
8- 🎦 TS 200 (54		101	5.630	-5.992	10.819					
(8) 20 TS 300 (8) GPS data (0 Grp.)		102	2.267	-6.451	10.808					
B GPS data (D Grp.)		103	9.355	-12,477	11.458					
B S DL Data (D Group)		104		-11.289	12.202					
CAD		105	-8.024	-10.290	12.772					
- Profiles		106	-15.319	-8.943	13.317					
- Roads		107	-13.480	-7.689	13.005					
- Paper spaces		108	-7.262	-9.440	12.743					
		109	-1.385	-10.266	12.245					
		110	0.697	-10.069	12.182					
		111	0.201	-6.712	10.718					
		112	-4.067	-6.189	10.849					
		113	-7.868	-5.178	11.113					
		114	-12.748	-4.755	11.654					
		115	-10.345	-7.215	12.003					
		116	-15.719	-2.194	11.248					
		117	-18.336	-3.062	11.634					
		118	-16.292	-5.495	12.380					
		119	-19.960	-5.836	12.907					
		120	-10.351	0.538	10.446					
		121	-8.731	0.566	10.274					
		122	-6.300	7.083	9.512					
		123	-2.090	5.801	9.401					
		124	-1.317	3.107	9.812					
		125	0.434	-2.390	10.370					
		126	5.253	-1.375	10.143					
	28	127	3.563	2.625	9,669	TREE				

Figure 81:

Expanding the node of a **Station** in the navigation tree, all of the points measured from the station will be listed.

Selecting one of these points will display the **Celerimetric Point** view.

The **Celerimetric Point** is composed of two pages.

The first, called **General** includes all of the fields corresponding to the measurements, coordinates, codes, notes and any drafts associated with the point itself.

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ile Modify View Insert Compu	station Output Settings Window 7	
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ument	X TS Point: 117 (Station: 100, Job: COUNTORS)	
in D Job COUNTORS (3.5c.)	General GIS data	
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an select CAD entities	N -7.572: E -60.336	SNAP ORTH OSNAP DYN

Figure 82:

The **GIS Data** page includes the GIS data associated with the point once the theme has been defined (in turn, once the theme is associated, it must be associated with a table).

To work on the GIS entities, proceed to the **CAD View** and use the commands found in the GIS menu.

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Figure 83:

Creating TS Data Manually

The following sections describe how to create TS Data manually.

Creating a job

To insert a job the user must:

- 1. Open the Jobs page from the navigation tree by clicking on the **TS Data** item.
- 2. Use the **Insert | Add Row** command to insert the first row and, once some lines have been added, insert a row under the current one. Another command that can be used (only if rows have already been inserted) is the **Insert | Insert Row** that is used to insert a row above the current one.
- 3. Added rows can be edited; each row corresponds to a job.

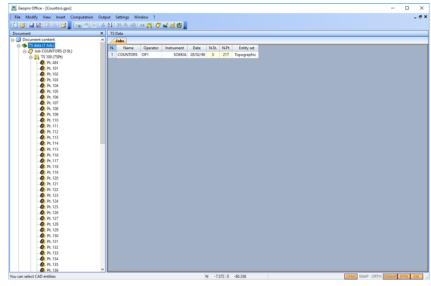


Figure 84:

Creating a station

To insert a station click in the navigation tree on a job where it is to be added and work in the Jobs View using the commands available for inserting jobs. Each added row corresponds to a station.

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Figure 85:

Creating a celerimetric point

To insert a celerimetric point, click in the navigation tree on a station where it is to be added and work in the Station View using the commands available for inserting stations and jobs. Each row corresponds to a celerimetric point.

Once the celerimetric point is inserted, its information can be edited using the specific grid or view activated by selecting it from the navigation tree (see the images below).

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Figure 86:

To change the TS Data, commands are available from the **Modify** menu.

- **Cut Function:** remove the selection from the active document (selected cells) and insert it into the clipboard; the function is active only if a cell or group of cells has been selected; select the row or cells to be cut, press CTRL+X or click on Cut from the Modify or Context menu.
- Copy Function: copy the selection from the active document (selected cells) and insert it into the clipboard; the function is active only if a cell or group of cells has been selected; select the row or cells to be copied, press CTRL+C or click on Copy from the Modify menu.
- Paste Function: paste the selection found in the clipboard of the active document, overwriting
 the original content of the cells; the function is active only if a cell or group of cells has been
 selected; select the row or cell from where to paste the clipboard, press CTRL+V or click on
 Paste from the Modify menu.
- **Insert Copied Cells Function:** insert the selection found in the clipboard in the active document. The original content of the cells will not be overwritten but first a number of rows equal to that stored in the clipboard will be inserted and then the content of the clipboard will be copied onto these rows. The function is active only if a cell or group of cells has been selected; select the row or cell to precede the inserted lines and where the section of the clipboard will be copied, press CTRL+I or click on Insert Copied Cells from the Modify menu.
- Add Copied Cells Function: add the selection found in the clipboard in the active document. The original content of the cells will not be overwritten but first a number of rows equal to that stored in the clipboard will be inserted and then the content of the clipboard will be copied onto these rows. The function is always active even when there are no rows present in the preselected view. If no rows or cells are selected, the new rows will be added to the end of the page, or after the last row found. Or, in the case of having no original rows, the necessary rows will be created. If instead, rows or cells are selected, the new rows will be added after the last selected. In any case, the content of the clipboard will be copied into these added cells. To execute the function, press CTRL+G or click on Add Copied Cells from the Modify menu.
- **Cut Object Function:** this is used to cut one or more objects to bring them into other jobs/stations or other files. The objects that can be cut are stations and celerimetric points. For each cut object, all of the information associated with it is stored (except for the GIS data which will be lost) and not just the information selected during execution of the command. Once the command has been executed, the objected copied can be brought to other jobs/stations/groups and files using the commands **Add Object for Measure** or **Add Object for Coordinates**. For known coordinate points, the command is **Add Object** since there is no distinction between the addition for measure or for coordinates.
- Copy Object Function: this is used to copy one or more objects to bring them into other files or jobs. The objects that can be copied are jobs, stations and celerimetric points. For each copied object, all of the information associated with it is stored (except for the GIS data which will be lost) and not just the information selected during execution of the command. Once the command has been executed, the objected copied can be brought to other jobs/stations/groups and files using the commands Add Object for Measure or Add Object for Coordinates. For known coordinate points, the command is Add Object since there is no distinction between the addition for measure or for coordinates.
- Add Object for Measure Function: this is used to add one or more copied/cut objects into other files or jobs keeping the measures constant. The objects that can be added for measure are jobs, stations and celerimetric points. For known coordinate points, the corresponding command is Add Object since there is no distinction between the addition for measure or for coordinates.
- Add Object for Coordinates Function: this is used to add one or more copied/cut objects into other files or jobs keeping the coordinates constant. The objects that can be added for coordinates are celerimetric points. For known coordinate points, the corresponding command is Add Object since there is no distinction between the addition for measure or for coordinates.
- **Find in data Function:** this procedure is used to find a Point in the data view; activating this function will open a window used to insert the Point Name or Code to search. The search can be done by Name, Code or both. Once the window is confirmed the program will search within the Points archive for the point with the desired characteristics. If the program finds it, it will open the section associated with the Station where the Point belongs and highlight this Point.

- **Find Next Function:** this procedure is used to automatically repeat the search operation on a Point in the data view without having to reopen the window to insert data. This functionality can be very helpful when searching for another Point with the same Point Name and/or Code found previously by means of the Find in Data function. This procedure can be launched even by simply pressing the F3 button on the keyboard.
- **Find in CAD Function:** this procedure is used to find a Point in the CAD View. The procedure is activated after selecting the line corresponding to the desired point. The program will open the CAD environment and highlight this point by running a Pan operation, or it will bring the found point exactly to the center of the screen while keeping the previously selected zoom factor. If the CAD environment was already opened in another view, the program will be limited to running the Pan operation.
- Delete row Function: this will eliminate rows (and therefore Jobs, Stations or Points depending on the selected view). Once the procedure is launched, the row where the cursor is positioned or the selected rows will be eliminated. To select multiple lines from the grid, just click on the Number "N" field and keeping the left mouse button held down, drag the cursor over the next or previous lines. The selected lines will be highlighted.



Note that if the user attempts to eliminate a Job that includes at least one Station (or a Station that includes various Points) the program will notify the operator and request confirmation to continue. Note that the function can be executed even by pressing the F8 button on the keyboard.

- Order Table Function: this is used to shuffle the order that the Stations or Points (depending
 on the selected view) appear in the table. Once the procedure is launched, a window will appear
 used to insert the options for ordering. In particular, the user can select whether to order the
 entire table or only those selected lines. Also, the user can select to take into account or not
 any differences between capitals and lower case. In regard to the real and true ordering, the
 user can select up to three columns to apply the ordering. The desired fields will be selected
 for each column. Finally, the user can select whether to order in increasing or decreasing order.
- **Operation on Selection Function:** this procedure is used to run operations or assignments to one or more cells in the data view grid. First of all, the user must select the group of cells to be used in the operations. On function activation a a window will be shown. Using this dialog the user can select the operation to run. The 4 arithmetic operations are possible, a fill operation and a renumbering operation. If an arithmetic operation is selected then the value to be used in the operation is input. Once the window is confirmed, the program will add, subtract, multiply or divide each value found in the selected cells with the value input into the specific field. The arithmetic operations are possible only in numeric field and not on any alpha-numeric. If the Fill operation is selected, the program will substitute the content of each selected cell with the text inserted into the specific field. This operation is applicable to all fields present. Instead, selecting the Renumber operation, the beginning value must be inserted to be used for launching the renumbering. The program will substitute the content of the first cell selected with the beginning value inserted and then will fill the selected cells underneath with those present. However, if the field is alphanumeric with the Name or Code, the initial value may also contain letters (ex.: P101); in this last case, the program will increase just the numeric part (ex.: P102, P103, ...).

Importing Data from Instrument

Using the command **Insert | Data Instrument...** menu, the user can import the data stored in the instrument.

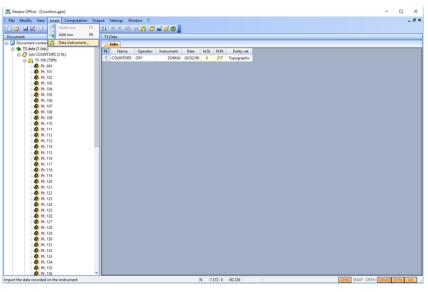


Figure 87:

The procedure will display existing profiles upon launch.

Profiles can be selected for any changes or to directly run the data transfer operation by pressing the **Import** button.

The **Details** button will display the profile characteristics, while the **Large Icons** button will return to displaying only the icons.

The program allows setting a profile as Default, so that upon subsequent launches of the procedure, this appears selected.

A profile can be Eliminated or Renamed by using the commands available in the menu activated by selecting the profile and pressing the right mouse button.

If profiles have not yet been created or new ones must be generated just select the New Icon and progress to the next page by pressing the **Forward** button.

Import to Instruments - Profile selection	Х
Profile	
Predefined Details	
-A PROFILE has information about the instrument and the data transfer modes. -To create a profile, please select New and then press	
< <u>B</u> ack <u>N</u> ext > Export Cancel Help	

Figure 88:

In the next window the user must select the brand and model of the instrument used.

Instrument selection	×
Brand Sokkia	
Model Sokkia CX	•
< <u>Indietro</u> <u>Avanti</u> Import Annulla	?

Figure 89:

Once the instrument is selected, the data download speed (for those instruments that allow it) and the serial port used for the connection from the instrument to the computer must be set.

Speed (baud rate)			
○ 300	0600	0 1200	O 2400	
◯ 4800	9600	0 19200	0 38400	
○ 57600) 115200			
Computer serial p	ort			
⊙ COM1	OCOM2	ОСОМЗ	O COM4	
◯ COM5	O COM6	O COM7		
О СОМЭ	○ COM10	○ COM11	OCOM12	

Figure 90:

On the next page the type of conversion must be indicated: Convert, No Convert, Ask the user whether to convert.

These options are used to decide whether to automatically insert or not the data imported from the instrument into the TS Data or to have a window appear for the selection.

Choosing the conversion	×
Selecting this option causes the imported data will be automatically added to file.	
Do not convert By choosing this option, data will not be not loaded.	
Ask if the user wants to convert After importing the data, the user is presented with a window where he can choose whether to load the data.	
< <u>Indietro</u> <u>Avanti ></u> Import Annulla	?

Figure 91:

The next window displays the list of existing profiles and allow saving of the just created profile; once the profile is saved, the user can return to the previous pages to change the profile settings, but cannot return to the selection of the instrument.

Saving the Profile	×
Already existing profiles	
Profile name Instrument Port Speed	
< >	
Saving the Profile	
Save Profile as (None)	
< Indietro Avanti > Import Annulla	?

Figure 92:

At this point the program will display a series of windows showing the user all of the steps necessary to run the setting of the instrument to execute the proper data import. The image below shows the window if the instrument is SOKKIA SET.

Data transfer from SOKKIA CX / TOP	CON ES - Settings	\times
Please press 'ESC' key until the wind Please press now 'F3' key. The men		
Archive Job Known points	Please select item 'JOB' and confirm.	
Code	The menu 'JOB' now shows up	
Job Select Job Rename Job Delete Job Output communic. Configure Communic	Please select item 'Configure Communic' and confirm.	
Baud rate : 9600 bps Bit data : 8 bit Parity : None Bit Stop : 1 bit Check sum : No ACK/NAK : No	Please check that the settings are the ones shown by the side. In case, please edit them. Please complete the settings.	
< Indietro	> Import Annulla ?	

Figure 93:

The last page shows the result of the transmission; if it was not successful the user can retry by pressing the **Retry** button; the causes may be:

- The correct serial port was not selected;
- Another program is using the selected port;
- The import parameters were not properly set;
- The instrument's cable is not functioning.

At the end of the import the data can be saved in the format received; furthermore, if the convert imported data was selected, the result of the import can be seen directly in the TS Data view.

Please press now 'F3' key ('A	he window of general information shows up. rchive').
Archive Job Known points	Please select item 'JOB' and press 'ENT' key.
Codes	The menu 'JOB' now shows up
Output communic. Type T	Please select item 'Output Communic.' and press 'EN' key.
Type S	Please select 'Type S' and press 'ENT' key.
1. JOB01 xx 2. JOB02 xx 3. JOB03 Out	Please select the job you want to transfer and press 'ENTER' key. The text 'Out' will show up abroad
4. JOB04 xx Oł	Then please press 'F4' key (OK).
Output communic.	Please select SDR 33 format and press 'ENT' key.
SDR 33 SDR 2x	Please select 'Measure Elements' and press 'ENT' ke The transfer will begin.

Figure 94:

File Menu|Import Command

Once the command is selected, a drop down menu will appear with the name of the file formats that can be converted.

The currently supported formats are: Topcon (.SRC), GTS-500-600-700-800/AP-L1/GMT 100 (.GT7), GPT-7000 (.TLSV), Sokkia (.SDR).

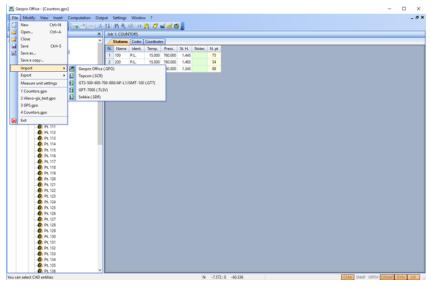


Figure 95:

Celerimetric Computation

The program offers a guided procedure for running the Celerimetric Computation (Computation |Automatic Celerimetric command) requiring a minimal intervention from the user thanks to the following elements:

- 1. Have available a series of codes to assign to the detail points;
- 2. Be able to automate code recognition;
- 3. Be able to interrupt, restart and change the calculation at any moment.

The **Computation** | Automatic Celerimetric procedure includes the following steps:

Step 1 - Select the Job to Elaborate

The **Initial Information** window is associated with this step, highlighting the jobs included in the document; for each job, the program indicates the number, name and status of elaboration.

If a job with a **Yes** elaboration status has been selected, the item **Cancel the computation** is activated and the **Forward** button is deactivated. In this case the associated box must be checked to reactivate this button and allow continuation of the elaboration.

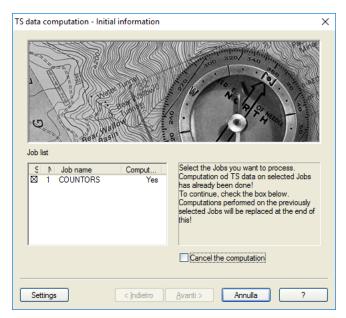


Figure 96:

The **Settings** button can be found in the lower left which will open the **Computation Options** window where the user can select:

•Whether to use the automatic code search;

•How to elaborate the points with same names, deciding whether or not to run an average of the points belonging to the same station.

•Whether to run verifications of the tolerances during elaboration.

Computation Options			×
Search Codes	Tolerances and Check -		
Automatic	Check	🔿 Yes	💿 No
	Duplicated Distances	10.000	[mm] + 1 ppm
Points with same name	Duplicated Elevations	10.000	[mm] + 1 ppm
 Always average 	Duplicated Angles	0.0030	[g]
Only same TS Station	Distance Closed Pol. 1/	6000	* Rad (Sum L²)
	Angle Closed Pol.	0.0100	[g]
ОК	Elevation Closed Pol.	5.000	[mm] + 5.000 × n
Cancel	Comp. Coord. TS Station	500.000	[mm]
Save CFG	Comp. Coord. TS Point	50.000	[mm]
	Computation Elevations	50.000	[mm]
Load CFG	Reflector height min.	1000.000	[mm]
Originals	Reflector height max.	5000.000	[mm]

Figure 97:

Step 2 - Preliminary Verification of Prism Heights

If the tolerances control is activated, press the **Forward>** button to open the **Show Intermediate Results** window where the user can check the prism heights.

The window can be extended to the entire screen using the **Expand** button.

Shov	w intermediate results		×
c	Control of reflector heights.		
	CONTROL OF REFLECTOR HEIGH	ITS /	
	List of Station points100		
	Name	Reflector Height	
	AN 110	0.000	
	List of Station points200		
	Name <	Reflector Height	·
	C	Expand	
	Settings < Indietr	o <u>Avanti</u> Annulla ?	

Figure 98:

Step 3 - Data Analysis

In this step the program displays the results of the Points or Stations analysis found in the selected jobs, required for the calculation using the **Analysis of data** window.

Computable		Total points	
Overall	0	Present	3
With known coordinates	0	Height computable	
Ex-Center computation	0	Overall	0
Snellius computation	0	With known height	(
Roto-Trasl. computation	0	With computable height	C
From other Stations	0	From other Stations	0
No computable		Height no computable	
Overall	3	Overall	3
Without horiz. angle	0		
HC insufficient point	0		

Figure 99:

Step 4 - Calculating Double Points and Polygonals

In this step the program tracks the Points with the same **Code** and **Name**, belonging to the same Station or Stations with the same name, considering them double. This indicates that during the calculation the coordinates and quote calculated for each of these points will be averaged among them.

OUT OF TOLLERANCE	ELEVATION DIFFERENCE	, S BETWEEN STATIONS
From Station	To Station	Elevation diffe
rrom Scation	10 Station	Elevation diffe
100	200	-3.073 **
200	100	-3.051 **
AVERAGE		-3.062
100	300	-3.377 **
300	100	-3.409 **
AVERAGE		-3.393
<		>
	Expand	

Figure 100:

Also, the out of tolerances associated with the distances reflected for the polygonal points are checked.

Only if the tolerances have been activated and if out of tolerance values have been found, the program will display these values.

Step 5 - Preliminary Calculation of Station Azimuth

The calculation of the azimuth corrections for the duplicate stations is displayed separating the duplicate Stations with the shared Points from those without shared Points.

For each one, the associated job number, station number, reference station number, job number associated with the reference station and finally the azimuth correction are indicated.

Computation of h	orizontal circle	correction f	or identical S	Stations		×
	nich the horizonta ed the points ha			mputed.		
Name	No.Sta. N	lo.Job No.F	Ref.S No	.Ref.J [Dif.Circle.Cor.	
300	4	1	3	1	0.0000	
	ut common point al circle correctio No.Sta.	n will be cons			Dif.Circle.Cor.	-
Settings	<	Indietro	<u>A</u> vanti >	Annuli	a) (?	

Figure 101:

Step 6 - Station Analysis

All of the orientations of the Stations to elaborate are searched in the station analysis.

At the end of these search operations, the program will display a window showing the orientable and quotable stations.

Any non-found stations are also shown in the window.

Station Analysis			×
Computable		Total points	
Overall	0	Present	3
AND I I I			
With known coordinates		Height computable	
Ex-Center computation	0	Overall	0
Coolline comentation		With longung bainht	
Snellius computation		With known height	
Roto-Trasl. computation	0	With computable height	0
From other Stations	0	From other Stations	
No computable		Height no computable	
Overall	3	Overall	3
Without horiz. angle	0		
HC insufficient point	0		
Settings	< Indietro	Avanti > Annulla	
Jettings			

Figure 102:

Step 7 - Option for the next computation

In step 7 the program requires options to be used in continuing the calculations.

In regard to the significance of the various options, for example it will be possible to orient the Stations from HC points using the Snellius or Ex-Centro methods automatically or interactively. Furthermore, it is possible to decide whether to print the results or not.

If the data found in the document allow it, the user can select whether to run the Roto-Translation calculation or not.

The print option or simply viewing the results can be activated even just for the polygonal calculation results and for the final station orientation.

Other options allow on screen inserting of the orientation or quote of the individual Stations. Another offer the possibility of waiving the quote calculation.

The last choice involves whether or not to run the Rigorous Layout or Altimetric Compensation.

ORIEN	NTATION	ELEV	ATIONS
From HC points	with print	Computation	
Automatic	⊖ Yes	 Yes 	🔘 No
With selection	No No	∠ Manual input	
Roto-translation	with print	• Yes	O No
) Yes	⊖ Yes	Traverse calc	Final results
No	No	O No output	O No output
		On screen	On screen
Manual input		On printer	On printer
Yes	🔘 No	STRICT CO	OMPENSATION
Traverse calc.	Final results	Compensation	with output
🔵 No output	O No output	⊙ No	O No output
 On screen 	 On screen 	Only Planim.	On screen
On printer	On printer	O Planim. + Elev.	On printer

Figure 103:

Step 8 - Station Orientation Analysis

Calculation of the station orientation uses the Ex-Centro or Snellius methods and will be run only if the data allow this kind of calculation.

For each station, a window will appear where the user can select the method to use.

The functionality of this window depends on the selections made in the previous window.

lanim	etric com	putation of Stati	ons				×
Pla	nimetric co	mputation of Statio	ons100				
S	Or. T	Points name	1	North	East	Circle	Dist
	Rese Rese	103 - strada 106 - strada		29196.547 29196.992	32243.589 32243.958	2.0526 2.0413	
	ESTI	WEIGHTED		29196.776	32243.779	2.0468	
<							>
	e single po responding	int combinations m symbol.	ay be excl	uded from the c	omputation by i	uncheck the	
		a	heck all	Unche	ick all		
Se	ettings		< <u>B</u> ack	<u>N</u> ext >	Cancel		Help

Figure 104:

Step 9 - Roto-Translation Calculation

The roto-translation calculation includes orientation of one or more stations simultaneously.

Even in this case, the calculation will be run only if the data allow it.

In this window the list of orientation points is displayed and it is possible to select which one to exclude from the calculation.

The calculation can be obtained in two different modes:

-Fixed: the transformation is done by setting the orientation point with the highest reliability value rotating the plane until it aligns with another point that, among those remaining, has the highest reliability value.

-Least square: this minimizes the squares of the distances between the real coordinates of the various orientation points and their coordinates calculated in the false reference system where the various Stations were initially oriented. The user can decide whether to force the scale factor equal to 1 or whether to allow the program to factor the calculation.

Roto-translation con	nputation				×
Roto-Translation ca	arried on Stations:S3	1 - S32			
S Point name ⊠ P23 ⊠ Q23	Rel 1 1	Req North -4.303 2.371	Req East 40.565 43.378	0.000	Pt.Ty Pt.Rot. Pt.Alli
	Scale factor Rotation angle Maximum residual Average residual pe excluded from the		0077	cale = 1	ding
symbol.	Select a	I Dese	elect all		
Settings	< <u>B</u> ack	<u>N</u> ext >	Cance		Help

Figure 105:

Step 10 - Station Quote Calculation

The program is able to calculate the Stations quotes by means of the QU Points.

Any out of tolerances are displayed if the associated option has been activated, otherwise no window is displayed.

now intermediate re		:
Tollerance check or	elevation computation.	
OUT OF TOLLER	ANCE:ELEVATION COMPUTATION OF STATIONS	5 ^
Elevation com	putation of Stations100	
Point	Elevation	
103	0.004 ** -0.053 **	
202	0.368 **	
AVERAGE	0.071	
<		~ >
	Expand	
	Cipana	
Settings	< <u>B</u> ack <u>N</u> ext > Cancel	Help
	Figure 106:	

Step 11 - Inputting Data from Keyboard

This step is run from the program only when the option to input the orientation of one or more Stations from the keyboard has been selected.

Also, the program displays the list of Stations that can be selected to assign the values from the keyboard.

To assign typed data to the Station, the user must press the **Assign values** button.

Station lis Name 100 200 300	t Or. Ty Manua Not plan. Not plan.	North 0.000	East 0.000	Circle c 0.0000	Elev.t Manua No Elev. No Elev.	Elev. 100.000
The entry are selecter You can n stations fo To assign Station, pr Press the	fields will be acti ed in the approp ot change the c r which it is poss the values enter ess the button [/	oordinates of the ible rototranslation. ed to the selected Assign values]. alues] to cancel the	Nar Nort East Hori Elev	h t z. Corr.		100 0.000 0.000 100.000 100.000 gn values cel values

Figure 107:

Step 12 - Polygonal Calculation

To run orientation of the Stations in polygonal two Stations must "see" each other, that is, the two respective horizontal angles must be measured.

If outcomes for Step 7 of the procedure have been set for display, the program will display the results of the calculation in this window.

For each calculated polygonal, the angular tolerance and closure line values are also displayed.

Traverse results	0 to the Station:100		
Name	FINAI Easting Az.Co		
100 200 300 100	-4.110 -39.274	33.988 29.945	
Traverse results			
<			3

Figure 108:

In regard to the altimetry, the same goes for the layout with the difference being that for the stations to be considered fixed they must have been quoted previously by VC points.

If outcomes for Step 7 of the procedure have been set for display, the program will display the results of the calculation in this window. In this case as well, for each calculated polygonal, the quote closure values are also displayed.

w intermediate res	ults	
Elevation results of tr	averse computations	
Traverse resu	lts	^
of the Station	1:100 to the Station:100	
Name	FINAL VALUES	
StationElev.		
100	0.000 Fixed	
200	-3.061 Compensated	
300	-3.395 Compensated	
100	0.000 Fixed	
Traverse resu	lts	
		~
<		>
	Expand	
Settings	< <u>B</u> ack <u>N</u> ext > Cancel	Help

Step 13 - Isolated Station Calculation

During this step the Isolated Station coordinates and quotes are calculated. That is, those Stations not oriented or quoted with any of the previous methods but for which there is a reciprocal "view" from one that is already oriented or quoted.

No particular window is displayed.

Step 14 - OC Points Elaboration

This step is executed only if OC points are found in the Jobs selected for elaboration. If indeed there are, then their coordinates and quotes are calculated.

The program will then attempt to associate these values with any HC or VC Points which were not previously associated.

If the association is successful, the program will restart execution of Step 8 to elaborate a new group of stations which, thanks to the values made available by the OC points, can now be oriented.

Step 15 - Input Options for Rigorous Compensation

This is the point reserved for inputting the Rigorous Compensation options if this calculation was selected during Step 7.

The program first of all offers insertion of the discards anticipated for measuring angles and distances. For the distances, there is a fixed part and a proportional part to the distance.

During this step, the maximum number of iterations allowed for calculating the Compensation is set.

Press Forward and the calculation will execute with the results displayed in the next step.

1020509-01

Options f	for strict comp	ensation			>
	dual provided (P Angular measure Distance measu		[g] [mm] +	20	ppm
Cont	rols for the comp Maximum numb			10	
Settir	ngs	< <u>B</u> ack 1	Vext >	Cancel	Help

Figure 110:

Step 16 - Rigorous Compensation Results

This step conducts the rigorous compensation and the program will report the calculation results in the **View Intermediate Results** window.

		THATE COOP	RDINATES A	ND TYPE OF POINTS	AND STATIONS	S USE
N	Nar	ne		Northing	Easting	Т
	1	100		0.000) o.	.000
	_	200		-4.104		
	3	300		-39.268	3 29.	951
		al Station				
		d Station				
<						>

Figure 111:

Step 17 - Final Results

In the **Results of Elaborations Executed** window, the program displays the final results of the layout and altimetric elaborations on the Stations found in the considered Jobs, identifying the type of coordinates or quote calculation.

Name	North	East	Circle c	Or. Type	No.Estim.
100	0.000	0.000	0.0000	Fixed	
200 300	-4.104 -39.268	33.986 29.951	-55.0077 55.5807		2
					_
Name	Elev. Elev.	v.ty No.E	stim.		
100	0.000	Fixed			
200 300	-3.061 Stric -3.395 Stric				
300	-3.350 300	a c			

Figure 112:

Step 18 - Detail Points Elaboration

The program now progresses to the orientation and calculation of the quote of the individual Points seen from each of the Stations oriented previously. During this step, Points with IE codes (Inaccessible Elevation) are elaborated in a particular manner.

When the program encounters a IE code, it attributes coordinates the same coordinates, same horizontal distance and same azimuth of the Point preceding it, but recalculates its quote based on the vertical angle seen in the IE point.

The program displays any out of tolerances for duplicate Points if the tolerance check was activated during the initial step of the Celerimetric Calculation.

The next step is calculation of the FI Points (Forward Intersection).

When the program encounters an FI Point, the first thing it does is check into the subsequent Stations to see if there are other FI Points with the same "Name" as the first one. If there are at least 2, then the program will calculate the orientation and quote of the first of the points found using calculation of the triangle with the vertices held by the two Stations from which the Point is "seen". It is possible to "see" an FI Point from 2 Stations: in this case the calculation will be done using the average of all possible combinations.

		tical points.			
OUT OF	TOLLERANCE	: AVERAGE	OF IDENTICA	AL POINTS IN	THE SAME S
List o	f Station p	oints100			
Name			Northing	Easting	Dist.fr
115 115			-10.345 -15.719		3676.825 3676.825
AVERAGI	E -13.	032	-4.704		11.6
<		ſ	Expand		>

Figure 113:

The program displays any out of tolerances for FI Points if the tolerance check was activated during the initial step of the Celerimetric Calculation.

As in the case of other duplicate Points, in the case of FI Points too, the values are averaged and assigned only to the first of these Points found in the archive.

AVERAGE	13.951	30.037		1.
Computati	on of FI point.	:104		
Stat.1	Stat.2	Northing	Easting	Dist.fr
	200 200	12.607 12.607	21.814 21.814	
	12.607	21.814		2.
<				>
		Expand		

Figure 114:

Step 19 - Any Roto-Translations of Various Entities

The program checks to see if the TS Data has already been elaborated. If so, then it checks for the presence of other entities in the file (Frames, Graphic Entities, Constraints, Borders, Triangles, Level Curves, Profiles and associated Projects) and displays a window where the user can select whether to change the position of the entity (roto-translate) based on the re-elaboration run on the TS Data.

Computation of the TS data - Roto-traslation	×
There are entities that can be Roto-Traslate computation of TS data	according to changes made in the
CAD entities	
Roto-Trans. the CAD entities	 Only entities not in locked layers
	O All entities
Other entities Trans. frames (translation only) Roto-Trans. Breaklines and Boundarie Roto-Trans. the Triangles	Recomputation of the Contours
Settings < <u>B</u> ack	Next > Cancel Help

Figure 115:

Step 20 - Final Confirmation of Calculation Executed

Here is the final step of the celerimetric calculation.

It is also possible in this step to go back using the specific button to review counts or potentially run changes to the calculation options.

Also, a **Cancel** button is available to exit from the procedure without any effect on the document.

The **Completed** button allows the user to transfer what has been elaborated to the FW1 file so that it can be used in the printing procedures or graphic view to be used in subsequent elaborations.

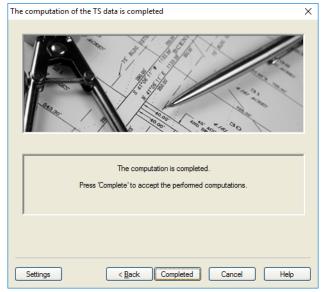


Figure 116:

Manual Input

The manual input is used primarily to work with local orientation or for a preview of the surveys.

In the **Options for the next computations** window, input **Yes** in the section **Manual Input**.

If the user wants to edit the quotes too, follow the same procedure in the **ELEVATIONS** section.

Press the **Forward** button to open the window allowing insertion of the data associated with the stations.

tions for the next co	omputations			X Manual entry of Station coordinates	:
ORIEI	NTATION	ELEV	ATIONS	Station list	
From HC points — Automatic With selection	Ves No	Organization Organ	◯ No	Name Or. Ty North East Circle c Elev. t 100 Not plan. No Elev. No Elev. 200 Not plan. No Elev. 300 Not plan. No Elev.	Elev.
Roto-translation — Yes No	With print Yes No	Yes Traverse calc. No output On screen	No Final results No output On screen	To insert data for a Station must first select it. Name The entry fields will be active only if the options are selected in the appropriate input box. North	10
Manual input	O No	On printer	On printer	You can not change the coordinates of the stations for which it is possible rototranslation. East To assign the values entered to the selected Station, press the button [Assign values]. Horiz. Corr.	
Traverse calc. No output On screen On printer	Final results No output On screen On printer 	Compensation No Only Planim. Planim. + Elev.	with output No output On screen On printer		n values el values
Settings	< <u>B</u> ack	Next > Car	ncel Help	Settings < <u>B</u> ack <u>Next</u> > Cancel	Help

Figure 117:

After selecting the station in the upper part of the window, the user can proceed with inserting the coordinates and azimuth correction.

Once the insertion is complete, it is important to press the **Assign values** button to ensure that the inserted data are definitively associated with the selected station.

The window below displays the intermediate calculation results; in particular, identified and calculated polygonals are displayed.

of the Station:100 to the Station:100 Name StationNorthing Easting Az.Cor. 100 0.000 0.000 0.0000 200 -4.111 33.985 -54.9891 Co. 300 -39.274 29.944 55.5975 Co. 100 0.000 0.000 0.0000 Fi
StationNorthing Easting Az.Cor. 100 0.000 0.000 0.0000 200 -4.111 33.985 -54.9891 Cc 300 -39.274 29.944 55.5975 Cc
100 0.000 0.000 0.000 F3 200 -4.111 33.985 -54.9891 C3 300 -39.274 29.944 55.5975 C3
200 -4.111 33.985 -54.9891 Co 300 -39.274 29.944 55.5975 Co
200 -4.111 33.985 -54.9891 Co 300 -39.274 29.944 55.5975 Co
100 0.000 0.000 Fi
Traverse results
< > >

Figure 118:

Moving forward with the guided procedure brings the user to the final window and by pressing the **Complete** button, the calculation will finish transferring the data to the TS data.

The results can be viewed also graphically.

Geopro Office - [Input_Video.gpo]	-	0 X
File Modify View Format Tools Draw Survey Images D.T.M. Roads GIS Window ?		_ # ×
▋▋▆▏▋▉▎▌▙▌▋▌▌▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖▖		
13 2 + 3 10 D + -/ C & 2 A 1 + + / / ≥ ⊃ O C / A 5 8 D D .		
S 🛇 🖓 🕲 0 - 🚒 🎄 - 🙁 🖬 BYLAYER BYLAYER BYLAYER		
Document X CAD		
8 ⊕ 15 data (1 lob.) -⊕ (45 data (0 Gp.) + 220 + 220 + 220 + 220		
(a) ⊕ none print de (b) ⊕ no		
(a) ● D. Data (0 Group 1) 109 1.66 145 153 15 123 - 213 - 213 - 225 - 2		
*169 w161 + 169 + 220 + 226		
◆ Reads +1270 +1272 1555 +157 +1272 1555 +157 +1272 +235		
+102 +124 195 +212 +235 100 +150 +150 +212 +211 +255 +210 +210 +210 +210 +210 +210 +210 +210		
*100 11 12000 120 120 120 120 120 120 120		
*145 *208+00 0200		

+165 +12442,121 +131 +1454625 +2441 +243 +250 +115 +120 +149 +149 +1866		
*10 ⁵¹¹⁴ *140 *130 *202 ⁰³ *249 \$265 \$250 *106+116		
*106 118*116 +139 * 548*3 \$388** +251 +388*3 \$388****		
+ UZ + 204 + 247		
* 119 ± 200 + 137 ± 130 + 347 ± 326 + 375 ± 374 + 346 + 347		
*106 +13+132001 +1346 +348 +220 and 373 +394		
+ 30 ² 133 + 344 + 369 + 371 + 372 - 371		
*364		
* 305 * 304 * 305 * 303 * 312 * 349 * 302 * 32829 * 302 * 349 * 368 * 368 * 365 * 365		
• 330 • 383 • 36/		
* 325 * 332 - 313 • 300 - 300		
+ 324 331 + 342 314 + 351 954 + 5959 + 323 3083 4 + 342 314 + 351 954 + 5959		
* 324, 331 * 342, 314 * 251, 954 * 5659 * 323, 533, 534, 541 * 315 * 555, 557		
* 323 - 33541 + 315 + 395 - 33540 + 316 + 356 + 357		
* 3399 * 316 * 315 * 355 * 357 * 335 * 336 * 317 * 335 * 337		
E		
Visu can select CAD antibias N -7.117: E 33.263	SHAP OFTH OSHAP	DVN IW

Figure 119:

Elaboration with HC and VC Codes

The points coded as HC are used for orienting the layout surveys when the user wants a highly precise system of reference identified by the Orientation Points.

The points coded as VC are used to orient the surveys in altimetry compared to various benchmarks; a point can be coded HC as well as VC.

			9 E	a 🗿 🖉 🖬 🖻	Ø										
ent X	Station 1: 100 (Job				_	_								_	
ocument content	Measurer Cod	les Coordinates													
TS data (1 Job.)	N. Description	Name/Num.	Model	GIS Theme HC	VC	TR	IE FI	OC	SL EL	CL N	aL LD	NT I	NP NV NC		
(i) 🙀 TS 100 (55	1 OR	201													
GPS data (0 Grp.)	2 QU	202			×										
Known points da	3 OR	103													
DL Data (0 Group	4	204													
CAD	5	205													
Profiles	6	206													
Roads Paper spaces	7	207													
Cabo shares	8	208													
	9	209													
	10	210													
	11	211			n	n						-			
	12	212										-			
	13	213													
	14	214			H	ň									
	15	215		0	ň	ň						n i			
	16	216			H	H		_				_			
	10	210										5			
	18											-			
		218													
	19	219						_							
	20	220													
	21	221										_			
	22	222													
	23	223													
	24	224													
	25	225													
	26	226													
	27	227													
	28	228													
	29	229													
	30	230													
	31	231		0											
	12	232													
	33	233													
	ы	234													
)	~	1.04	_	0	0		U L		00	0 0		0			

The program uses points coded as HC for three types of orientation:

- Snellius: a Station, to be oriented this way, must have at least 3 points coded as HC and all of them observed as only angles and not as distance.
- Ex-Centro: a Station, to be oriented this way, must have at least 2 points coded as HC and they must be observed as: one only as angles (therefore not distance) and the other as either angle or distance.
- Roto-Translation: one or more Stations connected in polygonal, to be oriented this way, must have at least two points coded as HC and all of them observed as angles as well as distance.

If the automatic search in the **Computation Options** window is set to **No** then during the data analysis, the program will recognize only the codes inserted by us.

Otherwise, it will automatically associate also the orientation points and detail points that have an identical name; in this case, it is not necessary that the detail points are coded as HC or VC.

The identified HC and VC points are displayed in the **Data Analysis** window of the procedure; also, for each one of these, the validity for the calculation is indicated.

Computation Options					×
Search Codes	Tolerances and Check —				
Automatic	Check	⊙Yes		🔿 No	
🔿 Yes 💿 No	Duplicated Distances	10.000	[mm] +	1	ppm
Points with same name	Duplicated Elevations	10.000	[mm] +	1	ppm
O Always average	Duplicated Angles	0.0030	[g]		
Only same TS Station	Distance Closed Pol. 1/	6000	* Rad (S	um L²)	
	Angle Closed Pol.	0.0100	[g]		
ОК	Elevation Closed Pol.	5.000	[mm] +	5.000	* n
Cancel	Comp. Coord. TS Station	500.000	[mm]		
Save CFG	Comp. Coord. TS Point	50.000	[mm]		
	Computation Elevations	50.000	[mm]		
Load CFG	Reflector height min.	1000.000	[mm]		
Originals	Reflector height max.	5000.000	[mm]		

Figure 121:

Proceeding with the elaboration will progress to the window where the stations are analyzed.

The image below shows that the station used can be oriented by layout using the Roto-Translation method with can be quoted.

Station Analysis		×
Computable Overall	Total points Present	1
With known coordinates	0 Height computable	
Ex-Center computation	0 Overall 0 With known height	
Roto-Trasl. computation	1 With computable height	
From other Stations	0 From other Stations	0
Overall	0 Height no computable Overall	0
Without horiz. angle		
HC insufficient point	0	
Settings < <u>B</u> a	ack Next > Cancel	Help

Figure 122:

The program automatically searches the methods by which it is possible to orient the Stations by layout.

In this case, activate the automatic calculation by Roto-Translation deactivating the other options; also, given that the station can be quoted, in the **ELEVATIONS** section, the calculation is set as **Yes** while the **Manual Input** is set at **No**.

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ORIEI	NTATION	ELEVATIONS			
From HC points	with print	Computation			
Automatic	⊖ Yes	 Yes 	O No		
With selection	No No	Manual input			
Roto-translation	with print	◯ Yes	No		
Yes	◯ Yes	Traverse calc.	- Final results -		
🔿 No	 No 	O No output	O No output		
		 On screen 	 On screen 		
Manual input		On printer	On printer		
) Yes	No	STRICT COMPENSATION			
Traverse calc.	Final results	Compensation —	with output -		
🔵 No output	O No output	⊙ No	O No output		
On screen	On screen	Only Planim.	On screen		
On printer	On printer	O Planim. + Elev.	On printer		

Figure 123:

At this point, proceed with the Roto-Translation calculation; this calculation can be done in two ways: using the fixed method or the one with least square (in this case the second was selected).

To run the calculation the program uses the HC points that are summarized in the upper part of the window; some may be unused (that is, deselected) by the user.

Once this selection is complete, the celerimetric calculation will run until it reaches the final window where, by pressing the **Complete** button, the user will initiate transfer of the results to the TS Data; the final results are those displayed in graphic.

Roto-translation con	nputation				×
Roto-Translation ca	arried on Stations:100)			
S Point name	Rel	Req North	Req East -16.162	Varia 0.054	Pt.Ty
⊠ 201	1 1	-24.014 -21.987	-16.162 -16.464		
Method	Scale factor	1.00	10000 🔽 S	icale = 1	
○ Fixed	Rotation angle	391	5873		
 Least square 	Maximum residual	5	4.331		
	Average residual	5	4.331		
The HC points may symbol.	be excluded from the	computation by	unchecking the	e correspor	nding
	Select al	I Des	elect all		
Settings	< <u>B</u> ack	<u>N</u> ext >	Canc	el 🗌	Help

Figure 124:

Using TR Code

The points coded as TR are those seen by the program as observations to other Stations; in particular, they are used in the calculation of the polygonals (open or closed).

The point search can be done automatically (selecting the **Yes** option in the **Search Codes** section of the **Computation Options** window) or manually.

In the first case, the program will automatically associate Stations and Detail Points with the same names (in this case it is not required that the detail points are coded as TR);

Computation Options			×
Search Codes	Tolerances and Check —		
Automatic	Check	🔿 Yes	💿 No
⊙Yes ○No	Duplicated Distances	10.000	[mm] + 1 ppm
Points with same name	Duplicated Elevations	10.000	[mm] + 1 ppm
 Always average 	Duplicated Angles	0.0030	[g]
Only same TS Station	Distance Closed Pol. 1/	6000	* Rad (Sum L²)
	Angle Closed Pol.	0.0100	[g]
ОК	Elevation Closed Pol.	5.000	[mm] + 5.000 * n
Cancel	Comp. Coord. TS Station	500.000	[mm]
Save CFG	Comp. Coord. TS Point	50.000	[mm]
	Computation Elevations	50.000	[mm]
Load CFG	Reflector height min.	1000.000	[mm]
Originals	Reflector height max.	5000.000	[mm]

Figure 125:

In the second case, the calculation procedure will only use those points coded as TR.

After setting the elaboration options, the calculation will proceed moving onto the **Analysis of data** window.

In this window the quantity of points coded as TR will be identified, how many are deemed valid and how many not valid.

	Present			Identical name
Points	Present	Valid	Not Valid	Identical name
HC coded	0	0	0	
VC coded	0	0	0	
TR coded	6	6	0	
FI coded	0	0	0	
OC coded	0	0	0	
Without code	106	106	0	

Figure 126:

After selecting the type of orientation in the **Options for the next computation**, the program will display the result of the polygonal calculation for layout as well as altimetry.

Only the following are displayed:

- •Closed polygonals (those that end on the same Station which is deemed independently orientable);
- •Those constrained at the ends (those that end on two orientable Stations).

Traverse results of the Station:1	00 to the Stati	lon:100			
Name StationNorthing			VALUES		
100	-		0.000	0.0000	
200			33.985		
300			29.944		
100			0.000		
Traverse results					
ilaveise lesuits					
<					>

Figure 127:

The image below displays the graphic result of the celerimetric calculation.

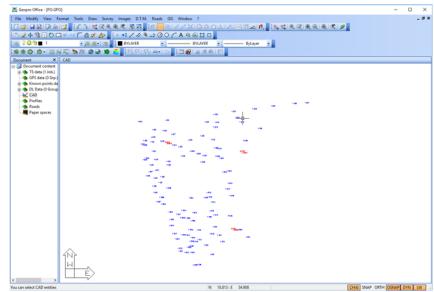


Figure 128:

Forward Intersection

The FI code is used when an inaccessible point has been hit by at least two stations or when only the vertical and horizontal angles have been measured and not the distance; this code is inserted specifically because there is the option to apply an automatic search.

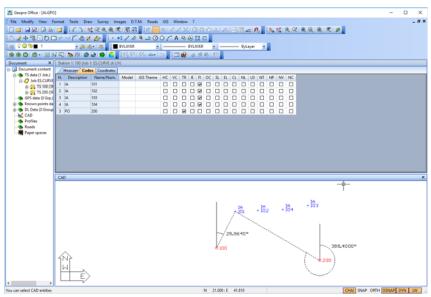


Figure 129:

Once the Celerimetric Calculation has been launched, tell the program to run checks on the tolerances and other checks using the **Elaboration Options** window.

Moving forward with the elaboration there will be a window displaying the results of the data analysis identifying how many points with the FI code were found, how many are valid and how many are not valid.

Stations	Present			Identical name
Points	Present	Valid	Not Valid	Identical name
HC coded	0	0	0	0
VC coded	0	0	0	0
TR coded	2	2	0	0
FI coded	8	8	0	0
OC coded	0	0	0	0
Without code	0	0	0	0
Settings	< <u>B</u> ack	Next >	Cancel	Help

The calculation of intersections forward is done only after orientation of the stations.

The image below displays the window seen when tolerances have not been respected.

The results can be seen in a larger window by pressing the **Expand** button.

	ELEVATION DIFFERENCES	
OUT OF TODDERANCE		DEINEER SIRIIONS
From Station	To Station	Elevation diffe
100	200	-3.073 **
200	100	-3.051 **
AVERAGE		-3.062
<	_	>

Figure 131:

Connecting Two Surveys

Two surveys can be connected in two different ways:

•When there is a shared Station and at least one point has been observed by both Stations (used, for example, in a suspension of the survey).

•Using OC and HC/VC codes (used, for example when two Stations are to be connected and they don't "see" each other).

When there is a shared Station it means that in a Job (or Jobs) included in the Celerimetric Booklet, two Stations have an identical name.

The program, in this case, will consider the Stations with the identical name as duplicate Stations that have, at the conclusion of the Celerimetric Calculation, the same layout coordinates and the same quote but it is not determinate that they have the same azimuth correction.

The shared point is used by the program to calculate the difference of azimuth correction.

The image below shows the duplicate station 100, for which point 104 was found shared in both surveys, displayed in the upper table in the **Azimuth Correction Calculation** window; in the field called **Az. Corr. Diff.** a value is displayed.

The duplicate station 200, for which no shared point was found, is displayed in the second table and in the field called **Az. Corr. Diff.** with the value of 0.

		100 A 11 A	4 10 10	a 17 🖬 1	1 😻 💂										
	Station 1: 100 (A	ab 1: Lavoro 1)						Stat	ien 1: 100 (Jeb 2	: Lavoro 2)					,
ment content S data (2 Job.)		Codes Coordinates							Measures Cod						
Job Lavoro 1		n Name/Num.	Prisma H.	Slope dist.	Vert. Ang.	Horiz Ang.		N.	Description		Prisma H.	Slope dist.	Vert. Ang.	Horiz, Ang.	Prism Typ
(64	1 OR.QU	SPIGOLO	1.550	2.828	99.6113	50.0000	Unknow	1		104	1.550	7.616	99.3560	114,2586	Unkno
ø	2 OR	PF02	1.550		98.3200	390.2820	Unknow	2		105	1.550	8.668	93.8800	258.6480	Unkno
		101	1.550	10.658	101.5560	98.3360	Unknow	3	PO	200	1.550	20,402	88.7921	278.3368	Unkno
9		102	1.550	9.748	93.4400	137.2400	Unknow								
2	5	103	1.550	8.776	95.3300	211.6000	Unknow								
(38 (18	6	104	1.550	7.616	99.3560	325.7762	Unknow								
	Station 2: 200 (A								ion 2: 200 (Job 2 Measures Cod						_
		Codes Coordinates						<u></u>	Description		Prisma H.	Slope dist.	Vert, Ang.	Horiz, Ang.	Prism Ty
		n Name/Num.	Prisma H.	Slope dist.	Vert. Ang.	Horiz, Ang.	Prism Type	1		202	1.550	6.041	99.8081	187.2746	Unkno
	1 PO	100	1.550	20.511	112.9805	318.8139	Unknow								
		201	1.550	8.352	99.3650	68.9614	Unknow								
	2														

Figure 132:

The OC and HC/VC codes are used if the surveys have no shared Stations, but there are at least two detail points observed in both surveys. In this case, additional information must be inserted into the document. At the beginning it must be established which of the two surveys can be individually oriented; in this case, the orientation can be done either using the Orientation Points or by inserting the station coordinates during execution of the Celerimetric Calculation (manual input).

data (2 Job.) Job 1 (1 St.)		Ition 1: 100 (Job 1: 1 Measures Codes													
Job 1 (1 St.)	N		Name/Num.	Prisma H.	Slope dist.	Vert. Ang.	Horiz, Ang.	Prism Type	Prism Constan	t Comme	nt Not	tes Sketc	h Photo	1 Photo	
		oc	101	1.500	84.20		257,1520								
2 TS 100 (92	2	oc	102	1.500	85.40		251.5540	Unknown							
TS 200 (75		wooden stake	103	2.000	427,49		116,1920								
S data (D Grp.)		wooden stake	104	5.000	133.30		68.8500								
own points da	5	building corner	105	1.500	99.60		259,4400								
Data (D Group		building corner	106	1.500	98.51		259,3800								
AD .		building corner	107	1.500	89.06		259.3620								
ofiles ads		building corner	108	1.500	86.01		259,1840								
per spaces		building corner	109	1.500	86.25		257,5060								
per spaces		building corner	110	1.500	86.06		257,3220								
		border	111	1.500	81,37		248.4180								
		border	112	1.500	83.75		248,8920								
		boder	113	2.060	85.06		247,9200								
		border	114	2.060	86.34		248.0020								
		border	115	2.060	79.79		260.5920								
	L	- Contract						Construction of Construction			_		_	_	
	St	rtion 1: 200 (Job 2: 2	2)												
		Measures Codes	Coordinates												
	N	Description	Name/Num. P	risma H. Sk	ope dist. V	let. Ang. Ho	riz. Ang. Pi	ism Type Pri	sm Constant	Comment	Notes	Sketch	Photo1	Photo	
	1	OR.QU 1	01	2.070	20.686	87.1020	0.0000	Unknown							
	2	OR.QU 1	02	2.070	13.400	81.1380	395.8600	Unknown							
	3	p1 2	01	2.070	10.766	91.8240	84.7880	Unknown							
	4	p2 2	20	2.070	265.010	100.3740	111.8660	Unknown							
	5	f1 2	03	2.070	12.818	85.3780	74.6560	Unknown							
		43. 4	04	2.070	7.254	95.9140	95.7500	Unknown							
	6	12 4					112,6580								

Figure 133:

Next the two (or more) Detail Points that share the two surveys must be identified in the associated Job. Then the OC (Orientation Created) Code must be assigned to these two Points and finally in the other Job, associated with the second survey, identify the same Points and assign them the HC (Horizontal Control point) Code and then the VC (Vertical Control point) if the user wants to connect the two surveys also by quote using these points.

Running the Celerimetric Computation will bring the user to the **Analysis of data** page where the program notifies the user that points with HC, VC and OC codes have been identified; all of these points are considered valid.

Stations	Present 2			Identical nam
Points	Present	Valid	Not Valid	Identical nam
HC coded	2	2	0	
VC coded	2	2	0	
TR coded	0	0	0	
FI coded	0	0	0	
OC coded	2	2	0	
Without code	95	95	0	

Figure 134:

In the **Station Analysis** window those stations that cannot be orientable or quotable are identified.

Press **Next** to move on to the **Options for the next computation** window where the program automatically sets the display input for the layout and the quotes in that, as already seen in the **Station Analysis** window, some stations cannot be oriented or quoted.

itation Analysis		
Computable		- Total points
Overall	0	Present 2
With known coordinates	s 0	Height computable
Ex-Center computation	0	Overall
Snellius computation	0	With known height 0
Roto-Trasl. computation	0	With computable height 0
From other Stations	0	From other Stations
No computable		Height no computable
Overall	2	Overall 2
Without horiz. angle	0	
HC insufficient point	0	
Settings	< Back	Next > Cancel Help

Figure 135:

At this point we input the coordinates and azimuth correction of station 100 into the **Manual entry** of **Station coordinates** window.

Station 200 remains not oriented and not quoted.

Name	Or. Ty	North	East	Circle c	Elev.t	Elev.
100 200	Manua Not plan.	0.000	0.000	0.0000	Manua No Elev.	0.000
The entry are select You can stations f To assign Station, p Press the	y fields will be activited in the appropri- not change the co- or which it is possi- the values enter- press the button [A button [Cancel va- the coordinates of	oordinates of the ble rototranslation. ed to the selected ssign values]. alues] to cancel the	No	oriz. Corr.		1 0.0 0.00 0.00 0.00 1 values

Figure 136:

Then the user arrives at the Roto-Translation Calculation.

At the end of the first step in the Celerimetric Calculation, when the Station 100 coordinates are inserted, the coordinates for points 101 and 102 are calculated.

At the second step of the Calculation, the coordinates of points 101 and 102 are used to orient Station 200 using the Roto-Translation method.

Roto-translation computation X									
Roto-Translation ca	arried on Stations:200)							
S Point name ⊠ 101 ⊠ 102	Rel	Req North -52.443 -58.822	Req East -65.764	Varia Pt.Ty 0.011 0.011					
102	1	-58.822	-61.781	0.011					
Method	Scale factor	1.00	0000 🔽 Sa	cale = 1					
○ Fixed	Rotation angle	357.3	3967						
 Least square 	Maximum residual	10	0.592 Within t	ollerance = 500.0[mm]					
	Average residual	10	0.592 Within t	ollerance = 500.0[mm]					
The HC points may symbol. The residuals are wi	be excluded from the thin tollerance.	computation by	unchecking the	corresponding					
	Select al	Dese	elect all						
Settings	< <u>B</u> ack	<u>N</u> ext >	Cance	Help					

Figure 137:

The result of the elaborations executed is shown in the image below.

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Name	North	East	Circle c	Or. Type	No.Estim.
100 200	0.000 -68.336	0.000 -53.194	0.0000 -42.6033	Fixed Rot.Tra	
Zeculte of the eli	wation computation				
Results of the ele	evation computation Elev. Elev	tv No.E	stim.		
	Elev. Elev 0.000	ty No.Ex Fixed Fixed	stim.		

Figure 138:

Using SL, EL and CL Codes

The SL, EL and CL codes are used to graphically design polylines connecting successive points found in the booklet.

The SL code signifies Start Line and is used to initiate the polyline; the EL signifies End Line and is used to terminate the polyline.

In the example shown in the image, point 137 is coded as SL and point 142 is coded as EL.

If is Mark View Ind Computers Organ Lines Organ Lines (I and C) Document Image: Start Hall Im	Geopro Office - [CurveLivNew.GPO]													-	
Description 100 • 10 Boonstrations + 10219 + 1274+1539 + 233 + 219 • 13 100 CPM + 34534420,110, 2144+125000 + 3363426551 + 232 + 232 + 232 + 233 + 219 • 13 100 CPM + 34534420,110, 2144+125000 + 33634420,110, 2144+125000 + 232 + 232 + 232 + 232 + 232 + 129 + 311 + 149 + 313 + 129 + 313 + 129 + 313 + 129 + 313 + 129 + 313 + 129 + 129 + 313 + 129 + 313 + 129 + 313 + 129 + 313 + 129 + 313 + 129 + 313 + 129 + 313 + 129 + 313 + 129 + 313 + 129 + 313 + 129 + 313 + 129 + 313 + 149 + 303 + 244 + 115 + 120 + 149 + 149 + 149 + 149 + 303 + 244 + 149 + 149 + 149 + 149 + 303 + 303 + 303 + 303 + 303 + 303	File Modify View Insert Computa	ation Output Set	tings Window	7											-
Operation + 1274 + 130 + 233 + 219 • 1546 (1/k) • 1650 (1/k) + 345 + 163 + 125 + 336 + 245 + 125 + 289 • 0 100 (1/k) • 110 (1/k) • 110 + 125 + 238 + 219 + 233 + 219 • 310 (1/k) • 110 + 125 • 236 + 256 2 B9 + 312 + 123 + 129 • 0 100 (1/k) • 110 + 125 • 238 + 229 + 238 + 219 + 129 • 0 100 (1/k) • 110 + 125 • 123 + 114 + 125 + 129 + 129 • 0 100 (1/k) • 110 + 120 + 123 + 114 + 125 + 129 + 129 • 0 100 (1/k) • 110 + 141 + 125 + 114 + 125 + 114 + 122 + 149 • 0 11 + 204 + 303 + 246 + 115 + 120 + 101 + 14248 + 115 + 120 + 114 + 129 + 149 • 0 10 (1/k) • 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	🕘 😅 属 🖪 🕼 🗞 📷 📕 🚟 🚽	8 8 4 4 4	4 10 10 2	0 1 4 6											
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Species 15:00/07:61:00/07 M Decreption NumeNum Model G5 Theme HC VC 11. E P OL 0 <th< td=""><td></td><td>1-2-2-2-</td><td>+ 33</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>145</td><td></td><td></td></th<>		1-2-2-2-	+ 33										145		
Memory Market Geneticate 1 Inc AM 65 Thema If 1		Station 1: 100 (Int	ST-ESCUEVE 4LL												
N. Bencyclew New Mode GS Theres N. NC T. N NC N NC N NC 2 SCAM 1010 - - - - - - - - - - - - 0				•7											
1 m AM 0				Model GIST	heme HC 1	C TR I	E FI OC	SL EL	CL N		T NP	W NC			
2 SCAM 101 0 <td></td>															
3 5.6AM 102 0 </td <td></td> <td>2 S.CAN</td> <td>101</td> <td></td>		2 S.CAN	101												
4 578A 190 0 <td></td> <td>3 S.CAN</td> <td>102</td> <td></td>		3 S.CAN	102												
6 578A 105 8 187E 105 1 187E 106 1 187E 106 1 2 1900 111 1 3 00T. 112 1 3 AUL 115 1 3 AUL 115 1 4 AUL 115 1 4 AUL 115 1 2 1900 111 1 3 00T. 113 1 3 00T. 113 1 4 AUL 115 1 4 AUL 115 1 4 AUL 115 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		4 STRA	103												
6 STMA 100 0 <td></td> <td>5 STRA</td> <td>104</td> <td></td>		5 STRA	104												
7 3784 106 0 <td></td> <td>6 STRA</td> <td>105</td> <td></td>		6 STRA	105												
8 Reff 100 1 <td></td> <td>7 STRA</td> <td>106</td> <td></td>		7 STRA	106												
10 RETE 109 0 </td <td></td> <td>8 RETE</td> <td>107</td> <td></td>		8 RETE	107												
11 ALTL 110 0 </td <td></td> <td>9 RETE</td> <td>108</td> <td></td>		9 RETE	108												
12 pm0 111 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		10 RETE	109												
13 DUT. 12 14 DET. 113 15 ALL 114 16 ALL 115 10 DUT. 12 10 DUT. 12		11 RETE	110												
10 Der. 112 D <t< td=""><td></td><td>12 PINO</td><td>111</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>		12 PINO	111												
M (Pff. 113 0 0 0 0 0 0 0 0 15 ALA. 114 0 0 0 0 0 0 0 0 0 16 ALA. 115 0 0 0 0 0 0 0 0 0		13 DET.	112												
13 ALL 114 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0															
16 ALB. 115		14 DET.													
		15 ALB.	114												

Figure 139:

The CL code means Close Line and is used to terminate and close the polyline.

In the following example, point 142 is coded as CL and the polyline is seen closed.

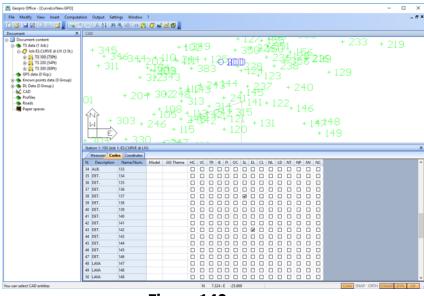


Figure 140:

The **Transform into Graphic Lines** function, found on the Survey|SL-EL-CL-LD Codes menu transforms lines derived from these codes into graphic polylines.

These graphic polylines can be handled easily as graphic entities; also, if changes are made on the booklet, they are not updated automatically.

The **Undo Transformation** command is used to cancel the result produced by the **Transform into Graphic Lines** command, thereby erasing the graphic entities found in the **LINES-FROM-CODES** plane.

The created graphic polylines, even if changed, will be erased, while the original lines joining the various points set by the SL, EL and CL codes will be redesigned.

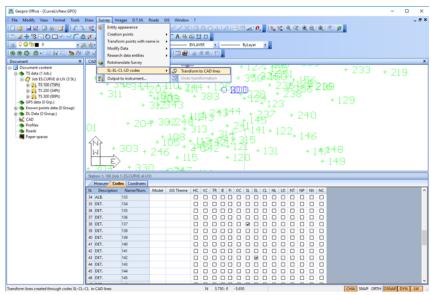


Figure 141:

Exporting Data to Instrument

The **Output | To Instrument...** command is used to transfer data to the instrument; the program offers the user a guided procedure for inserting all of the information needed for transmitting the data.

The settings selected for exporting and the type of instrument used can be stored in a profile and used again for a subsequent export.

The first step is to tell the program what to transfer by selecting the entities from the list and pressing the corresponding **arrow** button.

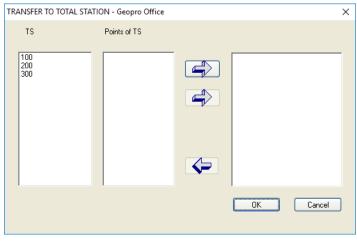


Figure 142:

Once this operation is complete, the procedure continues by displaying the **Import to Instruments** – **Profile selection** window.

This window is used to create a new profile or use one that has already been created. To use an already created profile, just select it or press the **Export** button; to create a new one, just select the **New** icon and press the **Next** button.

Import to Instruments - Profile selection	×
Profile	_
Predefined Details]
-A PROFILE has information about the instrument and the data transfer modes. -To create a profile, please select New and then press	
<back next=""> Export Cancel Help</back>	

Figure 143:

The next window is used to tell the program which type of instrument by specifying the brand and model.

Instrument selec	tion	×
Bran Sokk Mode	kia 💌 🧖	
	< <u>Back</u> Next > Export Cancel Help	

Figure 144:

Once the instrument is selected, the procedure will display the **Connection Information** window used to specify the communication parameters.

Connection in	formation				×
	Speed (baud rate)			
	O 300	0600	O 1200	O 2400	
	○ 4800	9600	0 19200	38400	
	○ 57600	0 115200			
	Computer serial p	ort			
	⊙ COM1	O COM2	ОСОМЗ	O COM4	
	◯ COM5	ОСОМЕ	OCOM7		
	О СОМЭ	○ COM10	○ COM11	O COM12	
	< <u>B</u> ack <u>N</u>	ext >	Export	Cancel	Help

Figure 145:

Moving forward in the procedure, the user will arrive to a window that lists those already created profiles and where it is possible to save the created profile.

Then there are windows that display the details to continue with the exporting of data to the selected instrument.

The last window suggested by the procedure, finally, displays the result of the transmission; if it did not execute successfully, the user can apply the **Retry** command to send it again.

The transfer of data to the instrument can be executed also directly in Graphic by using the **Output | To Instrument...** command; in this case, before launching the guided procedure the elements to be exported must be graphically selected.

Saving the Profile	×
Already existing profiles	
Profile name Instrument Port Speed	
Saving the Profile Save Profile as (None)	
<back next=""> Export Cancel Help</back>	

Figure 146:

File Menu|Export

This command includes a series of commands used to save the work in particular formats usable by other programs or instruments.

These are:

1. TS Data: this is used to create a report of the measures.

		Point Point Neight Sloped Vert Horiz Rel. Rel. Rel. Rel. code name Pitem distance angle angle distance Develon Borthing Easting	
		ALB. 125 1.370 2.460 56.656 311.4250 2.429 0.370 0.424 2.300 ALB. 125 1.370 5.400 56.036 363.700 5.400 0.443 5.253 4.375	
		AU. 127 130 4 40 192570 4 420 4 42 4 13 12 2 25 AU. 129 130 10 20 107.790 14 147 10 22 4 10 20 141 10 20	
		AU8. 129 1.310 16.000 107.0000 106.040 16.727 4.705 4.606 16.602	
		ALR. 101 1210 20:40 103.540 144.0750 20.371 4.119 4.13.962 14434 ALR. 101 1210 10.750 10.750 107.450 107.450 107.45 40 1087 4.010 4344	
		ALB. 112 1.310 25.900 100.1710 180.1000 25.900 0.055 24.742 7.955	
TS DATA		DET. 103 1390 27.99 190.000 194.770 27.08 4.334 24.99 10.59 DET. 104 1390 27.59 4469 197.9469 23.99 4.354 4.489	
		207. 105 1.305 25.070 96.470 255.820 25.204 1.990 25.07 207. 105 1.800 27.40 97.800 196.100 27.465 0.314 21.465 0.809	
Fie.	1MARIANGELA1ExchangelCorsoGeoproOfficelFile/CurveLinNew.gpo	DET. 107 1.500 21.610 99.4E0 162.5E00 21.609 0.121 -20.605 5.609	
N Job:	1	DET. 198 1300 22.20 100.200 195.300 23.20 4.50 4.50 10.11 11.14 DET. 199 1300 17.01 10.040 131.10 13.00 4.50 13.00 15.00 15.00 10.10 10.00 10.00 10.00 10.00 10.00 10.00 10.00	
Job Name:	ES. CURVE & LIV	DR7. NO 1.300 N.300 N.2NO 185.500 14.317 0.417 r4.09 3.145	
Operator:	RENGHINI	DET. 141 1.00 590 10.100 193.200 6161 0.20 4.04 1.203	
instrument	TOPCON	DET. 143 1.300 6.570 96.790 28.500 6.856 0.566 4.218 6.018	
Date:	25/02/96	DET. 144 1300 3.00 10.010 270.700 3.44 0.011 0.300 0.000 DET. 146 1300 5.00 19.0100 102.05 5.01 0.200 4.00 3.000	
		2077 H6 1300 2290 102320 128100 1284 3324 2380 1000	
Station Name:	100	L 148 2.150 17.50 136.2700 136.200 17.445 2.40 8.159 14.841	
identifier;	PL.	L 169 4.000 10.70 562/00 133/070 10.70 42.32 70.561 10.76 - 40.06 10 1300 6.000 107.4400 80.0200 6.016 0.017 2.011 6.167	
Temperature:	15.000	HEDDE 151 1.300 7.510 96.0190 350.4700 7.501 0.520 6.101 4.383	
Pressione:	760.000	WALL 152 3.000 5.70 98.970 7.980 5.73 4.461 5.74 5.77 1985 153 3.000 5.800 13.840 17.21 5.840 17.21 5.842 2.15 5.15 2.019	
Instrum, height	1445	TREE 154 3.000 8.190 104.200 33.2940 9.170 2.108 7.545 4.676	
		WALL 195 3.000 7.060 122.150 89.150 7.068 4.795 3.01 6270 WAL 195 3.000 10.70 122.250 80.000 17.12 4.93 1.952 10.059	
Point Point code name	Height Sloped Vert. Horiz Horiz Rel. Rel. Rel. Prism distance angle angle distance Elevation Northing Easting	TREE 167 3.000 0.000 194.0100 73.1100 0.000 2.315 4.410 11.109 HEOME 168 3.000 16.200 103.4100 17.3400 16.101 2.863 10.265 0.075	
no AN	0.000 10.000 100.0000 0.0000 10.000 1.445 10.000 0.000	HEDGE 159 3.800 12.150 88.8070 398.6980 11.964 4.035 9.297 7.529	
S GAN 101 S GAN 102	1.300 8.250 94.7913 346.0173 8.222 0.319 5.500 6.992 1.300 6.875 90.8460 321.5100 6.838 0.308 2.267 6.451	RCON 101 3800 11.000 12.400 29.400 13.44 4.011 11.41 -7.165 RCON 101 3800 11.00 11.00 1800 384800 384800 11.00 11.00 11.00 14.01	
R0AD 103	1.000 15.050 94.6510 340.9950 15.595 1.458 9.255 -12.477	RCON 152 3 500 13 510 103 5700 28 5940 13 409 2 314 12 222 5 117	
R0AD 104 R0AD 105	1.00 11.510 88.5590 294.9100 11.325 2.202 4.903 41.209 1.00 13.310 87.3540 257.8370 13.048 2.772 4.024 40.290	RCOR 103 3.000 10.00 100.000 81.394 10.372 3.077 12.289 10.077	
R0AD 101	1.000 18.020 88.7360 200.6360 17.759 3.317 45.319 4.943	HEDDE 165 3 500 12 250 101 5940 31 1520 12 244 2 527 10 307 5 755 Style Format Text Rove Column	mn
BORDER 100	1.300 15.750 88.3960 230.0020 15.519 3.005 43.460 2.569 1.300 12.190 88.3250 258.2570 11.910 2.743 7.252 4.440	HEDRE 95 350 10.50 96.3340 0.040 10.50 4.800 10.50 0.001 HEDRE 167 350 7.70 94.100 281.240 7.727 4.47 7.64 4.814	
BORDER 109 BORDER 110	1.300 10.570 87.2590 294.4540 10.359 2.245 -1.325 -10.255 0.300 10.120 96.3580 304.960 10.063 2.182 0.597 -10.359	DET. 10 300 1020 10110 1010 1010 440 841 4.00	
TREE 111	1310 6340 94.400 301.9390 6715 0.718 0.201 6.712	CANAL 170 1.520 11.630 90.526 32.1580 11.501 1.653 4.423 -10.615	~
DET. 112 DET. 113	1.3r0 7.440 90.8780 252.9520 7.406 0.949 4.087 6.189 1.3r0 9.470 90.4110 237.0570 9.419 1.113 -7.656 6.178	REC. 171 2.250 14.40 86.040 46.749 13.81 1542 8.87 40.759 C.C.C.C.C.C.C.C.C.C.C.C.C.C.C.C.C.C.C.	
ALD. 114	1.010 13.690 92.9040 222.7290 13.606 1.654 -12.748 -4.755	PO 200 1300 34.390 107.900 107.900 34.29 3.073 4.104 30.902	
ALR. 115 ALR. 110	1.5r0 12.750 90.6400 238.7680 12.6r2 2.003 -0.546 -7.215 1.5r0 15.9r0 96.5410 208.8300 15.871 1.248 -0.5719 -2.194	PO 300 1.300 46.500 194.500 49.366 4.377 49.274 29.566	
ALD. 117	1.010 18.650 94.8780 210.5330 18.590 1.604 -18.306 -3.952	Current tenciate	~
ALD. 110 ALD. 119	1.510 17.340 91.7360 220.7360 17.194 2.380 -16.252 8.465 1.510 22.960 91.5650 210.1360 20.796 2.907 -19.960 8.355		
ALB. 100 POLE 101	1.3m0 10.370 96.0520 196.6530 10.365 0.445 -10.351 0.538 1.3m0 8.750 96.9500 196.8750 8.749 0.274 -8.751 0.555	Header	
ALB. 122	1.010 9.500 104.1010 146.2010 9.400 -0.408 -0.000 7.003	O Header on all pages	
	1.3/0 5.2/0 107.5460 122.0/00 5.865 4.599 42.080 5.801 1.3/0 3.380 106.0850 125.5/80 3.375 4.188 4.3/7 3.107	Header only on the first page	
A3. 53		Othebaste	
ALB. 104		Page 2 of 6 O No reader	

Figure 147:

2. Celerimetric: this allows the user to create a file where the celerimetric calculation results are reported.

you shou bit work	replaced with the						header	
CELE	RIMETRIC	COMPUTATI	DN					
File:	D:\Curve	LivNew.gpo						
	Name	Identifying	Elevation	Northing	Easting	Azimuth	Short distance	
Station	100	P.L.	100.481	0.000	0.000	0.0000		
Punto	AN	nc	101.926	10.000	0.000	0.0000	10.000	
Punto	102	S.CAN	101,289	2.267	-6.451	321,5100	6.838	
Punto	103	ROAD	101.939	9.355	-12.477	340.9560	15.595	
Punto	104	ROAD	102.683	-0.903	-11.289	294,9180	11.325	
Punto	105	ROAD	103,252	-8.024	-10,290	257.8370	13.048	
Punto	106	ROAD	103.798	-15.319	-8.943	233,6390	17.739	
Punto	107	BORDER	103.486	-13.480	-7.689	233.0020	15.519	
Punto	108	BORDER	103.223	-7.262	-9.440	258.2570	11.910	
Punto Punto	109	BORDER	102.725 102.663	-1.385 0.697	-10.266	291.4540 304.3980	10.359	
Punto	110	TREE	102.663	0.201	-10.069	304,3980	6.715	
Punto	111	DET.	101.199	-4.067	-0.712 -6.189	262,9920	7.406	Style Format Test
Punto	113	DET.	101.594	-7.868	-5.178	237.0570	9.419	1000 100 100
Punto	114	ALB.	102.134	-12.748	-4.755	222,7290	13.606	Style
Punto	115	ALB.	102.484	-10.345	-7.215	238,7580	12.612	Default
Punto	116	ALB.	101.729	-15.719	-2.194	208.8300	15.871	Cease
Punto	117	ALB.	102.115	-18.336	-3.062	210.5330	18.590	Save Ren
Punto	118	ALB.	102.860	-16.292	-5.495	220,7080	17,194	
Punto	119	ALB.	103.387	-19.960	-5.836	218.1090	20.796	Model
Punto	120	ALB.	100.925	-10.351	0.538	195.6930	10.365	Current template
Punto	121	POLE	100.755	-8.731	0.566	195.8790	8.749	Construction
	122	ALB.	99.992	-6.300	7.083	146.2810	9.480	Header
Punto	123	ALB.	99.881	-2.090	5.001	122.0120	6.156	
Punto Punto		ALB.	100,293 100,851	-1.317 0.434	3.107	125.5180 311.4260	3.375 2.429	O Header on all page
Punto Punto Punto				0.434				 Header only on the
Punto Punto Punto Punto	125	ALB.		6.062				
Punto Punto Punto		ALB. ALB. ALB.	100.623	5.253 3.563	-1.375 2.625	383.7030 40.4220	5.430 4.426	O No header

Figure 148:

- 3. Free format: this procedure is used to create a file with selection of data from the TS Data and/or results from the Celerimetric Calculation. The selection of data and decimal numbers to use can be made using the Options|Print Options command.
- 4. File of Coordinates: this procedure is used to create a file by selecting the variables and their order. Once this procedure is activated, a window will appear in which to select the variables to be inserted into the file to create.

It is also possible here to select the number of decimals, the separator between one datum and another and whether to include names among the double apexes.

Once this window is confirmed, the file preview will activate used to create: the screen displayed is very similar to the print preview for the celerimetric.

Figure 149:

Output

TS Data: activating this command will display another menu that lists the possible outcomes available.

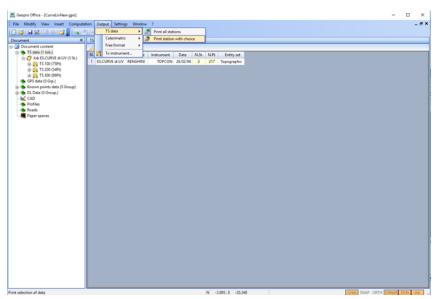


Figure 150:

The **Print All Stations** command creates a printout of all stations existing while the **Print with Station Selection** command offers the user the option (using the specific window shown here below) to use the mouse to select which station to print.

Print TS Data	?	×
TS Station to print		
100 200 300		
Print	Cancel	

Figure 151:

In both cases, a preview is created where the user can confirm or modify (using the specific functions offered by the program's print module) the produced outcomes.

Celerimetric: in this case as well, execution of this command will display another menu summarizing the outcomes that can be produced.

Similar to the Celerimetric Booklet and the Celerimetric Calculation, the **Print All Stations** and **Print with Station Selection** commands remain the same as the one for printing the Campaign Booklet.

Free Format: execution of this command will display a menu grouping a series of commands that are similar to the ones already described; what is different is the fact that it uses a free format defined by the **Settings | Print Options** command on the **TS Data** page.

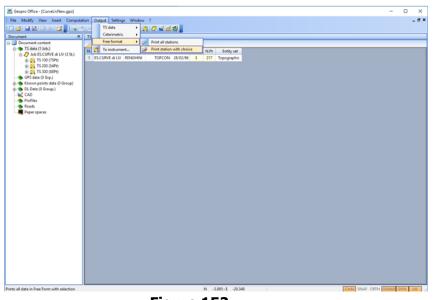


Figure 152:

The image below shows the printout of all stations in the Celerimetric Booklet as Free Format.

Calendary 1	facani akh ifu ga akto in Jong famat					h	eader		î	
	e nepoched as much as possible of the									
Bis scarpte	A 000 A 180									
TS DAT	TA .									
Fie:	D:/CurveLivNew.gpo									
	b. iourrechnen.gpo		-	-						
Name		Northing	Easting	Elev.	Horizontal distance	Vertical angle				
100	P.L.									
AN	nc	10.000	0.000	101.926	10.000	100.0000				
101	S.CAN				8.222	94.7910				
102	S.CAN	2.267	-6.451	101,289	6.838	93.8460				
103	ROAD	9.355	-12.477	101,939	15.595	94.6510				
104	ROAD	-0.903	-11289	102.683	11.325	88.5590				
105	ROAD	-8.024	-10.290	103.252	13.048	87.3540				
105	ROAD	-15.319	-8.943	103.798	17.739	88.7350				
107	BORDER	-13.400	-7.689	103.486	15.519	88.3950				
100	BORDER	-7.262	-9.440	103,223	11.910	86.3290				
109	BORDER	4.385	-10.255	102.725	10.359	87.2590			9	An Format Text Rows Column
110	BORDER	0.697	-10.059	102.663	10.093 6.715	95.3580 94.4830				
111	DET.	-4.067	-6.189	101.199	7.406	93.8790				Style
10	DET.	-7.068	-5.178	101.594	9.419	93,4110				Default
114	ALB.	-12.748	-4.755	102.134	13.606	92,92,40				
115	ALB.	-10.345	-7.215	102.484	12.612	90,6400				Save Rename Delete
115	ALB.	-15.719	-2.194	101,729	15.871	95.5410				
117	ALB.	-18.336	-3.062	102.115	18.590	94.8760				Model
113	ALB.	-16.292	-5.495	102,850	17.194	91.7360				Current template
119	ALB.	-19.960	-5.835	103.387	20.795	91.5650				
120	ALB.	-10.351	0.538	100.926	10.365	98.0920				Header
121	POLE	-8.731	0.566	100,755	8.749	98.9900				O Header on all pages
122	ALB.	-6.300	7.083	99.992	9.480	104,1810				 Header only on the first page
123	ALB.	-2.090	5.801	99.881	6.166	107.5460				O No header
	ALB.	-1.317	3.107	100,293	3.375	105.0550				0.000
124						93 8590				

Figure 153:

Details

Code Meanings: see the "Introduction" section of the Base course or the program's online guide, "Point Codes" chapter.

GIS: refer to the program's online guide, GIS menu in the Graphic View.

1020509-01

Creating Design Models: see the "CAD View" section of the Base course or the program's online guide, CAD View|Format menu.

Modify Menu: refer to the program's online guide, Modify Menu in the Numeric Views.

Common Points: see the document in the "How to..." section of the program's online guide.

Free Format: see the Print Module section of the base course or the program's online guide File|Export menu or the Output Menu in the TS Data View or the Settings Menu (Print Options).

Celerimetric Computation: refer to the program's online guide, TS Data View Computation Menu "Automatic Celerimetric"

Entity set: refer to the program's online guide, Format|Entity sets.

GPS Data

GPS Data Views

The GPS Data is the display of information collected through a GPS receiver.

This part of the document is used to archive one or more Groups, which in turn contain the data associated with a certain number of measured points.

To display the archived data, click the left mouse button on the GPS data node or nodes they produce (Groups) in the navigation tree of the document or drag the node into the display area, keeping the left mouse button held down.

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File Modify View Insert	Cor	mputa	tion Or	utput Setting	s Windo	N 7								_ # ×
ideraanasie, i	1	(150)	16 24	N 4 11 1	3									
		Data												
Document content	0	iroup	s Base S	Station Pla. Co	ords WGS	84 Other								
 TS data (1 Job.) GPS data (1 Grp.) 	N.	NE	Name	Operator	Instrumen	t Date	N.Pt	Tp.Horiz	Project.	Tp.Vert Project.	Entity set			
 Group: 100 (224p) 	1		100				224 P	an Local: C	ontrol Points	Ellipsoid height	Topographic			
8 S Known points data (
🛞 🐟 DL Data (0 Group.)	_													
CAD Profiles		Data												
 Profiles Roads 				Station Pla.C	Substants Bernards	active distances in the	-						-	-
Paper spaces	100.00		Name	Stat. Name		tude			CF Elevation	Ground Elevation	Antenna H.	Notes		<u></u>
	1	100	_	100	42*59'4	1,21488"N	12*06'4	5.92435°E	293.150	291,6	1.530			
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			Name	Stat, Nam	Contractor Service	atitude	10	ngitude	CF Elevation	Ground Elevatio	n Geoc. X Gr	build	Geoc. Y Ground	Geoc. Z Ground
	10000	100	. Hume	100				45.92435"F	293.15			34.546	980472.915	4327276.6
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Figure 154:

Click on the **GPS Data** node and the corresponding view will open including the following pages:

- 1. Groups Page :
- •Group name (alpha-numeric).
- •Operator (alpha-numeric).
- •Instrument (alpha-numeric).
- •Date (alpha-numeric).
- •Number of points in Group (numeric).
- •Tp. Horiz.Projec. (numeric)
- •Tp.Vert.Projec. (numeric).
- •Entity set.

2.Base Station Page :

- •Group name (alpha-numeric).
- •Base station name (alpha-numeric).
- •Base station latitude (numeric).
- •Base station longitude (numeric).
- •Base station elevation (numeric).
- •Ground elevation (numeric).
- •Antenna height (numeric).

3.Pla. Coord. Page

- •Group name (alpha-numeric).
- •Base station name (alpha-numeric).
- •Coordinate North of base station (numeric).
- •Coordinate East of base station (numeric).
- •Elevation of Base station (numeric).

4. WGS84 Page :

- •Group name;
- •Station name;
- Latitude;
- Longitude;
- •CF elevation;
- •Geoc. X;
- •Geoc. Y;
- •Geoc. Z.

5. Other Page:

- •Group name;
- •Station name;
- •PDOP;
- •GDOP;

•Sur. type;

- •Receiver type;
- •Description;

Select the node corresponding to a group and the **Group** view will open.

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Document ×	Grou	p 1: 100																		
Document content	G	PS Coords. W	GS84 Codes F	Ta. Coords Pr	ecision	Other														
I TS data (1 Job.)	N.	Name/Num.	Description	Latitud	ie	Lon	gitude		CF Ek	evation	G	round	Elevat	ion	Ante	nna H.	Quality	y Comment	Notes	Ske
GPS data (1 Grp.) Group: 100 (224g)	201	109	nail	42*59'38.11	900"N	12*071	2.3653	8°E		292.34	3		29	0.813		1.530	No So	ol.		
 B Shown points data (202	110	nail	42*59'37.59	409"N	12.070	2.7860	2"E		292.18	0		29	0.650		1.530	No So	st.		
* • DL Data (0 Group.)	<																			>
- K CAD	Grou	o 1:100							_									-		
- Profiles		S Coords / WG	S84 Codes Pl	a Coords Pre	cision [Other.			-											
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Paper spaces	201	109	nail	42*59'38.11	1900°N					292.34	3		29	0.813		4568519	502	980850.61	5 4	13272
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	Genu	p 1: 100						_	-		_	_	_	_	_					
		S Coords WG	S84 Codes Pt	a Coords Pre	cision [ther														
	N.	Name/Num.	Description	Entity style	GIS	Theme	HC	VC	oc	SL EL	a	NL	LD	NT	NV	NP NO				-
	201		nail				and the second second	2022				-								
	-	1466	(1997)	L	_	_			2			-	1.7							
		p 1: 100	and a line																	
	-	S Coords. WG	and the second se		-	_		-			_	_	_	_	_	_				
		Name/Num.	A CONTRACTOR OF A	North	Ea		Elevatio		Quali	· · · ·										
		109	nail	-11648.097			290.		Nos											
	202	110	nail	-11664.382	-628	9.240	290.	650	No S	iol,										
	Grou	p 1: 100																		
	/GF	S Coords WG	584 Codes Pla	Coordy Pres	cision	Other														
	N.	Name/Num.	RMS Horiz.	RMS Vert.	PDOF	GDO	P Co	v. XX	Co	v. XY	Cov. 1	XZ (Cov, Y	r Co	w. YZ	Cov.	ZZ			
	201	109			0.00	0.0	00	0.000		0.000	0.0	000	0.00	0	0.000	0.	000			
	Grou	p 1: 100																		
		S Coords. WGS	384 Codes Pla	Coords Prec	isioe C	ther		_	_											-
		Name/Num.	Date	and the other designs of the second se	GPS Sa	A & CO. MILLION CO.	GLO Sa	t (Geoc.	X Base	Ge	POC. Y	Base	Geo	c.Z.B	ise I	Descriptio	on		

Figure 155:

This view includes six pages.

In the page under the name **GPS Coord.** the columns included are:

- 1.Name/Number (alpha-numeric).
- 2.Description (alpha-numeric).
- 3.Latitude (numeric).
- 4.Longitude (numeric).
- 5.CF elevation (numeric).
- 6.Ground Elevation (numeric).
- 7.Antenna height (numeric).
- 8.Quality.
- 9.Comment.
- 10.Notes.
- 11.Sketch.

12.Photo1.

13.Photo2.

In the page under the name **WGS84. Coord.** the columns included are:

1.Name/Number (alpha-numeric).

2.Description (alpha-numeric).

3.Latitude (numeric).

4.Longitude (numeric).

5.CF elevation (numeric).

6.Geoc. X.

7.Geoc. Y.

8.Geoc. Z.

9.Antenna height (numeric).

10.Quality.

In the page under the name **Codes**, the columns included are:

1.Name/Number (alpha-numeric) cannot be modified on this page.

2.Description (alpha-numeric).

3.Model (alpha-numeric).

4.GIS theme.

5. Various columns associated with Codes (HC, VC, SL, ...).

In the page under the name **Pla. Coord.** the columns included are:

1.Name/Number (alpha-numeric).

2.Description (alpha-numeric):

3.Coordinate - North (numeric).

4.Coordinate - East (numeric).

5. Elevation (numeric).

6.Quality (selected from a certain number of items).

In the page under the name **Precision**, the columns included are:

1.Name/Number (alpha-numeric).

2.SQM horizontal (numeric).

3.SQM vertical (numeric).

4.PDOP (numeric)

5.GDOP (numeric)

6.Covariance XX (numeric)

7.Covariance XY (numeric)

8.Covariance XZ (numeric)

9.Covariance YY (numeric)

10.Covariance YZ (numeric)

11.Covariance ZZ (numeric)

In the page under the name **Other**, the columns included are:

1.Name/Number (alpha-numeric).

2.Date (numeric day-month-year, all at two digits).

3. Milliseconds beginning with the start of the day (numeric).

4.Number of GPS satellites (numeric).

5.Number of GLONASS satellites (alpha-numeric).

6.**Geoc. X Base**, **Geoc. Y Base**, **Geoc. Z Base** (contains the geocentric coordinates of the base from which the GPS correction was received).

7.Description (alpha-numeric).

If the Group node is expanded in the navigation tree, the list of points it contains is displayed.

Select a point and the program will open the corresponding view that includes two pages: **General** and **GIS Data**.

The **General** page shows the geographic coordinates, the plane coordinates, codes, notes and any drafts associated with the point.

2				Geopro	Office -	[GPS.gp	0]				
File Modify View Inse											- 6
	GPS Point: 105 (Group:	100.)									
in- ▼ Group: 100 (2. ^	General GIS data										
- @ Pt. 105	NI	105									
	Name :	105									
- Ch Pt. 108	TARGED ST.										
-@ Pt. 109	Mensures								^		
-G Pt. 110	Latitude	4215	9'58.84016"N								
	Longitude	120	7'00.47143°E								
- G Pt. 105	Den Allen	1. 12.0	17 00.47145 E								
- @ Pt. 106	Elevation	1	\$06.846								
- 28 Pt. 107	H Astenna	-	1 530								
(d) Pt. 108	n.enenna		1.530								
- @ Pt. 109	Description	1	neil								
-G Pt. 110	a second s										
- CA Pt. 200	Quality	No Sol	~								
- C Pt. 105	Coordinates										
- G Pt. 106	10000000										
- @ Pt. 107	North		-11007.901								
- 28 Pt. 108	East	-	-62946.428								
- 20 Pt. 109	Lon	-									
	Elevation		305.316	<					~		
- G PL 200				C					,		
- G PL 105	Codes										
- S Pt 106			□HC	DVC.	00C	⊡SL	EL.	Da.			
	Entity style	~	DNL.		DNT.			- NC			
	32030 10		LINU	Lup			LINP	LINC			
Pt. 105											
- 3 Pt. 106	Notes										
-G PL 107									-		
-Gi Pt. 108											
< > >	1								-		

Figure 156:

The GIS data is included on the GIS data page (again given that the association with the corresponding database has been executed).

	Geopro Office - [GPS.gpo]	- - ×
File Modify View Inser	t Computation Output Settings Window ?	_ # ×
	「「「「「」」(1) MA AS 参び。	
Document ×		
B Document content		
🖲 🐟 TS data (1 Job.)		•
8 SPS data (1 Grp.)	Name : 105	
IIII- T Group: 100 (2)	rume r roe	
- @ Pt. 105		
@ Pt. 106	GIS theme	
- G Pt. 107		
-G Pt. 108	Dame Oak tree	
-G Pt 110	height 2.000	
- 3 Pt. 200	145gnt 2000	
Pt. 105		
3 PL 106		
@ Pt. 107		
- G Pt. 108		
3 Pt. 109		
- @ Pt. 110		
@ Pt. 200		
@ Pt. 106		
6 Pt. 107		
- 3 Pt. 108 - 3 Pt. 109		
-G Pt 109		
-G Pt 200		
- @ Pt. 107		
- 🖾 Pt. 105		
-@ Pt. 106		
C Dt 107		<u>.</u>
You can select CAD entities	N 11003 700 F CONF3107	CHAI SNAL ORTH OSNA DYN LW
Tou can select CAD entities	N -11003.795 : E -62957.387	CHAN SHOW ORLY USINA DITA LW

Figure 157:

Insert and Change GPS points

To insert the GPS points the user must first create a group executing the following operations:

•open the **Groups** page from the navigation tree by clicking on the **GPS data** item.

•use the **Insert | Add row** command to insert the first line and, once some lines have been added, insert a line under the current one.

•another command that can be used (only if lines have already been inserted) is the **Insert | Insert row** that is used to insert a line above the current one.

To create a GPS point, the user must work within the pages corresponding to the node of the group where the point will be inserted and use the same commands offered for the groups.

Once the lines are inserted (corresponding to the GPS points) the user can insert the data or edit it directly in the table or specific point view.

GPS points can be changed through the **Modify** menu functions.

File |Import

Composable format: This function is used to import a text file into the GPS data; after activating the function, the program will open the **Open** window and ask the user to specify the file to import.

Once the file is selected, the **Select** window will open allowing the user to tell the program if the fields are to be fixed length or unlimited, the number of header lines and whether or not to eliminate the text apexes; the lower part of the window will display the preview of the file to import.

If the user selects the **Fixed length fields** option then the next window will display the number of recognized valid fields and the preview of the file based on the selections made in the previous window.

Also in this window, using the grid to insert the data length, the user can tell the program the length that each field must have.

If, instead, the **Unlimited fields** option was selected, then the window will display the file preview taking into account the selections made in the previous window as well as offer the user a section used to specify the types of separators to utilize.

In the last window of this guided procedure, the user can continue by assigning the data to import into the booklet fields.

This operation can be done by clicking on the column header where temporarily the text notes **Ignore**; if this name is not changed then the column will not be included in the import.

Another task to do in this window is specify whether or not a line is to be imported using the check box below of the line.

The procedure is very similar to the one associated with the **File | Import | Coordinates activated by Graphic View File** menu command.

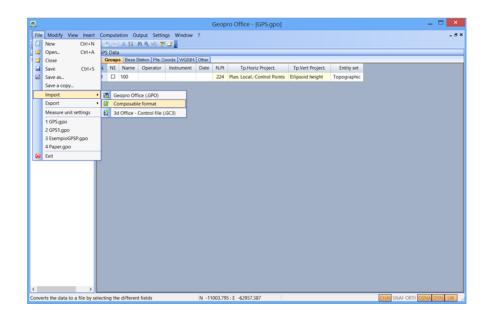


Figure 158:

Import 3d Office - Control file (.GC3)

This function is used to import control points from a file in GC3 format. When this command is activated, the file name to open is requested.

								Geop	ro Office - [GPS.gpo]				 ×
File		Insert Ctrl+N			utput Settin 19 4 👜 🏹 🍞		v ?						- 8)
		Ctrl+A	PS Da										
	Close Save	Ctrl+S			Station Pla. C Operator	Instrument		N.Pt	Tp.Horiz Project.	Tp.Vert Project.	Entity set		
	Save as	cur+3		100	operato.				Plan. Local .: Control Points		Topographic		
	Save a copy												
	Import	•		Seopro Off									
	Export	•		Composabl									
	Measure unit set	tings	11	3d Office -	Control file ((GC3)							
	2 GPS1.gpo												
	3 EsempioGPSP.	gpo											
	4 Paper.gpo												
Θ	Exit												
		- 1											
		- 1											
		- 1											
		- 1											
		- 1											
		- 1											
		- 1											
		- 1											
		- 1											
		- 1											
		- 1											
		_											
<	ta a GC3 file	>							5:E -62957.387			CHAI SNAF OR	

Figure 159:

A GPS group is created with the file name; for each point included in the file, the following will be created:

•A GPS point, inserted into the just created group, if there are geographic coordinates present.

•An orientation point, if the plane coordinates are present.

Computation Projections computation

This command, activated from the **Computation** menu in the **GPS data** view, is used to set the type of projection to be used for transforming the geographic coordinates into plane and altimetric coordinates through a guided procedure.

The first window opened by the procedure is used to select the group of points on which to calculate the projection.

If a projection has already been calculated for a group, then to continue, the user must insert a check mark in the **Cancel the computation** box thereby canceling the previous elaboration.

If the file includes TS data, then a check box will appear allowing the user to select whether or not to elaborate this data along with the GPS data.

Sel No. Grup Name Comp 1 100 Yes Select the Groups you want to process. The Projection of the selected Groups has already been done! To continue, check the box below. Computations performed on the previously selected Groups will be replaced at the end of this! Image: Compute also the TS data	Computation of projection : ir	nitial information the GPS data
this!	Sel No. Grup Name Comp	The Projection of the selected Groups has already been done! To continue, check the box below. Computations performed on the previously
From File < Indietro Avanti > Annulla ?		this!

Figure 160:

If the user selects to elaborate the data together, then the next window asks which TS jobs are to be elaborated.

If they have already been elaborated, the user is asked to confirm that the program is to elaborate the data again using the specific check box.

Computation of projection	: initial information the TS data
TS data S N Job name Comp ⊠ 1 Job n.1 Yes	Select the Jobs you want to process. Computation od TS data on selected Jobs has already been done! To continue, check the box below. Computations performed on the previously selected Jobs will be replaced at the end of this!
	Cancel the computation
Save < Indietro	Avanti > Annulla ?

Figure 161:

Continuing in the guided procedure, a page will appear in which the user can insert certain options:

•Read from file: this option is used to select whether to read the values used in the projection from a file saved at the end of a previous calculation onto another file. Placing a check mark in this box will activate the edit box found under the "..." button. Press this button to select the file from which to take the values for the calculation. All other options will be disabled and pressing the **Next>** button will carry the user directly to the end of the procedure.

Computation of projection : options
Pre-transformation of the original coordinates
No transformation Edit 7 parameter zone No transformation Transformation through 7 parameters (eg from IGByy) Transformation from a geographic localization points Computation options ✓ Auto search codes
Print options
Save <indietro ?<="" annulla="" td=""></indietro>

Figure 162:

•Pre-transform Original Coordinates: if the measured GPS coordinates refer to a system other than WGS84 then the following transformations are available to run:

1. Using 7 parameters: in this case, the user must insert the conversion parameters from/to WGS 84.

	Edit 7 para	ameter zone	×
Zone name	WGS 84		
Conversion parame	ters to/from WGS 84		
Scale (ppm)	K	From To	
Translation [m]	Tx 0	Ty 0	Tz 0
Rotation [sec]	Px 0	Ry 0	Rz 0
	ОК	Cancel	

Figure 163:

2.From geographic orientation points: this transformation is automatic and the results (including the discards and translation values) are posted in the window seen here below activated by pressing the **Next>** button in the **Calculate projections: calculation options** window.

Point name	Geoc.Recalc(x)	Geoc.Recalc.(v)	Geoc.Recalc.(z)	Variance
101	4659805.112	905774.358	4245623.910	0.000
Results				
	(Computation perform	ned	
Mean residual	(0.000 Tra	· · ·	15.666 Trasl. Elev.	2928221.37
Mean residual Max Dev.		asl. North 5792		2928221.37

Figure 164:

•Options for Calculation: placing a check mark in this box will activate the program to search various codes (HC, VC, OC, ...) needed for the elaboration. This association is done comparing the TS point and GPS point names and with orientation point names. The association will be run only if the names are absolutely the same, including capital and lower case letters.

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•**Print Options:** placing a check mark in this box the user will have, at the end of the calculation, a printout of the layout calculation results of it is run by control points.

The next window is used to select, respectively, the type of horizontal and vertical projection.

	Planimetric projection	Vertical projection	×
Planimetric localization	n Planimetric localization: Control points	Vertical localization Type Elipsoidal Elevation	
Planimetric coordinate Projection Datum	e system	Vertical coordinate system Geoid model	
Save	<indietro avanti=""> Annulla ?</indietro>	Save <indietro ?<="" annulla="" th=""><th></th></indietro>	

Figure 165:

The selections available for the horizontal projection are:

Plane localization: Control points

For this type of calculation, at least two GPS points are needed or, for mixed calculation, two TS points whose coordinates are identified in the reference plane where all of the GPS Groups or selected TS Jobs points are to be roto-translated. Translation, scale and rotation angle will be calculated by the program using the minimum squares method. Roto-translation is done after a GPS points projection that can be orthagonal or stereographic, as chosen by the operator.

A window will appear with the lists of points that have been coded HC automatically or by the user. Alongside each point will be a small box colored:

•White for invalid GPS points, that is for those that did not find correspondence with orientation points.

- •Yellow for valid GPS points
- •Blue for base GPS
- •Green for TS points and stations.

S Localization Pt.Name	Req	lorth	Req East	Variance
■ 101	-1136		63288.384	448.203
I02 I03	-1174 -1126		62911.415 63261.582	76.641 405.163
Projection method	Results			
 Orthogonal 		Computation	performed	
○ Stereographic	Mean residual	310.002	Scale	6.031844
	Max Dev.	448.203	Rot Angle	101.8743

Figure 166:

Click on the small box to either remove or replace the check mark to include or not the point in the calculation. If at least two were found and used then the calculation can be executed. This will be appropriately highlighted in the Results section of the window. In the same section the average and maximum discards will be identified along with the scale and rotation angle calculated. Alongside each point the corresponding discard will be indicated.

Finally, a check box is included used to set the scale at 1 to be used for the projection.

Plane localization: Data Entry

This type of calculation will roto-translate the selected GPS groups points to assign to them the coordinates desired by the operator. Again the operator must insert the values for the scale and the rotation angle. Here too, the roto-translation is done after a GPS points projection that can be orthagonal or stereographic, as chosen by the operator.

A window will open, similar to the preceding ones, only that in this one will list all of the points included in the GPS groups and any selected TS jobs. Alongside each point will be a small box whose color indicates the same information as the previous options.

Only one point can be selected. This point will show the corresponding small box checked off. The selection can be done for all points independent of the fact that correspondence with the orientation points was found or not. Selecting a point for which this correspondence was found, the North and East coordinate fields will be filled with the values inserted for the orientation points; otherwise the user must insert the desired values using the keyboard. Similarly, the user must insert the values for the scale and rotation angle which, in this case, will not be calculated by the program but rather are selected by the user. Each point with noted coordinates (yellow box) will display alongside it the corresponding discard.

			eq East	Variance	^
100	-1145		153.794		
101	-1153		135.674	481.901	
102	-1146		074.141	248.698	
103	-1152		151.941	557.781	
105	-10914		819.689		
106	-1091		820.882		
107	-1160		463.083		\sim
Projection method	- Values for the tr	ansformation			
Tojecton method	Values for are a				_
 Orthogonal 		Computation	performed		
O Stereographic	North	North	Scale	1.00063	4
	East	East	Rot. Angle	399 486	1

Figure 167:

The selections available for the vertical projection are:

Quote localization: Control Pt.

For this type of calculation, at least one GPS point is needed whose quote is identified in the reference system in which the selected GPS Groups points are being calculated.

A window will open, similar to the one that appears by selecting **Localization plane: Control points** in regard to its functionality as well as in regard to the system of point colors. In this window all of the points that have been coded OR automatically or by the user will be listed.

Click on the small box to either remove or replace the check mark to include or not the point in the calculation. If at least three have been found and considered then the calculation can be run for **Average points** as well as **By plane**. If fewer than 3 points are considered then the calculation can be run only for **Average points**.

The **Average points** calculation involves finding a vertical translation value from the average, for each considered point, of the differences between the ellipsoid quote and the quote inserted in the Orientation points section. The **By plane** calculation involves first an orthogonal or stereographic projection of the points and then the calculation, using the minimum squared method, on a plane that passes along selected points.

Com	putation of projection	: vertical localization	on 📕
Localization points for e	evation computation available		
Se Name Pt. Elev.	Orig. Elevation	Elevation Recalc.	Variance
■ 101	263.000) 255.420	7.580
■ 102	244.890		-10.530
■ 103	258.330) 255.380	2.950
<			>
Projection method —	Computation Method	Results	
Projection method			
Orthogonal	 Average points 	Computation pe	erformed
O Stereographic	On a Plane	M.S.D.	
		Max Dev.	10.530
Save	< <u>I</u> ndietro <u>A</u> va	nti > Annulla	?

Figure 168:

Quote localization: Data entry

A window will open whose functionality is similar to the one that appears when selecting the Localization plane option: Calculation. The only difference is in the fact that in this case, for the desired point, a quote value is inserted while for the other, the North and East coordinates are inserted.

Computa	tion of projectior	: vertical locali	zation		x
Localization points for elevation	on computation available	•			
S Name Pt Elev.	Orig. Elevation	Elevation Recalc.	Variance	^	
1 00		0.000			
1 01	263.000	65.080	197.920		
1 02	244.890	65.080	179.810		
1 03	258.330	65.040	193.290		
105		13.696			
		13.278			
		14.307		~	
Projection method	Value for the transform	nation			
 Orthogonal 	(Computation performe	ed		
○ Stereographic	, Elevation to be assig	ned to the point	0.00	0	
Save	< <u>Indietro</u>	ranti > Ann	ulla ?		

Figure 169:

Ellipsoid height

In this case, the ellipsoid quote assigned to the points is used.

Any Roto-Translations of Various Entities

The program checks to see if the GPS Booklet has already been elaborated. If so, then the program checks for the presence of other entities in the file (Frames, Graphic Entities, Constraints, Borders, Triangles, Level Curves, Profiles and associated Projects) and displays a window where the user can select whether to change the position of the entity (roto-translate) based on the re-elaboration run previously.

Computation of project There are entities that can be Roto-Traslate accorders data		>
CAD entities	 Only entities not in locked layers All entities 	
Other entities Trans. frames (translation only) Roto-Trans. Breaklines and Boundaries Roto-Trans. the Triangles	 Recomputation of the Contours Recomputation of the Profiles 	
Save < Indietro	Avanti > Annulla ?	

Figure 170:

At the end of the procedure, a last window will appear where the user must press the **Complete** button to run the real and true calculation of the points.

It is also possible in this step to go back using the specific button to review counts or potentially run changes to the calculation options.

Also, a **Cancel** button is available to exit from the procedure without any effect on the program document.

The Projection computation is finished.
The Projection computation is finished.
Press 'Complete' to convert the data in the Selected Groups of the GPS data.
Save <indietro ?<="" annulla="" complete="" td=""></indietro>

Figure 171:

Output

The Output Menu in the GPS data includes two commands:

•Gps data|Print all groups

•Gps data Print with select groups offers the user the option (through the specific window) to use the mouse to select which station to print.

0							Geopro Office - [GPS.	gpo]			_ □
File Modify View	,		I A 2 G	PS data 🔸	🧬 Pri	int all ç					- 4
	GPS (int with	choice of groups				
Document conte B- TS data (1 Jc				Coords WGS84		A1 04	Rolling Barlant	To Mark Decision	E di burret		
B- GPS data (1)			e Operator	Instrument	Date	N.Pt	Tp.Horiz Project.	Tp.Vert Project.	Entity set		
B Shown point	1	100				224	Plan. Local: Control Points	Ellipsoid height	Topographic		
B- S DL Data (0 G											
- CAD - Profiles											
- Roads											
Raper spaces											
nt all TS Data						N -1	1003.795 : E -62957.387			CHAI	SNAF ORTH OSNA DYN LW

Figure 172:

The GPS groups can be printed also according to a free format defined by using the **Settings | Print Options** command. For this type of print the user can also select whether to print all groups or just some.

The **Settings | Print Options** command is used to also define the free format to be applied if the user wants to also produce an outcome of the File data (**File | Export | Free format** command).

x
=

Figure 173:

GPS Data

File|Export

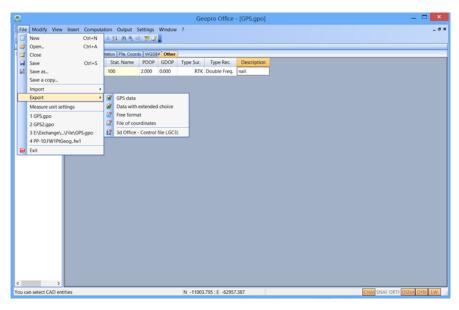


Figure 174:

GPS data: by running the **File | Export | GPS data** the user can export the GPS data in file by selecting the file name and save path through the specific window.

8	C	REA FILE LIBRETTO PUNTI GP	S		x
Salva in:	👢 CorsoMary	•	(† 🖻 🖨	*▼	
Risorse recenti	Nome Avanzato Base Esempi ManualeGisPe	erMeridiana		Ultima modifica 14/06/2013 13.00 26/06/2013 10.20 18/06/2013 13.12 25/06/2013 09.56	
	<				>
	Nome file: Salva come:	EsempioGPS1.bt File ASCII (*.TXT)		Salva Annulla	

Figure 175:

Data with extended choice: this command creates an ASCII format file that can be set as desired.

			Sele	ction field		>
Field list			Sele	cted fields		
Name Description	^			Field	^	•
Latitude Meas.			1	Name		
Longitude Meas. Ant. Height Meas.		>>	2	Description		Up
Coord. GeocX Ground Meas.		<<	3	Latitude Meas.		Down
Coord. GeocY Ground Meas. Coord. GeocZ Ground Meas.			4	Longitude Meas.		Down
Antenna height Quality			5	Ant. Height Meas.		
Northing			6	Antenna height		
Easting Elevation			7	Quality		
Horiz. RMS	\sim		0	Horiz PMC	~	·
Separator O Comma O Semicolor O Space O Tab	1		0	ates for the names) Yes) No		
		Ok		Cancel		

Figure 176:

Once the command is run, a window will appear used to insert the information for creating the file.

The left part of the window shows the list of fields available to export. To make the export effective, the user must select the desired field and then press the ">>" button. A new line will be inserted into the list shown in the right part of the window. Selecting a line from list on the right and pressing the "<<" button will instead eliminate that field from export.

It is possible to select the separator character inserted between the various fields and the usage of double apexes for names.

Press **OK** in this window and another one will open to select the name of the file to create. Initially the name will be set equal to the open program file but will instead have the TXT extension. This name can be changed by the user and the file can be saved in a file as desired.

Free format: This procedure creates a file based on a format set using the **Settings | Print Option** command, GPS data Page, used to select the field to insert and any decimals numbers to be used.

		Neme	Description Latitude Longitude	Elevation Ant Height		
		100	NAL 4210103 (1008) (210700 4100)	201-021 (100		
		67	nal 4210936-255391 (210532-33419	307-67 1.650		
		108	nal 47693627087 (270932164) nal 476938,11907 (2707323658	205.110 1.500 202.343 1.500		
		110	Aut 4710731 59434 1010102 7052	252.100 1.550		
		200	Aut 4210543387941 1210553 82360	293.621 1.500		
		105	HAL CREATING CONTRACTION	305.045 1.500 305.425 1.500		
		107	*# C18362639, C105303345	307.407 1.000		
GPS DA	TA	00	Hall 4216838,119001 (21082,1640) Hall 4216838,119001 (210702,3650)	205.109 1.500		
		112	nal 4/1017.5143F (2/0702.7002	252 190 1.500		
Fie	188ARIANGELA/Exchange/CorsoGeoproOffice/FierGPS.gpo	220	nal 4210943.00797 (210553.0230)	203.925 1.500		
Barne	Description Latitude Longitude Elevation Ant. Height	105	Hall 4710352340101 (210700-4714) Hall 471032-73081 (210700-4714)	305.848 1.500		
		-	+# @"1836.2653F 12"0532.33459	07.47 1.00		
	OH000 4215741.214(0 1210643.530(5) 250.150 1.550	828	*** 47/10/2010/00/2010/04/2	308.116 1.500 252.343 1.500		
105	nail 42*5956.84040* (2*0700.47143 X08.346 1.500	770	Aut 4215937394591 101070270802	292 190 1.000		
X08 107	nat 42*5958.78288 12*0700.4188 305.425 1.550 nat 42*5958.26539 12*0712.35478 307.457 1.550	220	nal 42"3343.33794" (2"0553.9226)	203 525 1.500		
108	Hall 42*5938.2108F 12*0532.15454 208.159 1.522	105	144 470956.54010 (210700.4114) 144 470956.7909 (210700.4109)	305.845 1.535 305.425 1.530		
109	Har 42"59133 11900 12"07102 38558 392 543 1.500 Har 42"5912 59439 12"07102 78402 392 510 1.550	427	14 4"15536,25539" (2"0532,334/3	307.457 1.000		
20	Nel 471943.88794 1270513.8280 280.805 1.500	100	144 C 1005 27087 C 1072 16 C 1	X6.159 1.550 252.343 1.500		
105	eal 42*5958.84046" (2*0700.47143) \$28.845 1.550	110.	Ad C 1912 1942 C 1912 1963	20.90 1.00		
87	Hell 42*5938.79236; 12*0705.418[1 305.426 1.550 Hell 42*5939.25537; 12*0752.33419 307.457 1.550	200	AN 6-104719-10-001710200	293.925 1.550		
108	Nal 42*5838.3108F 12*0832.15404 308.169 1.550	108	Auf 47055234010 1210700 KTH3	305.848 1.500		
109	*## 42*5938.11900" 12*0702.36538 282.343 1.550 *## 42*5937.55439" 12*0702.79802 260.100 1.550	107	nal 42198706 256387 1210852 33479	307.467 1.600		
200	Auf 4210943.007667.0210663.02360 280.025 1.650	100	Here Charles (1997) Charles (1997)	205.100 1.000 202.342 1.000	provide the second	
55	Auf 42*5958.34016* 12*0710 47143 305.345 1.550 Auf 42*5958.78296* 12*0710 41811 305.405 1.550	110	14 4210337.03497 (210702.7002)	262.100 1.500	Syle Format Te	xt Rows Column
100	Aul 4210908.78296 1210710.41801 300.425 1.850 Aul 4210930.28539 1210712.33418 307.457 1.650	200	nal 42*3341.0079F 12*0951.02300	293.921 1.530		
108	Hall 42*58/38.270887 42*08/32 16404 208.059 1.550	105	HAR COSTALIATION CONTRACTOR	206.046 1.500 306.425 1.500	Style	
109	ead 42*5838 11900 12*0702 35558 282,343 1:550 ead 42*5837 594437 12*0702 78502 282,560 1:550	er	AM C"1838.2853F (2"0832.3345	307.407 1.500		
20	nal 475043.88797 (20053.8230) 201.825 1.500	100	+# C1836,2308, C1072,3608	203-109 1.000 202-343 1.000	Detault	
55	mail 42*5956.640/67 12*0700.47143 306.645 1.550	112	Ad C1001130427 (210102 2002	20.90 1.00		
108	mail 42*5958.78238(*12*07700.4188) 305.425 1.500 mail 42*5930.25539*12*0612.30418 307.457 1.550	200	nal 42°3343.88799, 12°0853.82280	293.921 1.500	Seve	Pensme Delets
108	Auf 42*5810.27096" 12*0612.15454 304.109 1.500	105	144 475355340167 (210700-4116) 144 475355730287 (210700-4110)	305.945 1.500		
109	Hell 42*1010 11902 12*0702 30556 292 343 1100 Hell 42*1010 340 01 12*0703 47143 305 345 1100		Nal 471093625539 101063233413	307.407 1.500	Model	
106	Hall 42*5958.75296" 12*0/700 41801 308.428 1.550	100	Ad C 1000 21087 C 0012 HO 44 C 1012 HO 100 C 0012 HO 100 C 1000 2000	205.100 1.000 202.343 1.000	Model	
807	Hell 42*5936.255397 12*0632.33419 307.467 1.533	112	*# <7837.7842 (200702.3802	202341 1,000 202340 1,000	Current templat	
101	rai 421503027000 (2125321544) 305.109 1.500 rai 4215038.11900 (21270238558 282.343 1.500	200	AM 421543381961 12105533030	293.925 1.00		
110	Hall 42*5857 594097 12*07102 79802 282 100 1.000	100	Aut 471015234010 1010700 KTN3 Aut 4710152 1000 1010700 KTN3	205.845 1.500		
20	Hall 4210543 201794 1210553 2025 201 201 201 150 Hall 4210553 64045 1210700 47143 201 345 1.500	67	nal 42*0836,255391 (2*0832,3341)	307.407 1.000	Header	
100	Har C*1905 7508 C*0700 4181 X01 C8 1.50	108	Hall CHEMIC 2008, CONTO 1804 Hall CHEMIC 2008, CONTO 1804	205.109 1.500 202.342 1.550	Headeron a	a pages
107	AM 4218308 2003 2007 200832 33473 300 407 1.000	100	nal 47-5932 (1992) (21-07-02 3853) nal 47-5937 59439 (21-07-02 3853)	282.343 1.550 282.360 1.550		
108	nal 42*1930.2709/ 12*0212 1540/ 300 109 1.000 nal 42*1930.11902 12*0702.35505 362.343 1.550	- 200	AN 6"1041307M" (2"00113230)	201/021 1.000	Header only	on the first page
110	Hall 42*5857.594091 12*0702.79502 202.100 1.500	100	AN CONSENSOR CONSENS	305.945 1.500 305.425 1.500	O No hender	
200	nar 42*5943.087967 12*5953.82300 280.825 1.550	107	VE C.03073036, C.04094181	87.47 1.50	() No header	
62	Hall 42*5958.3H0787 12*0710 47140 308.3H8 1.500					

Figure 177:

File of coordinates: this procedure is used to create a file by selecting the variables and their order. The file will take into account the results of the Projection calculation run on the GPS data.

Once this procedure is activated, a window will appear in which to select the variables to be inserted into the file to create. It is also possible here to select the number of decimals, the separator between one datum and another and whether to include names among the double apexes.

Once confirmed, this window will activate the preview of the file selected for creation.

С	reate coor	dinat	es file - Options	×
ر ۷	ariables to use			
			Variable types	
F	Field 1	-		~
f	Field 2	Name	,	*
f	Field 3	Code	/ID	~
f	Field 4	Northi	ng	*
F	Field 5	Eastir	ig	~
f	Field 6	Eleva	tion	*
f	Field 7			~
f	Field 8			*
-Se	eparator		- Quotes for the names	
(Comma 		⊙ YES	
(Semicolon		O No	
(🔾 Space			
(⊃Tab			
	ОК		Cancel	

Figure 178:

3d Office – Control file (.GC3): this function is identical to the one in the Known point data and is described in chapter III of the base course (Known and Control Points) paragraph VIII.

Details

Code Meanings: see the "Introduction" section of the Base course or the program's online guide, "Point Codes" document.

Run the projection calculation: see the online guide GPS data View Elaboration Menu.

GIS: refer to the program's online guide, CAD View|GIS menu.

Creating Design Models: see the "CAD View" section of the Base course or the program's online guide, CAD View|Format menu.

Modify Menu: refer to the program's online guide, Modify Menu (Numeric Views).

Free format: see the Print Module chapter in the base course or the online guide of the GPS data View Menu File|Export, Outcomes and Options.

Entity sets: refer to the program's online guide, Format|Entity sets.

Post Processing Calculation

Introduction

This chapter will outline the Post Processing Calculation with an example file (PP-10.gpf) created with the Geopro Field program. All the same, note that the calculation can be run also through other data acquisition methods, for example, data stored directly within Sokkia/Topcon receivers in TPS format, or using RINEX, RINEX-Hatanaka and compressed files obtained from other receivers.

The data in the example were obtained from Geopro Field using **Points also in Post Processing** mode. When selecting this method, Geopro Field creates a folder with the same name of the .gpf file and stores inside it a TPS file format for each measured point also in RTK (see Appendix).

The command to run this calculation is found in the **Computation** menu of the GPS data View.

۲				Geopro	Office - [PF	o.gpo]	1		- 🗆 🗙
File Modify View Insert Cor			utput Settir omputation	ngs Window	?				-8×
Document 4			ing computa			<u> </u>			
B-G Document content TS data (0 Job.)			_	Pla. Coords 1	-				
 GPS data (3 Grp.) 	N.	Name	Operator	Instrument	Date	N.Pt	Tp.Horiz Project.	Tp.Vert Project.	Entity set
- Known points data (0 Gro	1	PP-10			5/8/2010	1	Plan. Local.: Data entry	Vert. Local.: Data entry	Topographic
- DL Data (0 Group.)	2	vrs			5/8/2010	4	Plan. Local.: Data entry	Vert. Local.: Data entry	Topographic
- CAD	3	1000				5	Plan. Local .: Data entry	Vert. Local : Data entry	Topographic
Roads									
< >	<								>
Compute Post processing of GPS da	t							CHAI SNAF ORTHOSN	A DYN LW

Figure 179:

Step 1 - Selecting Rover points

Having opened a work created with Geopro Field as **Points also in Post Processing** mode, the program will use the files found in the folder with the same name as the .gpf file (PP-10) to identify the Rover points.

The table includes one line for each inserted point.

The data shown in the **Details** and **Antenna Used** squares refer to the line selected in the table.

The table columns are:

• Used. (To exclude but not completely eliminate the point from the calculation the user must remove the check from the column);

File Modify View Insert O	Itput	Settings	Window	v ?								- 6
🗇 🐸 🖬 🖪 📭 🗞 📷 🖥 💷												
Document × - Document content - TS data (1 Job.)		pup 1: 100 Points Co Name		East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
	2	104 102 103 101	10.262 -10.627 -70.983 -74.948	79.884 79.691 2.424 18.714	65.080 65.040	building corner building corner building corner building corner						
→* Pt. 102 →* Pt. 103 ** Pt. 103 ** DL Data (0 Group.) →* CAD •* Profiles •* Roads Raper spaces												

Figure 180:

- Name;
- Status (if the symbol is green then the file is properly present in the computer at the indicated path, if the symbol is red, then the file is no longer present in the computer; this may occur when there is repetition of the elaboration);
- Start: this indicates the moment when the measuring begins;
- · End: this indicates the moment when the measuring ends;
- Ant. Type, this identifies the antenna model used which may be changed using the **Change Antenna** button;
- Hei.Ant.Mea. (m), indicates the height measurement of the pole supporting the receiver.

Document ×	Gro	up 1: 100		_								
- 3 Document content	_	oints C	odes									_
B → TS data (1 Job.) B → GPS data (1 Grp.)	Ν.	Name	North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
Southand State (1 Gip.)	1	104	10.262	79.884	65.040	building corner						
😑 📷 Group 100 (4 Pt.)	2	102	-10.627	79.691	65.080	building corner						
- 🔎 Pt. 104	3	103	-70.983	2.424	65.040	building corner						
- → Pt. 102 - → Pt. 103 - → Pt. 101	4	101	-74.948	18.714	65.080	building corner						
Pt. 103 DL Data (0 Group.) CAD Profiles Roads Paper spaces												

Figure 181:

The information that the receiver tends to recover from the loaded file and displaying it can be changed by the user.

Press the **Add** button in the Step 1 window to open another window used to select the file to be used for the calculation. These files may contain data in various formats such as .tps, RINEX, RINEX-Hatanaka and compressed files. The **Eliminate** button is used to eliminate a previously selected file from the calculation.

Step 2: Selecting Base points

Continuing in the guided procedure, a window will open where the user must select the files holding the data needed for the Post Processing and that represent the Base Points, that is, those points for which the noted coordinates are known exactly.

The functionality of this window is similar to the one used for selecting the Rover points.

The only differences involve the **Change Coordinates** and **Add** buttons.

Document ×	Gro	up 1: 100		-								
Document content	F	Points C	odes									_
 TS data (1 Job.) GPS data (1 Grp.) 	N.	Name	North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
	1	104	10.262	79.884	65.040	building corner						
e 📑 Group 100 (4 Pt.)	2	102	-10.627	79.691	65.080	building corner						
- 🖋 Pt. 104	3	103	-70.983	2.424	65.040	building corner						
- * Pt. 102 - * Pt. 103 - * Pt. 101	4	101	-74.948	18.714	65.080	building corner						
PL 103 DL Data (0 Group.) CAD Profiles Roads Paper spaces												

Figure 182:

After selecting the desired file (in format .tps, RINEX, RINEX-Hatanaka and compressed files) the **Add** button will activate Step 2 where the user must select the exact coordinates of the Base corresponding to the just added file.

Document ×		pup 1: 100 Points Co										_
🗉 🐟 TS data (1 Job.)	N.	_	North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
GPS data (1 Grp.)	1	104	10.262	79.884	65.040	building corner						
How Provide the State of the	2	102	-10.627	79.691	65.080	building corner						
- 🔎 Pt. 104	3	103	-70.983	2.424	65.040	building corner						
> Pt. 102 > Pt. 103	4	101	-74.948	18.714	65.080	building corner						
- * Pt. 103												

Figure 183:

This window is used to select the method to select/insert coordinates to be considered as exact for the inserted Base point. The information and approximated coordinates taken from the selected file are shown in the specific square found in the lower left part of the window. The right part of the window shows the information on the antenna used.

Document ×		up 1: 100		_								
- 3 Document content		Points C	_									_
⊕- TS data (1 Job.) ⊕- GPS data (1 Grp.)	N.		North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
S-S Gradata (1 Gip.)	1	104	10.262	79.884	65.040	building corner						
😑 📑 Group 100 (4 Pt.)	2	102	-10.627	79.691	65.080	building corner						
- ≫ Pt. 104 - ≫ Pt. 102 - ≫ Pt. 103 - ≫ Pt. 101	3	103	-70.983	2.424	65.040	building corner						
/	4	101	-74.948	18.714	65.080	building corner						
Control points ** Pt. 101 ** Pt. 102 ** Pt. 103 ** OD ** CAD ** Profiles ** Rads ** Rads ** Rads												

Figure 184:

This last information is identical to what is shown in the window associated with Step 2 and can, as selected, be changed in this or the other window.

In the illustrated example the Null antenna is selected. As such, the value 0 is inserted for the height and set as the vertical measurement.

Document ×	010	up 1: 100										
B-G Document content B-S data (1 Job.)	-	Points C Name		f	El continue	Description	6	Martin	Church	Dharad	Dh	_
B- GPS data (1 Grp.)		Name 104	North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
Known points data (1 Group)	1		10.262	79.884		building corner						
😑 📷 Group 100 (4 Pt.)	2	102	-10.627	79.691		building corner						
- Pt. 104	3	103	-70.983	2.424		building corner						
># Pt. 102 ># Pt. 103 ># Pt. 101	4	101	-74.948	18.714	65.080	building corner						
Pt 102 Pt 103 Pt 103 CAD Profiles Paper spaces												

Figure 185:

The choices available for the selection of exact coordinates of the inserted base are:

1.Association with a Localization Point / Insert New Point. Executing this selection and pressing the **Next>** button will proceed to Step 2b where the user can select one of the Orientation Points in geographic coordinates or insert a new one. The coordinates of this point will be used as the exact ones for the inserted Base point.

2.Present values in the selected File. It is correct to select this option if the user knows with certainty that the coordinates present in the file are to be considered exact: for example, if the file is a virtual RINEX. Press **Next>** to return directly to Step 2 without executing other operations.

3.Association with a base station RTK present in the file. Executing this selection and pressing the **Next>** button will proceed to Step 2c where the user can select one of the RTK stations. In this case, the coordinates of this station will be used as the exact ones for the inserted Base point. Normally, the RTK base coordinates are obtained from the rover receiver through remote connection and stored in the work. This selection is correct only if the receiver used as RTK base is the same used to store the file for the Post Processing.

In the example the third option was selected, and therefore moves to Step 2c.

Document ×	Gro	up 1: 100)	-								
B- Document content	F	Points C	odes									_
 TS data (1 Job.) GPS data (1 Grp.) 	N.	Name	North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
	1	104	10.262	79.884	65.040	building corner						
😑 📑 Group 100 (4 Pt.)	2	102	-10.627	79.691	65.080	building corner						
- 🔎 Pt. 104	3	103	-70.983	2.424	65.040	building corner						
-	4	101	-74.948	18.714	65.080	building corner						

Figure 186:

Completing Step 2c, press **Next>** to return to Step 2.

The **Change Coordinate** button is used to change the coordinates selected for a specific Base point already inserted into the list.

The functionality of this button is similar to the **Add** button, only that it does not allow the selection of a new file but rather acts directly on the file corresponding to the line selected and will activate Step 2a.

Occument ×	0.0	oup 1: 100									
Document content	-	Name		Co.e.	Character and	Description	C	Numer	Sketch	Photo1	Photo
B-S GPS data (1 Grp.)			North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo
B- Known points data (1 Gro			10.262	79.884		building corner					
😑 📑 Group 100 (4 Pt.)	2	102	-10.627	79.691		building corner					_
— ≠ Pt. 104 — ≠ Pt. 102	3	103	-70.983	2.424		building corner					_
-> Pt. 102 -> Pt. 103	4	101	-74.948	18.714	65.080	building corner					
 — ▲ CAD — ◆ Profiles — ◆ Roads ■ Paper spaces 											

Figure 187:

The list above displays all of the Orientation Points in geographic coordinates found in the open survey.

These are points that can be consulted and edited in the **Geographic Points** page corresponding to the **Known points data** | **Control Points** node of the navigation tree.

To select the desired point, place the check mark in the associated box of the **Sel. column**.

The details corresponding to this point will be displayed in the part under the window.

The attention symbol displayed in the **Valid** box indicates that the distance between the approximate coordinates, found in the file (.tps, RINEX, RINEX-Hatanaka and compressed files) and those of the corresponding point is greater than the warning value.

To find more information, just use the mouse to click on this symbol and an **Attention** notice will appear.

🗋 🐸 属 🔍 🖻 💩 📑 👷		up 1: 100		-								
- 🞯 Document content	F	Points Co	odes									
⊕- TS data (1 Job.)	Ν.	Name	North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
GPS data (1 Grp.) How many states of the second	1	104	10.262	79.884	65.040	building corner						
E-Group 100 (4 Pt.)	2	102	-10.627	79.691	65.080	building corner						
Pt. 104	3	103	-70.983	2.424	65.040	building corner						
-# Pt. 102 # Pt. 103	4	101	-74.948	18.714		building corner						
 DL Data (0 Group.) CAD Profiles 												

Figure 188:

If what is desired is not found in the displayed points, the user can insert it by pressing the **Add** button.

In this case, the following window will open where the user is required to insert the name and coordinates.

For the coordinates the user can insert values in even just one of two ways: latitude, longitude and elevation or in geocentric format.

The program will run the calculation and automatically insert the values for the other method.

Press the **OK** button and the new point will be inserted into the specific section.

Then the program returns to the previous window where this new point is displayed along with any others.

		-			opro onne	e - [GPS.gpo]						-
File Modify View Insert Ou												- 6
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Document A		Points C										_
🗉 🚸 TS data (1 Job.)	N.	_	North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
	1	104	10.262	79.884		building corner						
Known points data (1 Gro Group 100 (4 Pt.)	2	102	-10.627	79.691		building corner						
Pt 104	3	103	-70.983	2.424		building corner						
-# Pt. 102	4	101	-74.948			building corner						
> Pt. 103 → Pt. 101						-					_	
Control points												
-* Pt. 101												
—¥ Pt. 102												
 + Pt. 103 DL Data (0 Group.) 												
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- S Roads												
- S Roads												

Figure 189:

Step 2c - Select Coordinates for Base from RTK Stations Present in Open Work

The functionality of this window is similar to the one used in Step 2b.

However, the RTK base stations present in the open work are displayed instead of the Orientation Points.

Further, the **Add** button is not available as new stations cannot be added.

		up 1: 100										
- Document content	-	Points C										_
TS data (1 Job.) Sector (1 Grp.)	N.		North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
 Stata (1 Gp.) Known points data (1 Grd Group 100 (4 Pt.) 	1	104	10.262	79.884	65.040	building corner						
	2	102	-10.627	79.691	65.080	building corner						
- 📌 Pt. 104	3	103	-70.983	2.424	65.040	building corner						
> Pt. 102 > Pt. 103	4	101	-74.948	18.714	65.080	building corner						
- ** Pt. 102 - ** Pt. 103 B • DL Data (0 Group.) - CAD - Profiles - Roads Paper spaces												



Step 3: Calculate Base Line

The Post Processing calculation is activated automatically when it is launched and the bar, found on the lower part of the window, displays the percentage of calculation completed.

During this phase the user cannot execute any other operation.

Document ×	0.0	Group 1: 100 Points Codes											
 TS data (1 Job.) GPS data (1 Grp.) 	N.	_	North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo		
	1	104	10.262	79.884		building corner							
Known points data (1 Group 100 (4 Pt.)	2	102	-10.627	79.691		building corner							
- 🖋 Pt. 104	3	103	-70.983	2.424	65.040	building corner							
> Pt. 102 > Pt. 103	4	101	-74.948	18.714	65.080	building corner							
B DL Data (0 Group.) CAD													

Figure 191:

When the calculation is completed the window will assume this appearance...

The table above lists the Rover points inserted during Step 1, while the lower part displays the detailed results of the calculation for the point selected in the table.

The green colored symbol found in the **Elab.** column of the table indicates that the elaboration was completed successfully; otherwise, it would be red.

The **Method** column will display the calculation method used and as such an alarm symbol will appear if any of the following values is not in tolerance.

	Gro	up 1: 100										
B- Document content	F	Points C	odes									_
 TS data (1 Job.) GPS data (1 Grp.) 	N.	Name	North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
B → Gr3 data (1 Grp.) B → Known points data (1 Gro B → Group 100 (4 Pt.) - P Pt. 104	1	104	10.262	79.884	65.040	building corner						
	2	102	-10.627	79.691	65.080	building corner						
	3	103	-70.983	2.424	65.040	building corner						
> Pt. 102 > Pt. 103	4	101	-74.948	18,714	65.080	building corner						
BL Data (0 Group.) CAD Profiles Roads Paper spaces												

Figure 192:

Using the mouse to click on this symbol will bring up a window that details the values that are not in tolerance.

Also, those values that do not comply with the tolerances are found with a red background in the table rather than the standard light yellow.

Document ×	010	up 1: 100		-								
Document content B-S Document content	<u> </u>	Points C										_
⊕- GPS data (1 Grp.)	N.		North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
😑 🧇 Known points data (1 Gro	1	104	10.262	79.884		building corner						
😑 📑 Group 100 (4 Pt.)	2	102	-10.627			building corner						
- 🔎 Pt. 104	3	103	-70.983	2.424	65.040	building corner						
> Pt. 102 > Pt. 103	4	101	-74.948	18.714	65.080	building corner						
ie → DL Data (0 Group.) → CAD → Profiles → Roads ■ Paper spaces												

Figure 193:

It only needs one point that does not comply with the tolerances and the lower part of the window will display the text in red **Attention! Some of the values calculated are out of tolerance!**"

It is advised to closely evaluate whether to continue anyway with the calculation procedure accepting the results.

To activate the Post Processing calculation again, press the **Compute** button. This operation can be repeated after selecting or deselecting the points on which to run the calculation, using the check mark found in the **Used** column or after having changed the calculation options using the **Options** button.



Note that if a point has already be calculated and the user wants to deselect the associated box for the subsequent calculation, then the calculation run previously for this point will remain valid.

As such, if the result of the first calculation fails to deliver the expected results for all the points, those points whose calculation delivered valid values can be deselected (while maintaining the obtained results); then the user can attempt to change the possible options and repeat the calculation on the points with dubious results.

Press the **Options** button to open the following window used to insert the values that may directly affect the calculation and the values that control the validity of the obtained results.

The values able to affect the calculation are:

- Minimum elevation of satellites to consider them in the calculation;
- Constellation to use; the options are **GPS+Glonass** or **Only GPS**.

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The values and tolerances able to control validity of the calculation are:

- Quality of the accepted calculation; the selectable values are: Only Fixed, Fixed and Float and Fixed, Float and Code;
- The minimum acceptable horizontal accuracy;
- The minimum acceptable vertical accuracy;
- The maximum distance between Base and Rover;
- Minimum hold time on an expressed point as minutes per km of Base-Rover distance.

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Bocument content		Points C	odes									
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B Group 100 (4 Pt.)	2	102	-10.627	79.691	65.080	building corner						
- Pt. 104	3	103	-70.983	2.424	65.040	building corner						
—≠ Pt. 102 —≠ Pt. 103	4	101	-74.948	18.714	65.080	building corner						
CAD Profiles Roads Paper spaces												

Figure 194:

It is not advisable to change the first, fourth or fifth of these values as less restrictive than what is suggested. By changing these values to be less restrictive, the lower part of the window will display the text **Some values set are not advised!**.

This warning will not though block confirming them.

Press the **Default** button and the values considered standard by the program will be refreshed. Press **OK** or **Cancel** to return to the previous window, respectively by conserving or canceling any changed data.

Step 4: Operations to run in GPS data

This window is used to insert the options for the changes to apply to the booklet based on the calculations executed.

The first option involves creating the new points from the Post Processing calculation.

The possible options are:

• In the same group as the original points;

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- In a single existing group to be specified;
- In a new group to be created specifically for this.

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Document ×		pup 1: 100 Points C										
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😑 📷 Group 100 (4 Pt.)	2	102	-10.627			building corner						
> Pt. 104 > Pt. 102	3	103	-70.983	2.424		building corner						
- Pt. 102	4	101	-74.948	18.714	65.080	building corner						
 ** PL 101 ** PL 102 ** PL 103 DL Data (0 Group.) ** CAD ** Profiles ** Roads ** Paper spaces 												

Figure 195:

Original points are those points with the same name as the newly calculated points. They are, for example, those points measured with Mercurio/Pegaso using **Points also in Post Processing** mode.

If the second option is selected then the **Groups in Which to Create Points** box will activate where the user can select the existing group to run the new point creation operation.

The possible options are:

- Use names assigned in the previous windows;
- Add a suffix to the new points.

If the last option is selected then the box below will activate to insert the desired suffix.

The last option involves original points and the possible options are:

- Add a suffix to the names of original points;
- Erase points;
- Do no operation.

If the first option is selected then the box below will activate to insert the desired suffix.

Press the **Finish** button to conclude the procedure with the creation of new points and running the other operations with the methods just selected.

If the procedure was interrupted in any of its steps, the options and data that may have been inserted will be lost. Instead, if the procedure is completed, then all of this information is stored and suggested again in a future calculation.

The image below shows the result of the **Post Processing Computation** using the options set in the previous window: the **GPS Coord.** page of the PP-10 Group just created shows the new points with the **new** suffix, which the previous points have been renamed adding the suffix **OLD**.

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	N.	Name	North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
e- GPS data (1 Grp.)	1	104	10.262			building corner	connent	Hotes	Sheten	THOTOT	111010	
Known points data (1 Gro Group 100 (4 Pt.)	2	102	-10.627			building corner						
Group 100 (4 Pt.)	3	103	-70.983	2.424		building corner						
>* Pt. 102	-	101	-74.948			building corner						
PL 101 PL 102 PL 103 PL 103 Pt 103 Profiles Profiles Paper spaces												

Figure 196:

How to measure points from Geopro Field

using "Points also in Post Processing" mode

To set the **Points also in Post Processing** mode in Geopro Field, open the **Opt.** page in the currently displayed window during GPS data acquisition.

More specifically, the user must select the item corresponding to the box found in the **Acquisition Method** square. The point holding time must also be set.

Use of the **Automatic Duration [min]** method is advised setting a time equal to 2 minutes per km of distance from the base station.

Document ×	010	oup 1: 100 Points C										
	-	Name	North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
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Pt. 104	3	103	-70.983	2.424		building corner						
> Pt. 102 > Pt. 103	-	101	-74.948			building corner						
 DL Data (0 Group.) CAD Profiles Roads Paper spaces 												

Figure 197:

Returning to the **Point** page the user can begin acquisition in both methods: RTK and Post Processing. For this purpose, press the **Start** button.

In the **Pass** box the time elapsed will display, while the **Rem** box will display the time still remaining to wait on the point. Once this time is elapsed, the acquisition will automatically terminate.

As noted from the texts seen on the window, the current point does not have a valid correction and therefore the precision with which it will be stored on the GPF file will be limited.

After transferring the data to the program and running the Post Processing calculation, this point will be substituted with another having an appropriately measured precision.

Document ×		oup 1: 100 Points C										
	-	Name	North	East	Elevation	Description	Comment	Notes	Sketch	Photo1	Photo	
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Known points data (1 Gro Group 100 (4 Pt.)	2	102	-10.627	79.691		building corner						
Pt. 104	3	103	-70.983	2.424		building corner						
> Pt. 102 > Pt. 103	4	101	-74,948	18.714		building corner						
- ** Pt. 102 - ** Pt. 103 B • DL Data (0 Group.) - ** CAD - ** Profiles - ** Roads - ** Paper spaces												

Figure 198:

Because Geopro Field creates a folder with the same name as the .GPF file where the TPS format file is stored holding the data used for the Post Processing, for each point measured with this method, the user must remember to transfer onto the PC not only the .GPF file but this folder too.

Orientation Points

Known and Control Point Data

Known Coordinate points are very important and can be used:

- In calculating triangles;
- In calculating level curves;
- In profiles;
- In calculating volumes.

Control Points are those coordinate or noted quote points that can be used in elaborating data.

Known Points Data View

The view associated with the Known points data is composed of just one page called Groups.

The following information is found on the **Groups** page:

- Name (alpha-numeric)
- Description (alpha-numeric)
- Comment (alpha-numeric)
- Date (alpha-numeric)
- Number of points in Group (numeric)
- Entity set

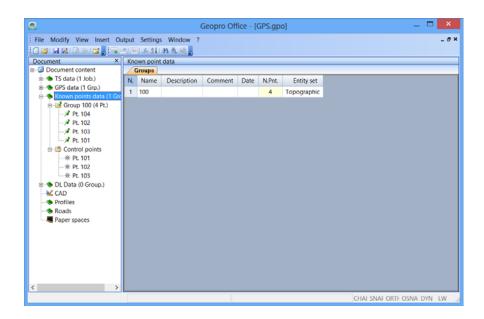


Figure 199:

Selecting the node corresponding to the Group created will open the corresponding view composed of two pages: **Points** and **Codes**.

The **Points** page is used to verify/change the following information: name, coordinates, description, Comment, note, sketch and two photographs.

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• Pt. 102 • A 101 -74.948 18.714 65.080 building corner • Pt. 103 • Pt. 102 • Pt. 103 • Pt. 102 • Pt. 103 • DL Data (0 Group.) • CAD • Profiles • Fe. 103 • Profiles • Reads • Ve. 102 • Ve. 103	-			2,424	-70.983	103	3	
						101		- 📌 Pt. 102
								→ Pt. 103 → DL Data (0 Group.) → CAD → Profiles → Roads
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On the **Codes** page, the user can:

- select the design model to associated to the point in CAD View; if the model is not selected the the standard is used. To create design models the user must activate the **Entity appearance** command from the **Format** menu in CAD View.
- insert the GIS theme (if defined). To create a GIS theme, the commands in the **GIS** menu found in the Graphic View are used. The theme must always be associated with a table.
- Activate/deactivate the codes used by the program to elaborate data or for other purposes.

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Figure 201:

If we extend the Group node (clicking the "+" alongside it) the navigation tree will extend listing the points that belong to the group.

Selecting a single point will display the view corresponding to the point which is also composed of two pages.

On the **General** page the user can verify/change the data associated with the point itself.

The GIS data is included on the GIS data page (again given that association with the GIS theme has been done).

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Figure 202:

The **Known points data** node not only includes the various known coordinate points groups but it also houses the **Control Points** node.

Clicking here will display a view composed of two pages: **Points** and **Geographic Points**.

The **Points** page displays all the information about orientation points, that is, the name, coordinates, description and the user can associate a note, sketch and two photographs.

The **Geographic Points** page displays the list of geographic points used in the **Post Processing Computation** procedure.

By expanding the **Control Points** node the program will display the navigation tree with the list of inserted orientation points.

Document			s (Localization	1)							
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B-B Group 100 (4 Pt.)	2	102	-11665.761	-62924.130	244.890	northeast corner					
- 🔎 Pt. 104	3	103	-11007.914	-62948.232	258.330	southeast corner					
📌 Pt. 102											
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Figure 203:

Selecting the point from the navigation tree will open the **Localization Point** view where the user can display/edit the associated data.

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Insert and Change Known coordinates points

To insert the known coordinate points the user must first create a group executing the following operations:

- Open the Groups page from the navigation tree by clicking on the **Known points data** node.
- Use the **Insert | Add row** command to insert the first line and, once some lines have been added, insert a line under the current one.

• Another command that can be used (only if lines have already been inserted) is the **Insert | Insert row** that is used to insert a line above the current one.

To create a known coordinate point, the user must work within the pages corresponding to the node of the group where the point will be inserted and use the same commands offered for the groups.

Once the lines are inserted (corresponding to the noted coordinate points) the user can insert the data or edit it directly in the table or specific point view.

Known coordinate points can be changed through the **Modify** menu functions.

Insert and Change Control Points

Manually inserting control points can be done using the **Add row** and **Insert row** commands in the **Insert** menu of the **Control Points** view.

Once the line is added, the data can be edited:

- Using the table;
- Using the view associated with the point.

For this view as well, to change the data there are functions available in the **Change** menu.

File Menu|Import

Coordinate Files

This command will activate a guided procedure to create noted coordinate points beginning with a coordinates file. A specific group is created for these points.

File|3D Office - Point file (.PT3)

This function is used to import points from a file in PT3 format. When this command is activated, the file name to open is requested. For each plane found in the file, a group of known coordinate points is created whose name is assigned by the juxtaposition of the file name and the plane name. For each plane a design model is also created with the same name as the plane and will be assigned to all points in the plane.

File|3D Office - Control file (.GC3):

This function is used to import control points from a file in GC3 format. When the command is activated, the user is asked for the name of the file to open and a GPS group will be created using the file name. For each point contained in the file, the following will be created:

- An orientation point, if the plane coordinates are present;
- A GPS point, inserted into the just created point, if there are geographic coordinates present.

File Menu|Export

File of coordinates

The **File of coordinates** command is used to create a file by selecting the data to include and their order.

Control Points

The **Control Points** command is used to create a file with all the defined control points.

3D Office - Control File (.GC3)

The outcomes to *.GC3 file (3D Office format from Topcon) is used to export the orientation points in .GC3 format.

If a GPS point in a GPS group exists for each orientation point with the same name then the associated geographic coordinates are also exported.

Output|Known points data

Executing the Output Known points data menu command will display a submenu that includes a series of commands corresponding to various types of outcomes that are available.

In regard to the **Print All Groups** command, the program will print all groups and the known coordinate points contained in the Known points data; the **Print with Selected Groups** command allows the user to tell the program (using the specific window) which groups to print.

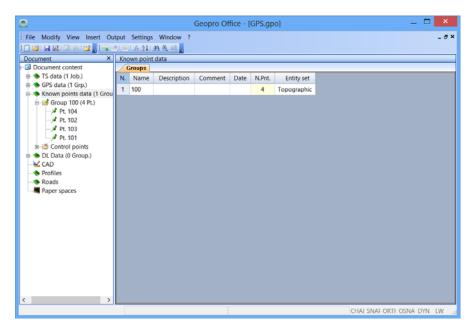


Figure 205:

The **Print Localization Points** command allows the user to print all of the control points found in the open file.

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int Localization points				-	_	_		CHAI SNAF ORTHOSNALD	_

Figure 206:

Details

Design ModeI: for greater detail on the **Design ModeI** refer to the Online Help CAD View Menu|Format|Entity Appearance.

GIS: for greater detail on **GIS**, refer to the Online Help Graphic View Menu|GIS.

Entity set: refer to the program's online guide, Format|Entity sets.

The program's Graphic View offers the user a series of functionalities to handle graphic items, items associated with various books, DTM projects, Road projects, GIS projects, and images.

The Graphic View makes it possible to use:

- Property view;
- Commands view;
- · Panoramic view;
- Detail view;
- Dynamic input.

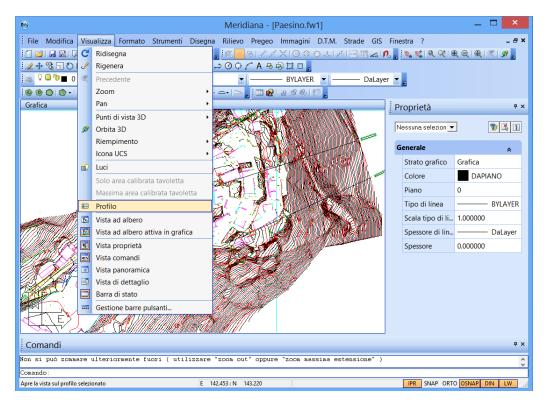


Figure 207:

Property view

The Property View includes a list of information associated with the graphic items that have been selected; also, using the specific commands found above and on the right, the user can:

- Activate/deactivate the double click during the selection specifically, if the third button is set at "1", the double click is activated and so by continuing with the same item the selection is not determined; if, instead, a "+" is set, then the second click is not considered and the item remains selected.
- Deselect all selected entities using the second button.

• Run a rapid search - using the first button.

Selezione rapida ×
Criterio selezione gruppo oggetti
Applica a: Disegno intero
Tipo oggetto: Multiplo
Criterio selezione oggetti
Seleziona tutto
C Proprietà
Operatore:
Azione fincludi nel nuovo gruppo di selezione C Escludi nel nuovo gruppo di selezione
Aggiungi a gruppo di selezione corrente
OK Annulla

Figure 208:

The rapid selection command is very interesting in that not only does it make it possible to run a fast selection by specifying the characteristics of the item to search, but it also creates multiple selection groups.

Below is a view of the window that will open for executing the command.

Use the upper part to specify in which context the search is to be applied, which type of object to select, and then run a deselection of the already selected items, if needed.

Use the central part to decide whether to select everything or specify the properties that the graphic items to search must have.

Use the lower part to notify the program whether to include/exclude the selection of the new selection group; finally, identify if the selection must be added to the current selection group.

The Property View can be activated or not by selecting/deselecting the **Property View** item from the **View** menu in the Graphic View.

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Figure 209:

Commands View

The Commands View offers the user a command line to run all of the menu commands in the Graphic View.

Once the command has run, it is stored in a list that can be recalled by using the **arrow** buttons; the user can also use storable alias commands by using the **General Options** command (**Alias** page).

Like the Property View, activation/deactivation of the view is done through the **Commands View** item on the **View** menu.

If the view has been deselected, functioning of the commands remains unchanged compared to the previous versions.

If, though, the view is activated, it is important to remember that to input data the dialogue window notes cannot be used but rather the view itself.

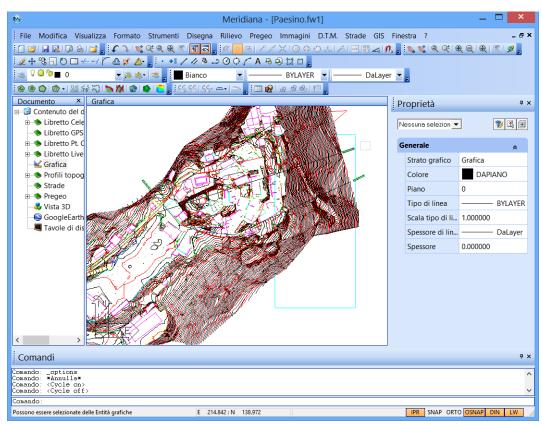


Figure 210:

The Command View offers the user the most selection options: for example, during insertion of coordinates, use the '@' symbol to specify that associated coordinates are being inserted and/or the '<' symbol to indicate angles.

During execution of the commands, it is also possible to use the booklet entity by editing it directly on the command line or by selecting it using the navigation tree view (if activated).

"Commands View: list of commands" on page 213 includes the list of recognized commands.

Panoramic Graphic View

The Panoramic View displays a window used to select an area to view in detail in the Graphic View. The window can be resized or moved. If the Real-Time option is selected and the left mouse button is held down, the effects of moving the window can be seen in real time in the Graphic View; otherwise, the Graphic View will be updated only when the final position is reached.

Graphic View in detail

The Detail View offers a detailed view of the graphic corresponding to the position of the mouse in the Graphic View. If the shift button is pressed, the mouse pointer will no longer be activated in the Graphic View but will be activated in the Detail View. This functionality was introduced to facilitate operations in Graphic.

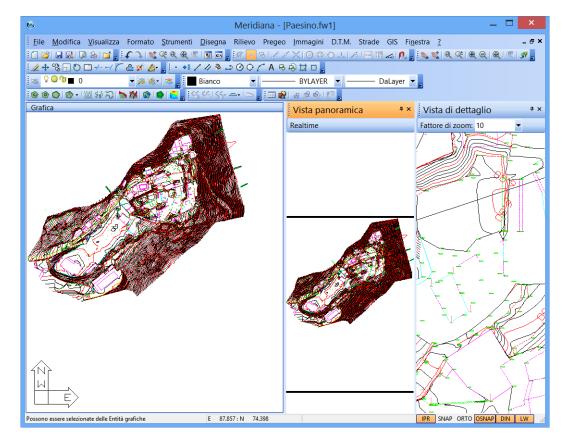
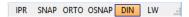


Figure 211:

Dynamic input

Activating this option during execution of Graphic View commands will display, near the cursor, a prompt of commands whose functions are similar to those of Commands View.



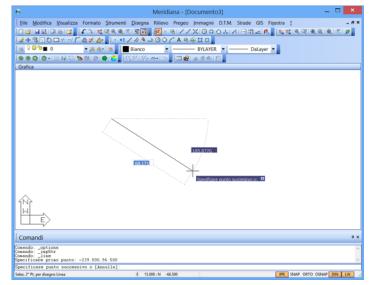


Figure 212:

More specifically, an edit will appear to input data associated with the designated object. It is updated continuously with the movement of the mouse.

The following buttons are used in the dynamic input:

- **Down Arrow:** to select the options available by the command.
- **TAB:** used to move between edits and dynamic insertion.
- -,: inserted coordinates will be Cartesian.
- **<:** inserted coordinates will be polar.
- **#:** inserted coordinates will be absolute type.
- @: inserted coordinates will be relative type.
- *: the value inserted will be considered as the name of the booklet points.

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Note that after inserting a value into an edit using the keyboard, the value will be blocked and a padlock symbol will appear. In this situation, moving the mouse will update only the unblocked coordinates. To unblock an edit, erase its contents and press **Tab**.

The dynamic input can be customized using the **Format | General** command in the **Dynamic Input** page of the **Graphic View**.

This page allows the user to:

- Select whether to activate execution of the commands and whether to view the coordinates and/or lengths;
- Specify the format (Cartesian or polar) and the type (absolute or relative) of the coordinates;
- Select the color of the text and command line fill;
- Specify the size and transparency of the command line.

Opzioni Generali ×
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Testo: Riempimento:
Dimensione Trasparenza
1.32 —
OK Annulla ?

Figure 213:

Example - draw a circle:

1. Using the dynamic input, recall the command from the Graphic View directly from the command line associated with the prompt.

2.Activating the command, the program will ask whether to specify the center of the circle (in this case the circle will be designed specifying the radius or diameter) or indicate using the **Down Arrow** button if using another method of design.

Specificare centro del cerchio o: 🖻 -21.246 411.610	Specificare centro del cerchio o: 3p 2p No ucs 3p
---	--



3.If 3 points are selected:

The program will request identification of the first point on the circle.

+		+
	Specificare centro del cerchio o: 🗉 -154.555 500.482	Specificare il primo punto sul cerchio: -167.251 557.614
	•3p	
	2р	
	No ucs 3p	



4. Then it will request selection of the second and third points.





5. Final result.



Figure 217:

Importing an AutoCAD file (.DXF/.DWG)

The Program allows creation of a Celerimetric Booklet using a DXF/DWG file.

After creating a new file, select the Graphic View and run the command: **Menu File | Import AutoCad (.DXF/.DWG)**.

The first thing the user must do is identify the file to import.

0	Impo	ortazione File DXF/DV	NG		×
Cerca in:	📜 EsempiPerVistaGrafic	a	• ÷ 🖻 🖻	* Ⅲ▼	
Risorse recenti Deskop Raccolte Raccolte Computer	Nome .svn CurveLiv.dxf Geopro.dxf Geopro3.dxf	•		Ultima modifica 28/05/2013 11.41 27/06/2013 10.33 28/09/2001 16.50 28/09/2001 16.57	
Rete		eLiv.dxf DXF (*.DXF)	-	 ✓ Apple ✓ Annu 	

Figure 218:

Once the file to import has been selected, a window will appear used to:

- Indicate in which Graphic Layer to store the imported graphic entities;
- Select whether to associate the points to the text or not.

If the **Associate texts to imported points** option is not selected, the points and texts will be stored separately.

Otherwise, association can be done using a distance criteria or by selecting to in any case input a point corresponding to the text.

Opzioni importazione da DXF/DWG ? ×
- Strato grafico
Strato grafico: Grafica
Associo testi a punti importati
Metodo per l'associazione
I testi sono associati ai punti che si trovano entro la distanza.
Distanza per ricerca (m) 1
C. Viene creato un punto in corrispondenza del testo
Piani contenenti i punti da modificare
PT_TOPOG_OUOT PREGEO_4_5_CENTRO PREGEO_4_5_SIMB PREGEO_4_5_NOME PREGEO_4_5_OUOTA PREGEO_4_5_OUOTA
Associo testi a blocchi particolari
Modello m Nuovo
Metodo Crea punti col nome 💌
OK Annulla

Figure 219:

Independently of the association method selected, the user can select the levels holding the points to be modified.

Press the OK button and the program will proceed with the Import.



Note that the settings of the AUTOCAD file will be maintained; more specifically, the graphic entities will be placed in the associated levels which will continue to retain the same name and same properties.

If module C is included, the program is able to interpret certain level names in a particular manner which may be found in the DXF/DWG file to be imported.

The names of these levels are:

- **VERT-TRI** All of the Points, Texts, Arches or Circles that belong to the level with this name are imported normally and placed in the level with this name. In regard to the Lines and Polylines, only the vertices are included. These are imported as Graphic Points and again, placed in the level with this name. This allows for any level curves found in the DXF/DWG file to be separated in points that can then be used for calculating the Triangles.
- VERT-T-C The program interprets this level the same as the previous with the only exception being that besides creating the Graphic Points from the vertices, a Tie for each Line and for each section of Polyline that belong to this level are also created. This makes it possible to force the triangulation along the level of the imported curves.
- **CONSTRAINTS** The Lines and Polyline sections that belong to the level using this name are imported as Constraints. All of the other Entities that may belong to this same level are ignored.

- **BORD-INT** and **BORD-EXT** The Polylines that belong to this level with this name are imported respectively as Internal Borders and External Borders. All of the other Entities that may belong to this same level are ignored.
- **DASH-NOR** and **DASH-SIG** The Polylines that belong to this level with this name are imported respectively as Dash Normal and Dash Significant. Beginning with these dashes, the splines will be calculated automatically. All of the other Entities that may belong to this same level are ignored.

The **Associate texts to specific blocks** option, is used to transform specific blocks found in the file being loaded as points with the name or as noted coordinate points.

To execute this transformation a model is needed.

The creation of a model can be done by pressing the **New** button.

Once pressed, the program will display a window where it is possible to set the options to associate the particular blocks, what to associate with the name, to the description and to the point model to be created; these selections are not required.

Ор	zioni per l'associazione dei blocchi 💦 🔀
Blocchi da ass	sociare
ST_TOPO(PPD_Stand TPD_Stand	lard
Opzioni Nome Descrizione Modello	
	OK Annulla

Figure 220:

The image below shows the result of importing in the **Graphic View**.

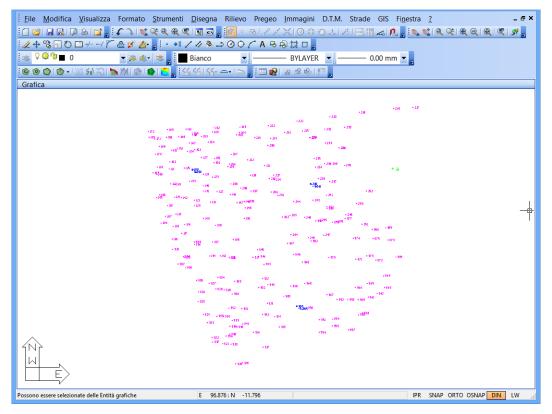


Figure 221:

Importing a Coordinate file

Use the **File | Import | Coordinate File** menu command to insert the entities stored in a coordinates file into the **Graphic View**.

Once the command is activated and the file to be imported is identified, the program will display the **Initial Selections** window.

Use this window to decide whether to run the import using the fixed length fields modality or the unlimited length fields; it is also possible to set the heading lines which will be discarded from the conversion and determine whether to eliminate the apexes from the texts.

The lower part of the window displays a summary of the selected file.

	Scelte iniziali
I dati importati saranno utilizzati:	
Per creare nuovi punti indipendentemente da	al nome letto
Dati da importare con :	Opzioni
🔿 Campi a lunghezza fissa	Numero righe di intestazione : 0
Campi delimitati	Eliminare gli apici dai testi
Anteprima file selezionato	
Riga Contenuto del file	^
1 "100",0.000,0.000,0.000,	
2 "200"4.104,33.986,-3.061,	
3 "300",-39.268,29.951,-3.395,	
4 "AN",10.000,0.000,1.445,	
5 "101".5.630,-5.992,0.819 6 "102".2.2676.451,0.808	
7 "103".9.35512.477.1.458	
8 "104",-0.903,-11.289,2.202,	
9 "105"8.02410.290.2.772	
10 "106",-15.319,-8.943,3.317,	
11 "107",-13.480,-7.689,3.005	
10 "102" -7 262 -0 ///0 2 7/3	*
	< Indietro Avanti > Annulla ?

Figure 222:

If the **Fixed Length Fields** option is selected, the next window is used to set how many fields to be imported and the length of each one.

This last piece of information must be inserted into the grid found in the upper part of the window while the lower part of the grid will display section by section the result obtained by the selected settings.

	ampi:	-5	_				-Sele			
Griglia pe	r l'immissi	one delle l	unghezze	dei dati. (l	Doppio-cli	ck sul num	ero pei	editare)	
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5	5	5	5	5						
Ŭ.	, in the second	, in the second	, in the second se							
Anteprim	а									
1°Cam	2°Cam	3°Cam	4°Cam	5°Cam	Fuori					
"100"	.0.00	0.0.0	00.0.	000						
"200"	4.1	04,33	.986,	-3.06	1					
"300"	39.	268.2	9.951	3.3	95					
"AN",	10.00	0,0.0	00,1.	445.,						
"101"	,5.63	0,-5.	992,0	.819,						
"102"	.2.26	7,-6.	451.0	.808.						
	.9.35	512	.477.	1.458						
"103"	0.9	031	1.289	,2.20	2					
		24,-1	0.290	,2.77	2					
"103"	8.0		8.943	3.31	7					
"103" "104"	8.0	319	0.945							

Figure 223:

If instead the unlimited fields option is selected, then the window that appears is used to select the field separator(s) to be used; here too, the lower part of the window displays the awaited result.

Tabula	atore		🔽 Virgola				
Punto e	e virgola		Spazio		Г	Altro :	I
1°Campo	2°Campo	3°Campo	4°Campo	5°Campo	6°Campo	7°Campo	8°Campo
"100"	0.000	0.000	0.000				
"200"	-4.104	33.986	-3.061				
"300"	-39.268	29.951	-3.395				
"AN"	10.000	0.000	1.445				
"101"	5.630	-5.992	0.819				
"102"	2.267	-6.451	0.808				
"103"	9.355	-12.477	1.458				
"104"	-0.903	-11.289	2.202				
"105"	-8.024	-10.290	2.772				
"106"	-15.319	-8.943	3.317				

Figure 224:

Using both selections will progress to a final window used to select, for each field, the variable used to associate it (**Name**, **Code**, **North Coord.**, **East Coord.**, **Quote**).

To make the selection, click on the table heading: a list of possible variations will appear from which to select the one desired. The data found in the selected file divided into the specified fields will appear under each variable. If the result is not the one expected, press the **Back** button and change the options inserted until the desired result is obtained.

Another possibility offered by the last window is that of excluding, as selected, some import lines by removing the check mark from the specific box identifying the lines to not be imported (the identified lines as headers are displayed already without the check mark).

The image below shows the result of importing in the **Graphic View.**

Selez.	Nome "100"	Coord.Nord (0.000	Coord.Est (Y) 0.000	Quota 0.000	Codice\Descr.	Ignora	_
	"200"	-4 104	33.986	-3.061			-
 ✓ ✓ 	"300"	-39.268	29.951	-3.395			
	"AN"	10.000	0.000	1.445			
	"101"	5.630	-5.992	0.819			
> > > >	"102"	2.267	-6.451	0.808			
~	"103"	9.355	-12.477	1.458			
v	"104"	-0.903	-11.289	2.202			
~	"105"	-8.024	-10.290	2.772			
× × × × × ×	"106"	-15.319	-8.943	3.317			
~	"107"	-13.480	-7.689	3.005			
✓	"108"	-7.262	-9.440	2.743			
<							>

Figure 225:

Importing a 3d Office file - Linework file (.LN3)

and 3d Office - TIN file (.TN3)

File | Import | 3d Office-Linework file (.LN3): Use this command to import the graphic entities found within an LN3 file created from 3dOffice or Pocket3d into the open file.

File | Import | 3d Office-TIN file (.TN3): Use this command to import the triangulation found within a TN3 file created from 3dOffice or Pocket3d into the open file. A new DTM project will be created and named "3dOffice" wherein all of the triangles found in the file will be created.

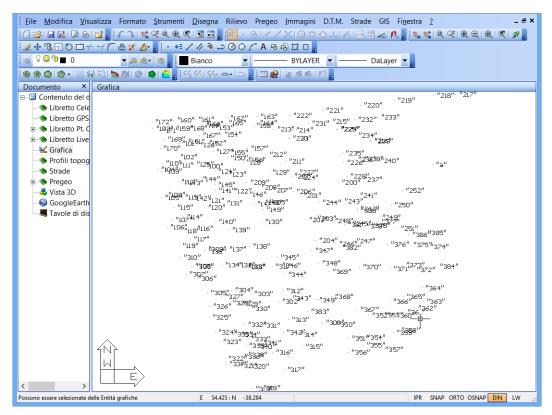


Figure 226:

Transforming points with name

The Graphic View offers a series of commands used to create new types of points beginning with points already available.

These commands offer a common characteristic: transforming a graphic point will result in its elimination.

To activate them, just access the **Survey** menu in the Graphic View and select the option **Transform points with name to**; next a detailed description of each one will display.

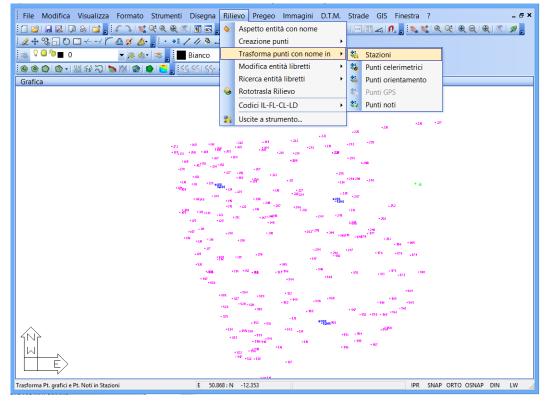


Figure 227:

1.**In Stations:** this command is used to transform graphic points, noted coordinate points, GPS points and Line 5 points in Stations.

Suppose the graphic point 700 in Station is to be transformed.

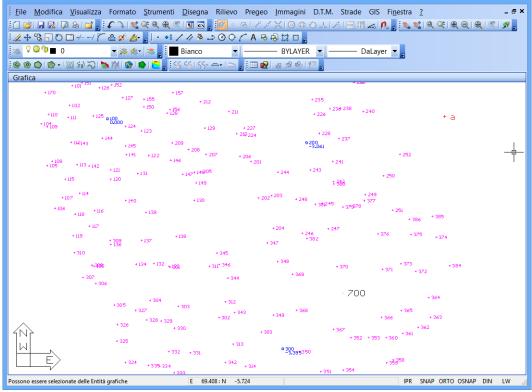


Figure 228:

After selecting the point, press the right mouse button and the program will display the **Transformation in Station** window where the user can conduct the selections used to create the station.

The **No Orientation** option of the window does not allow creating of an orientation; the second though, includes selection of a station to be used as a reference to conduct the orientation (in this case, two PO coded points will be created, one for each Station).

The third option, finally, includes orientation by creating an Orientation Point with the same name and coordinates of the created Station.

Use the same window to insert the Instrument Height values, when using a 3D file, or if the **Orientation from another Station** option has been selected, the user must insert the Prisma Height values for the PO points and the roundings for the angles and distance to be calculated prior to saving them in the Campaign Booklet.

Orig. Rounding button found in the window is used to set the default values for the distances from 0.001 and for angles from 0.0001.

The modifications made to these values will be stored on the configuration file and suggested again at the next use of this functions, even on a different file. This same window will identify which Work to be used for inputting the Station or Stations to be created.

If there are no Works and no Work to be created, and if there are already multiple available, select the one to be used for assigning the Stations.

Upon closing the **Transformation in Station** window, given that an orientation from another station was selected, we can, for example select station 300.

	Trasformazione	in stazione ×
Creazione Orientamento		Lavoro ove inserire la/le Stazioni
Nessun Orientamento		La o le Stazioni verranno inserite nel
 Orientamento da un'altra: 	Stazione	Lavoro indicato sotto.
C Creazione Pt. Orientamen	to con stesso nome	ES.CURVE di LIV
Dati complementari		
Altezza strumento	0.000	
Altezza prisma	1.220	
Arrotondamento Distanze	0.001	
Arrotondamento Angoli	0.0001	
<u></u> K	A <u>r</u> rotond. C	Irig. <u>A</u> nnulla

Figure 229:

Once the selection is completed, the program will display a video window displaying the number of points selected and a request to confirm the transformation.

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+102 +150 +156	+236,238
*110 *111 *125 0100 *10109 0.000 +124	+211 +226 +210 + a
+103 +123 +144 +144 +145 +209	TRASFERIMENTO A STAZIONI
+141 +122	+ 252
+108 +146 +105 +113+142 +121 +131 +14 +115 +120	Punti grafici selezionati: 1
+107 +114	Trasferisco ?
+140	+ 377 -37978 + 251
+118 +116 +139	+ 385
+ 117 + 119 + 138 + 138 + 137	Sì No +376 +375 +374
+ 310	+ 345
+ 3996 +134 +132 +180 +307	+ 311 ⁴ 346 + 348 + 370 + 373 + 384 + 344 + 369 + 371 + 372
+ 306	- 700
+304	+ 312
+ 327	* 343 * 368 * 365 * 302 * 349 * 366 * 363
+ 328 + 329 + 330	+ 383 + 367 + 362 + 362
+ 325	+ 352 + 353 + 360
+ 332 +	+ 331 -3.395350
+ 324 + 335-334	+ 342 + 314 + 351 + 354
Trasf. in Stazione: Selez. Pt. grafico E	E 42.170 : N -29.188 IPR SNAP ORTO OSNAP DIN LW

Figure 230:



Note that the Station created will be considered oriented.

If the file is to be elaborated further, the presuppositions must be created (Orientation Points, Polygonal, etc.) so that its orientation is properly recalculated.

The image below shows the result of the transformation.

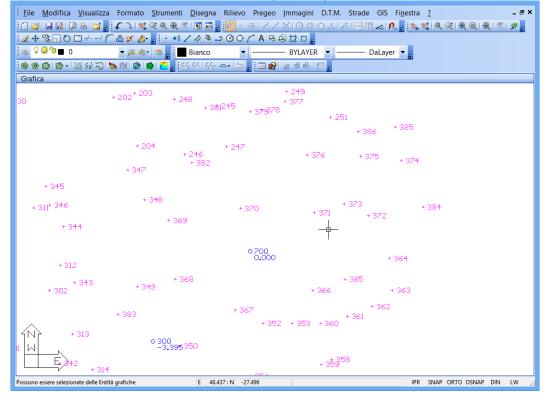


Figure 231:

2.**In Celerimetric Points:** this command is used to transform graphic points, noted coordinate points, GPS points and Line 5 Pregeo points in the station's detail points

First of all, select the Station (ex. 200) to receive the transferred points using the mouse and pressing the left button.

2 ቀ % ⊟ O □ ≁ -→ ₅	「 企 愛 公 」: ・・= ノ ル ネ ⇒ ③ ○ 广 A 马 向 註 □ 」 ▼ ※ ※・ ◎ 」: ■ Bianco ▼ BYLAYER ▼ DaLayer ▼ 」
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	+ 220
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	*169 *10 ⁷ ¹⁵¹ *124 * ¹⁵ 2 * ¹⁵⁷
	+127 +155 +212 + 2 +225 +102 +150 +150 +212 + 2 +276
	+100 +111 +125 •2500 +124 +127 +220 +227 •10150 +124 +127 +129 +220 +227 +144 +127 +220 +227 +230 +237
	*142149 *145 *209 *200 *141 *122 *209 *207 *206 *252
	* 105 * 410 + 102 * 121 * 101 * 147* 18905 * 244 * 249 * 250
	-100 -140 -1380 -107 -144 -240 -107 -140 -100 -202 ⁺²⁰⁰ +240 -19845 -2000-1277
	*106 *110 *116 *129 *205 *110 *116 *129 *205
	$+12^{-}$ $+204$ $+247$ $+27^{-}$
	+320 - 745 +4995 +134 +132 +890 +31/ 346 ^{- 349} - 570 +271 + 584 -307 - 324 + 349 + 549
	+204 +204 +204
	*105 + 000 - 100 +027 + 107 + 1040 + 1045 + 1040 + 1046 + 1040
	+ 926 + 990 + 967 + 962 + 990 + 967 + 962 + 990 + 967 + 962 + 990 + 961 + 961 + 961 + 962 + 960 + 961

Figure 232:

Then select the graphic points, following the same methods outlined for selecting the Stations; the points can be selected one at a time or in groups using the selection rectangle.

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	+ 213	+ 214	* 229	
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+ 127 + 155	+ 157			
+ 155	+ 212	- 2	+ 235	_
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+ 145	+ 209 + 208		9 200 - 3.061	
+ 141 + 122	+ 207	+ 206		+ 252
+ 142	+ 146	+ 201	+ 241	
+ 121 + 131	+ 147 + 148205	+ :	244 + 243	+ 250
+ 120	+ 149		‡ 3 \$6	233
				. 212
+ 140	+ 130	+ 202 ^{+ 203}		+ 249 + 377
+ 116			+ 381245 + 3	≯ 978 + 251
+ 116 + 139				+ 386
+ 17		+ 20	4 + 247	
	+ 138		+ 246	+ 376 + 375
+ 505 + 137 + 136 + 137		+ 347	+ 382	
Trasf. in Pt. Celerimetrico: Selez. Pt. grafico	E 30.854	: N -0.504	I	PR SNAP ORTO OSNAP DIN LW

Figure 233:

An already selected point can be erased simply by selecting it again; to end the selection phase, press the right mouse button.

Trasformazione in pun	ti celerimetrici 🛛 🗙
Sono stati selezionat	ii n. 3 punti grafici
Dati complementari Altezza prisma Arrotondamento Distanze Arrotondamento Angoli	1.22 0.001 0.0001
<u>Trasferisci</u> Arrotond.	Orig. <u>A</u> nnulla

Figure 234:

At the point, the program will open the **Transformation in Celerimetric Points** window.

The first part of the window shows a summary of the points selected while the second part allows the user to insert complementary data shared by the selected points.

If the **Rounded Distances** fields and the **Rounded Angles** fields are changed, then upon completion of the transformation they will be stored in a configuration file and suggested again when the command is launched again (even if working in a different file).

If, instead, the transfer has not been confirmed and the original values of these two fields are to be refreshed, just press the **Orig. Round.** button.

Once the operation is complete (**Transfer** button) the points will be inserted into the selection station (200); the new celerimetric points data will be assigned automatically by the program taking into account those already inserted. The image shows the result of the transformation.

<u>F</u> ile <u>M</u> odifica <u>V</u> isualizza <u>I</u> n 🗋 💕 🔒 🕵 🔯 😓 🖬 🙀									_ (
Documento ×	Staz	zione 2: 200 (Lavo	ro 1: ES.CURVE d	i LIV)								
🖓 Contenuto del documento	Misure Codici Coordinate											
E Libretto Celerimetrico (N.	Descrizione	Nome/Num.	Alt.Prisma	Dist.Incl.	Ang.Vert.	Ang.Orizz.	Tipo Prisma	Costante Prism			
E St. 100 (75pt)	37	DETT.	235	2.550	7.420	98.6070	63.4650	Sconosciuto				
🗉 🏭 St. 200 (57pt)	38	DETT.	236	2.550	7.110	107.8880	93.5200	Sconosciuto				
🗷 🕌 St. 300 (88pt)	39	DETT.	237	1.520	5.690	113.4850	146.9620	Sconosciuto				
Libretto GPS (0 Grp.)	40	DETT.	238	1.520	8.460	115.4370	104.5690	Sconosciuto				
 Libretto Pt. Coordinate Libretto Livello Digitale 	41	ALB.	239	1.520	13.500	114.4750	97.5520	Sconosciuto				
Grafica	42	ALB.	240	1.520	11.400	115.2830	122.8970	Sconosciuto				
Profili topografici	43	ALB.	241	1.520	5.560	103.9890	194.3930	Sconosciuto				
Strade	44	ALB.	242	1.520	8.110	102.2350	216.0660	Sconosciuto				
Pregeo Vista 3D	45	DETT.	243	1.520	4.720	101.8320	246.2260	Sconosciuto				
GoogleEarth	46	DETT.	244	1.520	7.020	97.9290	303.8340	Sconosciuto				
Tavole di disegno	47	DETT.	245	1.520	10.720	101.3300	238.7070	Sconosciuto				
	48	DETT.	246	1.520	15.480	100.2400	257.8190	Sconosciuto				
	49	DETT.	247	1.520	15.140	102.0620	239.1830	Sconosciuto				
	50	DETT.	248	1.520	9.810	99.8060	266.5450	Sconosciuto				
	51	ALB.	249	1.520	13.570	109.9360	200.9520	Sconosciuto				
	52	ALB.	250	1.950	14.550	110.7940	180.8310	Sconosciuto				
	53	ALB.	251	1.850	18.920	109.4630	197.3280	Sconosciuto				
	54	ALB.	252	1.950	16.390	112.4870	163.0320	Sconosciuto				
	55	GR - da grafica	1	1.220	11.727	84.6756	40.2896	Sconosciuto				
	56	GR - da grafica	2	1.220	10.457	82.7694	4.5335	Sconosciuto				
	-	GR - da grafica	3	1.220	4.345	55.5023	1.7010	Sconosciuto				
		3										

Figure 235:

3.**In Orientation Points:** this command is used to transform graphic points, noted coordinate points, GPS points and Line 5 Pregeo points into orientation points

The procedure to follow is very similar to the one outlined for transforming into celerimetric points: the only difference is that here there is no requirement to select the station.

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SoogleEarth	+ A44 + A44 324 + 228 + 217
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~	-111 +111 +112 +1244 +244 +241 +254
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Figure 236:

After selecting the points (ex. 1, 2, 3) the right mouse button must be pressed to display the window summarizing the number of points selected and the request to confirm the transfer.

Respond **YES** and verify the result of the transformation by going to **View in the Coordinates Pt. Booklet**, **Orientation Points** navigation tree.

TRASFERIMENTO A TRIGONOMETRICI
Punti grafici selezionati: 3 Trasferisco ?
<u>Sì</u> <u>N</u> o

Figure 237:

The image below shows the result of the transformation.

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Libretto Pt. Coordinate (0 Grup.)	2		2	-18.004	17.505	0.000	GR - da grafica					
	3		3	-16.420	27.505	0.000	GR - da grafica					
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Figure 238:

4.In **GPS Points:** this command is used to transform graphic points, noted coordinate points and celerimetric points, Line 5 Pregeo points and station points into GPS points

As in the orientation points, select the points (ex. 101, 102, 103, 104) in the **Graphic View** and then press the right mouse button to view the **Transforming into GPS points** window.

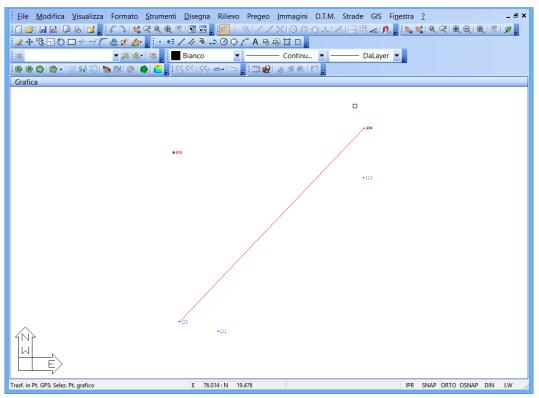


Figure 239:

This window displays a summary of the number of points selected while the destination group and height are still to be assigned.

The transfer is completed when the **Transfer** button is pressed; to ensure that the transfer is executed properly it is important that the projection calculations have been done correctly.

Trasformazione in punti GPS
Sono stati selezionati n. 4 punti grafici
Gruppo 100 💌
Altezza antenna.
<u>T</u> rasferisci <u>A</u> nnulla

Figure 240:

Figure 241:

The image below shows the result of the transformation.

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Contenuto del documento - Subretto Celerimetrico (1 Lav			SS84 Codici Coord: Pla. Precisione All				_
Libretto GPS (1 Grp.)	N.	Nome/Num.	Descrizione	Latitudine	Longitudine	Elevazione CF	1
B-T Gruppo: 100 (11pt)	1	105	CHIODO	42°59'58.84016"N	12°07'00.47143"E	306.846	
	2	106	CHIODO	42°59'58.79298"N	12°07'00.41931"E	306.428	
	3	107	CHIODO	42°59'36.25539"N	12°06'32.33419"E	307.457	
— 🧐 Pt. 107	4	108	CHIODO	42°59'36.27096"N	12°06'32.16404"E	308.159	
	5	109	CHIODO	42°59'38.00119"N	12°07'02.36538"E	292.343	
	6	110	CHIODO	42°59'37.59409"N	12°07'02.78602"E	292,180	
	7	200	CHIODO	42°59'43.89794"N	12°06'53.92350"E	293,925	
	8	101	PV - Spigolo Fabbricato - r.a.: a terra	42°59'38,78626"N	12°06'46.75046"E	358.700	
🧐 Pt. 102	9	102	PV - Spigolo Fabbricato - r.a.: a terra	42°59'40.87050"N	12°06'49.44224"E	358,700	
🖗 Pt. 103 🔄 Pt. 104	10	103	PV - Spigolo Fabbricato - r.a.: a terra	42°59'38.91475"N	12°06'46.03137"E	358.660	
 Libretto Pt. Coordinate (0 Gt 		103		42°59'41.54738"N	12°06'49.45078"E	358.660	
S Libretto Livello Digitale (0 G		104	PV - Spigolo Fabbricato - r.a.: a terra	42°59'41.547'38 N	12'06 49.45078 E	338.000	
Grafica Strade Profili topografici Pregeo Vista 3D GoogleEarth Tavole di disegno							

5.In **Noted Points**: this command is used to transform graphic points, celerimetric points, Line 5 Pregeo points, stations and GPS points into noted points

In this case too, select the points in the **Graphic View** (ex. 101, 102, 103, 104) and then press the right mouse button: the program will display the **Transforming into Noted Points** window.

1020509-01

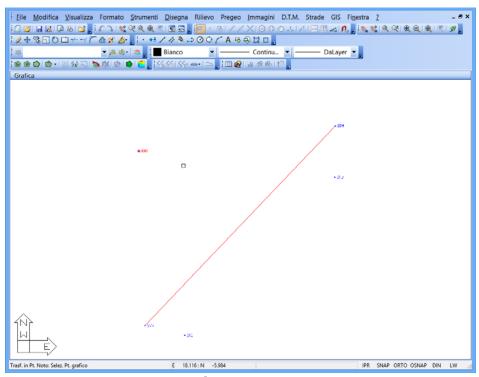


Figure 242:

Through the **Transforming into Noted Coordinate Points** window the user must identify the destination group for the selected points.

If the group does not exist, the program will create it automatically.

Trasformazione in punti di coordinate	n ×
Sono stati selezionati n. 4 punti grafici	
Gruppo 100	_
<u>T</u> rasferisci <u>A</u> nnulla	

Figure 243:

The image shows the result of the transformation.

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Gruppo 100 (4 Pt.)	2	102	-10.627	79.691	65.080	PV - Spigolo Fabbricato - r.a.: a terra					
Pt. 101	3	103	-70.983	2.424	65.040	PV - Spigolo Fabbricato - r.a.: a terra					
<i>></i> Pt. 102	4	104	10.262	79.884	65.040	PV - Spigolo Fabbricato - r.a.: a terra					
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Figure 244:

Survey|Creating points

The Graphic View offers a series of commands to design celerimetric , GPS, and noted coordinate points; to use them, access through the **Survey | Creating points** menu.

Survey|Creating Points|Celerimetric.

To create a celerimetric point, initially the station must be selected and then it must be designed as a graphic using the left mouse button.

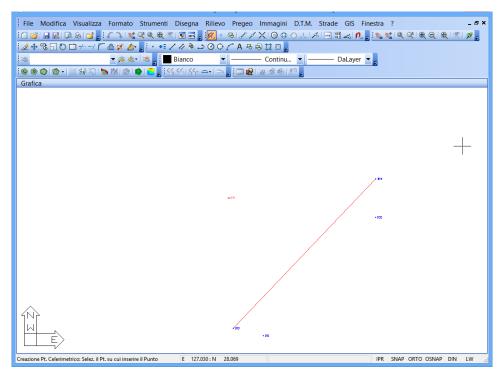


Figure 245:

Once the design is completed, the program will display the **Creating celerimetric points** window where the user can insert the information associated with the created point.

After designing the point, press the **Create** button and verify the result as a graphic as well as in the Station view 100.

Creazione punti	i celerimetrici 🛛 🗙
Nome e Codice	
Nome	140
Codice	GR - da grafica
Assegna il nome automatic	amente
Coordinate	
Coord. Nord	10.112
Coord. Est	82.817
Quota	0.000
C Dati complementari	
Altezza prisma	1.22
Arrotondamento Distanze	0.001
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Figure 246:

The following images will appear:

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Figure 247:

Survey|Creating Points|GPS

To create a GPS point, it must be designed as a graphic using the left mouse button.

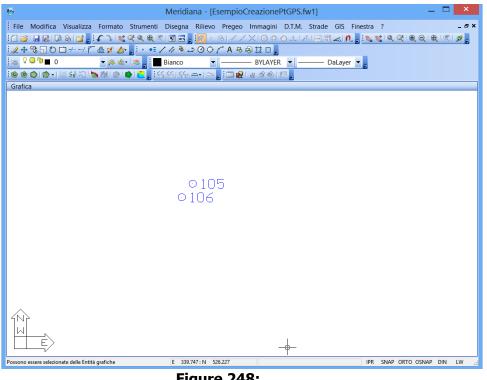


Figure 248:

Once the design is completed, the program will display the **Creating GPS points** window where the user can insert the information associated with the created point.

After designing the point, press the **Create** button and verify the result as a graphic as well as in the GPS Booklet, Group 100.



It is important to note that creating a GPS point results positively only when the projection calculation has been done.

Creazione p	unti GPS 🛛 🗙
Gruppo, Nome e Codice	
Gruppo	100 💌
Nome	300
Assegna il nome automatica	mente
Descrizione	GR - da grafica
Coordinate	
Coord. Nord	543.989
Coord. Est	331.937
Quota	0.000
Dati complementari	
Altezza Antenna	2
<u>O</u> rea	Annulla

Figure 249:

The following images will appear:

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			CHIODO		12*06'32,33419*E	307.457	105.927		No
	- 5 Pt 107		CHIODO		12*06'32.16404'E	308,159	306.629	1530) No
			CHIODO		12*07/02.36538*E	292.343		1.530	
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			No Sol						
		Quelta	No Sol						
		Coordinate							
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Figure 250:

Survey|Creating Points|Notes

To create a Noted point, initially the station must be selected and then it must be designed as a graphic using the left mouse button.

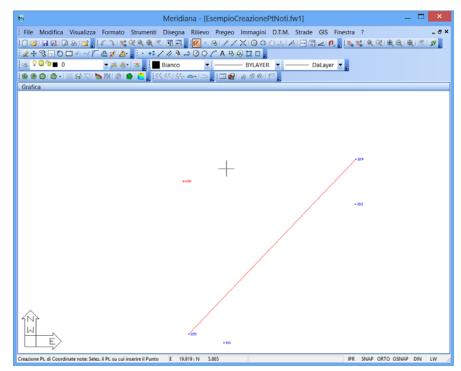


Figure 251:

Once the design is completed, the program will display the **Creating noted points** window where the user can insert the information associated with the created point.

After designing the point, press the Create button and verify the result as a graphic as well as in the Coordinate Pt. Booklet, Group 100.



It is important to note that the creation of a noted coordinate point will occur even if the destination group has not been specified (the program will create it automatically).

Creazione	punti noti ×
Gruppo, Nome e Codice Gruppo	100
Nome	250
Descrizione	GR - da grafica
Coordinate Coord. Nord Coord. Est	9.650 19.376
Quota	0.000
Crea	Annulla

Figure 252:

The following images will appear:

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Creatione Pt. dl Coordinate note: Selez. #Pt. so cui interire il Punto E 122.177 : N -17.014 PR 3944P ORTO ODHAP ON LW	C > C POISono essere selezionate delle Entrià grafi E -90.992 : N 20.115 / IPR. SNAJ ORTCOMP	DIN LW

Figure 253:

Survey|Changing Booklet Entities

The **Graphic View** allows for applying changes to the entities associated with the various booklets; to use these commands just proceed to the **Higlighting | Changing Booklet Entities** menu.

Here following is a description of each one.

1.Change Points

This procedure allows for editing of Celerimetric Points, GPS points and Noted Coordinate Points after having selected them using the graphic method. Depending on the point selected, a window displaying its information will appear. On the lower left of the window, use the **Notes** button to insert various notes associated with the point.

Celerimetric Points

Once the point is selected, the program will open a window made of 4 pages.

The first one shows the values of the measurements contained in the Celerimetric Booklet; the user can change them or confirm them.

If any changes are made, the coordinates and quote shown in the final part of the window will be recalculated in real time.

	Modifica p	unto celerimetrico
Dati libretto	Coordinate assolute Co	dici Dati GIS
Nome :		104
Codice :		PV - Spigolo Fabbricato - r.a.: a terra
Modello	grafico :	×
Altezza P	risma :	1.530
Di	stanza Inclinata :	103.523
Ar	igolo Verticale :	56.7529
Ar	ngolo Orizzontale :	92.4645
Co	oord. Nord:	10.262
	ord Est	79.884
Co	Joid. Est	,

Figure 254:

The second page allows the user to change the coordinates and quote by observing the result on the measurements compared to the Station to which it belongs.

ti libretto Coordinate assolute	Codici Dati GIS
Nome :	104
Codice :	PV - Spigolo Fabbricato - r.a.: a terra
Modello grafico :	v
Altezza Prisma :	1.530
Distanza Inclinata :	103.523
Angolo Verticale :	56.7529
Angolo Orizzontale :	92.4645
Coord Nord	10.262
Coord. Est:	79.884
Quota :	65.040

Figure 255:

The third page is used to change the codes associated with the point. This procedure is found to be particularly useful to change the coding of the Points: for example, assign the NC code to those Points not to be considered in creating Triangles (Code Definition).

Modifica pu	into celerimetrico	×
Dati libretto Coordinate assolute Cod	lici Dati GIS	- 1
Nome :	104	
Codice :	PV - Spigolo Fabbricato - r.a.: a terra	
Modello grafico :	•	
OR [ORientamento]	QI [Quota Inaccessibile]	
CU [QUota]	IA [Intersezione in Avanti]	
PO [POligonale]		
OC [Orientamento Creato]	NC [No Curve]	
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FL [Fine Linea]	NP [No Pregeo]	
CL [Chiudi Linea]	NT [No Terreno]	
NL [No Linea]	✓ 3D [3D per Pregeo]	
LD [Linea per Descrizione]	NE [No elaborazione]	
Note	<u>O</u> K <u>A</u> nnulla	2

Figure 256:

The fourth page is used to change the GIS data associated with the point; this page is the same as the one for the **GPS Points** and the **Noted Coordinates Points**.

Modifica	punto celerimetrico	×
Dati libretto Coordinate assolute	Codici Dati GIS	
Nome :	104	
Descrizione :	PV - Spigolo Fabbricato - r.a.: a terra	
Modello grafico :	Ψ.	
Tema GIS :	•	
Note	<u>O</u> K <u>A</u> nnulla	3

Figure 257:

Celerimetric Points with IA or QI codes or Points with a duplicate "Name" inside the same Station cannot be edited in this mode; changing the points data using this procedure means that reelaboration of the data is not required.

Informazioni gene				Dine 2 Con Durte famile	di la sus diss	
			100	Riga 2 Gps - Punto finale	di baseline	
Gruppo :			100	Dx Geocentrica:		-422.040
Nome :	105			Dy Geocentrica:		246.440
Descrizione :	CHIODO			Dz Geocentrica:		407.160
Modello grafico	:		*		,	
Altezza Antenna	:		1.530	Coordinate geografiche		
Runto di ema	, nazione del riliev	0		Latitudine :	42 59	58.84016
		0		Longitudine :	12 7	0.47143
Precisione:				Elevazione :		306.8458
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X 0.00	00000000 0.0	00000000	0.000000000	Coordinate assolute		
Y	0.0	00000000	0.000000000	Coord. Nord:		543.929
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FDOF.	2.000	GDOF.		Quota .	1	15.656

Figure 258:

GPS Point

The Change GPS Points window includes five pages.

The following information can be edited in the **Booklet Data** page:

- General information on the point;
- Geographic coordinates;
- Precision values.

formazio	ni generali ——			Riga 2 Gps - Punto finale	di baseline	
Gruppo :			100	Dx Geocentrica:		-422.040
Nome :	105	5		Dy Geocentrica:		246.440
Descrizio	one: CH	IODO		Dz Geocentrica:		407.160
Modello	grafico :		~			
Altezza A	Antenna :		1.530	-Coordinate geografiche -		
Punto	di emanazione de	el rilievo		Latitudine :		58.84016
				Longitudine :	12 7	0.47143
recisione	X	Y	Z	Elevazione :		306.8458
x	0.0000000000	0.0000000000	0.000000000	Coordinate assolute		
Y		0.000000000	0.000000000	Coord. Nord:		543.929
Z			0.000000000	Coord. Est		329.509
DOP:	2.000	GDOP:		Quota :		13.696
	Gruppo : Nome : Descrizio Modello Altezza A Punto recisione X Y Z	Descrizione : CH Modello grafico : Altezza Antenna : Punto di emanazione de recisione: X X 0.0000000000 Y Z	Gruppo : IUE Nome : IUE Descrizione : CHIODO Modello grafico :	Gruppo : 100 Nome : 100 Descrizione : CHIODO Wodello grafico : • Altezza Antenna : 1.530 Punto di emanazione del rilievo • recisione: X Y Z X 0.000000000 0.000000000 0.000000000 Y 0.000000000 0.000000000 0.000000000 Z 0.0000000000 0.000000000 0.000000000	Gruppo : 100 Nome : 100 Descrizione : CHIODO Wodello grafico : V Altezza Antenna : 1.530 Punto di emanazione del rilievo Coordinate geografiche Latitudine : Latitudine : Ecisione: X Y Z X 0.000000000 0.000000000 Coordinate assolute Y 0.000000000 Coordono000000000000000000000000000000000	Gruppo : 100 Nome : 105 Nome : 105 Descrizione : CHIODO Modello grafico : Image: Coordinate geografiche Matezza Antenna : 1.530 Punto di emanazione del rilievo Coordinate geografiche Latitudine : 42 X 0.000000000 Y 0.000000000 Y 0.000000000 Z 0.000000000 Coordinate assolute Coord. Nord: Coord. St Image: Coord. St

Figure 259:

Besides these, the user can also establish if the point is an emanation.

Editing the geographic coordinates is done automatically when the geocentric and absolute coordinates are recalculated.

Functionality of the **Absolute Coordinates** page is similar to the **Booklet Data** page with the only difference that the user can change the absolute coordinates.

Changing of the absolute coordinates will trigger updating of the geographic and geocentric coordinates in real time.

Modifica	punto GPS ×
Dati libretto Coordinate assolute Punto finale di baseline Codici Dati	GIS
_Informazioni generali	Riga 2 Gps - Punto finale di baseline
Gruppo : 100	Dx Geocentrica: -422.040
Nome : 105	Dy Geocentrica: 246.440
Descrizione : CHIODO	Dz Geocentrica: 407.160
Modello grafico :	
Altezza Antenna : 1.530	Coordinate geografiche
Punto di emanazione del rilievo:	Latitudine : 42 59 58.84016
	Longitudine : 12 7 0.47143
Precisione: X Y Z	Elevazione : 306.8458
X 0.000000000 0.00000000 0.00000000	Coordinate assolute
Y 0.000000000 0.00000000	Coord. Nord: 543.929
Z 0.000000000	Coord Est 329,509
PDOP: 2000 GDOP:	
PDOP: 2.000 GDOP:	Quota: 13.696
Note	OK Annulla

Figure 260:

The same goes for the **Final Baseline Point** page: in this case the user can edit the geocentric coordinates.

Changing of the geocentric coordinates will trigger updating of the absolute and geographic coordinates in real time.

The **Codes** page is used to change the codes associated with the point.

	Modifica p	ounto GPS
Dati libretto Coordinate assolute	e Punto finale di baseline Codici Dati Gl	B
Informazioni generali	100	Codici Orientamento e Quota
Nome :	05 HIODO	□ (OR [ORientamento]
Modello grafico :	×	□ (QU [QUota]
Punto di emanazione d	del rilievo:	
Codici		
OC [Orientament	to Creato] 🛛 🗌 LD [Linea per Des	scrizione]
NC [No Curve]	🗌 FL [Fine Linea]	NV [Non Visualizzato]
CL [Chiudi Linea] NP [No Pregeo]	NL [No Linea]
NT [No Terreno]]	ne]
Note		OK Annulla

Figure 261:

The **GIS Data** page is used to change the GIS theme of the point.

			Modifica p	ounto GPS		×
Dati libretto	Coordinate ass	plute Punto finale di base	line Codici Dati G	IS		
Inform	nazioni generali –			Tema Gis		1
Grup	opo :		100		~	
Non	ne :	105				
Des	crizione :	CHIODO				
Mod	dello grafico :		~			
Alte	zza Antenna :					
DP	unto di emanazio	ne del rilievo:				
	_					
Note					OK Annu	lla

Figure 262:

Changing the data using this procedure does not require re-elaboration.

Noted Coordinates Point

This window includes two pages:

The first page is used to change/confirm the coordinates of the booklet and the codes associated with the point.

The second page is used to change the GIS Data.

Modifica punt	to di coordinate note	x
Dati libretto Dati GIS		
Nome :	102	
Descrizione :	PV - Spigolo Fabbricato - r.a.: a terra	
Modello grafico :	Y	
Coord. Nord:	-10.627	
Coord. Est:	79.691	
Quota :	65.080	
OC [Orientamento Creato]	LD [Linea per Descrizione]	
Descrizione : PV- Modello grafico : Coord. Nord: [10.6 Coord. Est: [79.65 Quota : [65.03 OC [Orientamento Creato] ILL [Inizio Linea] FL [Fine Linea]	NC [No Curve]	
🗆 FL [Fine Linea]	NV [No Visualizzato]	
CL [Chiudi Linea]	NT [No Terreno]	
NL [No Linea]		
	OK Annulle	

Figure 263:

2.Erase Points

This function is used to erase Celerimetric, GPS and Noted Coordinate points.

Once the selection of points is completed (ex. 103, 104, 200, 110) in the Graphic View by pressing the right mouse button, a window will appear summarizing the selected points and requesting confirmation of the operation.

2

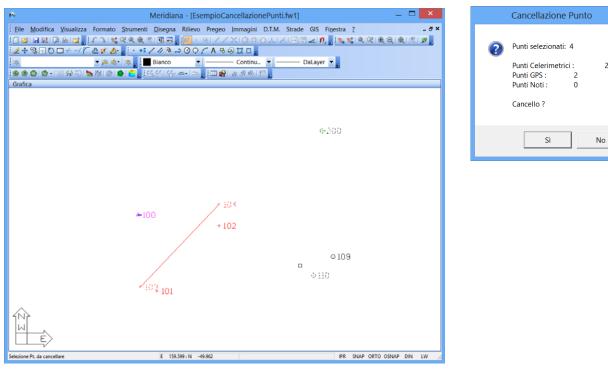


Figure 264:

The cancellation will take effect graphically as well as in the booklet that held the selected points.

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🛁 Grafica										
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GoogleEarth	<									>
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	N.	Nome/Num.	Descrizione		atitudine	Longitudine			Elevazione Terr.	Alt.Antenna
	1	105	CHIODO	42°5	9'58.84016"N	12°07'00.47143	"Е	306.846	305.31	
	2	106	CHIODO	42°5	9'58.79298"N	12°07'00.41931	"Е	306.428	304.89	8 1.530
	3	107	CHIODO	42°5	9'36.25539"N	12°06'32.33419	"Е	307.457	305.92	7 1.530
	4	108	CHIODO	42°5	9'36.27096"N	12°06'32.16404	"Е	308.159	306.62	9 1.530
	5	109	CHIODO	42°5	9'39.88628"N	12°06'54.40072	"E	292.343	290.81	<mark>3</mark> 1.530
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Figure 265:

3.Move Points

This function is used to move Celerimetric, GPS and Noted Coordinate points.

The entity can be selected by pressing the left mouse button; once the selection is made movement can be executed by using the free design instrument.

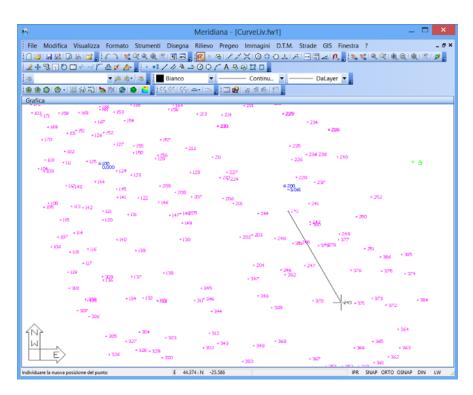


Figure 266:

The coordinates of the point will be updated automatically once the operation is completed; for Celerimetric Points, the measurements are also updated and for GPS Points, the geographic coordinates will also be updated.

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	+ 243	
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+ 303 + 343 + 268	+ 365	
+ 329 + 302 + 349	+ 366 + 363	
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Figure 267:

4.Move Celerimetric Stations

Moving the stations is done similar to the way points are moved; the operation involves recalculating all of the celerimetric point measurements without changing the position.

5.Move GPS Base

This command allows moving of the GPS base station by selecting a graphic or GPS point in the Graphic View.

Example 1: move the GPS base with graphic point

Once the command is launched, the program will display the **Move GPS Base** window where the user can select the station to be moved and, if desired, change its antenna height.

Suppose the Station Base 300 is to be moved and leave the antenna height unchanged.

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	3 Pt. PF02/0	2	2	200	38°38'41.75379"N	16°06'04.25756"E	443.830	441.530	2.300	
	- Galary Pt. PF03/0	3	3	300	38°38'39.90007"N	16°05'38.42059"E	482.633	480.333	2.300	
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Figure 268:

Press **Continue...** and the user can select, through the **Graphic View**, the point where to set the GPS base station.

To identify the position graphically, the **Object Snap** must be changed because the default command launches the **connect to point Snap**, while what we need must allow designing of the point graphically.

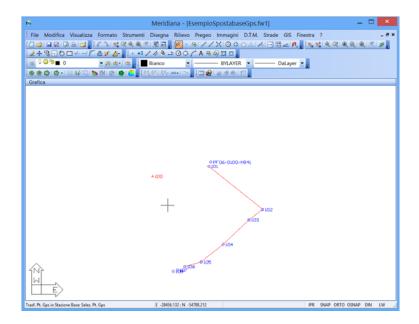


Figure 269:

In our example we selected to use **free design**.

Once the graphic selection is completed, the program will display the following message to request confirmation of the operation executed.

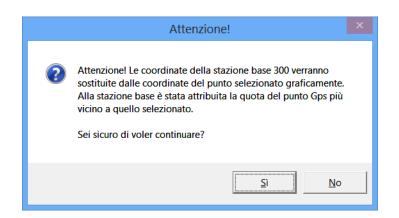


Figure 270:

By responding **Yes**, the Base 300 will be moved to the new point and will be assigned a quote equal to that of the closest GPS point.

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B−T Gruppo: 2	2 2	200	38°38'41.75379"N	16°06'04.25756"E	443.830	441.530	2.300	
⊞- T Gruppo:	3 3	300	38°38'48.85190"N	16°05'42.40543"E	483.082	480.782	2.300	
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Figure 271:

Example 2: move the GPS base with GPS point

In this example it was decided to move the GPS station base 100 to point 108 and change the antenna height from 2.3 to 1.

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Figure 272:

After pressing **Continue...** the program will suggest **Object Snap Connect to point** and at this point it is possible to immediately select point 108.

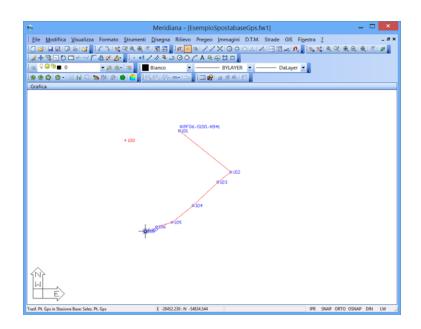


Figure 273:

Once the selection of the point is completed, the program will display the window shown at the side to receive confirmation of the operation executed.

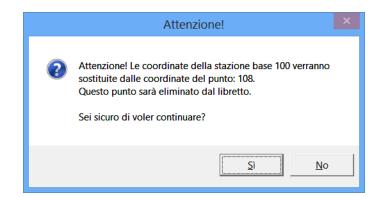


Figure 274:

The final result is shown in the image below.

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	1 1	100	38*38'47.43567"N	16°05'42.422	27°E	484.720	483.720	1.000	
	2 2	200	38*38'41.75379"N	16*06'04.257	56*E	443.830	441.530	2.300	
	3 3	300	38*38'39.90007"N	16*05'38.420	59°E	482.633	480.333	2.300	
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Figure 275:

6.Move Texts

This procedure is used to change the position of the texts (**Name, Code, Identification**, **Comment**, and **Quote**) associated with the Entities bearing the associated name.

Once activated, a selection symbol will appear on the video (a small square) to be positioned on the text to be moved. With a mouse click, the text will be "captured" and its graphic position can be changed.

If the **Ctrl** button on the keyboard is held down while making the mouse click on the various texts, more than one text can be selected at a time.

If a text is not selected but a click is made on any part of the graphic where there is no entity, the program will activate the **by window** modality to allow selecting of all the texts found within that window itself.

If the button is released, the next mouse click will restart the selection from the beginning. To exclude a text from being moved, just click on it with the left mouse button.

To proceed to the movement phase, press the right mouse button: the new text positions will be stored as positions relative to the point where the entity with the name is found.

Thus, if the user proceeds with a new data elaboration, the texts previously moved will maintain their unchanged positions compared to the Entity to which they belong.

The image shown below displays the selection phase for texts 102 and 104.

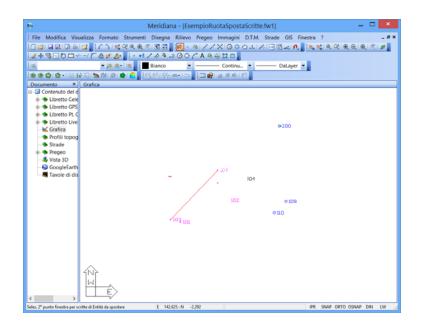


Figure 276:

This other image shows the results of the movement.

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Figure 277:

7. Rotating Texts

This procedure is used to rotate the direction of the texts (**Name**, **Code**, **Identification**, **Comment**, and **Quote**) associated with the Entities bearing the associated name.

Once activated, a selection symbol will appear on the video (a small square) to be positioned on the text to be rotated.

With a mouse click, the text will be "captured" and its graphic direction can be changed.

The rotation is done around the coordinates of the Entity to which the text belongs.

If the **Ctrl** button on the keyboard is held down while making the mouse click on the various texts, more than one text can be selected at a time.

If a text is not selected but a click is made on any part of the graphic where there is no entity, the program will activate the **by window** modality to allow selecting of all the texts found within that window itself.

If the button is released, the next mouse click will restart the selection from the beginning. To exclude a text from being rotated, just click on it with the left mouse button.

To terminate the selection and proceed with the rotation phase, just press the right mouse button.

The new rotation angles of the text will be stored in association with the Entities.

Thus, if the user proceeds with a new data elaboration, the texts previously rotated will maintain their unchanged directions compared to the Entity to which they belong.

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 Grafica Profili to: Strade Pregeo 🕹 Vista 3D 104 0.110 itte di Entità da 146.576 · N IPR SNAP ORTO OSNAP DIN LW elez. 2ª punto finestra per

The image below shows the selection of the text;

Figure 278:

in this image instead, the result of the rotation can be seen.

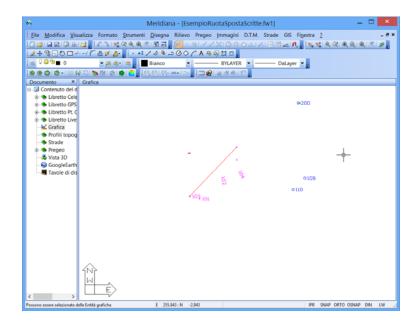


Figure 279:

8. Changing Design Model

This procedure is used to change the design model of the entities that have an associated name.

Once activated, a selection symbol will appear on the video (a small square) to be positioned on the entity whose design model is to be changed.

If a click is made on any part of the graphic where there is no entity, the program will activate the **by window** selection modality to allow selecting of all the entities found within that window itself.

To exclude the entity from being changed, the selected entity must be clicked on.

To terminate the selection press the right mouse button.

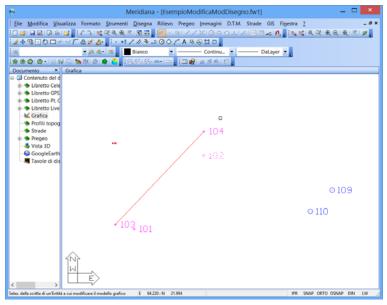


Figure 280:

At this point a window will appear in the upper part of the window summarizing the Entities selected divided by categories **(Celerimetric Points**, **GPS**, ...).

The lower part of the window will display a box in which to select the graphic model from a list that shows all of the models already created by means of the **Entity Format | Appearance With Name** procedure.

Selezione di un nuovo mod	ello grafico 🛛 🗙
Numero Entità selezionate	
Punti Grafici	0
Punti Celerimetrici	1
Punti GPS	0
Punti di Coordinate note	0
Modello grafico da applicare alle entità sele	zionate
Nome Modello Standard	_
OK A	nulla

Figure 281:

Once the **ModelPoint3** model is selected, press the **OK** button to conclude the operation.

Selezione di un nuovo mod	ello grafico 🛛 🗙						
Numero Entità selezionate							
Punti Grafici	0						
Punti Celerimetrici	1						
Punti GPS	0						
Punti di Coordinate note	0						
Modello grafico da applicare alle entità selezionate							
OK Ar	inulla						

Figure 282:

The result will take effect graphically as well as in the views that include the selected points.

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Figure 283:

9. Changing Codes

This function is used to changes the codes of one or more **Celerimetric**, **GPS**, and **Noted Coordinate** points.

Once the procedure has been launched using the left mouse button, select the points whose codes are to be changed in the **Graphic View**.

Once the operation is complete, press the right mouse button and the program will open the **Select Codes** window.

The window is divided into two sections: the first shows a summary of how many points have been selected based on their type; the second is used to select or deselect the codes.

Selezione	dei codici ×
Numero Entità selezionate	
Punti Celerimetrici	2
Punti GPS	1
Punti di Coordinate note	0
Opzioni da applicare alle entità sele	ezionate
CC [Orientamento Creato]	NC [No Curve]
🔲 IL [Inizio Linea]	🔲 NV [Non Visualizzato]
🔲 FL [Fine Linea]	NP [No Pregeo]
🔲 CL [Chiudi Linea]	🔲 NT [No Terreno]
🔲 NL [No Linea]	🔽 3D [3D per Pregeo]
LD [Linea per Descrizione]	
ОК	Annulla

Figure 284:

10.Refresh Text Position

This procedure is used to refresh the original positions of the texts, their rotational angle and their graphic model if they had been changed using the **Move Text**, **Rotate Text**, and **Change Design Model** functionalities.

Once activated, a video window will appear used to select the characteristics to be refreshed: movement, rotation and/or graphic model.

It is also possible to decide whether to proceed with a graphic selection of the entities to refresh or to refresh all entities that belong to a certain category: **Celerimetric Points**, **Stations**, ...

In the first case, once this window is closed, the user must proceed with selecting the points; in the second case, the program will proceed directly with refreshing what has been selected and for the categories selected.

Ripristino delle scrit	te associate ai punti 💦 🤶 🗙
Caratteristiche da ripristinare	
Spostamento scritte	
Rotazione scritte	
🔽 Modello grafico di disegno	
Selezione delle Entità da ripristinare C Selezione grafica delle scritte da ripristina Ripristino di tutte le scritte appartenenti alle	
🔲 Punti grafici con Nome	🦳 Punti di Righe 5 Pregeo
🔲 Stazioni Celerimetriche	☐ Punti GPS
Punti Celerimetrici	🔲 Stazioni Base GPS
Punti di Orientamento	🗌 Punti di Coordinate note
ОК	Annulla

Figure 285:

Searching Booklet Entities

The Graphic View offers the following types of searches:

- Find point in booklet: This procedure is used to highlight, after graphically selecting it, a Point within the corresponding view (**Celerimetric Booklet**, **GPS Booklet**, Coordinate Pt. **Booklet**).
- Find point in graphic: activating this function will display the **Search Meridian** window.

Use the first part of this window to identify what to search: the search can be done by name, code or both; use the second part of the window then to specify where to run the search; note that the selection is not exclusive.

Once the window is confirmed, the program will search for that point based on the specified characteristics: if the booklet data has been elaborated correctly, once the point is found the program will run a Pan operation, that is, it will bring the identified point exactly to the center of the screen keeping the zoom though, unchanged.

- Find Next in graphic: this command is used to repeat without reinserting the search data under the command **Find point in graphic**.
- Search point by image: this procedure is used to search a point using the image associated with it.

Once this procedure is activated, a video window appears displaying the images associated with the points; using the **Previous** and **Next** buttons to scroll through the various images and proceed with the selection.

The selection is confirmed by pressing the **OK** button and, in this case, the program runs a pan so as to position the point that the image was associated with at the center of the screen.

Ricerca	×
Trova punto con :	
🔽 nel nome	
nel codice	
Cerca in	
✓ Libretto Celerimetrico	
Libretto GPS	
🔽 Libretto Punti Noti	Successivo
Punti Grafici	Annulla
Figure 20C	

Figure 286:

Entity Format - Appearance with Name

The **Format | Entity appearance with Name** command was included specifically to have the user select how to design the various entities to which a name, a description and a quote are associated.

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Simbolo			Entità Cela			
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- Descrizione/Identificativo/Comm	ento				_	
☐ Visibile Colore 🔽	Spess. 🔽	Ψ				
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Figure 287:

Using the command, the **Entity Appearance with Name** window is opened and divided as follows: on the right is displayed the **List of Design Models**, on the left is a series of pages that allow the user to tell the program how the various entities are to be represented.

Aspetto entità con nome	×
Aspetto Testo Posizione Rotazione	Lista dei Modelli di disegno: Er Entità Celerimetriche Stazioni
Visibile Colore Spess. 0.00 mm	– Punti Dettaglio – Punti Dett. OR – Punti Dett. PO – Punti di Orientamento
Nome Visibile Colore V Spess. V V	
Descrizione/Identificativo/Commento Visibile Colore Visibile Spess.	 由tità Proposta Aggiornamento ⊕ Entità Grafiche con nome Modelli personalizzati
Quota	Seleziona tutti i modelli
Visibile Colore 🔽 Spess. 🔽	Aggiungi Modello Cancella Modello
Uso impostazioni GIS Nessun utilizzo 💌	Salva Lista Cfg Carica Lista Cfg Applica
Salva Valori Cíg Carica Valori Cíg Valori Default	OK Annulla

Figure 288:

The navigation tree is composed of knots that represent the various entities.

The entities that can be included in the list (the number and type depend on the license held by the program) are:

- Celerimetric,
- GPS,
- Noted Coordinates Point
- Pregeo Entities,
- Map Extracted Entities,
- Update Suggested Entities,
- Graphics with Name,
- Customized Models.

A standard design model is associated to each category of points by which it is possible to specify the modality to be used for graphically representing the points that belong to the same category. Under the Customized Models item, those design models created by the user will be added using the commands available in this window.

Here following is a brief description of the window commands and a brief guide on how to create Customized Models.

Window command Entity Appearance with Name

 Save CFG Values is used to save a configuration of values associated with a specific Model in the configuration file;

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- Load CFG Values assigns values previously saved for a Model with the same name to this Model.
- Default Values assigns standard values to the various fields for the selected Model;
- Apply allows the application and observation of the changes made to the design without exiting the window;
- **OK** and **Cancel** buttons close the window respectively maintaining or discarding any changes made.

The window also allows selecting of multiple entities simultaneously using the Ctrl button and the left mouse buttons so as to set a characteristic shared by the selected entities. When more than one line is selected, only those values that are identical among the models of the selected entities are displayed.

The **Select All Models** button then allows selection of the models of all entities.

Aspetto entità con nome		×
Varie Nome del nuovo modello : Nuovo	Lista dei Modelli di dis- Entità Celerimetric Entità GPS Entità Pregeo Entità Estratto Map Entità Estratto Map Entità Proposta Ag Entità Grafiche cor Modelli personaliz	ppa ggiornamento n nome
	Seleziona -	tutti i modelli
	Aggiungi Modello	Cancella Modello
	Salva Lista Cfg	Carica Lista Cfg
		Applica
Salva Valori Cfg Carica Valori Cfg Valori Default	OK	Annulla



Creating a Customized Model

Customized models are used to associate with one or more entities characteristics that are different from those suggested by the standard model. More specifically, while the standard model acts on all categories of points, the customized model will act only on entities to which it has been assigned.

The assignment of the model can be done:

a)Using the Celerimetric, GPS and Coordinate Pt. Booklet

b)Through the Survey|Change Booklet Entity|Change Design Model in the **Graphic View**.

To ad a design model then as a subnode under the category of **Customized Models** just press the **Add Model** button.

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The **Cancel Model** button is activated only when a Model is selected that belongs to the **Customized Models** category - the other types of models cannot be canceled.

The **Save CFG List** button is used to save the list of Models, shown in video, in the configuration file.

Use the **Load CFG List** to recall the list of previously saved Models within an already created file.

Aspetto entità con nome	×	Aspetto entità con nome	×
Varie Liee BFL-CL-LD Vable Colore Spessore 0.00 mm Elissi di encre Vable Colore Spessore 0.00 mm Rapporto di scala	Lute de Modelli di disegno:	Aspetto Testo Posizione Rotazione Simbolo Vable Colore Spess	Liste del Modelli di disegno:
Salva Valori CigCarica Valori Cig	QK Annulis	Salva Valori Olg	QK Arnulia

Figure 290:

Description of Tabs

Selecting a primary node (**Celerimetric Entities**, **GPS Entities**, ...) will display one unique tab called **Various**, while selecting a subnode or design model will display 4 tabs (**Appearance**, **Text**, **Position**, and **Rotation**).

Aspetto entità con nome	×
Aspetto Testo Posizione Rotazione	Lista dei Modelli di disegno:
Simbolo	Stazioni Punti Dettaglio Punti Dett. OR Punti Dett. PO
Nome Visibile Colore V Spess. V	Punti di Orientamento ⊞ Entità GPS ⊞ Entità Pregeo ⊞ Entità Estratto Mappa
Descrizione/Identificativo/Commento	Entità Proposta Aggiornamento Entità Grafiche con nome Modelli personalizzati
Quota	Seleziona. <u>t</u> utti i modelli
Visibile Colore 🗹 Spess. 🗸	Aggiungi Modello Ca <u>n</u> cella Modello
Uso impostazioni GIS Simbolo e colore delle mappe tematiche	Salva Lista Cfg Carica Lista Cfg
	Applica
<u>S</u> alva Valori Cfg <u>C</u> arica Valori Cfg <u>V</u> alori Default	<u>O</u> K <u>A</u> nnulla

Figure 291:

The **Appearance** tab is used first of all to select the information to be displayed; by removing the check mark from the box associated with the Model symbol, no other information will be displayed either.

This tab is also used to select the color of the symbol and the other information associated with the model.

If the check mark is placed in the box to the right of the text **Color** the same color as the symbol will be set for the various texts (**name**,); otherwise a different color for each of them can be assigned.

If as a color **DAPIANO** or **DABLOCCO** is selected, then the buttons indicating the color for the design will appear as white crossed by vertical and diagonal lines. In this case, the selections of **DAPIANO** and **DABLOCCO** are the same and cause the **Points** to be the same color as the plane to which they belong, while the selection of a particular color will result in them being designed by this color regardless of the plane's color.

If the point has been associated with GIS data then the user can decide using the **Use GIS Settings** option:

- To not use the thematic map associated with the point (in this case it is displayed as a point to which no GIS information has been associated);
- To use only the color selected in the thematic map in its representation;
- To use only the symbol selected in the thematic map in its representation;
- To use the color as well as the symbol selected in the thematic map in its representation.

Using the tab (Text) the symbol's dimensions can be indicated.

Also, the user can specify if the symbol and texts are to be designed in meters (and therefore in measurements that are proportional to the rest of the design) or in pixels (that is, in dimensions that are constant to any scale factor).

If the check boxes near the Dim. Item have been selected then the various texts will retain the same dimension as the symbol; otherwise (similar to the **Color** property in the **Appearance** tab) different dimensions can be assigned.

In the frame associated with the name there is also a drop down box to be used to identify a style for the text from those stored in the document. In this case as well, use the specific check boxes and drop down boxes to determine if the other texts (code/identification/comment and quote) will have the same style as the name.

Finally, for the quote, insert the number of decimal figures desired.

Aspetto entità con nome		×
Aspetto Testo Posizione Rotazione Simbolo / Testi Proporzionali in metri Nome Dim. 1 Stile STANDARD	Lista dei Modelli di disegno:	
Codice/Identificativo/Commento Dim. I Stile STANDARD	Entità Grafiche con Modelli personaliz:	nome zati
Quota Dim. V 1 Stile V. decimali	Seleziona <u>t</u> Aggiungi <u>M</u> odello Sal <u>v</u> a Lista Cfg	utti i modelli Cancella Modello Carica Lista Cfg
Salva Valori Cfg <u>C</u> arica Valori Cfg <u>V</u> alori Default	<u></u> K	Applica Annulla

Figure 292:

The **Position** tab is used to select the symbol with which the Point's position will be identified.

The same tab is used to select the associated position of the various texts compared to the symbol; the values to input are the coefficients that the program will multiply by the dimensions of the associated text to calculate the position of the text.

This tab is also used to specify the UCS compared to which the symbols and texts are designed; the UCS World is always available, while other texts will appear only if other UCSs have been created in the file.

Aspetto entità con nome		×
Aspetto Testo Posizione Rotazione	Lista dei Modelli di dise	egno:
Simbolo Tipo UCS	Entità Celerimetrich 	ne 🔨
Nome Coef. Oriz. 1.00 Coef. Vert. 1.00		
Codice/Identificativo/Commento Coef. Oriz. 1.00 Coef. Vert. 0.80	i ⊕. Entità Proposta Ag ⊕. Entità Grafiche con ⊡. Modelli personaliz	nome
Quota	Seleziona <u>t</u>	utti i modelli
Coef. Oriz. 1.00 Coef. Vert1.80	Aggiungi <u>M</u> odello	Ca <u>n</u> cella Modello
	Sal⊻a Lista Cfg	Ca <u>r</u> ica Lista Cfg
		Applica
<u>S</u> alva Valori Cfg <u>C</u> arica Valori Cfg <u>V</u> alori Default	<u>0</u> K	Annulla

Figure 293:

The **Rotation** tab is used first of all to specify a rotational angle for the entire symbol and all of the texts.

Using the mechanism of the check boxes seen earlier, the user can input a different rotational value for the symbol and for the texts: for example, the symbol can remain horizontal while rotating just the texts. The rotational angle is expressed in the units of measure selected with the specific option.

Aspetto entità con nome		×	¢
Aspetto Testo Posizione Rotazione	Lista dei Modelli di dise		_
Simbolo Rotazione	Entità Celerimetrich Stazioni Punti Dettaglio Punti Dettaglio Punti Dett. OR Punti Dett. PO		
Nome Rotazione 🔽 100.0	Entità GPS ⊕ Entità GPS ⊕ Entità Pregeo ⊕ Entità Estratto Map		
Codice/Identificativo/Commento Rotazione I00.0		giornamento nome	
Quota	Seleziona <u>t</u>	utti i modelli	
Rotazione 🔽 100.0	Aggiungi <u>M</u> odello	Ca <u>n</u> cella Modello	
	Sal⊻a Lista Cfg	Ca <u>r</u> ica Lista Cfg	
		Applica	
Salva Valori Cfg Qarica Valori Cfg Valori Default	<u>0</u> K	Annulla	

Figure 294:

The **Various** tab is displayed differently depending on the node selected:

Celerimetric Entities Node is used to select whether to display the lines produced using the IL-FL-CL codes input into the specific fields. Each line can be associated with a color and thickness.

The same selections apply to the error ellipses for the various Stations using this module.

Aspetto entità con nome		×
Varie Linee IL-FL-CL-LD Visibile Colore Spessore 0.00 mm Ellissi di errore Visibile Colore Spessore 0.00 mm 1000 Rapporto di scala	Lista dei Modelli di disi Entità Celerimetric Entità GPS Entità Pregeo Entità Estratto Map Entità Proposta Ac Entità Grafiche cor Modelli personaliz Nuovo	ppa ggiornamento n nome
	Seleziona	tutti i modelli
	Aggiungi <u>M</u> odello	Ca <u>n</u> cella Modello
	Sal⊻a Lista Cfg	Ca <u>r</u> ica Lista Cfg
		Applica
Salva Valori Cfg	<u>K</u>	Annulla
Figure 20F		

Figure 295:

GPS Entities Node offers only those options associated with the use of IL-FL-CL codes similar to the way the celerimetric entities can be associated with a color and thickness.

Aspetto entità con nome	X	
Varie Linee IL-FL-CL-LD IVisibile Colore Spessore 0.00 mm V	Lista dei Modelli di disegno: Entità Celerimetriche Entità GPS Entità Pregeo Entità Proposta Aggiornamento Entità Grafiche con nome Modelli personalizzati Nuovo Seleziona tutti i modelli	
Salva Valori Oʻg <u>C</u> arica Valori Oʻg <u>V</u> alori Default	Aggiungi Modello Cancella Modello Salva Lista Cíg Carica Lista Cíg Applica OK	

Figure 296:

PT Coordinates Entities Node offers only those options associated with the use of IL-FL-CL codes similar to the way the celerimetric entities can be associated with a color and thickness.

Aspetto entità con nome		×
Varie Linee IL-FL-CL-LD Visibile Colore Spessore 0.00 mm	Lista dei Modelli di disr Entità Celerimetrici Entità GPS Entità Progeo Entità Progeo Entità Estratto Map Entità Estratto Map Entità Proposta Ag Entità Grafiche cor Modelli personaliz	te ppa gjornamento n nome
	Seleziona <u>t</u>	țutti i modelli
	Aggiungi <u>M</u> odello	Ca <u>n</u> cella Modello
	Sal⊻a Lista Cfg	Ca <u>r</u> ica Lista Cfg
		Applica
Salva Valori Cfg Qarica Valori Cfg Valori Default	<u>0</u> K	Annulla

Figure 297:

Pregeo Entities Node offers the option to select to display or not type 7 and type 3 lines; for type 3 lines a color can also be associated.

Aspetto entità con nome		×
Varie Disegno Righe 7 ✓ Visibile Disegno Righe 3 ✓ Visibile Disegno Libretto Misure ✓ Disegno Punti e Righe 3 e 7	Lista dei Modelli di disegno: Entità Celerimetriche Entità GPS Entità Pt. Coordinate Entità Pregeo — Punti Righe5 Entità Estratto Mappa Entità Proposta Aggiornamento Entità Grafiche con nome — Modelli personalizzati	
	Seleziona <u>t</u>	utti i modelli
	Aggiungi <u>M</u> odello Sal <u>v</u> a Lista Cfg	Cancella Modello Carica Lista Cfg Agplica
Salva Valori Cfg Carica Valori Cfg Valori Default	<u> </u>	Annulla

Figure 298:

Map Extraction Entities Node and Suggested Update Entities Node are selected when the user want to be able to select:

- the color and thickness of the particle outlines;

- whether to display or not the entire extract/suggestion.

Aspetto entità con nome	×	Aspetto entità con nome
Varie Disegno Contomi Partcelle Visibili Colore Spessore 060 mm) Disegna Estrato Mappa P Disegna bill i Punis ed i Contomi	Liste dei Modelli di disegno: Tenta Celerenetiche Emita CPC Emita PC Cool Emita PC Cool Emita PC Cool Emita Proposta Aggressente Emita Proposta Aggressente Modelli personalizzati	Varie Liste dat Modelii di diregno:
Salva Valori Otg Carica Valori Otg Valori Defeuit	Seleziona tyti imodelli Aggiung Modello Coposite Modello Selys Lista Og Aggilca QK Agnuta	Selecione 3rti imodelli Aggiung Modelle Copyring Modelle Copyring Modelle Selya Liste Og Salva Valori Og Carica Valori Og Valori Default QK Agrica

Figure 299:

The Various tab does not include any options if the **Graphic Entities with Name** or **Customized Model** nodes have been selected.

Calculate Area, Polar Coordinates, Show Coordinates

and Show Distances Commands

To access these functions just open the **Instruments** menu from the Graphic View; here following are their descriptions.

1.Show Distances

This procedure is used to understand the distance between two selected points.

The method for proceeding is similar to that for tracking a line only that after selecting the second point a video window is displayed showing the value of the distance between the two selected points.

After closing the window, the last point selected previously is considered as the beginning point for calculating another distance; to terminate, press the right mouse button.

	Mostra distanze	×
	Iniziale	Finale
Coord. Y (Est)	24.510	47.163
Coord. X (Nord)	-7.331	-9.764
Coord. Z	2.178	-0.981
Distanza orizzor	itale	22.783
Dislivello		-3.158
Distanza inclina	a	23.001
Azimut		106.8116
	OK	

Figure 300:

2. Calculate Polar Coordinates

This procedure is used to calculate and print the polar coordinates of a series of points selected as compared to another point.

First step is to select the point from which to calculate the polar coordinates and then select the points for which the polar coordinates are to be identified.

The program will video track the conjunction line of the first selected point with the subsequent ones.

To terminate the selection press the right mouse button.

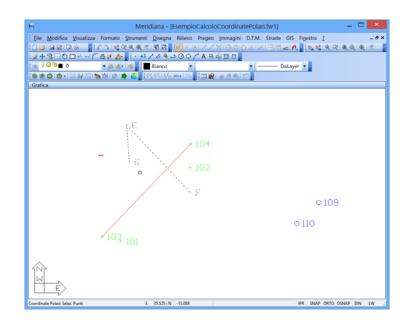


Figure 301:

At this point a window will open displaying the value of the additional angle which will be different than zero if the center selected is a station and in this case it corresponds to the opposite of the azimuth correction of the station itself.

The value associated with the additional angle can be change and is used to be added to the point's azimuth to obtain the campaign angle.

Calcolo coord	inate polari ×
Angolo addizionale	-0.0000
ОК	Annulla

Figure 302:

Press **OK** and the program will display the results in a print preview.

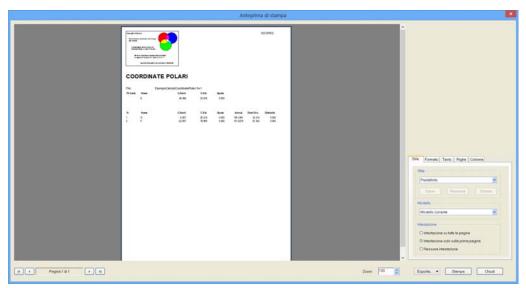


Figure 303:

3.Calculate Areas

This procedure is used to calculate the area of a surface, creating the outline of the border using the graphic selection of the vertex points.

First step is to outline the surface whose area is to be calculated; if a closed polyline has already been selected when this procedure is to be executed, it will be considered as the perimeter of the surface.

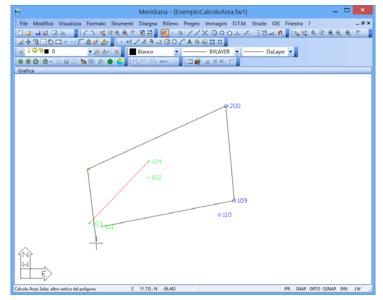


Figure 304:

This first phase terminates either by selecting the beginning point of the polygonal or by pressing the right mouse button or the **Instruments | Close Polylines** button; if the right mouse button is pressed without having selected any points, the program will continue on to selection mode to select a closed polygon that it will consider as the perimeter of the surface.

Once the selection is completed, the results will be displayed using the **Print Area** window which displays not only the results but also allows them to be printed.

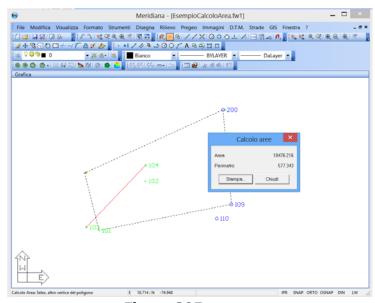


Figure 305:

4.Show Coordinates

This procedure is used to understand the coordinates, radius values or dimensions of a designed entity (Celerimetric, GPS, Noted Coordinates and Graphic).

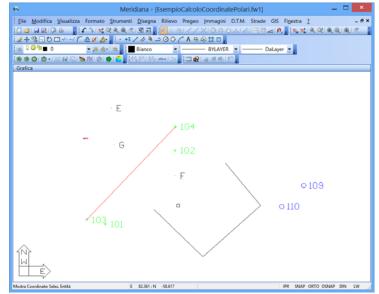
Once it is activated on the graphic view a graphic selection symbol will appear (a small rectangle) to be positioned on the Entity whose information is to be displayed.

To confirm the selection, press the left mouse button: at this point a specific window will appear displaying all of the information available for the selected Entity.

Coordinate punt	o celerime ×
Nome	103
Descr.	PV - Spigolo
In Stazione	100
Coord. Est	2.424
Coord. Nord	-70.983
Coord. Quota	65.040
ОК	Annulla

Figure 306:

If a polyline has been selected, the values of the individual vertices can be displayed by pressing the Next Vrt. button.





Press the **OK** button and the window will close. The program will allow selection of another Entity; to terminate the selection, press the right mouse button.

Coordinate polilinea	×
Piano	0
Vertice n.	1
Coord. Est	45.634
Coord. Nord	-59.352
Coord.	0.000
Vrt.Succ. OK	Annulla

Figure 308:

File Menu|Export

This menu offers the following commands:

Design on BMP file: A file is created that contains a BMP format image of all Entities designed as video. To select the name of the file a standard Windows window will open. Once the file name is inserted, another window will open used to select the horizontal dimensions of the image. The vertical dimensions will be calculated in relation to the dimensions of the display window. The dimensions that the file will occupy once created are also displayed.

Coordinate Files: This procedure is used to create a file by selecting the order of the coordinates, the names and the codes. The file will count the results in Ascii, Doc, and Html format.

Once this procedure is activated, the user must select the graphic entities whose coordinates are to be printed; the entities that can be selected are those that have an associated name.

At the end of the selection a video window will appear in which to select the variables to be inserted into the file to create and their order.

Also, this window is used to:

- insert the number of decimals;
- insert the separator between one datum and another;
- specify whether to place the names between double apexes.

Press the **OK** button and the program will display the preview of the file to be created.

Opzioni creazione file coordinate			
Variabili da usare			
	Tipo varia	abile	N°Decimali
Campo 1	Nome	*	3
Campo 2	Nome	*	3
Campo 3	Codice / Identificati	vo 💌	3
Campo 4	Coord. Nord	~	3
Campo 5	Coord. Est	~	3
Campo 6	Quota	*	3
Campo 7		~	3
Campo 8		*	3
Carattere sep	Carattere separatore		
⊙ Virqola		⊙ SI	
O Punto e v	ircola	© NO	
○ F unito e v		UNU	
O Tabulato	re		
OK Annulla			

Figure 309:

AutoCAD (.DXF/.DWG): use this option to create a file that can be read and used by the AUTOCAD program.

To select the name of the file, a standard Windows window will open to select the files.

After identifying the name of the file to create, a window will open for the user to:

Select whether to explode or not the entities with the name; if this option is not selected the entities can be exported as Blocks, otherwise the blocks will be exploded and the entities will be formatted as texts, lines, and points.

Select whether to insert headings or not; if the option is selected, the program will export all of the characteristics associated with the entities to be transferred.

Select the number of spatial dimensions to be transferred; that is, specify whether or not to transfer the quote to Autocad.

Using the fourth option, the user can select whether to also transfer entities that are not displayed in the graphic.

The last option involves the possibility of projecting the entity on a specific UCS at the time of export.

Scrittura file DXF/DWG		
Esplodi blocchi top. C Si I No	Intestazione DXF/DWG	
Dimensioni C 2D © 3D	Entità non visual. Ĉ Si @ No	
Proiezione su UCS	OK Annulla	

Figure 310:

3d Office-Point file (.PT3): this procedure is used to create a file by selecting the Celerimetric entities, GPS points and noted coordinate points and the points with the name in a PT3 file format for exchanging data with Pocket3d and 3d Office. Once the command is launched, select the entities to export; when the step is complete the name used to save the file will be requested. The exported points will belong to a plane determined as follows:

- Points with name: They will be inserted into a plane with the same name as the insertion plane.
- Topographic Entities: If a design model has been specified, they will be inserted into a plane with the same name as the design model; otherwise they will be inserted inot a plane that identifies the type of entity.

If there is at least one point from among those being exported that includes a non-numeric character, the program will automatically rename all the points, setting the description of the points to their original name.

- 3d office-Linework file (.LN3): this procedure is used to create a file in LN3 format for exchanging data with Pocket3d and 3d Office. Once the command is launched there will be a request for the name to be used for saving the file. All of the lines, circles, arches, polylines and texts of the current project will be saved.
- 3d Office TIN file (.TN3): this procedure is used to create a file in TN3 format for exchanging data with Pocket3d and 3d Office. Once the command is launched, a dialogue window will open used to select which triangulations to export. At least one triangulation must be selected, but more than one can also be selected. If there is only one triangulation in the project, the window is not displayed and it is automatically selected. When this step is terminated, the name of the file to create is requested.

Commands View: list of commands

Commands in File Menu

Command	Action
_impDxfDwg	To import DXF/DWG files
_impPnt	To import Coordinate files
_gisImpShape	To import Shape files
_ImpMapImage	To import Pregeo images/maps
_ImpImagePDF	To import PDF images
_ImpCxf	To import CXF files
_ImpLn3	To import - 3d Office - LineWork file (.LN3)
_ImpTn3	To import - 3d Office - TIN file (.TN3)
_createDxfDwg	To create DXF/DWG files
_createCoordFile	Coordinates on files
_createBmp	Design on Bmp file
_gisExpShape	To export Shape files
_ExpPt3	To export - 3d Office - Point file (.PT3)
_ExpLn3	To export - 3d Office - LineWork file (.LN3)
_ExpTn3	To export - 3d Office - TIN file (.TN3)
_straPrtSezAree	Export - Calculate sections areas
_straPrtSezAreeElement	Export - Calculate elementary sections areas
_straPrtSezVol	Export - Calculate sections volumes
_preview	Print preview
_PageSetup	Set page
_print	Print

Commands in Modify Menu

Command	Action
_undo	To erase last operation executed
_redo	To repeat last operation erased
erase /_erase	To erase an entity
move / _move	To move an entity
сору / _сору	To copy an entity
reflect	To reflect an entity
scale / _scale	To change the scale of an entity
rotate / _rotate	To rotate an entity
_adapt2d	To adapt graphic entities
offset /_offset	Object offsets
MATCHPROP /	Correspondence with property
_matchprop	
_property	To change the properties of the graphic entities
eattedit / _eattedit	To edit an attribute
eattmove / _ eattmove	To move an attribute
_altAtt	To change the height of the attributes
extend / _extend	To extend an entity
trim / _trim	To eliminate objects adjacent to others
tip	To change the length of two line segments so that their ends are the same.
fillet / _fillet	To fillet lines
break / _break	To break objects
explode / _explode	To explode blocks
_purge	To eliminate objects
_editpline	To change a polyline

Commands in View Menu

Command	Action
_redraw	Redraw
_regen	Regenerate
_zoompr	View previous zoom
_zoomrt	View real time zoom
_zoom	View window zoom
_zoomin	Enlarge current design window
_zoomout	Decrease current design window
_zoomex	View max extension zoom
_panrt	View real time pan
_pan	To move the design window to display
_panleft	To move the window to the left
_panright	To move the window to the right
_panup	To move the window up
_pandown	To move the window down
_3dplancurucs	Set the level view from the current UCS
_3dtop	Set the level view from above
_3dbott	Set the level view from below
_3dleft	Set the level view from the left
_3dright	Set the level view from the right
_3dfront	Set the level view from the front
_3dback	Set the level view from the back
_3dswiso	Set the isometric level view from SW
_3dneiso	Set the isometric level view from NE
_3dnwiso	Set the isometric level view from NW
_3dseiso	Set the isometric level view from SE
3dorbit / _3dorbit	View 3D orbit
_shade2dwf	To display only the external parts of the images
_shadeflat	To display also the surfaces of the images
_ucsIcon	To display or not the UCS icon
_ucsIconOr	To position or not the icon in its original location
_lights	Select lights
_viewAreaCal	Only plate calibration area
_viewMaxAreaCal	Max plate calibration area
_viewProf	To display the profile
_barCustom	Commands to customize the button bar

Commands in Format Menu

Command	Action
layer/_layer/	Select layer
_laymcur	Update entity plane
_layiso	Isolate entity plane
_layuniso	Cancel plane isolation
_layoff	Turn off entity plane
_allLayon	Turn on all planes
_layfreeze	Freeze entity plane
_allLayThaw	Unfreeze all planes
_laylock	Block entity plane
_layunlock	Unblock entity plane
color / _color	Select color
_linetype	Select line type
_lweight	Select line thickness
style / _style	Select text style
_curdimstyle	Select dimension style (quote)
elevation /_elevation	Select quote
_angleType	To change the unit of measure of angles
REFLECTTEXTS	Used to tell program whether to reflect or not texts
_disEntNome	Appearance of entities with name
_disCurLev	Level curves appearance
_disPrflName	Profiles/Roads/Sections name appearance
_disPrflStili	Profile Style
options / _options	General options selection

Commands in Instruments Menu

Command	Action
_viewDist	To display distances
_calcPolar	To calculate polar coordinates
area/_area	To calculate the area
_viewCoord	To display coordinates
_printEnts	Print graphic entities
_createEntsFile	Graphic entities on File
_design	Free design
_connPt	Connect to point
_ptMed	Middle point
_ptFin	End point
_perp	Perpendicular
_inters	Intersection
_center	Center
_quadr	Quadrant
_tang	Tangent
_ins	Insertion
_near	Near point
_coord	Input Coordinates
_libc	Free Data Celerimetric
_impStr	Instruments setting
_attOrt	Activate Move Orthog.
_gridsnap	Select snap and grid
_+ucsman	To select UCS or change any information about it
_ucsOrthoT	UCS Above
_ucsOrthoB	UCS Below
_ucsOrthoL	UCS Left
_ucsOrthoR	UCS Right
_ucsOrthoF	UCS Front
_ucsOrthoBa	UCS Back
_ucsNewView	To create a new UCS defining a new display
_ucsorigin	To create a new UCS defining a new origin
_ucsz	To create a new UCS specifying a direction on the z axis
_ucs3	To create a new UCS specifying 3 points in the space
_ucsxrot	To create a new UCS rotating the x axis
_ucsyrot	To create a new UCS rotating the y axis
_ucszrot	To create a new UCS rotating the z axis
_ucsy	To create a new UCS identifying only two points in the space
_viewTables	To display the created tables in graphic

Command	Action
_creaTables	To create the design tables from Graphic View
_closePoly	Close polyline
_digitchoose	Select plate
_calTabGri	Calibrate plate for grid
_calTabPt	Calibrate plate for spread points
_suspCalTabGri	Suspend calibration
_resCalTabGri	Reactivate calibration

Commands in Design Menu

Command	Action
point / _point	To create points
_ptName	To create points with name
_ptSquad	To create squared points
_ptAngDist	To design points identifying the angle and distance
_ptSuLIn	To create points on lines/arches/circles/polylines
line / _line	To create lines
parallel / _paralline	To create parallel lines
_ptLinFraz	Creating lines by fraction of areas
arc / _arc	To create arches
circle / _circle	To create circles
_circletan	To create circles that are tangent to two segments
_paral	To create parallelograms
_rect	To create rectangles
_psqr	To created squared polygons
text / _text	To create texts
_pLine	To create 2D polylines
_3dpoly	To create 3D polylines
block / _block	To define blocks
_insert	To insert a block
_attdef	To create attributes
_hatchpoly	To set a hatch for a polyline
_bhatch	To create hatch
dmlinear /dimlinear	To create linear dimensions
dimaligned / _imaligned	To create aligned dimensions
dimangular / _imangular	To create angular dimensions

Commands in Survey Menu

Command	Action
_disEntName	Appearance of entities with name
_ptCeler	Creating celerimetric points
_ptGps	Creating GPS points
_ptNoted	Creating noted points
_ptInStat	To transform points into stations
_ptInCeler	To transform points into celerimetric points
_ptInOri	To transform points into orientation points
_ptInGps	To transform points into GPS points
_ptInNoted	To transform points into Noted points
_modPt	Change points
_cancPt	Erase points
_movePt	Move points
_moveSta	Move stations
_SpstBaseGps	Move GPS base
_muoveAtt	Move texts
_rotAtt / eattrot / _eattrot	Rotating texts
_modDisMod	Changing design model
_modCod	Changing codes
_undoPosScri	Refresh text position
_findPtLib	Find point in booklet
_findPtGraf	Find point in graphic
_findPtSuccGraf	Find next in graphic
_findPtImm	Search point by image
_ifcTrasf	To transform graphic lines
_ifcCanTrasf	To cancel transformation
_adaptSurvey	To rototranslate Survey
_ToStrum	To instrument

Commands in Pregeo Menu

Command	Action
_pgeo3	To create the 3 lines
_pgeo45	To create the 4-5 lines
_pgeo7	To create the 7 lines
_pgeo7PtIs	To create the 7 lines vertices/direction
_pgeoAut	To automatically create lines
_pgeoElGra	To create elements in graphic
_pgeoDel7	To cancel 7 lines
_pgeoDel3	To cancel 3 lines
_pgeoImp45	To import 4-5 lines in graphic
_pgeoImp7	To import 7 lines in graphic
_pgeoAnnImp	To cancel import
_pgeoTPt	Verify tolerances for alignment points
_pgeoTDist	Verify tolerances between distances
_pgeoTSup	Verify tolerances between surfaces
_pgeoTRilDist	To verify tolerances for surveyed object relative to distances
_pgeoTRilSup	To verify tolerances for surveyed object relative to surfaces
_pgeoTTri	To verify if there are stations outside the triangle
_pgeoTSta	To verify the distances between stations
_pgeo89Par	To design particles for automatic-setup
_pgeo89ModPar	To change particles for automatic-setup
_pgeo89Prop	To generate update suggestion
_pgeoPropCanc	To cancel map extraction and update suggestion
_pgeo10AddText	To add a text in update suggestion
_moveAtt	To move a text in update suggestion
_eattrot	To rotate a text in update suggestion
_pgeo10AddSymb	To add a symbol in update suggestion
_pgeo10MoveSymb	To move a symbol in update suggestion
_pgeo10RotateArrow	To rotate an arrow symbol in update suggestion
_pgeo10DelProp	To eliminate texts, dotted/dash lines and symbols in update suggestion
_pgeo10MovePtProp	To move points in update suggestion
_printUpd	Print update suggestion
_pgeo10GetTypeLine9	Identify type

Commands in Image Menu

Command	Action
_ImMgr	Manage images
_ImCalLin	To run linear calibration
_ImmCalGri	To run grid calibration
_ImCalPt	To run spread points calibration
_ImmCalFrame	To run frame calibration
_ImmCalAuto	To run Pregeo auto-setup calibration
_ImmExpArea	Export area

Commands in D.T.M. Menu

Command	Action	
_disPrjCLiv	Manage level curves project	
_disCurLev	Level curves appearance	
_disPrflName	Profiles/Roads/Sections name appearance	
_disPrflStili	Profile Style	
_optPrflOptCalc	Profile calculation options	
constraints	To create constraints	
_eraseCon	To erase constraints	
_bordInt	To create internal borders	
_bordExt	To create external borders	
_editBrd	To edit borders	
_eraseBrd	To erase borders	
_triang	To create triangles	
_modTri	To modify triangles	
_eraseTri	To erase triangles	
_eraseAllTri	To erase all triangles	
_curvelev	To create level curves	
_scrSplineAut	Spline text automatically	
_modSpline	To modify spline tension	
_scrSpline	Add/cut spline texts	
_cancTrSpline	To erase spline sections	
_rotTexSpline	To rotate spline texts	
_eraseAllCvLv	Erase all level curves	
profiles	To create profiles	
sections	To create sections	
_calcQuoPrfl	To recalculate profile quotes	
_editPrfl	To edit profiles	

Command	Action
_erasePrfl	To erase profiles
ptiQuotTriang	To design points quoted by triangles
painters	To create painters
_trasfEntGrf	To transform graphic entities
_polyquotfix	To assign a fixed quote to polyline
_polyquotplan	To assign a plane quote to polyline
_polyquotdtm	To assign a DTM quote to polyline
_tripoly	To create triangles within a polyline
_creaslope	To create a slope
_creaslopdtm	To create DTM slope
_excav	Excavation project
_jointri	To join models
_extpnttri	To extract points from triangles
_calcVolAss	Calculate absolute volumes
_calcVolDiffS	Calculate volumes by simple difference
_calcVolDiffC	Calculate volumes by complex difference
_calcVolSzRag	Print calculation of leveled sections volumes
_calcVolSzRagF	Create file with leveled sections volumes
_map	Generate map

Commands in Roads Menu

Command	Action
_road	Create a new road
_roadCurr	Set current road
_roadProp	Road property
_roadRecalc	Recalculate road
_roadRect	Layout - New rectilinear
_roadCurve	Layout - New curve
_roadCurveMod	Layout - Change curve
_roadFlex	Layout - New flex clothoid
_roadRotat	Insert rotational
_roadCancElem	Erase an element
_roadTable	Elements table
_roadQuote	Altimetric - Recalculate roads quote
_roadSectOpt	Sections - Sections options
_roadSectPt	Sections - Section manual by point

Command	Action
_roadSectProg	Sections - Section manual by progressive
_roadSectCanc	Sections - Erase sections
_roadSectInterv	Sections - Intervals template
_roadSectEditor	Sections - Editor templates
_roadPend	Slopes and enlargements
_addTpsEnts	Tracking layout - Generation
_delTpsEnts	Tracking layout - Eliminate tracking layout
_insTpsLegenda	Tracking layout - Insert legend
_roadPlaniPrj	Project layout
_roadVel	Velocity graphic
_roadNorm	Guidelines check
_roadPos	Road position
_roadStake	Road stakeout
_roadVolOpt	Set volumes calculation
_roadVolSect	Print calculation of leveled sections volumes
_roadVolTray	Print volumes calculation tray
_roadVolSectFile	Create file with leveled sections volumes
_roadVolTrayFile	Create file with volumes tray calculation
_roadPrtSectAreas	Calculate sections areas
_roadPrtSectAreasElement	Calculate elementary sections areas
_roadPrtSectVol	Calculate sections volumes

Commands in GIS Menu

Command	Action
_gisTable	Manage tables
_gisTheme	Manage themes
_gisExpTheme	Export definition themes
_gisImpTheme	Import definition themes
_gisEntCrea	Create entities
_gisEntDel	Erase entities
_gisEntEdit	Edit entities
_gisExpShape	Export Shape files
_gisImpShape	Import Shape files
_gisQuery	Query

Commands of Points Clouds Menu

Command	Action
_pntCldProps	Property
_pnt _RotoTrasl	Georeference
_pntCldMorph	Terrain filter
_pntCldCnt	Generate external border
_pntCldDecimate	Decimation
_pntCldDelPnts	Erase points

Details

Graphic Layer: enter online program guide, Format|Graphic Layers.

Reports

Print Options

The **Print Options** command opens a window divided into five pages.

The first page, **General Options** is composed of two sections.

In the **Header** section the user can tell the program whether or not to print the heading and logo, and to insert the heading to be shown on the page.

In the second section **TS Data** the user is able to tell the program whether or not to print the TR or HC/VC points.

The remaining pages are used to select the information to include in the printouts and the free format output identifying the **Variable Type**.

General options TS data Ground profiles Projects/Polylines Header Print header Print logo Header rows 1 1 1 2 3 4 5 6 7 8			Print op	tions and Free	Format		×
Print header Print logo Header rows Header rows	General options	TS data GPS data	Ground profiles	Projects/Polylines			
Headerrows	Header						
Headerrows	Print h	eader					
Header rows							
TS data		000					
TS data							
2 3 4 5 6 7 8 TS data	Header	ows					
3 4 5 6 7 8 TS data	1						
4 5 6 7 8 TS data							
5 6 7 8 TS data Print TR Points							
6 7 8 TS data							
7 8 TS data							
8 TS data Print TR Points							
Print TR Points							
Print TR Points							
	TS data —						
Print HC/VC Points	Print T	'R Points					
	Print H	IC/VC Points					
OK Cancel Help					ОК	Cancel	Help

Figure 311:

TS Data

This page is used to set the free format for printing the TS Data (Output|Free Format|Print All Stations and Output|Free Format|Print With Selected Stations) and for creating files (File|Export|Free Format).

		FIIII OF		ronnat	
General options	TS data GPS da	a Ground profiles	Projects/Polylines		
	Print			ASCII file	
	Varia	ble types		Variable types	
Field 1	Name		~	Notes	¥
Field 2	Code / ID		~	Code / ID	×
Field 3	Absolute N	lorthing	~	Absolute Northing	¥
Field 4	Absolute E	asting	*	Absolute Easting	~
Field 5	Absolute E	levation	~	Absolute Elevation	~
Field 6	Measured	horizontal distance	~	Measured horizontal distance	~
Field 7	Measured	vertical circle	*	Measured vertical circle	~
Field 8	-		~	-	~
				OK Cancel	Help



GPS Data

This page is used to set the free format for printing the GPS data (Output|Free Format|Print All Groups and Output|Free Format|Print With Selected Groups) and for creating files (File|Export|Free Format).

		Print options and Fre	e Format	×
General options	TS data GPS data Grou	und profiles Projects/Polylines	3	
	- Print		ASCII file	
	Variable types	N°Decimals	Variable types	N°Decimals
Field 1	Name	~	Name	~
Field 2	Description	~	Description	~
Field 3	Latitude	*	Latitude	~
Field 4	Longitude	~	Longitude	~
Field 5	Elevation	~	Elevation	~
Field 6	Ant. Height	~	Ant. Height	~
Field 7	-	~	•	~
Field 8	-	~	-	~
			OK Ca	ncel Help

Figure 313:

Ground Profiles

This page is used to set the free format for printing Profiles (Output|Printout Ground Profile|Print Free Format Profile and Print Free Format All Profiles) and for creating ASCII files (File|Export| Printout Ground Profile and Printout of all ground Profiles).

	Print options and	I Free Format ×
General options T	S data GPS data Ground profiles Projects/Po	lylines
	Print	ASCII file
	Variable types	Variable types
Field 1	Point number 🗸 🗸	Point number
Field 2	Name	Name
Field 3	Elevation	Elevation
Field 4	Partial Distance	Partial Distance
Field 5	Chainage 👻	Chainage
Field 6	Description	Description
Field 7	· •	-
Field 8	-	-
Field 9	-	-
Field 10	· 💌	-
Field 11	· •	-
Field 12	· •	-
		OK Cancel Help

Figure 314:

Projects/Polylines

This page is used to set the free format for printing Projects (Output|Printout of Project/Poyline|Print Free Format Project and Print Free Format All Projects) and for creating ASCII files (File|Export| Printout of Project/Poyline and Printout of all Project/Poyline).

General options TS	data GPS data Ground profiles Proje	s/Polylines
· "	- Print	ASCII file
	Variable types	Variable types
Field 1	Point number 🗸 🗸	Point number
Field 2	Elevation	Elevation
Field 3	Partial Distance	Partial Distance
Field 4	Chainage 🔽	Chainage
Field 5	Difference in level	Difference in level
Field 6	-	-
Field 7	-	-
Field 8	-	-
Field 9	· 🗸	-
Field 10	-	-
Field 11	-	-
Field 12	-	· •
Field 13	-	-

Figure 315:

Print Component

There are five tabs available in the **Print Component** used to customize the printout.

	Print Preview	
	Annaper Section of Section 2014	
	TS DATA Fig. MMMMOLLA.DemagnCowdeeprofile/WiGPs.ge Natime 1 Statime 1	Byte Format Text Roves Column Style
[4 4 Page 1 of 1 5 5]	Zoom 100 💼	Export. • Print Close

Figure 316:

The **Style** tab is used to insert the style type (default or customized), the model to use and whether or not to print the heading.

Style	Format Text Rows Column
Sty	le
	Default 🗸 🗸
	Save Rename Delete
Mc	del
C	Current template 🗸 🗸
He	ader
C)Header on all pages
) Header only on the first page
C)No header

Figure 317:

The **Format** tab is used to indicate the orientation of the printout (vertical or horizontal), margins (upper, lower, left, right) and whether or not to activate borders.

Style	Forma	t Text	Rows	Colu	mn		
Ori	entation						
		 Vertica 	d				
) Horizo	ntal				
Ма	rgins [m	m]					
То	φ	5 🌩	Во	ttom		5 🌩	
Le	ft	5 🜲	Rig	ght		5 🌩	
Ed	ges						
		Ā	Active ed	ges			

Figure 318:

The **Text** tab displays a tree structure showing the organization of the document to be printed.

Each part of the document is identified by and name and can be selected.

If a text part is selected then the Select Font button is enabled allowing the user to change the format of the text selected.

Style	Format	Text	Rows	Column	
	Data (Data (- Te: - Joi - Joi - - Joi - - - - - - -	mpany_ e(Text) groups) xt e_name o_Name erator(D trument(ta(Data) ttion_Na intifier(D mperatu	ta) e(Data) Data) (Data)) ame(Data)		~
	Select F	Unit			

Figure 319:

The **Rows** tab also displays the organization of the document (tree structure).

This tab is used to change the height of the line for the selected component by inserting the datum into the specific box.

If this operation cannot be executed then the box remains disabled.

Style	Format Te:	a Row	s Colum	n	
	Report → Header → _2 → _3 → _4 → _5 → _6 → _7 → _8				
Row	9 - Data (grou 32 33 34 35 35 35	ps) informa	ation	~	

Figure 320:

The **Columns** tab is used to change the width of the columns; if the operation is not feasible then the box remains disabled.

Style	Format	Text	Rows	Column	
	Report - Heade - 11 12 13				^
	14 15 16 17 18 10				
	Data ((43 44 45		nformatior	1	~
Colu	mn width ([mm]		0	▲ ▼

Figure 321:

The following commands are available in the preview:

- "Export..." : to export the printout into the following formats: PDF, XML, RTF, HTML, TXT, JPEG, TIFF, BMP.
- "Print" : to select the print options and activate them.

F	Print	×
Printer Name: IP LaserJet 3055 PCL6 Class Driver	~	Properties
Where:		Print to file
Pages All Current page Pages: Enter page numbers and/or page ranges, separated by commas. For example, 1,3,5-12	Copies Number of copies	1 V Collate
Other Print All pages Order Direct (1-9) Duplex Default	Print mode	✓ Default ✓
Dupica		OK Cancel

Figure 322:

Digital Level Data View

The **Digital Level Data View** is the display of information collected through a Digital Level.

This part of the document is used to archive one or more L<u>eveling</u>s, which in turn contain the data associated with a certain number of measurements executed. Further, the **Benchmarks** node is always available, used to insert the information for elaboration of the measured data.

Selecting the **DL data** node will open the view displaying the Levelings; for each of these, the display includes the name, comment, data and number of points present.

Once the **DL data** node is expanded in the navigation tree, the list of levelings will be displayed; these levelings can be selected which will open the view corresponding to where the points measured are represented by a grid.

2	Geopro Office - [DigitalLevel.gpo]	- 🗆 🗙
1 🖬 🖬 🐘 🔍 🖓 👌 📷 🖕 🗮	Computation Output Settings Window ? :	- 8 :
	DL	
Document content S data (0 Job.)	Levelings	
- (0 GPS data (0 Grp.)	N. Name Description Comment Data N.Ptn.	
E-S Known points data (0 €	1 DIGA2Q 248	
E S DL Data (1 Group.)		
- Veveling DIGA2Q (2		
P Bench Marks CAD		
- Profiles		
- Roads		
Reper spaces		
>		TEOSNA DYN LW
	Chai SNAF OR	TF OSIAN DTIN LW

Figure 323:

For each point, a series of information is associated that varies depending on the type of measurement conducted and may be:

Number, Back, Forward, Distance, Elevation, Measurement no., RMS, and Notes;

Number, Measurement, Distance, Elevation, Measurement no., and Note.

File Modify View Insert C					ow ?						- 8
	i 알 내 문 요 : : : : : : : : : : : : : : : : : :										
			2Q								
Document content	_	pints								_	
	N.	Number	Back	Middle	Forward	Distance	Elevation	No Measure	RMS	Notes	
B-S GPS data (0 Gip.) B-S Known points data (0 C	1	0	0.121950			13.114					
E- DL Data (1 Group.)	2	0	0.121990			13.114					
- 😧 Leveling DIGA2Q (2	3	1			1.652710	13.315	203.330				
Bench Marks	4	1			1.652690	13.322	203.330				
-¥ CAD • Profiles	5	1	1.687520			21.926					
- Roads	6	1	1.687460			21.928					
Raper spaces	7	1			0.752140	22.067	204.266				
	8	1			0.752070	22.067	204.266				
	9	1	1,455370			22.033					
	10	1	1,455380			22.031					
	11	1	1.433300		1.347880	21.972	204.373				
	12	1				21.972					
					1.347890		204.373				
	13	1	1.244440			22.010					
	14	1	1.244340			22.016					
	15	2			1.312120	21.997	204.305				
	16	2			1.312160	21.990	204.305				
	17	2	1.318200			24.786					
	18	2	1.318120			24.783					
	19	2			1.277270	25.042	204.346				
()	20	3			1 277220	25.027	204 246				

Figure 324:

Selecting the **Benchmarks** node will display the corresponding view where the measured points are seen on a grid with their respective data (Name, Elevation and Description).

0	Geopro Office - [DigitalLevel.gpo] -	×
	Computation Output Settings Window ? ■	- 8
Document ×	Bench Marks	
Document content	Points	
- 🐟 TS data (0 Job.)	N. Name Elevation Description	
- SPS data (0 Grp.)	1 0 204.861000	
8 Known points data (0 C)	204/201000	
B DL Data (1 Group.)		
- Veveling DIGA2Q (2		
Bench Marks		
- 🖌 CAD		
— Section Profiles		
- Roads		
Paper spaces		
(
	CHAI SNAF ORTH OSNA	DVN IW
	Char shar out rosha	DITE LIT



Importing Data from Instrument

Using the command **Insert | Data Instrument...** menu, the user can import the data measured by the instrument into the Digital Level Booklet.

The program offers the user a guided procedure for inserting all of the information necessary for transmitting the data.

Instrument and settings can be stored in a profile to avoid repeating the complete procedure for each instrument data import.

Upon activation, the procedure displays a window where the user can execute the following operations:

Import from Instruments - Profile selection
Profile
New New
Predefined Details
-A PROFILE has information about the instrument and the data transfer modes. -To create a profile, please select New and then press <next>.</next>
<back next=""> Import Cancel Help</back>

Figure 326:

1) Create a new profile selecting the **New** icon and press **Next>** until the procedure is complete: at a certain point a window will appear where the profile can be saved and therefore also save all selections made in the previous windows.

2) Use a profile, without activating the procedure, by selecting it and pressing the **Import** button.

3) Cancel or rename a profile using a menu activated by clicking the right mouse button.

The list of profiles can also be seen in detail using the **Details** button; to refresh the default display, press the **Large Icons** button.

Finally, the profile can be set as default using the **Predefined** button; the default profile is the one then suggested upon activating the procedure.

Press **Next>** and the next window will display a list of instruments that the program makes available to users.

To continue, the user must select the instrument (for the moment the available instruments are Topcon DL-100 and DL-200; Topcon DL500).

Press the **Forward** button and the program will suggest a window where the user can insert the associated settings to transfer data.

Once their correctness is checked, press **Next>** to display a window where the type of conversion can be selected: Convert, No Convert, Ask the user whether to convert.

These options are used to decide whether or not to automatically insert the data imported from the instrument or to have a window appear for the selection.

Instrument selection ×
Instruments
⊙ Topcon DL100 - DL200
○ Topcon DL500
<back next=""> Import Cancel Help</back>

Figure 327:

Once the conversion type is selected the **Save Profile** window will appear listing the existing profiles and allowing the just created profile to be saved.

Once the profile is saved, the user can return to the previous pages to change the profile settings but cannot return to selecting the instrument.

Saving the Profile	×
Already existing profiles	
Profile name Instrument Port Speed Convert P	
<>	
Saving the Profile	_
Save Profile as (None)	
<back next=""> Import Cancel H</back>	Help

Figure 328:

The following windows show the steps to take for setting the instrument to allow importing the data.

The last window shows the result of the transmission; if the importing was not successful the user can retry by pressing the **Retry** button.

 Please connect the Digital level to the selected serial port of the Personal. Please turn it on and press 'SET' key. With the vertical arrows, please select the following window
File Out
 Please press 'ENT' key and select the desired type of Job (JOB). Please choose the Job (Job) with the vertical arrows.
Job JOB NAME
6. Please press 'ENT' key to confirm the Job.
Out ?
RECorESC
7. Please press now 'REC' key to start the transfer.
<back next=""> Import Cancel Help</back>

Figure 329:

File|Import|Various Formats

This command is used to convert the following file types:

		Geopro Office - [DigitalLevel.gpo]	_ 🗆 🗡
File	Modify View Insert Compu	tation Output Settings Window ?	_ 8 3
	New Ctrl+N	A 21 A3 🔍 😂 💞 🚽	
1	Open Ctrl+A		
	Close	/elings	
	Save Ctrl+S	Name Description Comment Data N.Ptn.	
8	Save as	IGA2Q 248	
	Save a copy		
	Import +	Geopro Office (.GPO)	
	Export +	😭 Various Format	
	Measure unit settings		
	1 DigitalLevel.gpo		
	2 esempiolivellodigitale.fw1		
	3 GPS.gpo		
	4 PP.gpo		
O	Exit		
<	>		

Figure 330:

DL-100 (*.DL1) File ;

Leica (*.WLD) File .

Executing the command will open a window used to select the file to be imported.

The selected file will be suggested again in the future executions of the command.

Once the name is selected, the conversion will run immediately, creating a group in the Digital Level Booklet in the currently open file.

Elevation Compensation

his command is used to run the Compensation Calculation of the Quotes on the data archived in the Digital Level of the open document.

Executing the command will activate a guided procedure where, in the first window, the user is able to select which Levelings are to be considered in the calculation and, make selections to set the type of calculation to apply and the type of outcomes to produce.

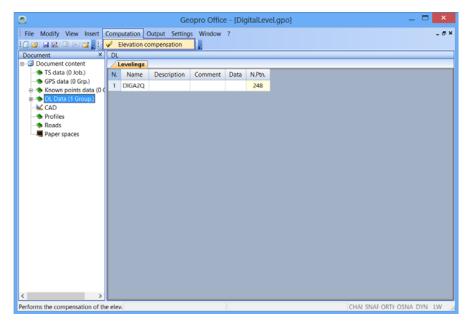


Figure 331:

By selecting **Yes** in the **Compensation** section the calculation will execute with more accuracy in that the strict compensation mechanism will be used.

By selecting **On printer** in the **with output** section, the user is telling the program to print the produced results.

Computation of elevati	ons - Starting infor	mation ×							
	COMPUT	ATION TYPE							
S No. Levelling name I DIGA2Q	Compensation	with output							
	O No	O No output							
	• Yes	 On printer 							
<									
Select the levellings you want to process.									
<back next=""> Cancel Help</back>									

Figure 332:

Pressing the **Next>** button will display the window with the compensation results.

The **Enlarge** button will display the results in a larger window.

Again pressing the **Next>** button will continue to a final window where the user transfers the calculation results by pressing the **Complete** button.

If the user decided to receive the outcome on the printer, the program will also activate the print preview.

	Computa	tion of elevat	ions - Results		
Compensation results.					
		ELEVATION	COMPENSATION	OF DL DATA	î
KNOWN ELEVATION	POINTS				
No.	Name T4	Elev [m] 204.861			
1	14	204.861			
MEASURED POINTS					
N	Name	Frequency	Туре		
1 2	т4 1-1	4	Fixed. Var.		
3	1A-1	4	Var.		
4	1R-1	4	Var	>	Ť
		Enlarge			
	< <u>B</u>	ack <u>N</u> ext	> Cano	el Help)
					_

Figure 333:

Output

The **Output** menu of the Digital Level data includes two commands:

Print All Levelings: this command is used to activate the printing of all levelings;

Print With Selected Levelings: here the user can tell the program which levelings to print by means of the selection window.

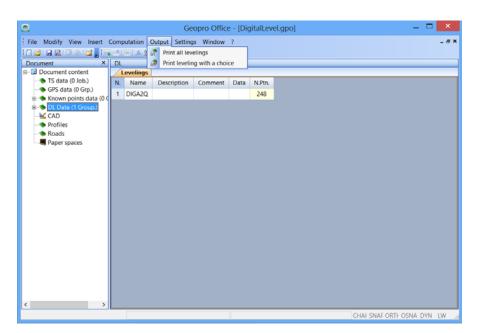


Figure 334:

Export File|Leveling (.CSV)

Export on File | Levelings (.CSV): this function is used to create an ASCII type file with the CSV extension. Executing this command will open a window where the user can insert the path for saving and the file name; the file produced can be easily imported into Excel.

				Ge	opro Office	e - (Dig	gitalLev	el.gpo] —	×
F	ile	Modify View Insert Compo	tation (Output Setting	s Window	?			_ @ ×
10		New Ctrl+N	Se 24	AA 🛝 🖄 💣	a 🗸				
	_	Open Ctrl+A							
1		Close	velings						
6		Save Ctrl+S	Name	Description	Comment	Data	N.Ptn.		
		Save as	IGA2Q				248		
		Save a copy							
	-	Import •	_		_				
	-	Export •	🐨 Le	elings (.CSV)					
		Measure unit settings							
		1 DigitalLevel.gpo							
		2 esempiolivellodigitale.fw1							
		3 GPS.gpo							
		4 PP.gpo							
6	9	Exit							
<									
Crea	ate	a file with data						CHAI SNAF ORTE OSNA D	YN LW .

Figure 335:

Introduction

The Geographic Information Systems (GIS) are based on a merger of the computerized design and the relational databases.

The first system allows computerized design of the geographic entities, while the second stores the data and information associated with these entities. The merger of these two systems in the GIS is used to analyze a geographic entity, whether for its complete geometric nature (and symbolic) as well as for its total informational content; in essence, these systems create a link between each geographic entity in a map and a line of a database.

With these new systems, each piece of data can be represented through a geographic position, defined by the coordinate system adopted and along with all of the information that applies to it, which can be stored in a database. In this way, the analysis of the geometric properties of the entities represented in a geographic map (for example, their exact physical dimensions) can be combined with the general properties of other cartographic entities (such as reciprocal distance between houses, habitations, schools and hospitals, etc.), and for each entity preselected, the user can analyze in detail all of the information about it.

Over the last few years, almost all traditional geographic cartography, of any genre and type, is becoming digital and shortly will be part of territorial information systems that, through the GIS, are able to produce geographic and thematic maps for all of our needs and goals.

The use of a GIS is obvious:

- In all sectors where the use of geographic or topographic cartography (military, industrial, administrative sectors, etc.) is strategic: such as in the management of funds for defending a state, which will, for example, be directed toward border regions; in the selection of where to place new clinics and hospitals, fundamental for those in charge of the health sector; or in the selection, just as fundamental for a transportation company, of the routes to take for completing its deliveries.
- In all geothematic, geologic, geomorphologic, hydrogeologic, resource, forestry, environmental cartography sectors of use and development. A forestry company, for example, must know where to plant or cut trees and must know roads and paths to access them; a geological service must be aware of where there are land slides, sources, quarry probes, etc.
- In all territorial planning sectors: a public agency that manages the territory uses GIS to prepare and develop urban plans (regulatory plans, coordinating territorial plans or structural plans); a tourist or anyone taking a trip must make selections on where to go, how to get there and at which point to lodge.

To work with GIS the commands in the **GIS** menu found in the CAD View are used.

In particular, the user must begin working from zero through these commands:

- Manage Tables to manage the tables and the fields associated with the GIS database;
- Manage Themes to define the thematic maps to associate to the GIS graphic entities;
- Create Entities, Delete Entities and Edit Entities to manage the GIS graphic entities.

Or by beginning with files saved in previous works using these commands:

- Import theme definitions (.gis, .gtd);
- Import Shape files.

The *.gis file is a format that includes the definition of the database tables and the themes created by the user.

The Shapes file is characterized by three files with the .shp, .dbf and .shx extension which must have the same name and contain the GIS graphic entities including the associated table with all the additional information.

Once the work is completed, the user can:

- Export the definition of the tables and themes using the command Export themes definition;
- Export the GIS graphic entities with the respective table and all the additional information in the Shape format using the command Export Shapes file;
- Run querys using the Query command.
- The sections in this chapter illustrate the functions of these commands with examples.

Import themes definition

The **Import themes definitions** command in the GIS CAD View, is used to import a *.gis/gtd file created by the user previously, to insert into Tables and Themes into the project. The result of the import can be seen through the following commands:

Look <u>i</u> n:	👢 File	🗸 🔶 (1		
e.	Name 🔺		Date modified	1	
	Celer2D.sto)	16/02/2017 10.32		
Recent places	UCOUNTORS (1	I).BAK	16/02/2017 12.09	- 6	
	Countors.g	ро	16/02/2017 13.32		
Desktop	Countors.st	o	16/02/2017 17.31		
A-100	durveLiv1.g	16/02/2017 10.05			
	UrveLivNe	w (1).BAK	17/02/2017 14.37		
Libraries	durveLivNe	w.gpo	17/02/2017 14.42		
	DigitalLeve	l.gpo	17/02/2017 13.24		
Computer	🔂 DLData.gp	D	16/02/2017 09.49		
Computer	🔂 Gis.gpo		20/02/2017 10.00		
	5 GPS (0).BA	ĸ	15/02/2017 14.36		
Network	🔂 GPS.gpo		16/02/2017 13.06		
	All and		17/02/2017 14:05	>	
	File <u>n</u> ame:	Gis.gpo	<u>Oper</u>	n	
	Files of type:	Definition of tables and themes (*.GIS;*.GTD)	Canc	el	

Figure 336:

GIS | Tables displays the Table window that shows the list of all imported GIS Tables.

GIS | Themes displays the **Themes** window that shows the list of all imported GIS Themes.

Name	V B C
🗱 cockpit	S 🕲
🛱 detail	S 12
🗱 fountain	S 🕲 🗸
🗱 hydrant	S 🕲
anhole 🗧	S 12
🗱 pole	S 12
🛠 quote	S 13
station 🖇	S 73



Import Shape files

The **GIS** | **Import Shape files** command is used to import files with the .shp, .shx and .dbf extension that contain GIS Graphic Entities and the associated table with all of the additional information.

Tables	x
🖾 New 🗙 Delete 🚎 Rename 🖀 Properties 🔚 View	
III cockpit III detail	
🛄 fountain	
manhole	
🛄 pole	
auote	

Figure 338:

Once the command is activated a dialogue window will appear asking for the path of the file to import.

Import file shape - Select file						
Shape file E:\Exchange\CorsoGeoproOffice\File\cockpit.shp Browse						
< <u>Back</u> <u>N</u> ext> Cancel	_					

Figure 339:

Press the **Next>** button to access the second screen, used to specify whether or not to create a known point for each vertex of the imported entities. It is advised to activate this option only when you have to stakeout the vertices.

Impor	rt file shape - Options
Create and assign points to	GIS entities
Name Code/Description	▼ material
	< <u>Back</u> Finish Cancel

Figure 340:

If a .shp file is imported that contains points (ex. Manhole) and the user wants to create known points, then the name and description (material) of the noted coordinate points can be specified by the values contained in the fields of the table associated with the entity.

The following image shows the final result:

8					Ge	eopro Offic	e - [EsG	is.gpo] — 🗖 🗙
File	Modify	View For	mat Too	ls Draw S	urvey Images	D.T.M. Ro	ads GIS	Window ?
	i 🖬 🔊 🖌	ء 🖬 🖗	531	💘 ્ ્ ્ હ્	ې کې کې کې	ж <mark>-</mark> 🖲 🖍) 🗘 ଠ 그 그 그 그 🖂 🖬 🔜 🍂 💺 🔍 🔍 🔍 🔍 🖉 💂
ß.	🖉 🕂 😵 🗖	00+	Ira:	8 🔏 🔒 🗄	+= / // & .	200C	A 🗟 🗟 1	
\$	S 🖸 🖉 🔳 (0	- 🇯	& 🙁 , i	BYLAYER	-	- BYL	AYER 👻 ———— ByLayer 💌 💂
1	• 🏚 🖨 🖲	M # 50	🏷 WI 🕫) 🗟 i 🎽 🚨	. (() (() () () () () () () () () () () (- ,	II 🔬 😨	余 �� (1 ¹¹
	up 1: cockpi							CAD
	Points Code							+ 205/2006
N.	Name	North	East	Elevation	Description	Comment	Note ^	
	2/5/2006	-217.756	143.129		2/5/2006			
2	2/5/2006	-219.540	142.847		2/5/2006		_	
3	2/5/2006	-216.275	171.332		2/5/2006			
4	2/5/2006	-197.791			2/5/2006			
5	2/5/2006	-215.753		-0.712	2/5/2006			+ 129-5/2006
6	2/5/2006	-104.208	35.296	0.674	2/5/2006			
7	2/5/2006	-105.584	32.331	0.674	2/5/2006			
8	2/5/2006	-119.134	39.712	0.533	2/5/2006			D6
9	2/5/2006	-119.184	39.727	0.531	2/5/2006			+ 129-5/2006
10	2/5/2006	-134.055	47.975	0.443	2/5/2006			
11	2/5/2006	-170.332	81.383	0.219	2/5/2006			
12	2/5/2006	-192.279	111.401	-0.256	2/5/2006			[▶] ∧
13	2/5/2006	-188.258	124.609	-0.221	2/5/2006			12
14	2/5/2006	-187.364	124.053	-0.254	2/5/2006			5kapo6
15	2/5/2006	-184 961	122 763	0.060	2/5/2006		Ý	5/2006 E>

Figure 341:

If the user imports a file that contains a GIS table with the same name of a table created previously, but with differences in fields, then the **Imported table conflicts** window will appear.

At this point the user must select whether to rename the table to import or join the two tables resolving the conflicts.

Imported table conflicts
The file you are importing contains a GIS table with the same name of a previously created, but there are some difference between the fields. Choose whether to rename the table to import, or whether to merge the two tables resolving conflicts
• Rename imported table
Current imported table's name cockpit
New table's name
O Merge fields of the tables in conflict
New imported table fields
✓ Date ✓ access ✓ tube ✓ type ✓ portcullis ✓ dimension ✓ valves ✓ state ✓ material
Conflicted fields with existing table
Name Current Type Import Type Status
Finish

Figure 342:

Manage Tables

Using the **Tables** command, the user can manage the tables of the database and can change them using these buttons: **New**, **Delete**, **Rename**, and **Property**.

The **New** button will bring up the **Table name** window where the user must insert the name of the new table to be created, initially empty, that is, without fields.

The purpose of a table is to represent the characteristics of any entity that are strict and can be consulted such as: particles, poles, wells.

	Table name	x
Table Name	TEST	
	OK Cancel	

Figure 343:

To define a table field, the user must specify its name, type and format.

			Table prope	erties	×
	Name	Туре	Format		
	TEST	From user	Text		
*					
сFi	eld properties —			Up Down	
	Request				
	Fext				
	Default value	_			
	Detauit value				
Ľ					IJ
				OK Cancel	

Figure 344:

The **Delete** button will open the window asking the user for confirmation to cancel the selected table.

A table with an associated theme cannot be canceled.

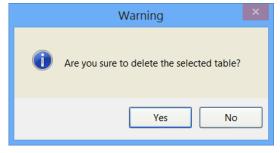


Figure 345:

The **Rename** button requires the user to insert the new name to give the selected table.

	Table name	×
Table Name	TREE	
	OK Cancel	

Figure 346:

The **Property** button will bring up the **Table properties** window where the user can change, insert and cancel fields in the selected table.

To view the content of a table, the user must select the table to inspect and then press the **View** button.

			Table pro	perties			x
	Name	Туре	Format				^
	Date	From user	List				
	type	From user	Number				
	dimension	From user	Decimal nu.				
	state	From user	Data				
	access	From user	Text				,
۲ ام	eld properties Request ist OAK TREE silver fir pine nuts		[Add Default value	Delete	Up [Down
					ОК	Cano	cel

Figure 347:

This window does not allow adding or eliminating lines, though the value of individual fields can be changed.

]			Table				_ □ ▶	<	
	Date	type	dimension	state	access	portcullis	valves	material	^	
1	Tue May 02 13:00:00 2006	0.000	2/5/2006	143.129	0.000	No	No	2/5/2006		
2	Tue May 02 13:00:00 2006	0.000	2/5/2006	142.847	0.000	No	No	2/5/2006		
3	Tue May 02 13:00:00 2006	0.000	2/5/2006	171.332	0.000	No	No	2/5/2006		
4	Tue May 02 13:00:00 2006	0.000	2/5/2006	161.767	0.000	No	No	2/5/2006		
5	Tue May 02 13:00:00 2006	0.000	2/5/2006	113.511	0.000	No	No	2/5/2006		
6	Tue May 02 13:00:00 2006	0.000	2/5/2006	35.296	0.000	No	No	2/5/2006		
7	Tue May 02 13:00:00 2006	0.000	2/5/2006	32.331	0.000	No	No	2/5/2006		
8	Tue May 02 13:00:00 2006	0.000	2/5/2006	39.712	0.000	No	No	2/5/2006		
9	Tue May 02 13:00:00 2006	0.000	2/5/2006	39.727	0.000	No	No	2/5/2006	\checkmark	
<								>		
		OK Cancel								

Figure 348:

Change Table Structure

A name, type and format can be associated with each field of the table. To cancel a field, the user must select the entire line and then press the **Canc.** button. To change the position of a field, the user must select the corresponding line and then press the buttons **Up** and **Down**.

The types available are:

From User - The user must insert the appropriate value.

Point name - Valid only for GIS entities point. Automatically compiles the field with the name of the associated TS/GPS/Known point.

Point description - Valid only for GIS entities point. Automatically compiles the field with the description of the associated TS/GPS/Known point.

Area - Valid only for GIS entities polylines and polygons. Automatically compiles the field with the are of the associated entity.

2D perimeter - Valid only for GIS entities polylines and polygons. Automatically compiles the field with the perimeter of the associated entity. In the calculation of the quotes, the individual vertices are ignored.

3D perimeter - Valid only for GIS entities polylines and polygons. Automatically compiles the field with the perimeter of the associated entity. In the calculation, the quotes of the individual vertices are considered.

Barycenter X - Automatically compiles the field using the average of the X coordinates of the vertices for the associated entity. If the associated GIS entity is a point, the barycenter of the entity corresponds to the coordinates of the same.

Barycenter Y - Automatically compiles the field using the average of the Y coordinates of the vertices for the associated entity. If the associated GIS entity is a point, the barycenter of the entity corresponds to the coordinates of the same.

SID

Draft - Valid only for GIS entities point. Automatically compiles the field with the path of the draft for the associated TS/GPS/Known point.

Photo 1 - Valid only for GIS entities point. Automatically compiles the field with the path of the Photo 1 for the associated TS/GPS/Known point.

Photo 2 - Valid only for GIS entities point. Automatically compiles the field with the path of the Photo 2 for the associated TS/GPS/Known point.

			Table prop	erties ×
	Name	Туре	Format	
	TREE	From user	*	
×		From user Point name Point Descr Area Perimeter 2D Perimeter 3D	~	
	eld properties]Request Text Default value			Up Down
				OK Cancel

Figure 349:

The **Format** of a field indicates the format of the values that can be assigned to a field.

The formats available are:

Text - Any sequence of characters can be assigned to the field.

Numeric - Any internal value can be assigned to the field.

Decimal number - Any real value can be assigned to the field. The difference between numeric and decimal formats is that the decimals field can have values with a comma inserted while this is not possible in numeric fields.

List - Only the values contained within a list can be assigned to the field.

Yes/No - Only the values Yes or No can be assigned to the field.

Date - One date can be assigned to the field.

		Table properties	×
Name	Туре	Format	
TREE	From user	Text 🖌	
*		Text Number Decimal number List Yes/No Data	
Field properties -			Up Down
Default value			
			OK Cancel



If a field type different from **From User**, the program will automatically select the corresponding format.

		Table prope	erties	×
Name	Туре	Format		
TREE	Point name	Text		
*				
				Up Down
Field properties —				
CText				
TEX				
Default value				
			ОК	Cancel

Figure 351:

Indifferently from the field format, the user can specify a default value and whether it is required; in this last case, the field can never be left empty.

		Table prop	erties ×
Name	Туре	Format	<u>^</u>
Date	From user	List	
type	From user	Number	
dimension	From user	Decimal nu	
state	From user	Data	
access	From user	Text	
eld properties] Request _ist OAK TREE silver fir pine nuts		user Number user Decimal nu user Data	
			OK Cancel



If the format is numeric or decimal the minimum and maximum value can also be specified.

_			Table prope	erties ×		
	Name	Туре	Format	^		
	Date	From user	Text			
	type	Area	Decimal nu			
	dimension	Point name	Text	-		
	state	Center of gr	Decimal nu			
	access	Perimeter 3D	Decimal nu			
	Field properties Request Decimal number Default value N* decimal					
	Minimum ∨alue	3 	We.	aximum value		

Figure 353:

Manage Themes

The **GIS** | **Themes** command will display a window that is used to manage the GIS Themes sorted in the file using the **New**, **Delete**, **Rename**, and **Properties** commands.

Each theme has icons associated with it that indicate whether the theme is visible, blocked and which is currently active.

GIS

One theme is abstract entity which includes a group of graphic entities of the same type, each of which is associated with a line in a table. All of the graphic entities that constitute the theme refer to the same table.

Graphic entities can be: points, polylines or closed polygons.

Them	nes ×
😧 New 🗙 Delete 斗 Rename 👚 Prop	perties
Name	V B C
🛠 <mark>cockpit</mark>	S 😰 🗸

Figure 354:

The **New** button will display the **Create Theme** window where the user can insert:

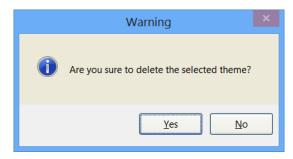
- The name of the theme to create;
- The type of coordinates (2D or 3D);
- The type of entity (Point, Line or Polygon);
- The name of the table to which it is associated;
- The Entity set to which it belongs (one already existing or a new one).

The new created theme becomes the active theme. The active theme is the theme to which the new GIS entities will be added.

Create Theme ×
Theme Name
Coordinates Type
○ 2D
Entity type
 O Points
O Lines
O Polygons
Associated Table
cockpit 💌
Entity set
Entity set Topographic 💌
OK Cancel

Figure 355:

The **Delete** button will open the window asking the user for confirmation to cancel the selected theme.





The **Rename** button requires the user to insert the new name to give the selected theme.

	Theme name	x
Theme Name		
	OK Cancel	

Figure 357:

The **Properties** button will open the **Theme Properties** window with the **Theme Options** tab indicating by the check mark if the theme is active and the general characteristics of the edited theme:

- Type of entity,
- Type of coordinate,
- Associated table.

SID

This window is used to change the **Entity** set associated with the theme by selecting the already existing one or a new one.

Thomas ontion		
Theme option	S Thematic Map Label	
Active	\checkmark	
General —		
Entity Type :	: Points	
Coordinates	s Type : 3D	
Associated	Table : cockpit	
Entity set —		
Entity set	Topographic 🗸	
	Topographic	
·	New entity set	

Figure 358:

The Thematic Map tab, in the **Theme Properties** window indicates the option to display the entities constituting a theme with different colors depending on the values of the fields.

There are three types of thematic maps that can be created:

None - All of the entities are displayed with the same color. This is the map selected by default settings.

If the **None** type is selected, then only the **All** element is displayed in the list below; this element represents all of the theme elements.

Theme properties ×
Theme options Thematic Map Label
Type None Field
Color Value Label
All
Classes Update
OK Cancel

Figure 359:

Single value - A different color is used for each value assumed by one column. This type of map is helpful for highlighting elements that are limited in number and recurring values; ex: registry sheet, shared code, element status.

The **Update** button is used to add associated thematic maps to any new GIS entities designed in the CAD View to which a new values was added to the selected **Field**.

Executing the **Update** field will cancel all of the already created thematic map settings.

Theme properties
Theme options Thematic Map Label
Type Singol Value V Field Date V
Color Value Label Default
Classes Update
OK Cancel

Figure 360:

Range - The range of values assumed by fields in a column is divided into multiple intervals, each of which is colored with a different color. This type of map is helpful to highlight the value of a field (typically decimal) that can have many values and for which a single value representation would not produce an easily interpreted result; ex: quotes map, classification based on a field.

If the **Range** type is selected, then the user can customize the intervals by pressing the left button on the cell of the **Value** column to change; the inserted value will be considered as the maximum interval value.

Theme properties	×
Theme options Thematic Map Label	_
Type Range V Field State V	
Color Value Label	
Default	
-13.912275 - 171.3323	
Classes 1 VDdate	
Classes 1 V Update	
OK Cancel	٦

Figure 361:

The appearance used to display the entities belonging to a class can be changed by double clicking on the color to the left of the class. A different dialogue window will appear depending on the type of entity constituting the theme.

For polylines, the user can specify color, thickness and type of line used to design them.

Polyline options				
Line				
Color				
Width	0.00 mm 💌			
Line type	Continuous			
[OK Cancel			

Figure 362:

For points, the user can specify color, symbol, scale and the rotation angle used to design them.

Point options ×				
Symbol				
Туре	\bigcirc			
Color				
Scale factor	1.000000			
Rotation	100.0000			
	OK Cancel			

Figure 363:

For polygons, the user can specify the color and type of hatching, the color and thickness of the border line.

SID

Polig	on options 🛛 🗙
Hatch	
☑ Transparent	
Pattern	
Color	
Scale factor	1.000000
Rotation	100.0000
Boundary	
Color	
Line weight	0.00 mm 🔽
	OK Cancel

Figure 364:

The **Label** tab, in the **Theme Properties** window is used to indicate the option of displaying the value of an attribute alongside each GIS entity for the associated table.

The displayed field will be the same for all entities belonging to a theme.

The summary box **Field to Use** is used to select the field to be displayed alongside the GIS entity.

To not display any label, the user selects the value **None**; this is the default value.

Theme properties				
Theme options Thematic Map Label				
Field to use None 🗸				
Text Options				
✓ Aligned				
Style STANDARD Color				
Height 1.000 Rotation 100.0000				
Offset				
Horizontal 0.000				
Vertical 0.000				
OK Cance				

Figure 365:

The program will position the label based on the graphic type:

- **Symbol:** the text will be positioned at the location identified by the horizontal and vertical offset parameters. The user can specify the text's rotational angle.
- Line: the text will be positioned along the long side. The user can specify whether to align the text to the line or specify a fixed rotational angle. The user can specify by how distant the text should be from the line.

• **Polygon:** the text will be positioned along the polygon's barycenter. The user can specify the text's rotational angle and any offset.

In all cases, the user can specify the height, style, and color of the text.

Manage Graphic Entities Create entities

The **Create entity** command from the GIS menu is used to create entities associated with the point, the line and the polygon depending on the active theme of the **Manage themes** table.

By activating this command, the user can design/select the vertices necessary for creating a new GIS entity.

Once the selection of entity vertices is completed, a dialogue window will appear in which the user can insert data associated with the just created entity.

	GIS properties	_ 🗖 🗙
Theme ground Table ground		
Туре	agricultural	
burnt	No	
Note		
х	339243.376	
Y	4827810.817	
Area	52605.646	
Perimeter 2D	1173.058	
Photo		
Sketch		
	OK Cancel]

Figure 366:

Example of created entity

Select the **ground** theme from the **Themes** table and place the check mark for active.

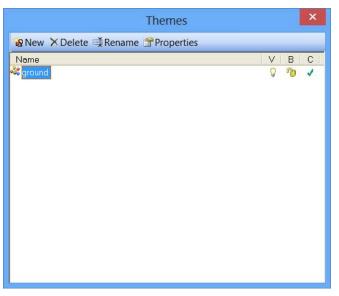


Figure 367:

After activating the Ground theme, the user can design the polygon by using the **Create entity** command in the **GIS** menu of the **CAD View**.

Once the design is completed, the **GIS properties** window will appear, used to edit the characteristics of the graphic entity.

	GIS properties	_ 🗆 🗙
Theme ground Table ground		
Туре	agricultural	
burnt	No	
Note		
х	339243.376	
Υ	4827810.817	
Area	52605.646	
Perimeter 2D	1173.058	
Photo		
Sketch		
	OK Cancel]

Figure 368:

Press **OK** and the graphic entity will be created (see image below).

259

SID



Figure 369:

The newly created entity is represented by a red colored grid, because the agricultural terrain is identified with this thematic map as seen in the **Theme Properties** window.

Theme properties ×
Theme options Thematic Map Label
Type Singol Value V Field Type V
Color Value Label
Default agricultural
meadow
Classes Update
Classes
OK Cancel

Figure 370:

Delete entities

The **Delete entity** command in the GIS menu will bring up the selection mark to cancel one or more existing GIS entities.

Once the selection is completed, press the right button to confirm; a dialogue window will appear displaying the number of the canceled entities and requesting confirmation of the operation.

If there are points from the booklet associated with the graphic entity, they cannot be canceled.

DELETE GIS ENTITY				
0	Entity selected: 1 Point Entity : 1 Line Entity : 0 Polygon Entity : 0 Delete ?			
	Yes No			

Figure 371:

Edit entities

Use the **Edit entity** command from the **GIS** menu and the selection mark will appear, clicking in the graphic entity will bring up a dialogue window displaying the values of the fields associated with the entity.

The values can be changed directly in this window. To confirm the changes, press the **OK** button; at the same time, press the **Cancel** button and any changes made will be canceled.

If the entity is part of a theme for which a **Single Values** or **Interval** type thematic map has been defined and the changed field is the used in creating the thematic map, the appearance of the entity changes immediately according to the thematic map.

Displaying the properties of a GIS entity, the command will not terminate, thereby allowing the properties of other entities to be displayed. To terminate the command, the user must press the right button.

	GIS properties	_ □ ×
Theme cockpit Table cockpit		
Date	Tue May 02 1	3:00:00 2006
type	0.000	
dimension	2/5/2006	
state	39.712	
access	0.000	
portcullis	No	
valves	No	
material	2/5/2006	
tube		
	OK Cancel	

Figure 372:

SID

Query

This function is used to run a search on the GIS entities using the values of the fields associated to them.

Activating the command will bring up the following dialogue window:

In the upper left part the user can select the theme on which to run the query.

To run the search, the user must insert an expression into the **Query** tab text box.

	Query	×				
- Data						
Theme ground	▼					
Fields Type	Values agricultural meadow	-				
burnt Note X	= > = > meadow wood					
Area						
Perimeter 2D	And Or Not					
Photo Sketch	Like IsNull					
Query Result		-				
	OK Run					

Figure 373:

The query can be edited directly in the **Query** box or as follows:

- Select the **Theme** item,
- Double click on an element from the Fields list,
- Select the operator,
- Double click on an element from the Values list,

Table							– 🗆 🗙		
	Туре	burnt	Note	Х	Y	Area	Perimeter 2D	Photo	Sketch
1	agricultural	No		339243.376	4827810.817	52605.646	1173.058		
2	wood	Yes		339428.327	4828006.530	21830.627	617.726		
3	meadow	No		339233.635	4827734.016	15136.130	519.394		
	OK Cancel								

Figure 374:

Example - run a query on the **Terrain** table.

1.Select the Ground theme

2.Double click on the **Type** element in the **Fields** list

3.Press the [=] button

4.Double click on the Agricultural element in the Values list

By doing so, the expression **Type = 'Agricultural'** will appear in the text box of the **Query** page.

To run the search press the **Run** button. The program will consider all entities belonging to the selected theme and will list those for which the expression was found verified in the grid of the **Result** tab.

Selecting one line from the result, the program will center the view on the corresponding entity. To exit the window, press the **OK** button.

Query							
Data Theme ground Fields Type burnt Note X Y Area Perimeter 2D Photo Sketch	~	< = <= <> And Or Like Is) >= Not	Values agricultural meadow wood			
Query Result Type	burnt	Note	X	Y	Area		
1 agricultural	No		339243.376	4827810.817	52605.646		
<					>		
		ОК	Run				

Figure 375:

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SID

Export themes definition

This function is used to save the organization of the tables and the definition of the themes currently found in the project so as to be able to load them into a future project.

Once the command is activated, the program will display a dialogue window used to specify the folder in which to save the file with the definition of the themes and the tables.

		Save As			×
Save <u>i</u> n:	👢 File	~	+ € 6	* 🎟 •	
Recent places	Name 🔺			Date modifi 21/02/2017	
Desktop Desktop Libraries Computer Ocomputer Network					
	<				>
	File <u>n</u> ame: Save as <u>t</u> ype:	ground.gis Definition of tables and themes (*.GIS)		· [<u>S</u> ave Cancel

Figure 376:

Export Shape files

This operation is used to export GIS .shp interchange files.

Activating the command will bring up the following window used to select:

- The themes to export;
- The type of 2D/3D coordinates to use in generating the files; From Theme means that it takes the type of coordinate selected during creation of the theme;
- The folder where the files are saved, for each selected theme, three files will be created with the same name as the theme but with different extensions: .shp, .dbf, .shx.

Export f	ile shape	×
ground		
Coordinates Type [Maximum number of chare Folder	From Theme	~
E:\Exchange\CorsoGeop	roOffice\File	 cel

Figure 377:

Associate GIS Data to Topographic Points

GIS data can be associated with topographic points by using the **GIS Data** page.

	Geopro Office - [rilievo-gis	_test_o.gpo] _ 🗆 💌
File Modify View Insert Co	omputation Output Settings Window ?	_ 6 >
1 🖆 🖬 🔜 🕼 A 🖬 🚬 🚟		
Document ×		
Document content TS data (0 Job.)	General GIS data	<u>^</u>
8 - S GPS data (2 Grp.)	Name : 100	
Group: test (1pt)		
Pt. 100 P. T Group: relief (18pt)		
8 - Known points data (0 Gr	GIS theme	
8 S DL Data (0 Group.)	[here	Oak tree
- CAD	type	10,000
- Roads	height	
Reper spaces	good health	Yes
	photo1	
	Sketch	
You can select CAD entities	N 4829982.357 : E 334998.759	CHAI SNAF ORTH OSNAL DYN LW

Figure 378:

Once the theme is selected, the user can insert its characteristics determining the addition of a line in the respective table (ex. tree).

				Table		_ 🗆 🗙					
	type	height	good health	photo1	Sketch						
1	pine	10.000	No								
2				FotoLand_pt	Sketch_pt17						
3	Oak tree	10.000	Yes								
			ОК	Can	cel						

Figure 379:

If the topographic points are associated with GIS data, then the user can:

• With the option **Tree view active in CAD** from the **Display** menu, the user can select whether or not to activation the pan automatically to bring the entity selected from the tree into the center of the screen;

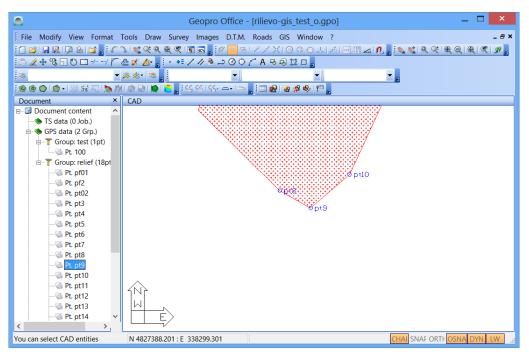


Figure 380:

• Export the GIS data from the ASCII file produced by the **File | Export | Free Format** command after having specified it with the **Print Options** command;

	F	Print options and Fr	ee Format	X
General options	TS data GPS data Ground	d profiles Projects/Polyline	es	
	Print		ASCII file	
	Variable types	N°Decimals	Variable types	N°Decimals
Field 1	Name	~	Name	~
Field 2	Description	~	Description	~
Field 3	Latitude	~	Latitude	*
Field 4	Longitude	~	Longitude	*
Field 5	Elevation	~	Elevation	¥
Field 6	Ant. Height	~	Ant. Height	¥
Field 7	-	~	-	~
Field 8	-	~	-	~
			ОКС	ancel Help



• Manage the display of the thematic map for celerimetric, GPS and noted coordinate points using the **Entity appearance** command.

The user can decide:

- To not use the thematic map associated with the point (in this case it is displayed as a point to which no GIS information has been associated);
- To use only the color selected in the thematic map in representing the point;
- To use only the symbol selected in the thematic map in its representation;
- To use the color as well as the symbol selected in the thematic map in its representation.

				Entity appearan	ce		X
Appearance Symbol Visible	Text Po Color	sition	Rotation Width	0.00 mm	•	List of entity styles TS entities Stations TS points TS points HC TS points TR	
Name Visible Description/I	Color Identity/Cor Color	IV nment IV	Width		~	Control points ⊕ GPS entities ⊕ CAD entities Custom entity style	25
Elevation —	Color	V	Width		~	Select all a	Delete entity style
Use GIS se	t tings Ofg values]	No use Only the color of Only the symbol	olor of thematic maps of thematic maps ol of thematic maps olor of thematic maps	·	Save Cig List	Load Cfg List Apply Cancel

Figure 382:

Example

In this example, a GPS survey was taken into consideration.

File Modify View Ins				-	rilievo-gis_te	st_0	.gpu]									×
		Computation		-	?												_ 8 :
	_	up 2: relief															
Document content		iPS Coords. TWG							_	_	_						
TS data (0 Job.) GPS data (2 Grp	N.	Name/Num.	Description	Entity style	GIS Theme	HC	VC	OC	SL	EL	CL	NL	LD	NT	NV	NP	NC
Group: test (1	pf01			tree	⊻	⊻										
	2	pf2			ground										~		
E- Known points d	3	pt02			ground										\checkmark		
Control poin	4	pt3			ground										✓		
DL Data (0 Grou	5	pt4			ground										\checkmark		
	6	pt5			ground										•		
	7	pt6			ground										•		
Roads	8	pt7			ground										~		
Paper spaces	9	pt8			ground												
	10	pt9			ground												
	11	pt10			ground												
	12	pt11			ground												
	13	pt12			ground												
	14	, pt13			ground												
		pt14			ground												
		pt15			ground												
		pt15 pt16			ground	П				П				П		П	
		pt10 pt17			tree												
>	10	ptir			uce												

Figure 383:

In this case, the user selected to use the symbol and color of the thematic map.

GIS

File Modify View Format Tools Draw Survey Images D.T.M. Roads 그 가 나 나 나 나 나 나 나 나 나 나 나 나 나 나 나 나 나 나	(이아이지가)금래석(M,) 및 및 및 및 및 및 및) 용법고, BYLAVER 및	- #×
B-@ Document cont	Entity appearance	
- ◆ TS data (0 Jc B- ◆ GPS data (2	Appearance Text Position Rotation	List of entity styles
	Symbol Visible Color Width 000mm	⊕ TS entries GPS entries GPS Bases B CAD entries Custom ently styles
Paper space		Select all entity styles
	Elevation Visible Color V Width V	Add entity style Delete entity style
	Use GIS settings Symbol and color of thematic maps	Save Clg List Load Clg List Apply
	Save Cfg values Load Cfg values Default Values	OK Cancel
	7	
< > > V fou can select CAD entities	N 4826970.507 : E 339231.843	CHAI SNAF ORTHOSNA DYN LW

Figure 384:

In this case, the user selected to not use the thematic map.

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GPS data (2 in ■ Group: te in ■ Group: te	a p+01	Appearance Text Position Rotation Symbol Visible Color Width 0.00 mm V Name Visible Color Width Ø Description/identity/Comment Visible Color Ø Width Ø Use GIS settings No use	List of entity styles : E: TS entities CPS entities CPS Bases E: CAS entities Custom entity styles Add entity styles Add entity style Sove Clg List Load Clg List Apply
You can select CAD entities	>	Save Clg values Load Clg values Default Values	OK Cencel

Figure 385:

Introduction

Roads are planned using the CAD View and the Roads View; the Roads planimetry is done in the CAD View while the altimetric is done in the Roads View.

Roads are managed through codes associated upon creation: the Roads profile is always associated to the GND code.

Projects (max 10) and polylines can be inserted into the Roads profile and are identified also by codes; the first project inserted is considered with a particular code (PRO) as it is seen as the principal project.

Projects are different from polylines as they can have vertical curves inserted and cannot be loaded by dtm.

Roads can be divided into Road Cross Sections whose information is displayed either in CAD View or in the Roads Cross Sections View.

Also the Roads Cross Sections are managed by codes; the ground profile of a cross section has the GND code.

Only polylines can be added to the Roads Cross Sections and the user can create a grubbing, terracing or excavation.

The graphic display of the Roads and Roads Cross Sections in the Roads View can be customized using styles that can be used again in other projects.

Profile Codes

Profile codes are managed using the **Profile Codes** command in the **Profile** menu of the **Altimetric View**.

Running the command will display the **Profile Codes** window divided into two pages: **Projects** and **Profile Polylines**.

The **Projects** page lists the codes associated with the projects (max 10); the **PRO** code is associated with the principal project; codes **PR2..PR10** are instead associated with the secondary projects that can be used for various purposes.

	Code	Description	Carry to GND	Carry from GND	Vertical traits	Color	
1	PRO	Project					
2	PR2	Project 2					
3	PR3	Project 3		V	•		
4	PR4	Project 4			•		
5	PR5	Project 5		V	•		
5	PR6	Project 6		V	•		
7	PR7	Project 7		V	•		
B	PR8	Project 8		V	•		
9	PR9	Project 9		V	•		
10	PR10	Other projects			•		



The **Profile Polylines** page includes the code associated with the profile (GND) and the codes associated with the profile polylines (LN1, LN2, ... etc.). The following information is associated with the profile codes:

- Description: information found in the headings of the Altimetric Data view pages and the profile columns.
- Carry to GND: the selected altimetric profile points are added to the terrain
- Carry from GND: the terrain points and intersections (between the terrain and altimetric profile) are added to the selected altimetric profile.
- Vertical traits: to select whether or not to display the vertical traits of the profile/project/polyline in the profile's CAD View.
- **Color:** to select the color of the profile/project/polyline used in the graphic display.

Three buttons are included in the final part of the window:

- 1.Load Default: to load the default settings;
- 2.Load Config: to load the previously saved settings;
- 3. Save Config: to save the current settings and be able to reload them in another context.

	ode	Description	Carry to GND	Carry from GND	Vertical traits	Color	
	ND N1	Ground Line 1					
	.N2	Line 1		V	▼		
	.N3	Line 3					
; L	.N4	Line 4			•		
5 L	.N5	Line 5		V	✓		
*							

Figure 387:

Cross Sections Codes

Cross Section codes must be managed using the **Cross Sections Codes** command in the **Cross Section** menu of the **Roads Cross Section's CAD View.**

Executing the command will open the **Set Volumes Calculation** window: the sections codes are found in the **Lines** page.

The GND code is associated with the cross section's terrain profile; the other codes are used for the profile polylines that can be added to the cross section.

The following information is associated with the sections codes:

- Description: information found in the headings of the Section Data view pages and the section columns.
- Carry to GND: the selected altimetric profile points are added to the terrain.
- Carry from GND: the terrain points and intersections (between the terrain and altimetric profile) are added to the selected altimetric profile.
- Vertical Sections: to select whether or not to display the vertical sections of the profile/project/polyline in the profile's graphic view.
- **Color:** to select the color of the profile/project/polyline used in the graphic display.
- Planimetry: to select whether to include the polyline in the calculation of the project layout; this option is functional only on road sections.

 Barbette: to select whether to include the slope line corresponding to this polyline in calculating the project layout; this option is functional only on road sections.

Three buttons are included in the final part of the window:

- 1.Load Default: to load the default settings;
- 2.Load Config: to load the previously saved settings;

3. Save Config: to save the current settings and be able to reload them in another context.

				0.000 000	tion codes				
es									
	Code	Description	Carry to GND	Carry from GND	Vertical traits	Color	Planimetry	Barbette	^
	GND	Ground					V		
2	PRO	Project						•	
3	GRUB	Grubbing							
ŀ	HEXC	Horizontal excavation							
i	BEXC	Bench excavation							
5	GUT	Gutter							
'	WLK	Sidewalk							
3	SHO	Shoulder							
)	CURB	Curb							
0	FND	Foundation							
1	DIT	Ditch						•	
2	WALL	Wall							
3	SURF	Surface course							
4	BIND	Binder course							
5	BASE	Base course							
6	SUB	Sub-base course							
7	САР	Capping course							
8	DRN	Drainage							
9	EXC	Excavation							
20	LN1	Line 1							
21	IN2	Line 2	Π						×



Roads View

The Roads View manages the Roads altimetric information similar to the Topographic Profiles method.

Select the **Roads** node to open the **Roads** view that lists the Roads created by the user.

Roads can be inserted only in the CAD View using the **Roads | Create New Road** command or by adding a **Road entity set** using the **Format | Entity set** command.

By default, the last Road inserted is set as **Current Road**. This means that all commands in the **Roads** menu of the CAD View will operate only on this Road. To change the Road status, use the **Roads | Set Current Road** or **Format | Entity sets** commands in the CAD View.

The information included in this view is as follows:

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1.Name;

- 2.Tot. Distance;
- 3. Average elevation;
- 4. Minimum elevation;
- 5.Maximum elevation;
- 6.Current Road.

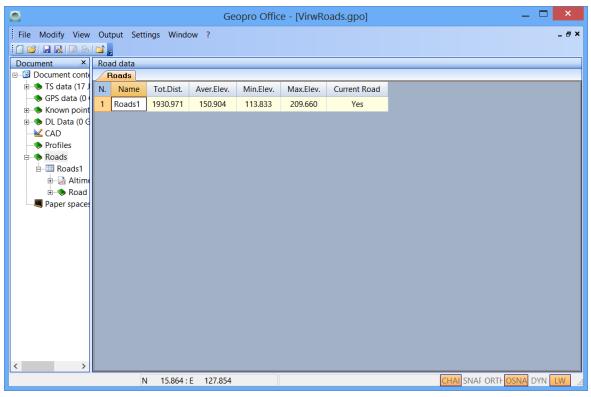


Figure 389:

If the node corresponding to the **Road Name** is selected (in our example P1, Road1), then the program will display a graphic preview of the Road planimetry.

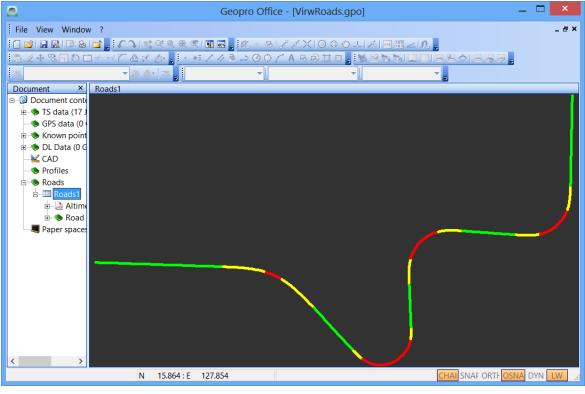


Figure 390:

Activating the Altimetric node, the program will graphically display the Road altimetry.

The road can be displayed in two ways: with box or as bar.

The image below shows the box method. The method used to display this graphic can be personalized using Styles managed through the **Format | Profile Styles**, **Format | Current Profile Style** and **Format | Set Profile Style** commands.

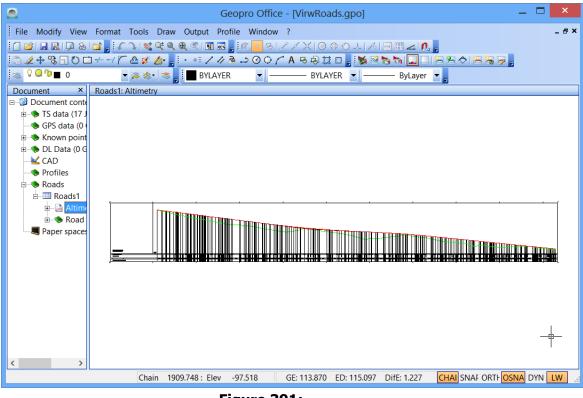


Figure 391:

This other image shows the bar method.

In this case, two bars are displayed under the graphic:

- The first shows the sequence of road planimetric elements with their respective length;
- The second shows the longitudinal slope and, if present, the radius length of the curve.

In the **Altimetric View** the user can add Projects and Polylines as well as manage the **Profile Codes**.

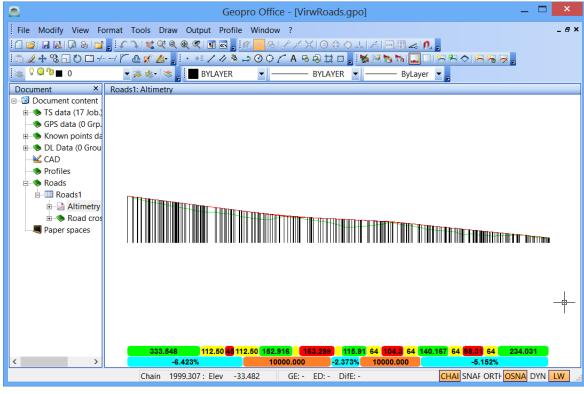


Figure 392:

In the **Altimetric Data** view, multiple pages may be included that show the numeric data associated with the Road altimetry. The first page will count the data associated with the ground profile (code GND) while additional pages may include information on the projects (code PRO, PR2, PR3... PR10) and/or on polylines (code LN1, LN2...). The heading on these pages shows the description that varies depending on the code that describes the entity reference (profile, polyline, project). This description can be changed using the **Profile | Profile Code** command.

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	5		26.707	206.415	160.627	23.309					
							15.494				
	6		42.201	204.154	160.098	38.794					
							1.896				
	7		44.098	203.803	160.034	40.689					
							1.870				
	8		45.968	203.531	159.970	42.559					
							13.626				
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Figure 393:

The data included on the first page are:

- 1.Name (alpha-numeric);
- 2.Chainage (numeric).
- 3. Elevation (numeric).
- 4.North (numeric).
- 5.East (numeric).
- 6.Partial distance (numeric).

In the pages associated with the Projects and Polylines, the columns included are:

1.Name.

- 2.Chainage (numeric).
- 3. Elevation (numeric).
- 4. Elevation difference (numeric).
- 5.North (numeric).

6.East (numeric).

7.Partial distance (numeric).

8.Slope (numeric).

The Road Cross Sections of the road are listed in the **Roads Cross Sections** node.

The Roads Cross Sections can be added automatically (see **Roads | Road Properties** command) and manually (see **Roads | Cross Sections** menu in the CAD View).

The information shown in the Roads Cross Sections node is:

1.Name (alpha-numeric);

2.Chainage (numeric);

3.Width (numeric);

4.N. Points (numeric);

5. Average elevation (numeric).

6.Minimum elevation (numeric).

7.Maximum elevation (numeric).

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	3	3	50.000	20.000	4	202.921	202.849	202.999	
Profiles	4	4	75.000	20.000	6	199.643	199.447	200.090	
■ Soads ■ Roads1	5	5	100.000	20.000	7	196.801	196.331	197.292	
Altimetry	6	6	125.000	20.000	8	194.522	193.465	195.461	
🛄 Altime	7	7	150.000	20.000	6	192.613	191.718	193.539	
	8	8	175.000	20.000	3	190.497	189.618	191.024	
Paper spaces	9	9	200.000	20.000	4	188.106	187.474	189.371	
	10	10	225.000	20.000	8	185.641	185.486	186.210	
	11	11	250.000	20.000	7	182.935	182.479	183.627	
	12	12	275.000	20.000	5	181.025	180.968	181.056	
	13	13	300.000	20.000	8	177.766	177.107	178.416	
	14	14	326.048	20.000	7	175.728	175.221	176.317	
	15	15	333.548	20.000	6	175.242	174.956	175.827	
	16	16	350.000	20.000	6	174.105	173.694	175.575	
	17	17	375.000	20.000	3	173.526	172.046	174.760	
	18	18	392.759	20.000	2	173.237	172.040	174.384	
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Figure 394:

Selecting the individual Road Cross Section, the program will display its graphic appearance which can also be customized using the styles managed through the **Format | Profile Styles**, **Format | Current Profile Style** and **Format | Set Profile Style** commands.

In the Roads Cross Section the user can add Polylines, create a new grubbing, horizontal and bench excavations, and manage the **Cross Section Codes**.

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Figure 395:

The **Cross Section Data** view shows the numeric data associated with the cross section altimetry.

The view can include multiple pages whose heading can be changed using the **Cross Section Codes** command.

On the first page the cross section information is included (code GND) while the other pages show the information associated with any added polylines (code PRO, GRUB, HEXC...).

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ī.	N.	Name	Chainage	Elevation	North	East	Part.Dist.			
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±							9.948			
	2		-0.052	209.654	161.590	-3.381				
							0.050			
	3		-0.002	209.660	161.541	-3.382				
	-						10.002			
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Figure 396:

The information included on the first page is as follows:

- 1.Name (alpha-numeric);
- 2.Chainage (numeric).
- 3. Elevation (numeric).
- 4.North (numeric).
- 5.East (numeric).
- 6.Partial distance (numeric).

In the pages associated with the Polylines, the columns included are:

- 1.Name.
- 2.Chainage (numeric).
- 3. Elevation (numeric).
- 4. Elevation difference (numeric).
- 5.North (numeric).
- 6.East (numeric).
- 7.Partial distance (numeric).

Managing Profiles/Cross Sections Styles

The Roads and Roads Cross Sections styles are managed by the **Profile Style** command in the **Format** menu of the profile or cross section CAD View.

Execution of the command will open the **Profile Style** window.

This window is used to manage the profile and sections styles in the **Project (current file)** as well as **Archive (computer)**; the styles stored in the archive can be reused in other projects.

The following commands are available in the window:

- Properties: this command displays the Edit Profile Style window and allows the user to change the characteristics of the selected style (style name, dimensions, first page text, columns, texts and colors). The Edit Profile Style window is described in the following paragraph as it is similar to the one displayed by the Current Profile Style command (Format menu in the profile or cross section CAD View).
- Add: to add a new profile or cross section style in the Project (current file) or Archive (computer);
- Delete: to eliminate a selected style;
- Set Current: to set the style selected as the default style for profiles or sections to be created;
- Save in Archive: to store a Project (current file) style in the Archive (computer);
- Load from Archive: to reload a project style beginning from its version stored in the archive;
- Import in Project: to import a project from the Archive (computer) to the Project (current file).

				Profile	e styles					
N 1 2 3	Position Style nam Profilo sta Stile1 Stile2	Project (current file) ne Indard	 _	Height	Profiles Profiles Cross section 00 00 00	15 297 200 297	YES YES YES	4 8 4	Si	Properties Add Delete Set Current ave in Archive d from Archive port in Project
			ОК			Cancel				

Figure 397:

Changing Current Profile/Cross Section Style

The **Current Profile Style** command is used to change the characteristics of the style associated with a road or road cross section.

When a road or road sections are created from the CAD View, the program assigns the default style; this association can be changed using the **Format | Current Profile Style** command that can be activated from the Altimetric View as well as the road cross section CAD View.

The **Edit Profile Style** window includes six pages.

The **General** page is used to change the name of the current style.

Edit profile style	×
General Dimensions First page texts Columnings Texts Colors	
Name	
Style name Profiles Standard	
ОК Салс	;el

Figure 398:

The **Dimensions** page is used to edit the following information: scale used for length and height.

- Whether or not to design the initial page. If this option is set at Yes, the dimensions of the first page can be specified. The horizontal dimensions of the design are instead determined automatically by the presence of the initial page, the scale of the lengths and the interval of the progressive distances to design;
- The vertical dimensions of the sheet for the design;
- The value of the design's external margins;
- The value of the margins between the profile design and the surrounding frame;
- The value of the margins to apply to the text found on the first page and the headings on the columns;
- Whether or not to design some lines helpful for folding the final design. If affirmative, then their dimensions and intervals can be changed. It must be noted that horizontal fold lines are intended as those used to horizontally fold the sheet and will be marked in this direction;
- The length of the sections highlighting the Profile component points, any Projects/Polylines and Particular Points designed by the Add Particular Point command activated through the Project menu as well as the Profile Polylines menu. To avoid them set the associated field at 0. To trace a continuous line from the Profile or from the Projects/Polylines to the design base, insert a very high value into these fields (for example 1000);

 The dimensions of the symbol indicate the reference quote and its movement compared to the initial point. It must be noted that for each quote jump, one of these symbols will be designed, and will be moved, compared to the point where this jump occurs, from the quantity specified by means of this procedure.

	Edit profile styl	e ×
General Dimensions First page texts	Columnings Texts Colors	
Drawing Scale	Outer Margins [mm]	Sheet bending lines [mm]
Length Scale 1: 1000	Upper 5.000	⊙ Yes ◯ No
Height Scale 1: 500	Lower 5.000	Size Interval
	Left 5.000	Vertical 5.000 210.000
	Right 5.000	Horizont. 5.000 297.000
Starting page [mm]	Profile Margins [mm]	Trait size [mm]
⊙ Yes O No	Upper 20.000	Merge ground 1000.000
Vertical Dimens. 297.000	Lower 20.000	Merge projects/polylines 1000.000
Horizontal Dimens. 210.000	Left 20.000	Spec. pt. 10.000
	Right 10.000	
Sheet Dimens. [mm]	Text Margins [mm]	Elevation triangle symbol [mm]
Vertical 297.000	Upper 10.000	Size 10.000
	Lower 10.000	Horizontal shift -10.000
	Left 10.000	
		OK Cancel

Figure 399:

The **First Page Texts** page is used to select which fields to input onto the initial page and the number of decimals used to view the values. The upper part of the tab includes a list of the texts and their characteristics.

The order of the texts can be changed using the **Down** and **Up** buttons. The **Insert** and **Add** buttons, respectively, add a text before or after the one currently selected.

The **Delete** button will remove the selected text from the list. To change the characteristics of a text, select it and then intervene in the fields available in the lower part of the tab:

	Edit profile style	×
General Dimensions	First page texts Columnings Texts Colors	
N Text Type 1 User	Actual Text/Prefix User	
Details text n. 1 Text Type Actual Text/Prefix Code 1 Code 2 Text height [mm]	User User V 3.0 🗘	Up Down Delete Add Insert
		OK Cancel

Figure 400:

Text Type: this specifies the type of text to view.

The types of text available are:

- User to write a note at the user's discretion.
- Cross Section to view the name of the profile/cross section.
- Road to view the name of the road.
- Chainage to view the progression of the cross section.
- Project Elevation to view the quote of the selected project at progression 0.
- Previous Chainage to view the progression of the previous cross section.
- Subsequent Chainage to view the progression of the subsequent cross section.
- Cut Area to view the total amount of the excavation area between the terrain profile and the project profile.
- Fill Area to view the total amount of the fill area between the terrain profile and the project profile.
- Cut Area Between Projects to view the total amount of the excavation area between two project profiles.

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- Fill Area Between Projects to view the total amount of the fill area between two project profiles.
- Computable Sections Area this is used to list the areas and developments of the elements found in the cross section.

Actual Text/ Prefix: identifies the text that describes the text.

Code 1: this is activated only for those types of text that refer to a project

Code 2: this is activated only for texts Excavation/Fill Area Between Projects.

Text Height: this identifies the height of the written text to be inserted.

The **Columnings** page is used to identify which fields to include in the columnings, their dimensions in millimeters and whether to position the columnings below or above.

The upper part of the tab includes a list of the added columnings and their characteristics.

The order of the columings can be changed using the **Down** and **Up** buttons.

The **Insert** and **Add** buttons, respectively, add a new columning to the list before or after the one currently selected; the **Delete** button will cancel the selected columning from the list.

To change the characteristics of a columning, select it and then modify the fields present in the lower part of the tab:

Columning type		Actual text		Code 1	Code 2	Η	Hi	Vrt.
points measured f	Proj p	points measured l	Project	PRO		50	NO	NO
Partial distances (Partial distances (GND		50	NO	NO
Chainages Ground points measured F		Chainages Groun points measured I		GND PRO		15 50	NO NO	YES NO
Elevations Project		Elevations Projec		PRO		15		YES
Partial distances F	Proje F	Partial distances l	Project	PRO		50	NO	NO
Chainages Projec	t (Chainages Projec	t	PRO		15	NO	YES
Details columning n. 1 Category		ct/Polyline 🗸	Туре	points measured		~		Up
0	Proje	ct/Polyline 🗸		points measured		~		Up Down
Category	Proje	measured Proje		points measured	~	~		
Category Actual text	Projec points		ct	points measured	~	~		
Category Actual text Code 1	Projec points	measured Proje	ct	points measured	>	•		
Category Actual text Code 1 Column. height	Projec points	measured Proje	ct		>			Down
Category Actual text Code 1 Column. height Values height	Projec points	measured Proje	ct	Upper position	~			Down

Figure 401:

- **Category** to specify to which category of Columnings the one selected belongs. There are 4 types of categories available: ground, project/polyline, road/profile, additional texts.
- Code 1: this is activated only for those types of text that refer to a project
- Code 2: this is activated only for texts Cut/Fill Area Between Projects.
- **Type** this list depends on the category selected:
 - If the category selected for the columning is ground, then the list of columning types includes:
 - Points measured,
 - Elevations,
 - Partial distances,
 - Chainage,
 - Point name,
 - Partial inclined distances,
 - Total inclined distances,

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- If the category selected for the columning is project/polylines, then the list of columning types includes:
 - Points measured,
 - Elevations,
 - Partial distances,
 - Chainage,
 - Difference in level
 - Horizontal partial distances
 - Sloped partial distances
 - Elevation differences
 - Slope %
 - Slope variation.
 - Area
 - Elem. Area Prev. Sec.
 - Elem. Area Next Sec.
 - Area between projects.
- If the category selected for the columning is road/profile, then the list of columning types includes:
 - Hectometer dist. type 1,
 - Hectometer dist. type 2,
 - Kilometer dist. type 1,
 - Kilometer dist. type 2,
 - Planim. variation angle,
 - Horizontal alignment,
 - Edge course,
 - Partial distance cross sections,
 - Chainages and cross sections,
 - Cross section elevations.

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- If the category selected for the columning is additional text, then the list of columning types includes:
 - Part. Select. distance,
 - Changeable text no. 1,
 - Changeable text no. 2,
 - Changeable text no. 3,
 - Changeable text no. 4,
 - Changeable text no. 5,
 - Changeable text no. 6,
 - Changeable text no. 7,
 - Changeable text no. 8,
 - Changeable text no. 9,
 - Changeable text no. 10.
- Actual Text this edit field is automatically set once the Category and Columning Type are selected and includes the text that will appear in the design.
- **Text Height** to specify the height of the columning in mm.
- **Upper Position** This is a check box that will activate to move the Columning into the upper part of the design. The only exception is represented by the Elevation difference Columning (project/polylines category). In this case, by selecting Above, the text is placed immediately above the project.
- **Vertical Text** selecting this check box activates the print text of the columning vertically, otherwise it is printed horizontally.

The **Texts** page, activated through the **Texts** menu, is divided into sections.

The **Texts Style and Dimensions** section is used to change the dimension of the various texts included in the design.

The **Columning Identifiers** section is also used to determine whether or not to design the texts that identify the various columns.

In the **Texts in Intervals if Too large** the user can execute operations on the texts placed within the intervals if they are too big.

			Edit	profil	e style	ę			×
General	Dimensions	First page texts	Columnings	Texts	Colors				
- Text s	tyles and dime	ensions [mm] —							
First	page texts	þ.0	STANDARD	*		Scales	3.000	STANDARD	*
Colu	mning identifier	rs 2.500	STANDARD	*		Elevation	2.000	STANDARD	~
Spec	ial texts	2.000	STANDARD	~		Values	2.000	STANDARD	~
Colum	ining identifiers					correspond	ence to po	pints —	
	Yes	○ No				d trait size		1.000	_
Texts	in intervals: if to	oo large				ait for Horiz T	• •	. ,	_
R	educe dimensi	ions			Tra	ait for Vert. T	exts [mm]	1.000	
N	/lin. text dimens	sion [mm]	1.000] r	Texts in	correspond	ence to po	oints: if overlap —	
□Ve	ertical rotate				Shift	if overlap			
Ν	/lin. text dimens	sion [mm]	1.000		Ма	ximum shift	[mm]	1.000	
	on't draw				Don	't draw			
								ок с	ancel

Figure 402:

Finally, in the **Texts in correspondence to Points** section the user can associate the dimensions of the text sections horizontally as well as vertically to texts that correspond to points. When the texts corresponding to points are overlaid, the user can select whether or not to design them telling the program the maximum dimension of the move.

The **Colors** page, accessed through the **Elements Colors** menu is used to change the colors of the various elements found in the design:

- Profile box;
- Merge traits;
- Other lines;
- First page text;
- Columning text

Edit profile style	X
General Dimensions First page texts Columnings Texts Colors	
Profile Profile Box Blue	
Lines	
Merge traits White	
Other lines Blue	
Texts	
First page texts Red Columning texts White	
Columning texts White	
ОК	Cancel

Figure 403:

Assigning Profile/Cross Section Style

The **Set Profile Style** command found in the **Format** menu of the **Altimetric CAD View** or the **Roads Cross Section CAD View** is used to assign a new style to a road or its cross section.

Execution of the command will open the **Assign Style** window where the user can select the profile and associate its style using a specific drop down menu.

The style can be associated with multiple profiles/sections.

Assign style
✓Roads1
Select all Invert selection Delete selection
Profile style Profilo standard
OK Cancel

Figure 404:

Profile/Cross Section Properties

This command is used to change the properties of a road or its cross sections:

- The name;
- The style;
- The initial reference elevation (or minimum elevation) calculated by the program;
- The minimum progressive distance (initially set at 0) and the maximum, so as to display only one part of the Profile.

Profile properties					
General		_			
Name	P1				
Profile style	Standard profiles	~			
Starting chainage	0.000				
Number of first cross	Number of first cross				
Values					
Minimum Elevation	242.000				
Minimum Distance	Minimum Distance 0.000				
Maximum Distance 1257.585					
OK Cancel					

Figure 405:

Project Management

Inserting a project in a Road profile can be done in the view corresponding to the profile, using the **New** command in the **Profile | Projects** menu.

Executing the command will open the **Draw project profile** window that initially shows the code associated with the project (see Profile codes).

Use this window to select the type of project to create and which method to use to create it.

Selecting the type of project can be done with the following possibilities:

1)By graphic points: continue the same way as in designing a polyline; although, after identifying each vertex confirmation will appear for the progressive distance and the quote of the created point;

2)By edited points: for each section of the project there will be a window used to insert the progressive distance and the initial and final quotes of the section in question;

3)Starting point + slope; for each section, the user must insert the progressive distance, initial quote, horizontal length and slope of the section itself;

4)Ending point + slope; for each section, the user must insert the progressive distance, final quote, horizontal length and slope of the section itself;

5)Fixed elevation difference: the user must insert the values of the initial and final progressive distances and a fixed value for the drop. The distance values are preset to those for the entire profile.

The possible selections for the type of design are:

1. Single line: the project will be made of a continuous simple line;

2.With thickness: this must be edited in the specific thickness to be assigned to the project line being created;

Draw project p	orofile ×
Code PR2	~
CProject Type	
By graphic points	•
By edited points	0
Starting point + slope	0
Ending point + slope	0
Fixed elevation difference	0
Drawing type	
Single Line	•
With Thickness (upper line)	0
With Thickness (middle pipe) 🔿
With Thickness (lower line)	0
	0.000
ОК	Cancel

Figure 406:

Here following are the images for inserting the project.

Insert Project by graphic points.

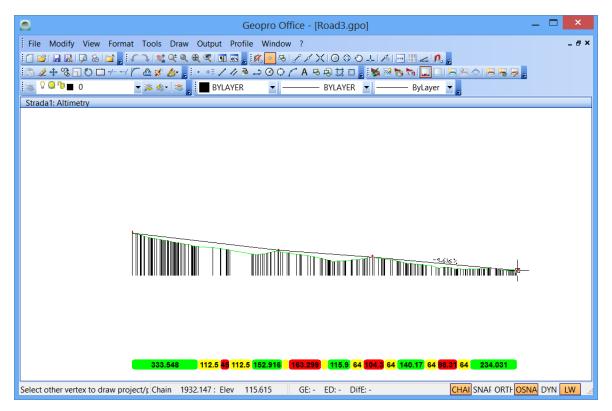


Figure 407:

Complete Insert Project by graphic points.

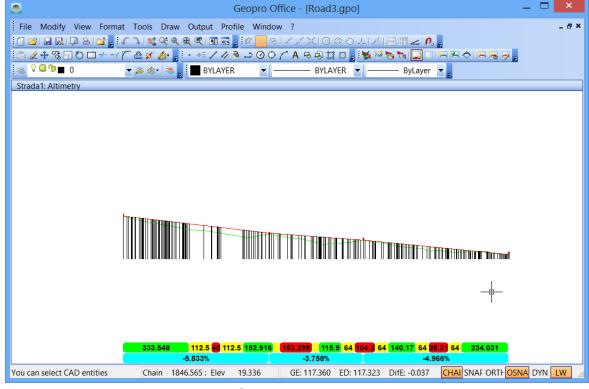


Figure 408:

The user can add points to the project by using the **Add Points** function found in the **Profile | Projects** menu.

The functionality of the **Add Points** command is similar to the functionality of the **New** command; the only difference is that the points can be added only at the two ends.

Vertical curves can be inserted into the project using the **Profile | Projects | Vertical Curve** command.

Once the command is activated, the user must graphically select the vertex where the curve should be inserted at.

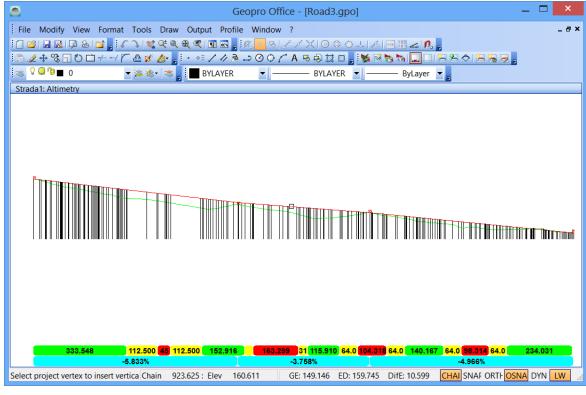


Figure 409:

Once the selection is completed, the program will display an **Insert Vertical Curve** window.

This window is used to select:

- The radius of the curve;
- Approximation to use.

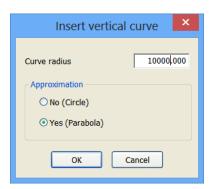


Figure 410:

Here following is the final result.

The following graphic information can be inserted into the vertical curves:

- Direct segments representing the radii of the vertical curve;
- Table with the characteristic values of the vertical curve;

- Vertical comments corresponding to the beginning and end points of the horizontal curve.

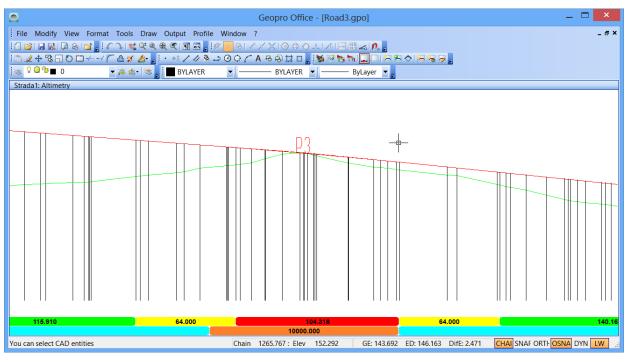


Figure 411:

Inserting this information can be done using the **Draw special elements** command.

The entities created will be placed in special planes and can be changed as common entities. Redoing the function will not eliminate the previously created entities. To do so, the user must proceed with canceling through the Erase Graphic Entities function.

Using the Delete Project function, the user can cancel previously designed projects.

Draw special elements
Draw Entities
Add Vertical Curves Radius
Add vertical Curves Table
Add vertical Comments to signal horizontal curves
OK Cancel

Figure 412:

Polylines Management

To create a profile polyline, there are two commands available: **Profile Polylines | New** and **Profile Polylines | New from DTM...**; these two commands are available from the **Profile** (profile graphic view) and **Cross section** (section graphic view) menus.

The profile polylines are similar to project and differ from them in the following ways:

- Vertical curves cannot be inserted;
- They can also be created from DTM projects.

For this reason, the procedure to create a profile polyline with the **New** command is similar to the one seen for projects with the difference in that the code to associate with the polyline can be selected which, among other things, can be shared by multiple polylines.

Profile	e polyline ×
Code	LN1 💌
Project Type	
By graphic points	۲
By edited points	0
Starting point + slop	e O
Ending point + slope	• •
Fixed elevation diffe	rence O
Drawing type	
Single Line	\odot
With Thickness (upp	perline) O
With Thickness (mic	Idle pipe) O
With Thickness (low	erline) O
	0.000
ОК	Cancel

Figure 413:

In regard to creating from a DTM project, once the command is activated, the program will display the **Choose DTM for profile polyline** window which differs depending on whether the polyline is added in a profile or a cross section.

Choose DTM for the profile polyline					
Code	profile polyline				
Select DTM to assign	n to the profile polyline				
 Project 					
DTM	Survey				
◯ File					
Path	Browse				
DTM	▼				
	OK Cancel				

Figure 414:

In the cross section, besides the altimetric profile code and the DTM project data, the user is asked to specify into which cross section the polyline is to be inserted.

Choose DTM for the profile polyline					
Cod	e profile polyline				
Select DTM to assig	n to the profile polyline				
○ Project					
DTM	Survey 👻				
⊙ File					
Path	\\MARIANGELA\Exchange\CorsoGeop Browse				
DTM	Rilievo 👻				
	OK Cancel				

Figure 415:

After selecting the code to associate to the polyline, the user must tell the program which DTM project to use, which may be in the current file or an external file (in this case the route must be specified).

Once the selection is completed, press **OK** and the polyline will be added into the graphic as well as the numeric data view.

The polyline can be edited using the **Profile Polylines | Edit** command.

Once the command is activated the polyline can be changed using the commands from the **Modify | Polyline** menu.

Operations Common to Projects and Polylines

Here following are descriptions of various commands common to Projects and Polylines.

 Add Particular Point: this function is used to insert particular points into projects and polylines; to activate it, go to the **Projects** menu or the **Profile Polylines** menu depending on where to add the points.

Inserting the point can be done in two ways:

1. By chainage: the user must insert a value for the progressive distance from the beginning of the profile.

2.By chosen point and partial distance: the user must select, first of all, the project point from which to begin and then, the distance from this point.

- Trim/Merge: After activating the function, select the first project/polyline and then the second. Then confirm the operation in the window that appears. Projects and Polylines will be cut or extended depending on their disposition; at the end there will be only one Project/Polyline.
- Break: Once activating the function, select the project/polyline to divide using the left button and then select the point where to divide the project/polyline; at the end there will be two Projects/Polylines.
- Delete Project/Polyline Once activating the function, select the project/polyline to eliminate using the left mouse button and confirm with the right button.

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• Delete Point: Once activating the function, graphically select the project/polyline points to eliminate. Once the point to be eliminated is identified, it will be immediately eliminated and the design will refresh. The command will conclude by right mouse button.



Note that the selecting operator cannot be positioned along the vertical joint or on the column associated with the point to avoid any ambiguity in selecting between profile points and project points.

• Delete Intermediate Points: this function will automatically eliminate intermediate points of a project or a profile polyline.

Draw special point	х
Insert special point	
By chainage	۲
By chosen Pt. + Part.Dist.	0
OK Cancel]

Figure 416:

Profiles/Roads/Cross Sections Appearance

Use this command to run selections associated with the CAD View display of the Topographic/Roads Profile and Cross Sections names.

Once the command is activated, the program will open a window made of 2 pages:

Profile/Road/Cross Section appearance				×		
Profiles - Roads Text Height Style Alignment Names Draw Nam Position Prefix	1.000 Distance STANDARD ✓ Aligned ✓		Box Draw Box Type	Circular	Color	
Save CFG	Load CFG				OK Can	cel

Figure 417:

1.**Topographic Profiles - Roads**, for the profile and roads name, the user can:

- specify the height, distance, style, color and alignment;
- insert a frame with a circle or rectangle of any chosen color;
- select whether to display the name indicating its position and whether to associate a prefix/suffix;
- 2. Cross Sections for the sections name, the user can:
 - specify the height, distance, color ,style, and alignment;
 - insert a frame with a circle or rectangle of any chosen color;
 - select whether to display the name indicating its position and whether to associate a prefix/suffix;
 - select whether or not to display the Progressive indicating its position and the format with the number of decimals, associate a prefix/suffix to the Progressive name;
 - insert text to the right or left of the significant sections (ex. <Fr/Icl> for a cross section in the point that ends a connection and begins a clothoid);
 - insert a symbol "A to the right or left of the sections for those created automatically and "M" for those created manually.

The **Save CFG** and **Load CFG** buttons are used respectively to save the current configuration and to refresh it. The configuration saved with **Save CFG** will be automatically suggested again upon creation of a new document.

Profile/Road/Cross Section appearance					x	
Profiles - Roads	S Cross sections					
Height	1.000 Distance	1.000	Box Draw Bo	x		
Style	STANDARD 💌	Color	Туре	Circular	Color	
Alignment	Aligned					
Names	ne		Chainage -	ainage		
Position	To the left		Position Format	To the right 1234.56	Decimals 2	_
Prefix	Suffix		Prefix		Suffix	
Special Point	is Texts		Cross section	on Types		\leq
Draw			Draw			
Position	To the left 🗸		Position	To the left	~	
Save CFG	Load CFG				OK Cano	cel

Figure 418:

Elevation Jump

If the profile exits from the graphic where it is inserted, the function **Elevation Jump** is used to keep the profile within the graphic.

The profile will be separated into two or more parts that will be carried into the graphic itself; if the Elevation Jump is activated, projects cannot be designed nor can any changes be made to them; in order to redesign Projects, any Elevation Jumps created must be canceled.

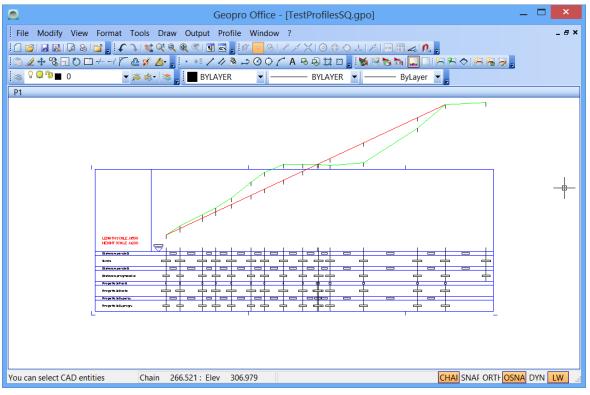


Figure 419:

From the view corresponding to the profile where the user is working, go to the **Profiles | Elevation Jump** menu; the possible choices are:

- Automatic: use this procedure and the program will automatically calculate the points where to apply the Elevation Jump.
- Select point: the user must graphically select the point in which to insert the Elevation Jump, or divide the Profile.

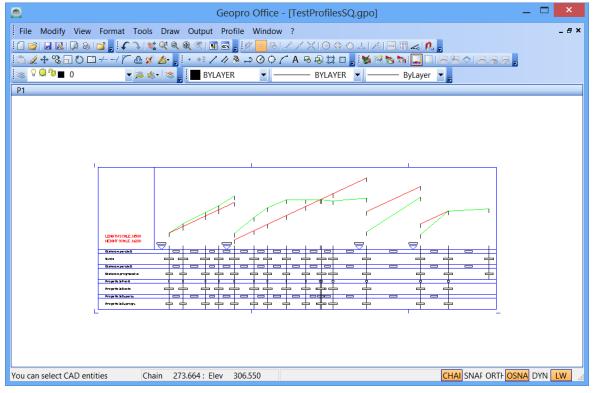


Figure 420:

The image shown above displays the beginning status; the image below shows the graphic result of the **Elevation Jump | Automatic**: as can be clearly seen after each quote jump, the triangle indicating the new profile reference point will repeat.

The beginning status is similar to the one suggested for the automatic Elevation Jump. The image below shows the functionality of the **Elevation Jump | Selection** operation.

After specifying the point graphically, a window will appear to confirm or change the value of the suggested Elevation Jump.

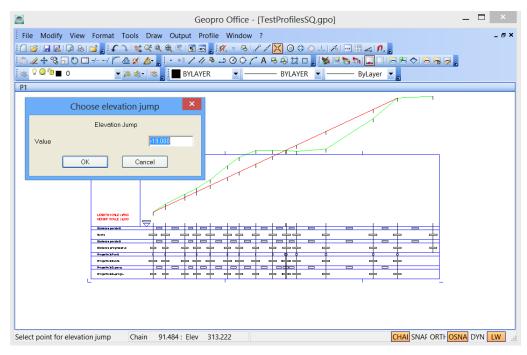


Figure 421:

Once this operation is executed, this result is obtained.

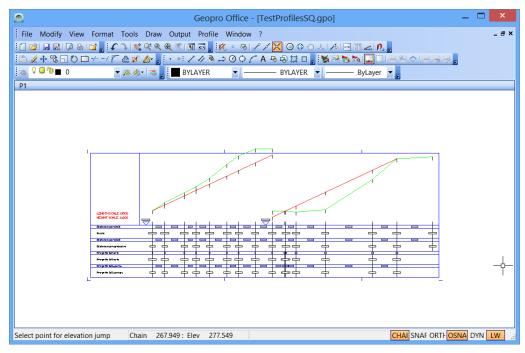


Figure 422:

Active Altimetric Profiles

This procedure is always activated from the **Format | Altimetric Profiles Active** menu and lists the created profiles.

This window is used to determine whether or not to display the profile (turning on/off the light found under the **Visible** columning); similarly, the user can select whether or not to view the columns (turning on/off the light found under the **Columning** column).

To confirm the selections, press **OK**.

Activate drawing of altimetric profiles				
Name Ground Project		Visible V	Columning V V	
	ОК	Cancel		



Special Texts

The view corresponding to the profile, found through the **Format | Current Profile Style** menu will offer a series of functions used to insert the typical profile texts.

Culture Texts

Before activating the **Culture Texts** function, the user must add the **Culture** columning into the profile style through the **Columnings** tab in the **Edit Profile Style** window, activated using the **Format | Current Profile Style** command.

To add the **Culture** columning, select the **Additional Texts** category and then select it from the **Columning Type** list.

In the **Actual Text** field, the description **Culture** will be automatically inserted; this description can be changed.

Edit profile style						
General Dimensions F	irst page texts Columnings Te	exts Colors				
Columning type Culture Elevations Grou points measure chainages Grou points measure	Actual text Culture Quote points measured Ground Chainages Ground points measured Project	Cod GNE GNE GNE PRO PRO		H Hi Vrt 50 NO NO 15 NO NO 50 NO NO 15 NO YES 50 NO YES		
 Elevations Project Elevation differe Slope % Project 	Elevations Project Elevation difference Project Slope % Project	PRO PRO PRO		15 NO YES 50 NO NO 50 NO NO		
Details columning n. 1				Up		
Category Actual text	Additional texts V Type Culture	Culture	~	Down		
Code 1	Code	2	~			
Column. height Values height	5 \$	Upper position Vertical Text		Delete		
Starting value		Venucal Feat		Add		
			ОК	Cancel		

Figure 424:

Proceed with **OK** and verify that the column has been added to the profile graphic currently in progress.

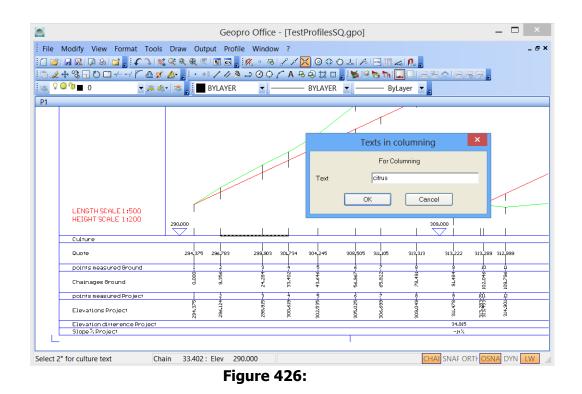
۲	Geor	oro Office - [TestProfil	esSQ.gpo]		- 🗆 🗙
File Modify View Format To	ools Draw Output Profi	le Window ?			_ 8 ×
10 🖬 🖬 🕼 🖓 🗞 🖬 🖥 14 🗘 🤉				< 0.	
10 2 + 3 - V □ / ~ e					
	🕹 🐀 🛛 💐 📕 BYLAYER			Layer 🔻 🚬	
P1					
				/ .	
		1			
		'			
LENGTH SCALE 1:500					
HEIGHT SCALE 1:200	290,000	i		309.000	
	230000			303.000	
Culture					
Quote	294,375 296,783	299,903 301,734 304,24	5 308,505 311,105	313 313 313 222	313,289 312,999
points measured Ground	2	3 4 5	6 7	8 9	io ii
Chainages Ground	0.000	24.284 33.402 43.646	56.967 65.922	78.491	102.046
		2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		к о	
points measured Project	24-1	332-0 213-1			년 14:80 14:80 14:80 14:80 14:80
Elevations Project	294.375 296.124	298.915 300.619 302.535	305.025	309.049- 311.478-	333.5
Elevation ditterence Proje Slope % Project	ct			34.915	
Stope / Project				-1+ %	
L					
You can select CAD entities	Chain 45.759 : Elev 29)2.695		CHAI SNAF O	RTHOSNA DYN LW

Figure 425:

Activate the **Culture Texts** function and then select the two points (in the profile or columning) that will outline the space where the text will be inserted.

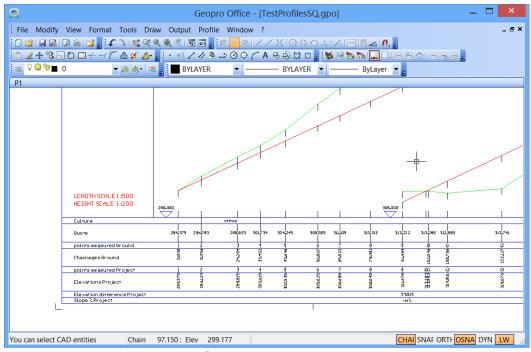
After selecting the second point, a window will appear used to insert the text.

The text will be positioned at the center of the selected interval. At the edges of the interval, separator lines will be designed.



The user is free to continue with inserting more texts beginning with the last point selected or to terminate the command using the right mouse button.

The image here below shows the result from inserting the text.





Columning Editable Texts

Before activating the **Columning Editable Texts** function, the user must add the **Change Text no....** columning into the profile style through the **Columnings** tab in the **Edit Profile Style** window, activated using the **Format | Current Profile Style** command.

To add the **Change Text no....** column, select the **Additional Texts** category and then select it from the **Columning Type** list.

The description will be automatically inserted into the **Actual Text** field.

Change Text no....; this description can be changed (in this example the effective text is SEDIMENT).

Edit profile style						
General Dimensions F	irst page texts Columnings Texts	Colors				
N Columning type 1 Edit text n. 1 2 Elevations Grou 3 points measure 4 Chainages Grou 5 points measure 6 Elevations Project 7 Elevation differe 8 Slope % Project	Actual text sediment Quote points measured Ground Chainages Ground points measured Project Elevations Project Elevation difference Project Slope % Project	Code 1 GND GND GND PRO PRO PRO PRO PRO	Code 2 H 50 15 50, 15 50, 15 50, 50, 50, 50,	NO NO NO NO NO YES NO NO NO YES NO NO		
Details columning n. 1 Category Actual text Code 1 Column. height Values height Starting value	Additional texts V Type sediment Code 2 5 20 20	Edit text n. 1		Up Down Delete Add Insert		
			ОК	Cancel		

Figure 428:

Proceed with **OK** and verify that the column has been added to the profile graphic currently in progress.

		Geopro Office - [TestProfilesSQ.gpo]	
•		Draw Output Profile Window ?	-8,
	🕅 🖗 🗖 🖥 🕻 🗸 🖉 🥳	€ 🔍 🔍 🔍 🔤 💂 🕅 🖉 🖉 🗡 🗙 । ⓒ ۞ ۞ ↓ ा मा 🖃 🔤 💦 💂	
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P1			
			/
	LENGTH SCALE 1:500		
	HEIGHT SCALE 1:200	290.000 309.000	
	sediment		
	Quote	291-375 294,783 299,803 301,731 301,245 309,805 311,05 313,313 313,222 313,289 312,989	313.741
	points measured Ground	0.0.00 3.354 3.314 3.436 64.42 64.42 102.0 44.61 - 4 102.0 44.61 - 4	4-2772 51
	Chainages Ground		
	points measured Project		24
	ElevationsProject		920°616
	Elevations Project Elevation ditterence Project Slope A Project	284.13 284.12 284.12 284.12 284.12 306.45 308.05 30	OBIE
L	Elevation ditterence Project	31.915	7616
L	Elevation ditterence Project	31.915	JULE CONTRACT

Figure 429:

Activate the **Columning Editable Texts** function: the program will display the **Draw Texts in Columning** window where the user can select the text to insert; in this example, we confirm **SEDIMENT** and then press **OK** to proceed with graphically identifying the interval on which to insert the text.

	Draw text in columning
_ Text typ	e
۲	sediment
0	Edittext n. 2
0	Edit text n. 3
0	Edit text n. 4
0	Edit text n. 5
0	Edit text n. 6
0	Edit text n. 7
0	Edit text n. 8
0	Edit text n. 9
0	Edit text n. 10
(OK Cancel

Figure 430:

Once the selection is completed, the window will appear for inserting the text itself.

The text is positioned at the center of the interval while the two edges are designed with separator lines.

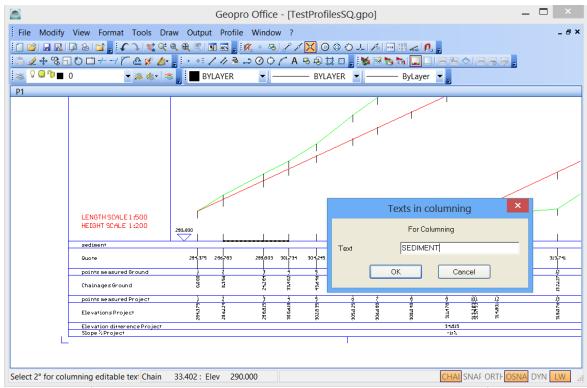


Figure 431:

The result of the operation is shown in the image below.

Geopro Office - [TestProfilesSQ.gpo] –					
File Modify View Format Tools Draw Output Profile Window ?					
! [] ❷ ⊒ ℝ ♀ & ♀ , ! ✔ ` ` ♥ ♥ ♥ ♥ ♥ ■ ₂ ! ½ <mark> </mark> & ↗ / X ○ ☆ ○ ⊥ ↗ ─ ⊞ ∡ // . ₂					
ो≜∡┿╚╗᠐◻┼┤ア๕¥┟₀┆·ё╱∥ề⇒⊘ѺҀА╚Ӫҏ҃ҏ╻┇Ѭ҄҄฿๖҄҄҉ѩ҄҄⊒□ӀӞӞѺӀӞ╔┍╻					
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P1					
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HEIGHT SCALE 1:200					
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Guote	294,375 296,783 298,403 301,734 304,245 308,505 311,05 313,213 313,222 313,289 312,399 313,741				
points measured Ground					
Chainages Ground	0.000 9.136 9.136 9.144 6.141 7.6.141 9.146 9.161 1.02.046				
points measured Project					
ElevationsProject	244.779-4 234.1244-4 234.1244-4 236.00415-4 200.00415-4 219.19.124-124-4 200.00415-4 219.14.124-124-4 200.00415-4 219.124-124-124-4 219.124-124-124-124-124-124-124-124-124-124-				
Elevation ditterence Project Slope % Project	14.915 1-12				
	-#4				
You can select CAD entities Chain	67.941 : Elev 292.355 CHAI SNAF ORTHOSNA DYN LW				

Figure 432:

Selected Distances Texts

Before activating the **Distance Text Selected** function, the user must add the **Sel part. Distances** columning into the profile style through the **Columnings** tab in the **Edit Profile Style** window, activated using the **Format | Current Profile Style** command.

To add the **Sel part. Distances** column, select the **Additional Texts** category and then select it from the **Columning Type** list.

In the **Actual Text** field, the description **Sel part. Distances** will be automatically inserted; this description can be changed.

		Edit p	orofil	e style					X
General Dimensions F	irst page texts Co	olumnings	Texts	Colors					
 Columning type Sel. part distanc Elevations Grou points measure Chainages Grou points measure clevations Project Elevation differe Slope % Project 	Actual text Sel. part. distance Quote points measured Chainages Grour points measured Elevations Projeet Elevation differen Slope % Project	Ground d Project t			Code 1 GND GND PRO PRO PRO PRO PRO	Code 2	H 50 50 15 50 15 50 50	NO NO NO NO	Vrt NO NO YES NO YES NO NO
Details columning n. 1 Category Actual text	Additional texts Sel. part. distanc	► Typ	e	Sel. part. dist	ances	~		Up Dow	
Code 1		Cod	le 2		~				
Column. height Values height Starting value		5 \$		Upper positio Vertical Text	n			Delet Add	
						ОК		Ca	incel

Figure 433:

This function is used to insert the partial distance between two terrain or project peaks into Columnings.

In fact, at the end of the procedure, the partial distance separating the selected points will be automatically posted into the selected intervals.

After graphically selecting the two points, there is no need to edit a text and it will be automatically created by the program based on the real distance between the points.

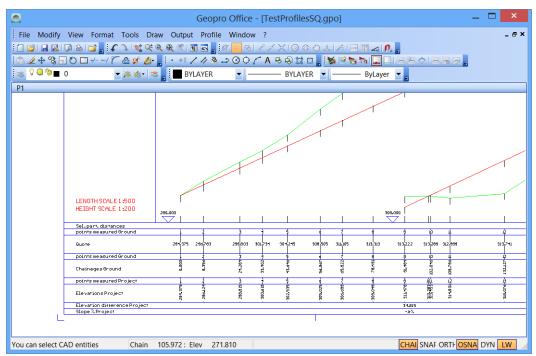


Figure 434:

Vertical Comments

This command is used to specifically insert vertical texts alongside profile-columning or projectcolumning connections.

First of all, set the graphic selection symbol onto the connection alongside the one to be used for inserting a comment; after executing the selection a window will appear used for inputting the comment to be inserted; once the comment is inserted and confirmed, another one can be inserted; to conclude, press the right mouse button.

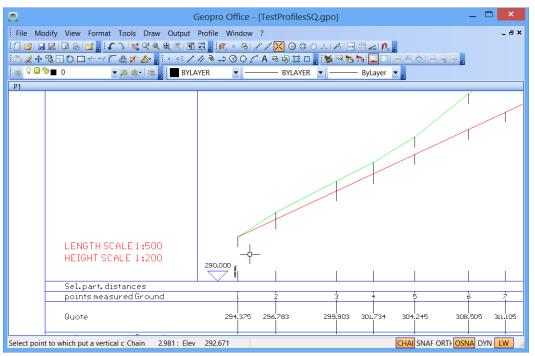


Figure 435:

Delete

This is activated through the **Profile** menu and is used to eliminate particular texts that were previously inserted (**Culture Texts**, **Columning Editable Texts**, **Distance Text Selected**, **Vertical Comments**); the selection of the texts is done through the Profile CAD View using the left mouse button and the right mouse button is used to confirm it.

File |Export

The following commands are available in the **File | Export** menu:

• **DXF/DWG Profile File:** this command is used to create a DXF/DWG file containing the profile; in particular, the user is asked only for the name to assign to the file and the design is created as a block that can be exploded after importing it into Autocad.

- All DXF/DWG file sections: activating this function from the Profiles View allows the user to create a dxf/dwg file format containing all of the sections found in a profile/road. This function is activated only if the profile displayed refers to a road or a cross section of it. After activating this function and after giving a name to the file in the window called Create DXF/DWG File another window will open so the user can customize the order in which the sections are inserted into the file. In particular, the user can decide if the order of the sections designs must proceed by line or by column. Further, the user can establish the maximum number of lines or columns. Another option involves the sections to be included in the file; in fact, the user can change the initial number as well as the final number of the sections to include.
- Multiple profiles to DXF/DWG files All DXF/DWG file sections: activating this function from the Profiles View allows the user to create a dxf/dwg file format containing all of the sections found in multiple profiles/roads. After activating this function and giving a name to the file in the window called Create DXF/DWG File the Transfer Profiles to DXF window will open so the user can determine the order of the profiles by line or by column indicating the maximum number of lines or columns.

Transfer profiles to dxf	x
Profiles to print Order	
✓ P1 1→2→3→4 ✓ P2 ✓ P3 ✓ P4 5→6→7→8	
 Prior by columns then by rows 1 3 5 7	
∼ Maximum number	
Maximum number of rows	
Sel. all OMaximum number of columns	
OK Cancel	

Figure 436:

• **Printout of Terrain Profile:** This procedure produces a file spreadsheet associated with the profile taking into account the settings saved through the Options|Print Options procedure. Before creating the file a preview is displayed (see the image below) where the user can change the character font, increase or reduce the zoom and specify the type of file to create. To create the file the user must press the Save button and indicate the save route.

					Print Preview	
	GROUND PR	OFILE				Î
•	Indund profile: P1	e De	Dig Pag	Distance Progressia	bangan	
		t 286,763 4 296,963 6 261,754 8 364,965 9 311,965 6 313,203 6 313,203 6 313,203 7 32,206 3 313,741 0 25,200 9 25,200	0.000 8.000 1.1.20 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00000 0.0000 0.0000 0.0000 0.00000 0.00000 0.0000 0.0000 0.00000 0.00000 0.000000	0.000 1.8.255 4.0.255 4.0.257 6.0.257 6.0.257 6.0.257 7.0.012 7.0.000 7.0000 7.0000 7.0000 7.0000 7.0000 7.0000 7.0000 7.0000 7.00000 7.00000 7.00000 7.00000 7.000000 7.00000000		Syle Formet Text Rows Octume Syle Detsut Serve Paname Deter Model Ourners rengabe Hadder Hadder Hadder Hadder Hadder Hadder Hadder Hadder Hadder
K C Pege 1 of 1 3 3					200m 100	Export. • Print Close

Figure 437:

• **Printout of All Terrain Profiles:** this command is similar to the **Printout of Terrain Profile** with the only difference being that all profiles are printed.

Print options and Free Format				
General options TS	data GPS data Ground profiles Projects	Polylines		
	Print	ASCII file		
	Variable types	Variable types		
Field 1	Point number 🗸 🗸	Point number		
Field 2	Elevation	Elevation		
Field 3	Partial Distance	Partial Distance 🔽		
Field 4	Chainage 👻	Chainage		
Field 5	Difference in level	Difference in level		
Field 6	-	-		
Field 7	-	-		
Field 8	-	-		
Field 9	-	-		
Field 10	-	-		
Field 11	-	-		
Field 12	-	-		
Field 13	-	-		
		OK Cancel Help		

Figure 438:

• **Printout of Project/Polyline:** this function allows the user to create a file containing the data of a selected project (project page must be activated). The data to insert into the file can be specified using the Options|Print Options command. Before creating the file a preview is displayed (see the image below) where the user can change the character font, increase or reduce the zoom and specify the type of file to create. To create the file the user must press the Save button and indicate the save route.

Figure 439:

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• Printout of All Projects/Polylines: this function is similar to the Printout of Project/Polyline with the only difference being that all projects of the profile are printed.

	Print Preview	
	Image: Second	Syle Famile Text: Row: Column Syle Defeat Generitungiate Header Header on it pages Header only on the fort page Header only on the fort page
jt c Page1 of1 3 9		v 200m 100 ⊊ Expot. v Pivit Close

Figure 440:

Output

Selecting the **Printout of Terrain Profile** from the **Output** menu allows the user to execute the following printouts:

standard format printing;

1.standard format printing;

2.free format printing;

3.All free format printing;

If the user selects to print the profile spreadsheet in standard format, the program will display first of all the print preview and as can be clearly seen, the profile information is printed on a spreadsheet che includes the following information:

- Progressive numbering of the point,
- Any name,
- Quote,
- Partial distance,
- Progressive distance,
- Any comment.

If the user selects a free format printout then the data printed will be what was selected using the **Options | Print Options** command.

In regard to the printing of projects, the user is not offered a standard print choice like for profiles and therefore the free format must be set (using the **Options | Print Options** command). For projects, like for profiles, one single project or all projects (Spreadsheet Project/Polyline|Free Format Print and Spreadsheet Project/Polyline|Free Format Print All).

Here following is an example of a print preview.

			Print Pres	W (
Der mage Si var giv Frager Si var giv Frager Per senten in der ange Si varier varge bester Transmission ange bester Transmission ange bester Si varier varge bester Si varier varge bester Si varier varier bester Si var	same ta				^	
GROUND PROFIL NPoids Name 1 79 2 87 3 85 5 85 5 85 5 85 5 85 6 85 7 10 8 21 6 85 7 10 8 21 7 10 7	E Elevation 24.37 26.52 27.54 28.55 21.55	Part.Dist. 8.1.6.54 0.000 0.04 0.04 0.04 0.04 0.040 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	Chainege Commette Dati. 1330 VINTCA, 1330 VINTCA, 13300 VINTCA, 1330 VINTCA, 1330 VINTCA, 1330 V			
н тон 6 164	20 20 23 76	9.85 2.03	90.79 24 97			She Formel Text Rows Column She Detaut v Serve Resone Determ
						Model Current template

Figure 441:

Commands View: list of commands

The following tables list the commands in Commands View.

Commands in File Menu

	14210 -
_ImpDxfDwg	Import Autocad (.DXF/.DWG)
_profDxfDwg	Export profile to file (.DXF/DWG)
_secDxfDwg	All sections to DXF/DWG files
_profMultiDxfDwg	Multiple profiles to file DXF/DWG files
_printProfFile	Spreadsheet of profile is saved on file
_printAllProfFile	Spreadsheet of all profiles is saved on file
_printPrgPolFile	Spreadsheet of project is saved on file
_printAllPrgPolFile	Spreadsheet of all projects is saved on file

Table 1.

Roads View

_preview	Print preview
_PageSetup	Set page
_print	Print

Commands in Modify Menu

The commands for this menu are similar to those seen for the CAD View.

Commands in View Menu

The following are added to the commands offered in the CAD View:

_sezIni	Initial Cross Section	
_sezPre	Previous Cross Section	
_sezSuc	Next Cross Section	
_sezFin	Final Cross Section	

Table 2

Commands in Format Menu

The following are added to the commands offered in the CAD View:

Table 3.			
_profStyles	Profile Style		
_optProfAct	Active Altimetric Profiles		
_profCurStile	Current Profile Style		
_reassStile	Assign Profile Style		
options / _options	General options selection		

Commands in Instruments Menu

The commands for this menu are similar to those seen for the CAD View.

Commands in Design Menu

The commands for this menu are similar to those seen for the CAD View.

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Commands in Outcomes Menu

Table 4.

_printProfStd	Print profile in standard format
_printProfFree	Print profile in free format
_printAllProfFree	Print all profiles in free format
_printPrgPollFree	Free format printing;
_printAllPrgPolFree	Print all in free format

Profile/Cross Sections Menu Commands

_optPropProf	Profile Properties
_optPrflOpzCalc	Profile Calculation Options
_optCodProf	Profiles Codes
_newPrg	New Project
_addPtPrg	Add Points
_raccPrg	Vertical Connector
_disElemPrg	Particular Elements Design
_newPol	New Profile Polyline
_newPrgDTM	New Profile Polyline from DTM
_editPol	Edit Profile Polyline
_addPtPrgPol	Add Particular Point
_cimaPrgPol	To Tip/Join Projects and Profiles
_spePrgPol	To Divide Projects and Profiles
_delPrgPol	Cancel Project/Polyline
_optCancPt	Erase Point
_optCancPtInt	Erase Intermediate Points
_scriCol	Culture Texts
_scriFinc	Changeable Column Texts
_scriDist	Selected Distances Texts
_scriComm	Vertical Comments
_delScr	To Eliminate Particular Texts
_elevJumpAuto	Automatic Quote Jump
_elevJumpSel	Quote Jump Selection
_elevJumpAnn	Cancel Quote Jump
_newGrubAutoScotAuto	Cross Section - Create Automatic Grubbing
_newHorizEx	Cross Section - Create Reclamation
_ newBenchEx	Cross Section - Create Terracing
_editSag	Change Template
_roadVolOpt	Set volumes calculation
_roadVolSect	Print calculation of leveled sections volumes
_roadVolTray	Print volumes calculation tray
_roadVolSectFile	Create file with leveled sections volumes
_roadVolTrayFile	Create file with volumes tray calculation
_roadPrtSectAreas	Calculate sections areas
_roadPrtSectAreasElement	Calculate elementary sections areas
_roadPrtSectVol	Calculate sections volumes
_chkRule	Guidelines check

Road Template Editor

This command is used to create road templates that may then be mounted onto a progressive interval ("**Roads | Cross Sections | Template intervals**" command in the CAD View).

The road template can be stored in a .sag format file so that it can be used in multiple projects.

The editor used for creating the template is very simple and versatile: the right side lists the elements that can be added while the left side shows those already inserted.

In the "**Element information**" view, the user can read and change the information associated with the element selected in the "**Elements list**" view while the central part offers a graphic view that can display the planned template as well as its mounting on the current road.

The following information is found on the "Cross section Data" view:

- Section chainage values;
- Ground and project values;
- Slope and widening values.

In the **"Template Editor**" these values can be edited to test the mounting of the template; in the "**Mount on road**" they are calculated based on the current road and cannot be changed, except for the chainage (using the edit field or the slider).

Template editor										- 0 ×
	t 🕄 🤁 🛞 Mode	emplate Editor	Current elements Central element	ts • 0.454 : 0.	106					
Dement list	9								Element archive	
XHIAZ									Element	Cut/Fill
									Gutter type 1	Anywhere
Benent name Gutter type 1_r	Benent type Gutter type 1								Overtum gutter type 1 Ditch by widos Ditch by widoes Curb Overtum curb Single trait Lane Shoulder Sidewalk Traffic sland Gutter type 3	Anywhere Anywhere Anywhere Anywhere Anywhere Central element Central element Central element Central element Central element
Element informations	9								oute tipe a	Cervaleenen
Base informations	*									
Name	Gutter type 1_r									
Element type	Gutter type 1									
Category	Gutters									
Direction	Right					· _				
Parameters										
Hook point	Cross_section_origin					/ /				
Insert point: X	e e e e e e e e e e e e e e e e e e e					/ /				
Inset point: Y						_ /				
Project line code	PRO									
Gutter line code	GUT									
Inner trait width	0.550									
Central trait width	0.180									
Outer trait width	0.120									
Inner trait height	0.090									
Outer trait height	0.340									
Gutter depth	0.160									
		Cross section data							0	
		Chainage			Ground elevation	10.000	Left slope	-2.9		
		Cross section			Project Elevation	0.000	Right slope	-2.5		
		North			Elev. diff.	10.000	Left widening	0.00		
		East			Ground slope[%]	5.00	Right widening	0.00		
		Chainage						Chainage S	·	
Search Wind	dows		0 📃 🛍 🤤	🧠 🌍 👂	ø 🗗 🕻		WI		스 탄 수 대	318 PM 2/17/2017

Figure 442:

Template edit method

Road elements

Road elements that can be inserted into a road template are divided into three types:

Central elements:

- Gutter type 1
- Overturn gutter type 1
- Ditch (by width, by slopes)
- Single trait
- Lane
- Shoulder
- Sidewalk
- Curb
- Overturn curb
- Gutter type 3

Excavation elements:

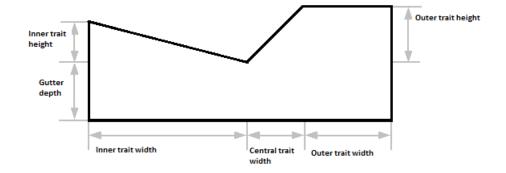
- Gutter type 1
- Overturn gutter type 1
- Ditch (by width, by slopes)
- Single trait
- Cantilever wall
- Gravity wall
- Fixed slope
- Automatic slope
- Fixed bench
- Automatic bench
- Gutter type 2 by slope
- Gutter type 2 by width

Road Template Editor

Fill elements:

- Gutter type 1
- Overturn gutter type 1
- Ditch (by width, by slopes)
- Single trait
- Retaining wall
- Gravity wall
- Fixed slope
- Automatic slope
- Fixed bench
- Automatic bench
- Gutter type 2 by slope
- Gutter type 2 by width

GUTTER TYPE 1



GUTTER TYPE 1 CODE

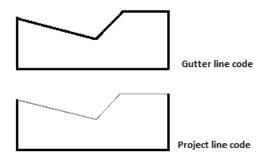


Figure 443:

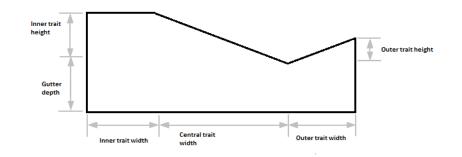
The parameters for the gutter type 1 are:

- Name;
- Direction (right or left);
- Insert point (none or section origin or other);
- Project and gutter line codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Width (inner, central, outer trait);
- Height (inner, outer trait);
- Depth.

Element informations	ą
Base informations	*
Name	Gutter type 1_r
Element type	Gutter type 1
Category	Gutters
Direction	Right
Parameters	*
Hook point	Cross_section_origin
Insert point: X	
Insert point: Y	
Project line code	PRO
Gutter line code	GUT
Inner trait width	0.550
Central trait width	0.180
Outer trait width	0.120
Inner trait height	0.090
Outer trait height	0.340
Gutter depth	0.160

Figure 444:

OVERTURN GUTTER TYPE 1 PARAMETERS



OVERTURN GUTTER TYPE 1 CODE

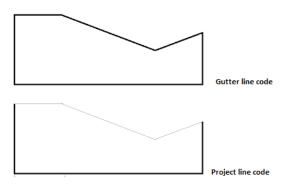


Figure 445:

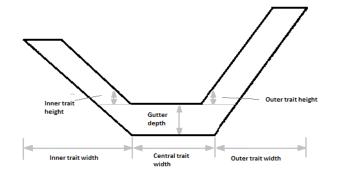
The parameters for the Overturn gutter type 1 are:

- Name;
- Direction (right or left);
- Insert point (none or section origin or other);
- Project and gutter line codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Width (inner, central, outer trait);
- Height (inner, outer trait);
- Depth.

Element informations	Ф.
Base informations	*
Name	Overturn gutter type 1_r
Element type	Overturn gutter type 1
Category	Gutters
Direction	Right
Parameters	*
Hook point	Cross_section_origin
Insert point: X	
Insert point: Y	
Project line code	PRO
Gutter line code	GUT
Inner trait width	0.120
Central trait width	0.180
Outer trait width	0.550
Inner trait height	0.340
Outer trait height	0.090
Gutter depth	0.160

Figure 446:

GUTTER TYPE 2 BY WIDTHS PARAMETERS



GUTTER TYPE 2 BY WIDTHS PARAMETERS

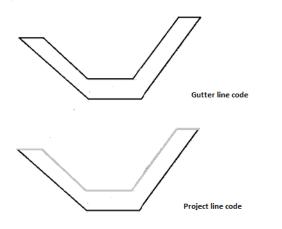


Figure 447:

The parameters for the gutter type 2 defined by widths are:

- Name;
- Direction (right or left);
- Insert point (none or section origin or other);
- Project and gutter line codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Width (inner, central, outer trait);
- Gutter thickness;
- Height (inner, outer trait);
- Gutter depth;

Element informations	4
Base informations	*
Name	Gutter type 2 by widths_r
Element type	Gutter type 2 by widths
Category	Gutters
Direction	Right
Parameters	*
Hook point	Gutter type 1_r3_L
Insert point: X	
Insert point: Y	
Project line code	PRO
Gutter line code	GUT
Inner trait width	0.300
Central trait width	0.300
Outer trait width	0.300
Gutter thickness	0.080
Inner trait height	0.300
Outer trait height	0.300
Gutter depth	0.090

Figure 448:

GUTTER TYPE 2 BY SLOPES PARAMETERS

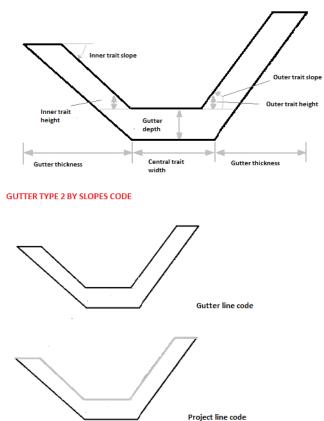


Figure 449:

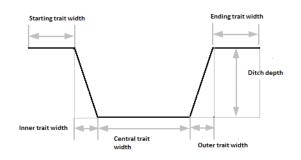
The parameters for the gutter type 2 defined by slopes are:

- Name;
- Direction (right or left);
- Insert point (none or section origin or other);
- Project and gutter line codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Width (central trait);
- Gutter thickness
- Height (inner, outer trait);
- Inner trait slope;
- Outer trait slope;
- Gutter depth.

Element informations	4
Base informations	\$
Name	Gutter type 2 by slopes_r
Element type	Gutter type 2 by slopes
Category	Gutters
Direction	Right
Parameters	\$
Hook point	None
Insert point: X	0.057
Insert point: Y	0.095
Project line code	PRO
Gutter line code	GUT
Central trait width	0.300
Gutter thickness	0.080
Inner trait height	0.300
Outer trait height	0.300
Inner trait slope [%]	100.000
Outer trait slope [%]	100.000
Gutter depth	0.090

Figure 450:

DITCH BY WIDTHS PARAMETER



DITCH BY WIDTHS CODE

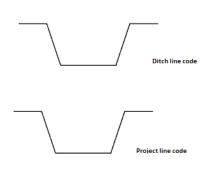


Figure 451:

The parameters for the ditch defined by width are:

- Name;
- Direction (right or left);
- Insert point (none or section origin or other);
- Project and ditch codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Width (starting, inner, central, outer, ending trait);
- Ditch depth.

Element informations	ą
Base informations	*
Name	Ditch by widths_r
Element type	Ditch by widths
Category	Ditches
Direction	Right
Parameters	*
Hook point	Cross_section_origin
Insert point: X	
Insert point: Y	
Project line code	PRO
Ditch line code	DIT
Starting trait width	0.500
Inner trait width	0.500
Central trait width	0.500
Outer trait width	0.500
Ending trait width	0.500
Ditch depth	1.000

Figure 452:

DITCH BY SLOPES PARAMETER

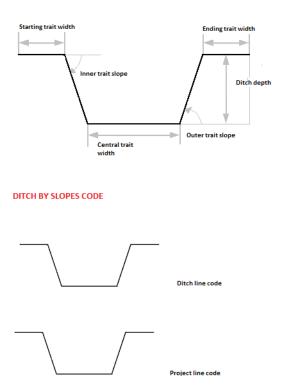


Figure 453:

The parameters for the ditch defined by slopes are:

- Name;
- Direction (right or left);
- Insert point (none or section origin or other);
- Project and ditch codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Width (starting, central, ending trait);
- Inner trait slope;
- Outer trait slope;
- Ditch depth;

Element informations	4
Base informations	*
Name	Ditch by slopes_r
Element type	Ditch by slopes
Category	Ditches
Direction	Right
Parameters	*
Hook point	Cross_section_origin
Insert point: X	
Insert point: Y	
Project line code	PRO
Ditch line code	DIT
Starting trait width	0.500
Central trait width	0.500
Ending trait width	0.500
Inner trait slope [%]	100.000
Outer trait slope [%]	100.000
Ditch depth	1.000

Figure 454:

SINGLE TRAIT PARAMETER



SINGLE TRAIT CODE



Project line code



The parameters for the Single trait are:

- Name;
- Direction;
- Insert point (none or section origin or other);

- Project line code: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Horizontal shift;
- Vertical shift;
- Visible, to make the single trait visible (Yes) or invisible (No).

Element informations	Ф
Name	Single trait_r
Element type	Single trait
Category	Objects
Direction	Right
	- ingin
Parameters	*
Hook point	Cross_section_origin
Insert point: X	
Insert point: Y	
Project line code	PRO
Horizontal shift	0.000
Vertical shift	1.000
Visible	Yes

Figure 456:

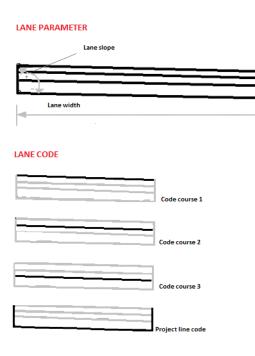


Figure 457:

The parameters for the Lane are:

- Name;
- Direction;
- Insert point (none or section origin or other);
- Project line and courses codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Widening: if this option is set at "Yes" then the element will consider the graph of the slopes and widenings in the road mount method.
- Lane width;
- Type of slope; this can be:
- 1."By Graph": the slope is calculated taking into account the graph of the slopes and widenings of the road;
- 2."Fixed": the slope is selected by the user and must be inserted into the "Lane Slope [%]" field;
- Courses: these represent the courses that constitute the lane. Each course has a code, a depth, a widening and a slope associated. Courses can be changed using the "Manage courses" command available in the "Element list" view.

Element informations		1
Base informations	*	
Name	Lane_r	
Element type	Lane	
Category	Roadways	
Direction	Right	
Parameters	\$	
Hook point	Cross_section_origin	
Insert point: X		
Insert point: Y		
Project line code	PRO	
Widening	Yes	
Lane width	3.000	
Slope type	By graph	
Lane slope [%]	-2.500	
Courses	*	
Code course 1	USUR	
Depth course 1	0.070	
Widening course 1	0.000	
Slope course 1 [%]	0.000	
Horizontal course 1	No	
Code course 2	BIND	
Depth course 2	0.100	
Widening course 2	0.000	
Slope course 2 [%]	0.000	
Horizontal course 2	No	
Code course 3	BASE	
Depth course 3	0.150	
Widening course 3	0.000	
Slope course 3 [%]	0.000	
Horizontal course 3	No	

Figure 458:

SHOULDER PARAMETER



SHOULDER CODE

Code course 1
Ċode course 2
 Code course 3
Project line code

Figure 459:

The parameters for the shoulder are:

- Name;
- Direction;
- Insert point (none or section origin or other);
- Project line and courses codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Shoulder width;
- Type of slope; this can be:

1."**By Graph**": the slope is calculated taking into account the graph of the slopes and widenings of the road;

2."**Fixed**": the slope is selected by the user and must be inserted into the "**Shoulder Slope [%]**" field.

 Courses: these represent the courses that constitute the shoulder. Each course has a code, a depth, a widening and a slope associated. Courses can be changed using the "Manage courses" command available in the "Element list" view.

Element informations	ą
Base informations	*
Name	Shoulder_r
Element type	Shoulder
Category	Roadways
Direction	Right
Parameters	\$
Hook point	Cross_section_origin
Insert point: X	
Insert point: Y	
Project line code	PRO
Shoulder width	1.000
Slope type	By graph
Shoulder slope [%]	-2.500
Courses	\$
Code course 1	USUR
Depth course 1	0.070
Widening course 1	0.000
Slope course 1 [%]	0.000
Horizontal course 1	No
Code course 2	BIND
Depth course 2	0.100
Widening course 2	0.000
Slope course 2 [%]	0.000
Horizontal course 2	No
Code course 3	BASE
Depth course 3	0.150
Widening course 3	0.000
Slope course 3 [%]	0.000
Horizontal course 3	No

Figure 460:

SIDEWALK PARAMETER	
Sidewalk width	
SIDEWALK CODE	
Code course 1	
Project line code	



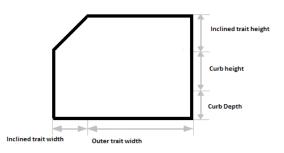
The parameters for the sidewalk are:

- Name;
- Direction;
- Insert point (none or section origin or other);
- Project line and sidewalk codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Sidewalk width;
- Sidewalk slope;
- Courses: these represent the courses that constitute the sidewalk. Each course has a code, a depth, a widening and a slope associated. Courses can be changed using the "Manage courses" command available in the "Element list" view.

ten over o	д
Element informations	
Base informations	۵
Name	Sidewalk_r
Element type	Sidewalk
Category	Roadways
Direction	Right
Parameters	*
Hook point	Cross_section_origin
Insert point: X	
Insert point: Y	
Project line code	PRO
Sidewalk width	1.000
Sidewalk slope [%]	0.000
Courses	*
Code course 1	PAV
Depth course 1	0.080
Widening course 1	0.000
Slope course 1 [%]	0.000
Horizontal course 1	No
Code course 2	CONC
Depth course 2	0.080
Widening course 2	0.000
Slope course 2 [%]	0.000
Horizontal course 2	No

Figure 462:





CURB CODE

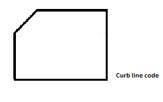




Figure 463:

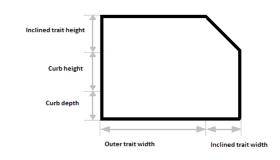
The parameters for the curb are:

- Name;
- Direction;
- Insert point (none or section origin or other);
- Project line and curb codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Inclined trait width;
- Outer trait width;
- Curb height;
- Inclined trait height;
- Curb depth.

Element informations	ą
Base informations	*
Name	Curb_r
Element type	Curb
Category	Objects
Direction	Right
Parameters	*
Hook point	Cross_section_origin
Insert point: X	
Insert point: Y	
Project line code	PRO
Curb line code	CURB
Inclined trait width	0.020
Outer trait width	0.100
Curb height	0.050
Inclined trait height	0.050
Curb depth	0.150

Figure 464:

OVERTURN CURB PARAMETER



OVERTURN CURB CODE

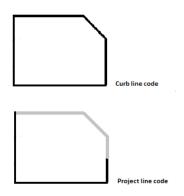


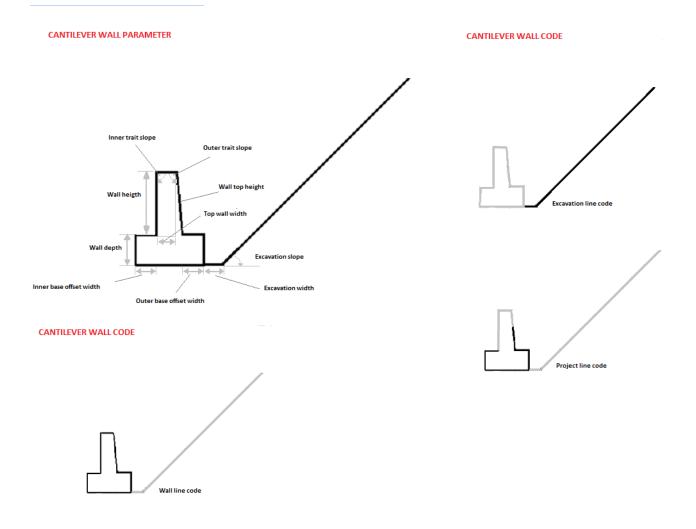
Figure 465:

The parameters for the overturn curb are:

- Name;
- Direction;
- Insert point (none or section origin or other);
- Project line and curb codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Inclined trait width;
- Inner trait width;
- Curb height;
- Inclined trait height;
- Curb depth.

Element informations	ф.
Base informations	\$
Name	Overturn curb_r
Element type	Overturn curb
Category	Objects
Direction	Right
Parameters	*
Hook point	Cross_section_origin
Insert point: X	
Insert point: Y	
Project line code	PRO
Curb line code	CURB
Inner trait width	0.100
Inclined trait width	0.020
Curb height	0.050
Inclined trait height	0.050
Curb depth	0.150

Figure 466:



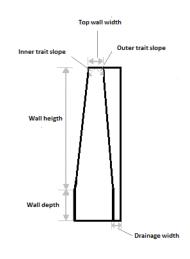


The parameters for the cantilever wall are:

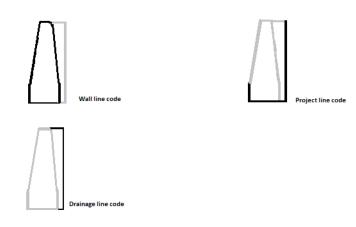
- Name;
- Direction;
- Insert point (none or section origin or other);
- Project line, wall and excavation codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Top wall width;
- Outer base offset width;
- Inner base offset width;
- Excavation width;
- Wall height: this value is considered only if the "Automatic height" field is set at "No" and is used to set the wall height;
- Maximum height: the maximum height value of the wall if the automatic height has been activated;
- Minimum height: the minimum height value of the wall if the automatic height has been activated;
- Wall top height (represents the point where another element can be connected);
- Inner trait slope;
- Outer trait slope;
- Excavation slope;
- Wall depth.

Base informations	Cantilever wall r	*
Element type	Cantilever wall	
Category	Walls	
Direction	Right	
Parameters		*
Hook point	None	
Insert point: X	1.046	
Insert point: Y	1.046	
Project line code	PRO	
Wall line code	WALL	
Excavation line code	EXC	
Top wall width	1.000	
outer bae offset width	1.000	
Inner base offset width	1.000	
Excavation width	1.000	
Automatic height	Yes	
Wall height	3.000	
Maximum height	9.000	
Minimum height	0.500	
Wall top height	0.000	
Inner trait slope [%]	0.000	
Outer trait slope [%]	10.000	
Excavation slope [%]	100.000	
Wall depth	1.500	

GRAVITY WALL PARAMETER









The parameters for the gravity wall are:

- Name;
- Direction;
- Insert point (none or section origin or other);
- Project line, wall and drainage codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Top wall width;
- Drainage width;
- Automatic height: if set to "Yes" then the height is calculated with the intersection of the ground and cannot be greater than the value inserted in the "Maximum height" field;

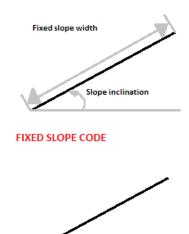
1020509-01

- Wall height: this value is considered only if the "Automatic height" field is set at "No" and is used to set the wall height;
- Maximum height: the maximum height value of the wall if the automatic height has been activated;
- Minimum height: the minimum height value of the wall if the automatic height has been activated;
- Inner trait slope;
- Outer trait slope;
- Wall depth.

Element informations		ą
Base informations		*
Name	Gravity wall_r	
Element type	Gravity wall	
Category	Walls	
Direction	Right	
Parameters		*
Hook point	None	
Insert point: X		
Insert point: Y		
Project line code	PRO	
Wall line code	WALL	
Drainage line code	DRN	
Top wall width	1.000	
Drainage width	0.300	
Automatic height	Yes	
Wall height	3.000	
Maximum height	9.000	
Minimum height	0.500	
Inner trait slope [%]	10.000	
Outer trait slope [%]	10.000	
Wall depth	1.500	

Figure 470:

FIXED SLOPE PARAMETER





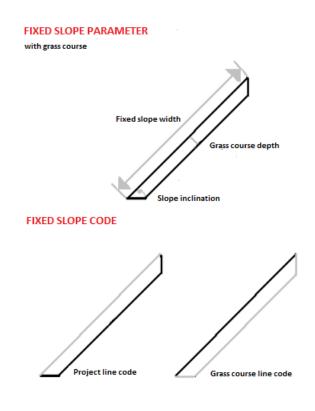


The parameters for the fixed slope are:

- Name;
- Direction;
- Inssert point (none or section origin or other);
- Project line code. these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Slope width;
- Slope inclination;
- Grass course depth

Element informations	L	ą
Base informations	*	
Name	Fixed slope_r	
Element type	Fixed slope	
Category	Slopes	
Direction	Right	
Parameters	*	
Hook point	Fixed bench_r19_L	
Insert point: X		
Insert point: Y		
Project line code	PRO	
Grass course code	GRS	
Slope width	5.000	
Slope inclination[%]	100.000	
Grass course depth	0.000	

Figure 472:





The parameters for the fixed slope with vegetal terrain are:

- Name;
- Direction;
- Insert point (none or section origin or other);
- Project line code. these codes are used by the Altimetry view and create the lines describing the template mounted on the section;

- Slope width;
- Slope inclination;
- Grass course depth.

Element informations				
Base informations		\$		
Name	Fixed slope_r			
Element type	Fixed slope			
Category	Slopes			
Direction	Right			
Parameters		*		
Hook point	None			
Insert point: X	0.095			
Insert point: Y	0.019			
Project line code	PRO			
Grass course code	GRS			
Slope width	2.000			
Slope inclination[%]	100.000			
Grass course depth	1.000			

Figure 474:

AUTOMATIC SLOPE PARAMETER

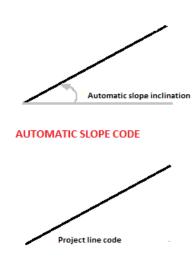


Figure 475:

The parameters for the automatic slope are:

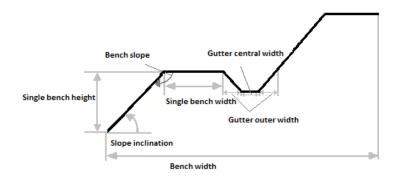
- Name;
- Direction;
- Insert point (none or section origin or other);
- Project line code. these codes are used by the Altimetry view and create the lines describing the template mounted on the section;

- Slope inclination;
- Grass course depth.

Element informations	Ŧ
Base informations	\$
Name	Automatic slope_r
Element type	Automatic slope
Category	Slopes
Direction	Right
Parameters	*
Hook point	None
Insert point: X	0.014
Insert point: Y	-0.020
Project line code	PRO
Grass course code	GRS
Maximum width	
Maximum height	
Slope inclination[%]	100.000
Grass course depth	0.000

Figure 476:

FIXED BENCH PARAMETER



FIXED BENCH CODE

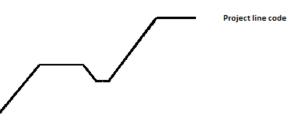


Figure 477:

The parameters for the fixed bench are:

- Name;
- Direction;
- Insert point (none or section origin or other);

Road Template Editor

- Project line code: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Single bench width;
- Insert gutter: to establish whether or not to insert gutter.
- Gutter outer width;
- Gutter central width;
- Bench width;
- Single bench height;
- Gutter height;
- Slope inclination;
- Bench slope;
- Maximum number of steps.

Element informations		д
Base informations		
Name	Fixed bench_r	
Element type	Fixed bench	
Category	Slopes	
Direction	Right	
Parameters		\$
Hook point	Gravity wall_r7_L	
Insert point: X		
Insert point: Y		
Project line code	PRO	
Single bench width	2.000	
Insert gutter	Yes	
Gutter outer width	0.300	
Gutter central width	0.300	
Bench width	5.000	
Single bench height	1.000	
Gutter height	0.300	
Slope inclination[%]	100.000	
Bench slope [%]	1.000	
Maximum number of si	3	

Figure 478:

AUTOMATIC BENCH PARAMETER

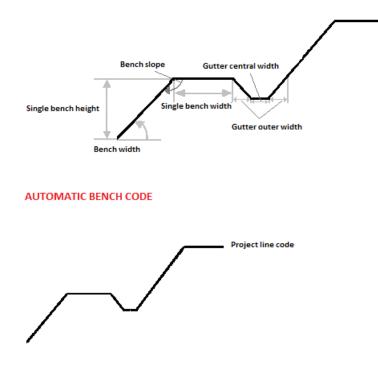


Figure 479:

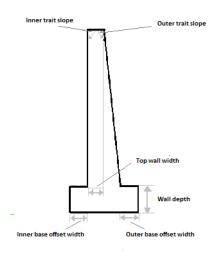
The parameters for the automatic bench are:

- Name;
- Direction;
- Insert point (none or section origin or other);
- Project line code: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Single bench width;
- Insert gutter: to establish whether or not to insert gutter.
- Gutter outer width;
- Gutter central width;
- Bench height;
- Gutter height;
- Slope inclination;
- Bench slope;
- Maximum number of steps.

Base informations	*
Name	Automatic bench_r
Element type	Automatic bench
Category	Slopes
Direction	Right
Parameters	*
Hook point	None
Insert point: X	0.014
Insert point: Y	0.459
Project line code	PRO
Maximum width	
Maximum height	
Single bench width	2.000
Insert gutter	Yes
Gutter outer width	0.300
Gutter central width	0.300
Single bench height	1.000
Gutter height	0.300
Slope inclination[%]	100.000
Bench slope [%]	1.000
Maximum number of si	3

Figure 480:

RETAINING WALL PARAMETER



RETAINING WALL CODE

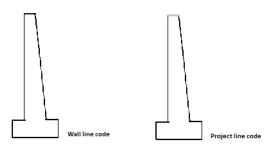


Figure 481:

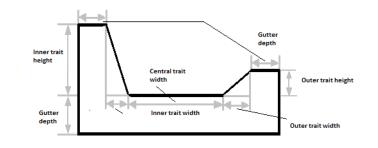
The parameters for the retaining wall are:

- Name;
- Direction;
- Insert point (none or section origin or other);
- Project line and wall codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Top wall width;
- Outer base offset width;
- Inner base offset width;
- Automatic height: if set to "-" then the height is calculated with the intersection of the terrain and cannot be greater than the value inserted in the "Maximum height" field;
- Maximum height: the maximum height value of the wall if the automatic height has been activated;
- Wall height: this value is considered only if the "Automatic height" field is set at "No" and is used to set the wall height;
- Maximum height: calculation of the wall height is always automatic and the user can select only the maximum height;
- Inner trait slope;
- Outer trait slope;
- Wall depth.

Base informations	*
Name	Retaining wall_r
Element type	Retaining wall
Category	Walls
Direction	Right
Parameters	*
Hook point	None
Insert point: X	0.171
Insert point: Y	0.133
Project line code	PRO
Wall line code	WALL
Top wall width	1.000
outer bae offset width	1.000
Inner base offset width	1.000
Automatic height	Yes
Wall height	3.000
Maximum height	9.000
Minimum height	0.500
Inner trait slope [%]	0.000
Outer trait slope [%]	10.000
Wall depth	1.500

Figure 482:

GUTTER TYPE 3 PARAMTER



GUTTER TYPE 3 CODE



Project line code

Figure 483:

The parameters for the curb trough are:

- Name;
- Direction;
- Insert point (none or section origin or other);
- Project line and gutter codes: these codes are used by the Altimetry view and create the lines describing the template mounted on the section;
- Inner trait width;
- Central trait width;
- Outer trait width;
- Gutter thickness
- Inner trait height;
- Outer trait height;
- Gutter depth.

Element informations	д
Base informations	*
Name	Gutter type 3_r
Element type	Gutter type 3
Category	Gutters
Direction	Right
Parameters	*
Hook point	Cross_section_origin
Insert point: X	
Insert point: Y	
Project line code	PRO
Gutter line code	GUT
Inner trait width	0.010
Central trait width	0.200
Outer trait width	0.010
Gutter thickness	0.070
Inner trait height	0.130
Outer trait height	0.050
Gutter depth	0.070

Figure 484:

Inserting an Element

To insert an element the user must first specify if an element is central, cut or fill using the menu found alongside the current elements.

After selecting the type of element, it is selected from the Elements Archive and dragged into the graphic view using the mouse, keeping the left button pressed down.

If the element is not set in a valid connection point, the program will display the "**Insert element**" window where the user can:

- not specify the connection point and edit the x,y insertion coordinates;
- specify the connection point (origin_section or other).

Insert element	×	:
Grip point	None	
Coordinate X	4.119	
Coordinate Y	1.432	
	OK Cancel	
	Figure 485:	

If the element is connected at the same point as another element, then the program will ask whether to connect the other elements to that element.

Another thing the program may ask, during the element insertion phase, is its direction (right or left) according to the origin point.

Only for inserting a lane, berm or sidewalk the program will display the "**Manage layers**" window described below.

Delete an Element

To delete an element, the user will activate the "**Delete**" command from the "**List elements**" view after selecting it.

Change Element Property

The properties of an element can be changed through the "**Element informations**" view after selecting the element to change in the "**List elements**" view.

Reflect One Side of Template

To reflect the side of a temple, the user must activate the "**Mirror side**" command; this command is used to copy the elements found on one side of the template onto another and eliminate those existing. The side onto which the elements are to be copied must be specified by the user.

Transfer Properties from One Element to Another

This command is used to transfer the settings from one element in the template to another element of the same type specifying it graphically.

Manage courses

anage cou	rses						
No°	Туре	Code	Thickness	Side widening	Side slope [%]	Horiz. base	Add
1	Custom Course	PAV	0.080	0.000	0.00		Insert
2	Custom Course	CONC	0.080	0.000	0.00		Insere
			ок	Cancel			

Figure 486:

The "**Manage courses**" command in the "**List elements**" view is used to add/insert or eliminate courses from a lane, shoulder or sidewalk.

There are various types of courses:

- Surface course;
- Binder course;
- Base course;
- Subbase course;
- Capping course;
- User defined course.

For each course the user can define the thickness; if the course is defined by the user then the course code must also be inserted.

To ensure that the course code is valid, it must also be inserted into the Sections Codes or it will not be considered.

nes	Areas	Computation sequence	Closed areas comput	tation					
	Code	Description	Carry to GND	Carry from GND	Vertical traits	Color	Planimetry	Barbette	
1	GND	Ground							
2	PRO	Project					✓	•	
3	GRUB	Grubbing					✓		
4	HEXC	Horizontal excavation					✓		
5	BEXC	Bench excavation					✓		
6	GUT	Gutter					✓		
7	WLK	Sidewalk					✓		
8	SHO	Shoulder					✓		
9	CURB	Curb					✓		
10	FND	Foundation					✓		
11	DIT	Ditch					✓	•	
12	WALL	Wall					✓		
13	SURF	Surface course					✓		
14	BIND	Binder course					✓		
15	BASE	Base course					✓		
16	SUB	Sub-base course					✓		
17	CAP	Capping course					✓		
18	DRN	Drainage					✓		
19	EXC	Excavation					✓		
20	LN1	Line 1							
21	LN2	Line 2							
22	LN3	Line 3							
<u> </u>	LNM	Line A							

Figure 487:

Cross section data

The following values can be changed in the Cross Sections Data view:

- Chainage: in this mode it is disabled;
- Section: in this mode it is disabled.

- East, North coordinate: in this mode they are disabled;
- Groud elevation: terrain quote at the template's central point;
- Project elevation: in this mode it is always zero;
- Elevation difference: difference between the project quote and the terrain quote at the template's central point;
- Ground slope: slope of the line representing the terrain;
- Left slope: left slope of the slopes and widenings graph;
- Right slope: right slope of the slopes and widenings graph;
- Left widening: left widening of the slopes and widenings graph;
- Right widening: right widening of the slopes and widenings graph;
- Progressive/Section slider: in this mode it is disabled;

Cross section data				4
Chainage	Ground elev	levation 10.000	Left slope	-2.50
Cross section	Project Elev	levation 0.000	Right slope	-2.50
North	Elev. diff.	. 10.000	Left widening	0.000
East	Ground slop	lope[%] 5.00	Right widening	0.000
Cross		0		57 Cross section



To test the road mounting.

Mount on road method

This method is used to preview the mounting of the template on the current road point by point.

To ensure that the mounting is possible, the road must have the primary (PRO code) and ground (GND code) project.

In this method, the "**Elements Archive**" view is not available while the other view can be displayed but the values cannot be edited.

The only exception is the "**Cross Sections Data**" view where the user can change the chainage or section (using the chainage/section slider).

Template editor									— D	×
🗅 😂 🔡 🔛 💇	🗅 🔁 🤁 💇 🛛 Mode	Template Editor	Current elements	Central elements 🔹	6.456 : 6.193	3				
Element list		4				i		Element archive		ņ
× H 🗉 🛦 🖌								Element	Cut/Fill	_
Element name	Element type	_						Gutter type 1	Anywhere	
Banchina_sx	Shoulder					1		Overturn gutter type 1 Ditch by widths	Anywhere Anywhere	
Corsia_sx	Lane Shoulder							Ditch by slopes	Anywhere	
Banchina_dx	Snoulder							Curb Overturn curb Single trait Lane Shoulder	Anywhere Anywhere Anywhere Central element Central element	
Element information	5	4						Sidewalk Traffic island	Central element	t
Base informations	*	^						Gutter type 3	Central element Central element	
Name	Corsia_sx					I				
Element type	Lane									
Category	Roadways									
Direction	Left					🛨 Л				
Parameters	\$									
Hook point	Cross_section_origin			L						
Insert point: X										
Insert point: Y						1				
Project line code	PRO									
Widening	Yes									
Lane width	3.750					1				
Slope type	By graph									
Lane slope [%]	-2.500									
Courses	*									
Code course 1	SURF					I				
Depth course 1	0.120									
Widening course 1	0.000									
Slope course 1 [%]	0.000					1				
Horizontal course 1	No	Cross section of	data				ą.			
Code course 2	BIND			Ground elevation	10.000		-2.50			
Depth course 2	0.180	Chainage		Ground elevation		Left slope				
Widening course 2	0.000	Cross section		Project Elevation	0.000	Right slope	-2.50			
Slope course 2 [%]	0.000	North		Elev. diff.	10.000	Left widening	0.000			
Horizontal course 2	No			-		-				
Code course 3	BASE	East		Ground slope[%]	5.00	Right widening	0.000			
Depth course 3	0.250	Chainage					Chainage			
Widening course 3	0.000	Chanage					Cridinage V			

Figure 489:

In the "**Element Information**" view the user can set the characteristics for the entire road; to specify these characteristics for the chainage interval then the "**Element Properties**" window must be used, activated with the "**Edit Characteristics**" command (this command is active only if the editor is open from the "**Template Intervals**" window).

The window shows the list of changeable properties for the element selected in the **"List Elements"** view and a table where the intervals can be inserted.

The table includes three columns:

- Chainage;
- Value;
- Transition (none, linear, constant).

Prop	erties Lane wid	th	~
	Chainage	Value	Transition
	500.000	3.500	Linear
	1000.000	6.000	Linear
	1500.000	7.500	Linear
*			

Figure 490:

The table is read vertically: if the transition is not set (none) then the value inserted applies only to the indicated chainage; if the transition is liner or constant then it applies to the chainage interval included between the current line and the next line.

If the transition is constant then the property of the element is fixed at that value in the interval.

If the transition is linear then the property of the element varies until it reaches the final one.

Consider two particular cases:

- If the "Slope type" property in the "Element Information" view is set at "By Graph" then this table is not taken into consideration.
- If the "Widenings" option in the "Element Information" view is active, then the widening is added to the width defined in the table.

Mounting automatic slopes and automatic walls

Among the elements that can constitute a template, slopes, benches and walls are the only ones that can be automatic (for slopes selecting the **"Automatic slope**" element, for benches selecting the **"Automatic bench**" element, and for walls setting the **"Automatic Height"** property to **"Yes**"). When any of these automatic elements must be mounted, the program will design it until it finds the intersection with the terrain.

What happens if there is an automatic wall and an automatic slope (or bench)?

The program will rationalize as follows:

 If the slope/bench has no maximum limit (maximum width and maximum height are both not set) or if it is possible to connect the slope/bench to the ground without exceeding this limit, then only the slope/bench will be mounted.

Template editor										- 0 ×
D 📽 🖬 🖳 🛃 🤇	Of 🕄 🕀 🞯 Mode	Template Editor	Current elements Cut elements	 8.726 : 7.510 						
Element list	9								Element archive	
× 🗆 🖬 🛦 🗵					i				Element	Cut/HI
Element name	Element type								Gutter type 1 Overturn gutter type 1	Anywhere Anywhere
Automatic slope_l Gravity wall_r	Automatic slope Gravity wall								Ditch by widths Ditch by slopes	Anywhere Anywhere
Automatic slope_r	Automatic slope				I				Curb	Anyohere
									Overturn ourb Single trait	Anywhere Anywhere
								/	Gutter type 2 by width Gutter type 2 by slope	s Cut/Fill
							/		Cantlever wall Gravity wall	Only Cut Cut/Fill
Element informations	د ¢				- I				Fixed slope Automatic slope	Cut/Fill Cut/Fill
ase informations	8				i				Fixed bench Automatic bench	Cut/Fill Cut/Fill
Name	Automatic slope_I						/		Action Bill, De for	Coopera
liement type	Automatic slope						/			
Category	Slopes				- I	/				
Direction	Left				i					
Parameters	A					/				
Hook point Insert point: X	Shoulder_11_L				4	z/				
nsert point: X										
Project line code	PRO				i					
Grass course code	GRS									
Maximum width										
Maximum height					I					
Slope inclination[%] Grass course depth	0.000									
orass course deport	0.000									
					I					
									_	
		Cross section data								
		Chainage		Ground elevation		10.00	Left slope	-2	50	
		Cross section		Project Elevation		0.00		2	50	
				Elev. dff.		10.00	_	0.0		
		North								
		East	1	Ground slope[%]	1	5.0	0 Right widening	0.0	00	
		Chainage						() Chainage		
Search Wir			n 🖿 🛱 🍋 🥨	a 🌒 👩 💌 🛛					へ口々に	A 11:09 AM

Figure 491:

 Otherwise the wall with the minimum height and the slope/bench needed to find the intersection with the ground will be mounted.

	C C C C Mode	remplace coltor	· Current elements	Col elements	-24.430	10097						1	
ement list	÷	6					i					Element archive	
: 🖃 🛝 🖌												Element Gutter type 1	Out/Fill Anywhere
ement name tomatic slope J	Element type Automatic slope											Overturn gutter type	1 Anywhere
avity wall r	Gravity wal						1					Ditch by widths Ditch by slopes	Anywhere Anywhere
tomatic slope_r	Automatic slope	1										Curb Overturn curb	Anywhere Anywhere
		+										Single trait	Anywhere
										/		Gutter type 2 by width Gutter type 2 by slope	s Cut/Fil
												Cantilever wall Gravity wall	Only Cut Cut/Fill
												Fixed slope	Cut/Fill
lement informations se informations		6										Automatic slope Fixed bench	Cut/Fill Cut/Fill
me	Automatic slope_r	4					i		1			Automatic bench	Cut/Fill
me ment type	Automatic slope							1					
tegory	Slopes							1	11				
ection	Right						i		11				
rameters		1						1	11				
ook point	Gravity wall_r7_L	1							1				
sert point: X	ereniy manginge						V T	2	1				
vert point: Y													
oject line code	PRO												
iss course code	GRS						I						
aximum width	5.000						i						
aximum height	100.000												
ape inclination[%] ass course depth	0.000	4					I						
ass course deput	0.000						1						
							1						
							I						
		Cross section data										0	
		Chainage				Ground elevation			10.000	Left slope		2.50	
									0.000			2.50	
		Cross section				Project Elevation				Right slope			
		North				Elev. diff.			10.000	Left widening	0.	000	
		East				Ground slope[%]			5.00	Right widening	0.	000	
		Chainage									Chainage	~	
		_											

Figure 492:

 If in this case the slope/bench should exceed the maximum set limit, then the slope/bench will be mounted with the maximum width and the wall with the height needed to find the intersection with the ground.

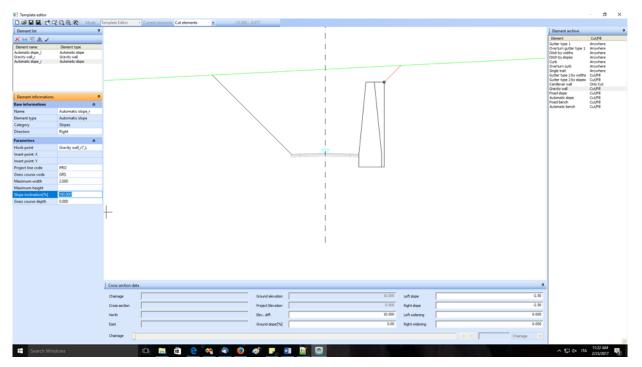


Figure 493:

 If in this case it cannot find an intersection, then both elements are mounted with maximum height.

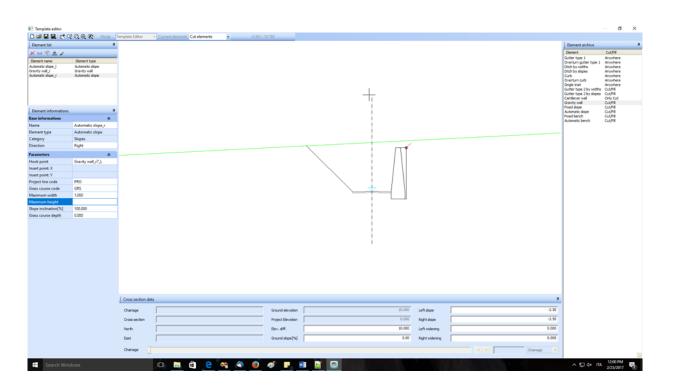


Figure 494:

D.T.M.

3D Booklet

To work with level curves or profiles the survey must be oriented planimetrically and altimetrically.

In this case, the Celerimetric Booklet must be in 3D and each station must have valid values in the **Instrument height** field.

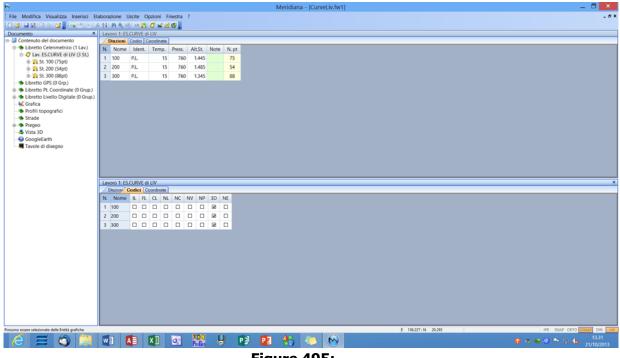


Figure 495:

The detail points must have valid values in the **Prisma height** and **Vertical angle** fields.

ile Modifica Visualizza Inserisci E															
			voro 1: ES.CURVE												
Contenuto del documento		Misure Codici	Coordinate												
Libretto Celerimetrico (1 Lav.)	N.	Descrizione	Nome/Num.	Alt.Prisma	Dist.Incl.	Ang.Vert.	Ang.Orizz.	Tipo Prisma	Costante Prisma	Commento	Note	Schizzo	Foto1	Foto	
E-Q Lav. ES.CURVE di LIV (3 St.) E-Q St. 100 (75pt)	1	nc	AN	0.000	10.000	100.0000	0.0000	Sconosciuto							
e 2 St. 200 (54pt)	2	S.CAN	101	1.300	8.250	94.7910	348.0170	Sconosciuto							
B St. 300 (88pt)	3	S.CAN	102	1.300	6.870	93.8460	321.5100	Sconosciuto							
- hibretto GPS (0 Grp.)	4	STRA	103	1.300	15.650	94.6510	340.9560	Sconosciuto							
Eibretto Pt. Coordinate (0 Grup.)	5	STRA	104	1.300	11.510	88.5590	294.9180	Sconosciuto							
 Sector Control Co	6	STRA	105	1.300	13.310	87.3540	257.8370	Sconosciuto							
Oralica Oralica Oralica Oralica	-	STRA	106	1.300	18.020	88,7350	233.6390	Sconosciuto							
- Strade	<u> </u>	RETE	107	1.300	15.780	88.3960	233.0020	Sconosciuto							
- I Pregeo	9		108	1.300	12,190	86.3290	258,2570	Sconosciuto						_	
Vista 3D	-													_	
GoogleEarth Tavole di disegno		RETE	109	1.300	10.570	87.2690	291.4640	Sconosciuto						_	
a lavole di disegno		RETE	110	0.000	10.120	95.3580	304.3980	Sconosciuto						_	
		PINO	111	1.310	6.740	94.4830	301.9090	Sconosciuto						_	
	13	DET.	112	1.310	7.440	93.8790	262.9920	Sconosciuto						_	
	14	DET.	113	1.310	9.470	93.4110	237.0570	Sconosciuto						_	
	15	ALB.	114	1.310	13.690	92.9240	222.7290	Sconosciuto							
	16	ALB.	115	1.310	12.750	90.6400	238.7680	Sconosciuto							
	17	ALB.	116	1.310	15.910	95.5410	208.8300	Sconosciuto							
	18	ALB.	117	1.310	18.650	94.8760	210.5330	Sconosciuto							
	19	ALB.	118	1.310	17.340	91.7360	220.7080	Sconosciuto							
	20	ALB.	119	1.310	20.980	91.5650	218.1090	Sconosciuto							
	21	ALB.	120	1.310	10.370	98.0920	196.6930	Sconosciuto							
		PALO	121	1.310	8.750	98.9900	195.8790	Sconosciuto							
		ALB.	122	1.310	9.500	104.1810	146.2810	Sconosciuto							
		ALB.	123	1.310	6.210	107.5460	122.0120	Sconosciuto						_	
		ALB.	124	1.310	3.390	106.0660	125.5180	Sconosciuto						_	
		ALB.	124	1.310	2,440	93,8590	311,4260							_	
								Sconosciuto							
		ALB.	126	1.310	5.430	99.9090	383.7030	Sconosciuto						_	
		ALB.	127	1.310	4.450	106.6750	40.4220	Sconosciuto						_	
		ALB.	128	1.310	10.330	107.7910	94.1470	Sconosciuto							
	30	ALB.	129	1.310	16.830	107.0500	106.0440	Sconosciuto						_	
no essere selezionate delle Entità grafiche											E 136.22	27:N 20.29	3	1	IPR SNAP lunedi 21 ottob

Figure 496:

It must also be possible to quote the survey; to do this a noted quote point was inserted in the orientation points (101).

Here following is an example of a 3D file celerimetric calculation.



Note in the **Data analysis** window that the noted quote point 101 was seen by Station 100 and coded as QU.

This page notes that the point was found and recognized as a valid point for the calculation.

Stazioni	Presenti 3			Nome Duplic.
Punti	Presenti	Validi	Non Validi	Nome Duplic.
Con codice OR	0	0	0	0
Con codice QU	1	1	0	0
Con codice PO	6	6	0	0
Con codice IA	0	0	0	0
Con codice OC	0	0	0	0
Senza codice	210	210	0	0

Figure 498:

The **Stations analysis** page notes that the three stations were found to be planimetrically not orientable.

But they are quotable: Station 100 using the identified QU point; the other two, instead, using Station 100 itself.

	Analisi de	lle stazioni	×
Orientabili		Totale Stazioni	
Complessivamente	0	Presenti	3
Con Coordinate Note	0	Quotabili	
Orientab. Ex-Centro	0	Complessivamente	3
Orientab. Snellius	0	Con Quota Nota	0
Orientab. Rot.Trasl.	0	Con Quota Calcolabile	1
Da altre Stazioni	0	Da altre Stazioni	2
Non Orientabili		Non Quotabili	
Complessivamente	3	Complessivamente	0
Senza Ang.Or.x CoAz	0		
Con Pt. OR Insuff.	0		
Opzioni	< Indietro	Avanti > Annulla	?

Figure 499:

In the **Options for continuing elaboration** window, the program will automatically place **Yes** in the **Display input** option for the planimetry; this is because the survey stations are not planimetrically orientable.

Vice versa for the quotes: in fact, the **Calculation** option was put automatically at **Yes** while the **Display input** option was set at **No** given that Station 100 is quotable through the identified QU point.

ORIEN	TAMENTO	QL	JOTE
Da punti OR	con stampa	Calcolo	
Automatico	⊖ Si	⊙ Si	○ No
Con selezione	No	_Input a video	
Roto Traslazione	con stampa	OSi	 No
) Si	⊖ Si	Calc. Poligonali	Risultati Finali
No	No	O Nessuna uscita	O Nessuna uscita
		Su video	Su video
nput a video		O Su stampante	O Su stampante
) Si	○ No	COMPENSA	ZIONE RIGOROSA
Calc. Poligonali	Risultati Finali	Compensazione —	con uscita
🔿 Nessuna uscita	O Nessuna uscita	⊙ No	O Nessuna uscita
Su video	 Su video 	O Solo Planim.	Su video
) Su stampante	○ Su stampante	O Planim. + Altim.	⊖ Su stampante

Figure 500:

The **Input data for stations** window asks for the planimetric coordinates for the stations (in fact, in the previous window, the display for the planimetry was set at **Yes**) while the quote cannot be inserted (in fact, in the previous window, the display for the quote was set at **No**).

As already noted, the quote was calculated for the Station 100 using the point 101.

Input dati p	er stazione
Nome Tipo Or. Coord X(Nord) Coord Y(f 100 Da video 0.000 0. 200 Non.Or. 300 Non.Or.	st) Corr.Azim, Tipo Qu, Quota 000 0.0000 DaPt QU 99.181 Da altre Da altre
Per inserire i dati di una Stazione occorre prima selezionarla. I campi per l'inserimento saranno attivi solo se le opzioni per l'input sono state selezionate nell'apposita finestra. Non è possibile modificare le coordinate delle Stazioni per le quali è possibile la rototraslazione. Per attribuire i valori immessi alla Stazione Selezionta, occorre premere il bottone [Attribuisci valori]. Premere il bottone [Annulla valori] per annullare le coordinate o le quote della Stazione selezionata.	Nome 100 Coord. X (Nord) 0.000 Coord. Y (Est) 0.000 Corr. Azim. 0.0000 Quota 99.181 Attribuisci valori Annulla valori
Opzioni < Indietro	Avanti > Annulla ?

Figure 501:

The **Results of elaborations conducted** window is used to verify that all Stations are found oriented (upper frame); another item that can be verified is that their quotes have also been calculated (lower frame).

In this case, the survey was oriented locally in the planimetry; in the altimetry it was oriented in association with the noted quote point 101.

Nome	Coord.X(Nord)	Coord.Y(Est)		Tipo Or.	N.Stime	
100 200	0.000 -4 104	0.000	0.0000	Fissa Da altre	2	
200 300	-4.104		-55.0055 55.5785		2	
Risultati d	elle elaborazioni alt	imetriche				
Risultati d Nome	elle elaborazioni alt Quota	Tipo Qu.	N.Stir	ne		
Nome 100	Quota 99.1807	Tipo Qu. Fissa	N.Stir			
Nome	Quota	Tipo Qu.	N.Stir	me2		

Figure 502:

Use the **Outcomes | Celerimetric | Display** command to see a preview of the results of the calculation executed.

	Nome / Numero	Codice / Identificativo	Quota	Coordinata Nord (X)	Coordinata Est (Y)	Corr.Azimut. / Arimut.	Distanza Nidotta
tazione	100	P.1.	99,101	0.000	0.000	0.0000	
t.	AN	BC .	100.626	10.000	0.000	0.0000	10.000
τ.	102	5.CAN	\$9.929	2.267	-6.451	321.5100	6.830
5.	103	STRA	100.639	9.355	-12.477	340.9560	15.595
5. ·	104	STRA	101.383	-0.903	-11.289	294,9180	11.325
t.	105	SIRA	101.952	-8.024	-10.290	257.8370	13.048
5.e	106	STRA	102.498	-15,319	-8.943	233.6390	17.739
t.,	107	RETE	102.186	-13,400	-7.629	233.0020	15.519
5	108	RETE	101.923	-7.262	~9.440	258.2570	11.910
c.	108	RETE	101.425	-1.385	-10.266	291.4640	10.359
t.	110	RETE	101.363	0.697	-10,069	304,3960	10.093
5 .	111	PT190	99,899	0.201	-6.712	301.9090	4,715
s	112	DET.	100.030	-4.067	-6,129	262,9920	7,406
τ.	113	DET.	100.294	-7.068	-5.178	237.0570	9,419
ε.	114	ALB.	100.834	-12.745	-4.755	222.7290	13.606
τ.	115	ALD.	101.184	-10.345	-7.215	238.7480	12.412
ε.	116	ALB.	100.429	-15.719	-2.194	206.8300	15.671
ŧ.	117	ALB.	100.815	-10.336	-3.062	210.5330	18.590
τ.	110	ALB.	101.560	-16,292	-5,495	220,7080	17,194
÷.	119	ALB.	102.087	-19,960	-5.036	218,1090	20.796
s. 5.	120	ALB.	39.626	-10.351	0.536	196,6930	10.365
÷.	121	FALO	39.455	-8.731	0.546	195.8790	8.749
5. 5.	122	ALB.	30.692	-6.300	7.083	146.2810	9,450
5. 5.	123	ALD.	90.501	-2.090	5.001	122.0120	6.166
5. 5.	123	ALB.	90.993	-2.090	3.107	125.5180	3.375
		ALD.					
c. t.	125	ALB.	99.531	0.434	-2.390	311.4260	2,429
	126		99.323	5.253	-1.375	383.7030	5.430
τ.,		ALB.	98.850	3.543	2.625	40.4220	4.426
s.,	128	ALS.	98.055	0.941	10.209	94.1470	10.253
τ.	129	ALB.	97.456	-1.586	16.652	106.0440	14.727
£.,	130	ALS.	98.042	-13,962	14,834	148.0730	20.371
5.	131	ALB.	99,041	-9.348	5.199	167.6860	10.697
ε.	132	ALB.	99.246	-24,742	7.956	180,1990	25.993
t.	133	ALB.	90.047	-25.190	10.539	174.7730	27.306
τ.	134	DET.	99.516	-24.840	4.903	187.5940	25.319
5.	135	DET.	101.141	-25,199	-2.307	205.8120	25.304
5. ·	136	DET.	99.925	-21,456	0.609	198.1930	21.465
5 .	137	CRT.	99,302	-20,806	5.839	182.5830	21.609
5. c	138	DET.	38.591	-20.100	11.744	166.3380	23.260
τ.	139	DET.	99.149	-16.002	6.598	175.1020	17.309
5	140	DET.	99,598	-14,029	3.245	185,9390	14.357
c.	141	DET.	90.970	-6.154	3.233	149.2060	6.951
t.	142	DET.	99.857	-8.077	-3.134	223.5420	8.664
τ.	143	DET.	99.767	-4.211	-5.018	255,5000	6.555
s.,	144	DET.	99,130	-3,320	-0,835	215,7330	3,424
τ.	145	DET.	90.918	-4,605	3.096	162.8230	5.615
ε.	146	DET.	98.256	-7.093	10,830	136,9130	12.946
τ.	147	LAVA	90.320	-9.479	12.851	140.4580	15,968
e	148	LAVA	96.751	-9.169	14.041	135.2330	17.445
e.	149	LAVE	96.839	-10,941	15.176	139.7670	18.709
τ.	150	SIEPE	90.564	2.011	6.197	80.0220	6.516
τ.	151	SIXPE	99,701	6.101	-4.263	360.4780	7.501
	121	Large contract	A4 44A	8 7.48	A ***	a anda	8 764

Figure 503:

Here is another example where no point is coded QU and no quoted point is found among the orientation points.

The attempt is to run a 2D celerimetric calculation; it can be seen that under the same conditions the calculation will not be successful.

An analysis of the data shows that no QU points were identified and no points were quoted from the orientation points.

	Presenti			Nome Duplic
Punti	Presenti	Validi	Non Validi	Nome Duplic
Con codice OR	0	0	0	(
Con codice QU	0	0	0	(
Con codice PO	6	6	0	
Con codice IA	0	0	0	(
Con codice OC	0	0	0	(
Senza codice	211	211	0	(

Figure 504:

In this case too, the user selects to display the planimetric coordinates used specifically to orient the stations planimetrically while for the quotes the **Calculation** option is left at **Yes** while the **Display input** option remains set at **No**.

	TAMENTO		JOTE
Da punti OR	con stampa	Calcolo	
Automatico	⊖ Si	 Si 	○ No
Con selezione	No	Input a video	
Roto Traslazione	con stampa	⊖ Si	 No
) Si	⊖ Si	Calc. Poligonali	- Risultati Finali
No	No	O Nessuna uscita	O Nessuna uscita
		Su video	Su video
Input a video		O Su stampante	O Su stampante
⊙ Si	○ No	· .	ZIONE BIGOBOSA
Calc. Poligonali	Risultati Finali	Compensazione	con uscita
🔿 Nessuna uscita	O Nessuna uscita	⊙ No	O Nessuna uscita
Su video	Su video	O Solo Planim.	Su video
⊖ Su stampante	O Su stampante	O Planim. + Altim.	⊖ Su stampante

Figure 505:

The elaboration results clearly show in this case that all stations were oriented planimetrically thought the altimetric orientation was not successful for any of them.

	Coord.X(Nord)	Coord.Y(Est)	Corr.Azim.	Tipo Or.	N.Stime
100	0.000	0.000	0.0000	Fissa	_
200 300	-4.104 -39.268	33.986 29.951	-55.0053 55.5785	Da altre Da altre	2
Risultati de	elle elaborazioni altim	etriche			
Nome	Quota Tip	oo Qu. N.Stime	e		
100		Quo			
	Non	Quo Quo Quo			

Figure 506:

When the calculation is terminated in Graphic nothing is displayed and if the **Outcomes | Celerimetric | Display** command is activated, then it will be noted that the three stations were not oriented.

This means that if the user decides to run the calculation of the quotes but the data inserted is not appropriate for the operation requested then the work will not be oriented planimetrically either.

ALCOLO C	ELERIMETRICO							
	Some / Numero	Codice / Identificativo	Quota	Coordinata Nord (X)	Coordinata Est (Y)	Corr.Azimut. / Arimut.	Distanza Ridotta	
tazione	100	F.1.		NON ORIENTATE				
azione	200	P.L.		NON OBJENTATA	0			
azione	300	P.L.		NON CRIENTATA	C			
		_						
Font	Aumenta	Riduci						0

Figure 507:

To resolve this problem the user need only return back to the **Options for continuing elaboration** window and place a **No** for the quote calculation.

	TAMENTO		JOTE
Da punti OR	con stampa	Calcolo	
Automatico	⊖ Si	⊖ Si	No
Con selezione	No	Input a video	
Roto Traslazione —	con stampa	OSi	No
) Si	⊖ Si	Calc. Poligonali	Risultati Finali
No	No	O Nessuna uscita	O Nessuna uscita
		Su video	Su video
Input a video		O Su stampante	O Su stampante
⊙ Si	○ No	COMPENSA	ZIONE RIGOROSA
Calc. Poligonali	Risultati Finali	Compensazione —	con uscita
🔿 Nessuna uscita	O Nessuna uscita	⊙ No	O Nessuna uscita
Su video	 Su video 	O Solo Planim.	Su video
🔿 Su stampante	O Su stampante	O Planim. + Altim.	O Su stampante
Opzioni	< Indietro	Avanti > Ann	ulla ?

With this selection, the user will note that in the next windows the sections associated with the quotes will be deactivated and the calculation will run only planimetrically.

		sultati delle e	laborazior	ni eseguite		>
Risultati d	elle elaborazioni pl	animetriche				
Nome	Coord.X(Nord)	Coord.Y(Est)	Corr.Azi	Tipo Or.	N.Stime	
100	0.000	0.000	0.0000	Fissa		
200	-4.104	33.986	-55.0053	Da altre	2	
300	-39.268	29.951	55.5785	Da altre	2	
Risultati d	elle elaborazioni al	timetriche				
Nome	Quota	Tipo N Sti				
Nome	Quota	Tipo N.Sti				
Nome	Quota	Tipo N.Sti				
Nome	Quota	Tipo N.Sti				
Nome	Quota	Tipo N.Sti				
Nome	Quota	Tipo N.Sti				
Nome	Quota	Tipo N.Sti				
Nome	Quota	Tipo N.Sti				
Nome	Quota	Tipo N.Sti				
Nome	Quota	Tipo N.Sti				
Nome		Tipo N.Sti	Avanti >	Annı	ulla	?

Figure 509:

The image below shows the result in the **Graphic View** of the calculation just run.

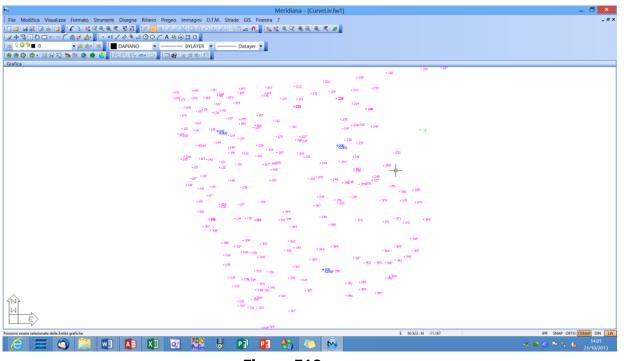


Figure 510:

Manage level curves project...

Multiple projects can be open on the same file in the program.

For each project, the user can:

- Define constraints, internal and external borders;
- Run calculation of the triangles;
- create level curves;
- Define profiles.

To manage projects the user must activate the **D.T.M. | Manage level curve projects...** command in the **Graphic View**.

Executing the command will open a window where the existing projects are listed and the following information is displayed:

- Whether or not it is displayed in graphic according to the indicator light which is lit for displayed and off if not displayed;
- Whether the project is blocked or not according to the padlock symbol that is closed if the project is blocked and open if it is not blocked. Note that when working with a blocked project design operations can be done but not changes;
- Whether the project is active or not: if yes, then there will be a check mark and if not, nothing.

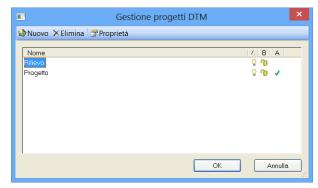


Figure 511:

The following commands are available in the window:

- **New** to add a new project;
- Eliminate to eliminate a selected project;
- **Properties** to change the project's design options.



Note that the operations on various projects will be affected by the selections made in this window; details are outlined in paragraphs below.

Constraints

Constraints are those entities used to control the calculation of triangles; in the program the triangles represent the mathematical model of the quoted plane.

When there is a constraint, a triangle is created with a side coinciding with the constraint itself.

In some programs the constraints are also called **Discontinuity Lines** in that they are primarily used in cases of discontinuity of the terrain: escarpments, ditches, etc.

To design constraints on the active project the **D.T.M.** | **Constraints** | **Create constraints** command must be run from the **Graphic View** menu.

This command is used to design the constraints (whose design is similar to the normal design of a line) and transform graphic lines into constraints (in this case the lines are selected and by pressing the right mouse button the transformation operation will be completed).

In order for the constraint to be considered in the calculation of the triangles its vertices must be included in the group of points that will be used in the triangulation. In this case, triangles will be created with sides adjacent to the constraints.

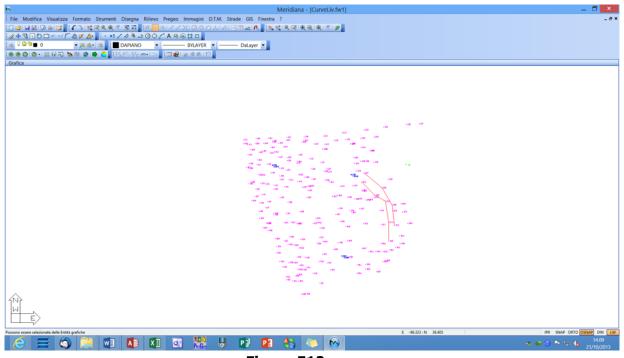
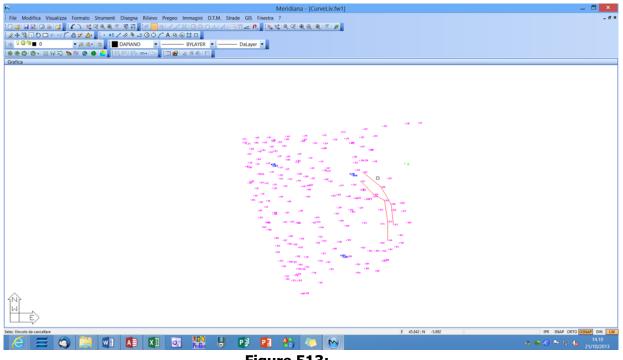


Figure 512:

If the constraints are part of a non blocked project they can be:

1)Eliminated using the **Constraints | Eliminate constraints** command in the D.T.M. menu. Once the constraints are selected by the selection operator, press the right mouse button.



The **Eliminate Constraints** window will open showing the number of constraints selected and request operation confirmation.

Cancellazione vincoli
Vincoli selezionati: 1 Cancello ?
Sì No

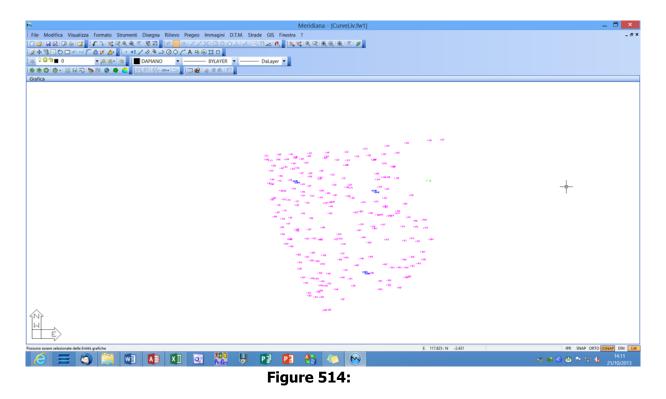
2)Transformed into graphic entities using the **Transform in graphic entities** command in the D.T.M. menu;

3)Changed in the vertices position as if they were normal graphic entities; once the entity is selected the user can execute on the grips or run the commands from the **Change** menu.

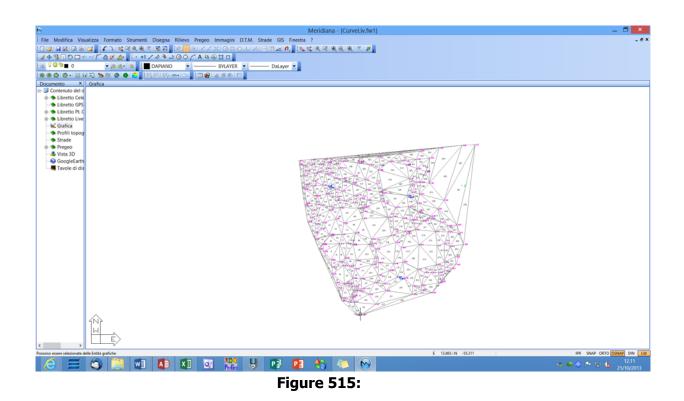
Changes on the constraints can be eliminated as well as refreshed.

Here is an example of a calculation on triangles where the entities of the Celerimetric Booklet were considered without using constraints: the example represents an escarpment.

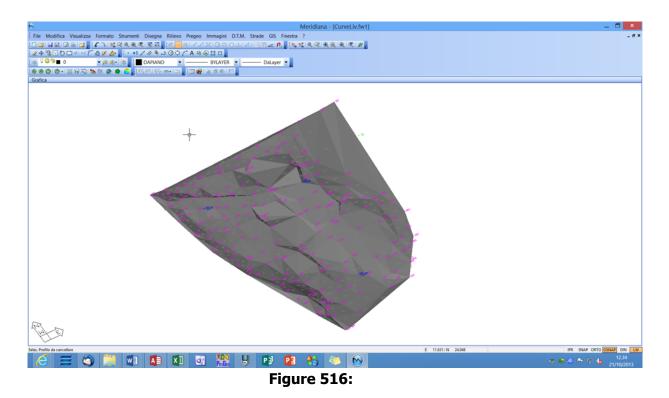
The figure below displays the **Graphic View** prior to calculation of the triangles.



The figure below displays the **Graphic View** after calculation of the triangles.



The figure below displays the **3D View** of the calculated model: triangles are placed badly. To resolve the issue, constraints must be added.



The figure below displays the **Graphic View** after adding the constraints.

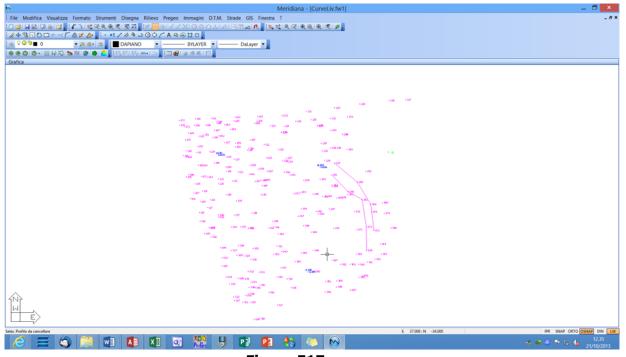
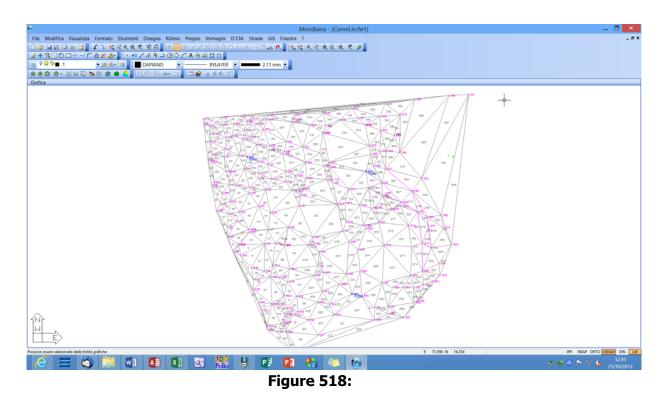


Figure 517:

The figure below displays the **Graphic View** after running the calculation of the triangles with the added constraints.



The figure below displays the **3D View** of the calculated model, which clearly illustrates that introducing the constraint resulted in a proper representation of the calculated model (triangles properly represent the escarpment).

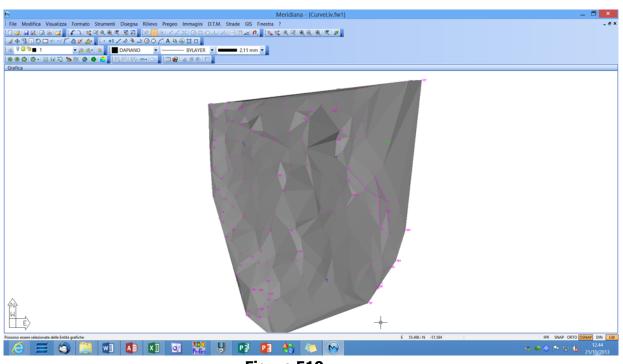


Figure 519:

Borders

Borders, like constraints, are used to control the calculation of the triangles.

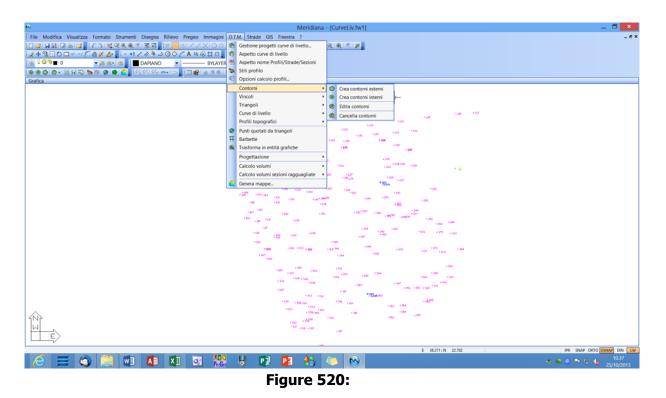
Borders outline survey areas that may be included or not in the calculation:

- **Internal Border** is used to exclude from the triangulation all points enclosed.
- **External Border** is used to exclude from the triangulation all points identified as outside the border itself.

It is advisable to connect the Borders to the points that will be used for the triangulation in that the sides of the Borders are also considered as constraints.

To create Borders in the current project commands are available in the **D.T.M.** | **Borders** menu: **Create external borders** and **Create internal borders**.

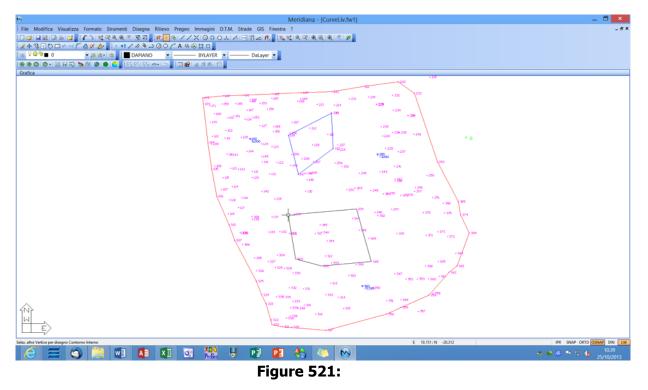
The border can be designed or created beginning with a polyline graphic.



To design a Border, proceed similar to designing a graphic polyline; it is important to select at least 3 vertices.

In the design operation, it is good to remember that:

- selecting the point previously selected will cancel the selection;
- the design terminates either by selecting the end point or by pressing the right mouse button (and by doing this the design will automatically close).



To create the border beginning with a graphic polyline, the user must, through the right mouse button, change the design operator to selection operator; once this switch is made, the transformation will execute automatically selecting the polyline with the left mouse button.

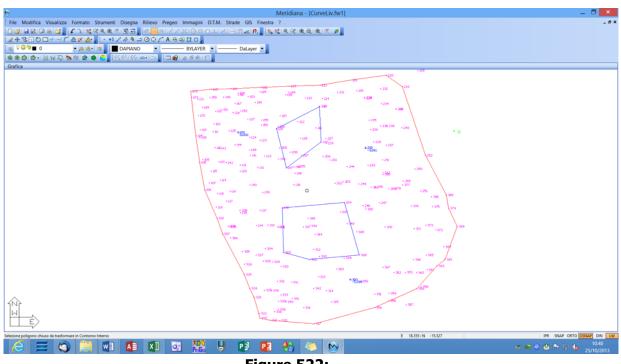


Figure 522:

If the borders are part of a non blocked project they can be:

- Eliminated, whether internal or external, using the **D.T.M. | Borders | Cancel borders** menu command;
- Transformed into polylines from the **D.T.M. | Transform into graphic entities** menu.
- Changed in the vertices position as if they were normal graphic entities; once the entity is selected the user can execute directly on the grips or run the commands directly from the **Change** menu.

Changes on the borders can be eliminated as well as refreshed.

Triangles

The program considers triangles as the representation of the mathematical model for the quoted plane.

The triangles calculation is an automatic procedure; the program optimizes the plane layout of the triangles and the user must only set some options prior to running the calculation.

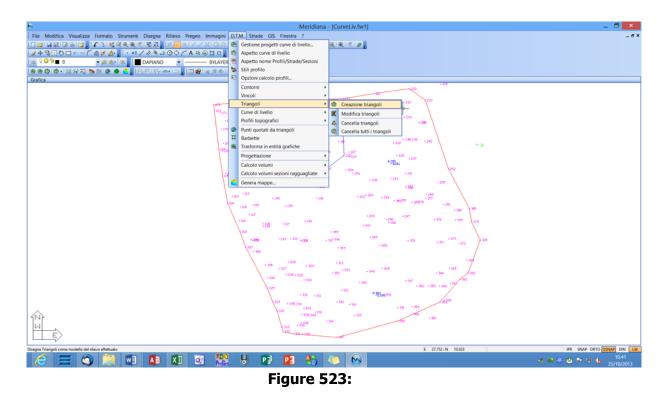
If the user wants to completely determine the triangulation then constraints need to be created along the sides where the triangles are to be positioned.

If changes are made to the quoted plane (for example, on the planimetric reference system or the quotes) then the calculation must be rerun.

The calculation of the triangles on the current project can be launched from the Graphic View by selecting the **D.T.M. | Triangles | Create triangles** menu.

After activating the function, the program will display the **Triangulation** window that includes three pages:

- Triangulation;
- Symbols;
- Colors.



Use the **Triangulation** page to tell the program which points are to be used to create the grid through an easy navigation tree that lists the entities included in the current project.

The entities can be selected using the specific check box set to the side; by expanding the node of the various entities, the program will display the entity in detail.

Triango	olazione
Triangolazione Simbologia Colori Entità considerate	 ✓ Considera le stazioni ☐ Considera le stazioni base GPS
I Modelli □ Nuvole di punti	
Opzioni	
Considero i vincoli	
Considero i contorni interni	
Considero contorni esterni	
	OK Annulla Applica

Figure 524:

In particular:

- extending the **Celerimetric Booklet** node the program will list the works that are part of it;
- extending the GPS Booklet node the program will list the groups associated with the GPS Booklet;
- Extending the Coordinate Pt. Booklet the program lists the groups associated with the Noted Pt. Booklet;
- the Orientation points node cannot be extended in that it refers to orientation points defined in the Orientation points page of the Coordinate Pt. Booklet;
- extending the Graphic Entities node will list the layers;
- extending the Models node will list the design models created using the Format | Entity
 Appearance with name command. It is through this list that the user can tell the procedure
 to include the points associated with that model in the calculation. If the model is not selected
 then the points associated with it will not be considered in the calculation.
- extending the **Points Cloud** node will list all of the loaded clouds.
- Other considerations on the calculation:
- Only noted quote points are considered;
- Points with Station NC code, Celerimetric Points, GPS points and Noted Points are not considered during the Triangle creation phase;
- Celerimetric Points with PO or OR/QU code, displayed in graphic correspond to the calculated triangles.

Triangolazion	e ×
Triangolazione Simbologia Colori Entità considerate □ Quitorato Celerimetrico □ Quitorato Gps □ Uibreto P Coordinate □ Punti di orientamento □ Punti di orientamento □ Dutida grafiche □ Modelli □ Nuvole di punti	✓ Considera le stazioni Considera le stazioni base GPS
Opzioni Considero i vincoli Considero i contorni interni Considero contorni esterni	OK Annulla Applica

Figure 525:

Still on the triangulation page, the user can indicate whether to consider:

- celerimetric stations in the calculation;
- GPS stations in the calculation;
- constraints;
- internal borders;
- external borders.

In the **Symbols** page the user can indicate the type of symbol to use within the triangle.

The possible choices are:

- none;
- name;
- barycentric;
- slope (in this case the box marked **Text Dim.** becomes the **Scale** box; with this selection the user asks the program to represent the survey slope; the larger the arrow the higher the slope.

Figure 526:

On the **Colors** page, finally, the user can select whether to use uniform colors for the triangles and the symbols; or a gradation of colors. If gradation is selected, then the coloration is done taking into account the quote and the number of intervals indicated.

The quote intervals can be customized by selecting the specific check box.

	Triangolazione
Triangolazione Simbologia Colori	
Colore uniforme Triangoli 8 Simboli 8 Cradazione di colore Quota Quota Quota minima	Colore
Quota massima	Rimuovi
□ Personalizzazione intervalli Numero intervalli: 4	di quota
	OK Annulla Applica ?

Figure 527:

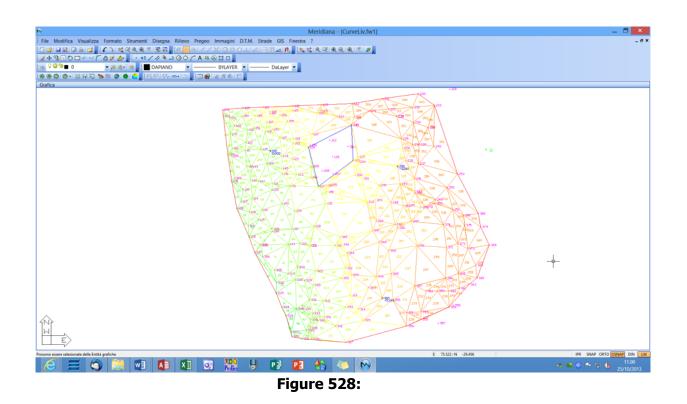
The result of the calculation is shown in the image below.

As can be seen, the constraints connect to their adjacent triangles, further, within the internal border and outside of the external border no triangle has been designed.

If the project is not found blocked, then the triangles can also be erased (**D.T.M.** | **Triangles** | **Cancel triangles** and **Cancel all triangles** menu) or changed (**D.T.M.** | **Triangles** | **Change triangles** menu).



Note that erased triangles are redesigned if the calculation is redone and that triangles cannot be changed if they form a concave quadrilateral.



Level curves

The level curves are polylines that join all points found at a determinate quote.

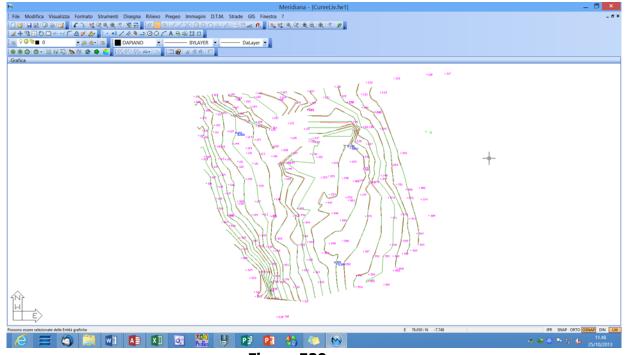


Figure 529:

There are two types of level curves in the program: **Dash Lines** and **Splines**.

Dash lines (green color) are non-rounded polylines that join points of equal quote on triangles; these represent a second level of quoted plane approximation after triangles.

Splines (red color) are calculated beginning with the dash lines and represent an embellishment in that it rounds the corners.

Splines do not represent a mathematical model of approximation and the degree of rounding can be controlled individually.

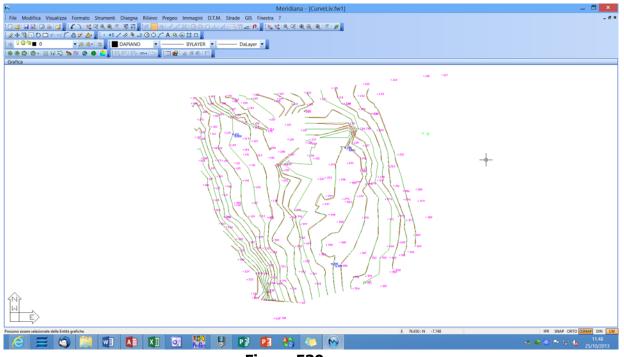


Figure 530:

To designed the level curves on the active project, triangles must have already been created.

Creating level curves is an automatic procedure and the user must only set various options prior to launching the calculation.

During calculation, dash lines and splines are generated and the calculation is repeated each time that changes to the triangles or to the quoted plane are made (changes to the planimetric reference system, changes to the reference quote, etc.).

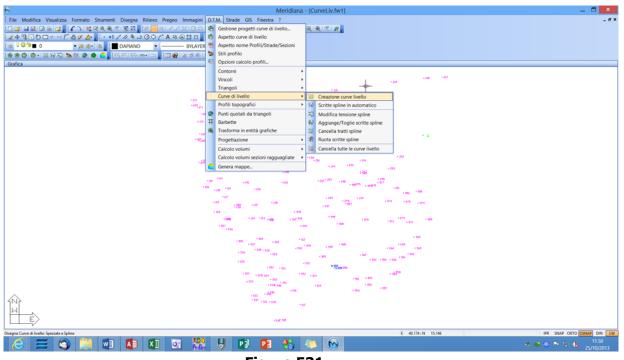


Figure 531:

The procedure is activated by accessing the **Graphic View** and selecting the **Create Level Curve** command found in the **D.T.M. | Level curve** menu.

Executing the command will open the **Create Level Curve** window.

If the calculation has been run, then the program, prior to opening this window, will ask the user for confirmation before being able to continue with the operation.

The Equidistance (m) field is the distance in meters between

two consecutive dash lines; changing the distance affects the number of dash lines that are displayed and their distance: the shorter it is, the closer the dashes will be.

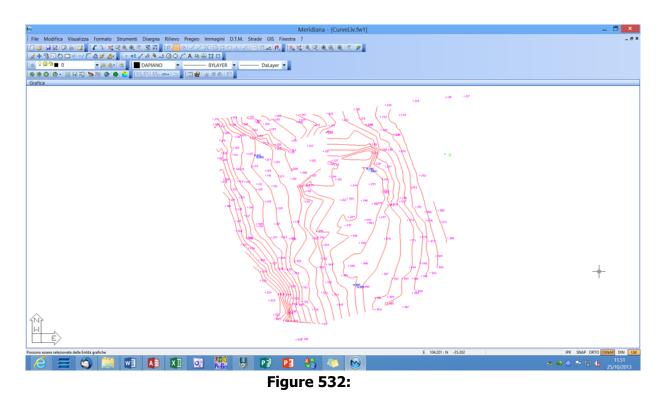
The **Notable equidistance (m)** field is the distance in meters between two notable dash lines; they can be colored differently from the others.

The **Tension by Spline** field expresses the degree of spline rounding; the higher value inserted will display a spline that is more similar to the dash lines, while the lower value inserted will display a spline that assumes a more curved form.

The **Check spline overlay** check box is used to activate or not the check spline overlay; this selection can significantly slow the spline calculation.

Creazione curve di	livello ×
Equidistanza [m]	0.5000
Equidistanza notevole [m]	2.5000
Tensione per Spline (0.1 - 50)	5.0000
Controllo sovrapposizione Spline	
ОК А	nnulla

The image below shows the results of the calculation run; the level curves were designed only in that part of the survey where the triangles were calculated.



Here following is the description of some of the commands in the **D.T.M. | Level curves** menu.

• Cancel all level curves: created level curves can be erased using the D.T.M. | Level curves | Cancel all level curves command.

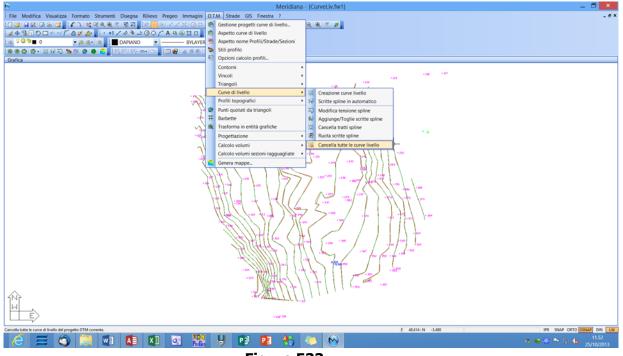


Figure 533:

Level curve | Change spline tension: this command is used to change the degree of rounding of one or all splines in the non blocked active project. Once the command is executed, the program asks the user whether or not to modify all created splines. Should the user respond No, prior to inserting the new tension value, the user must graphically select the spline. Should the user respond Yes, the user will proceed immediately into inserting the tension value through the specific window.



In this case, the tension value of the spline is equal to 1.

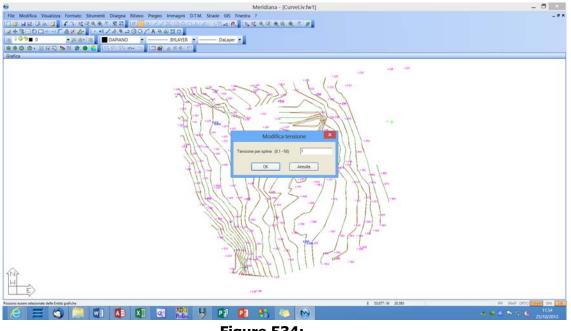


Figure 534:

The result of the operation is shown in the image below.

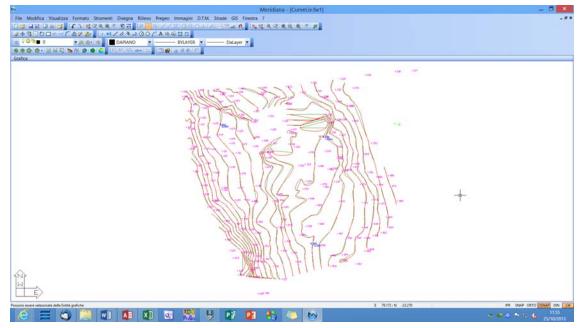


Figure 535:

The image below shows the result in **Graphic View** for when tension is set equal to 10.

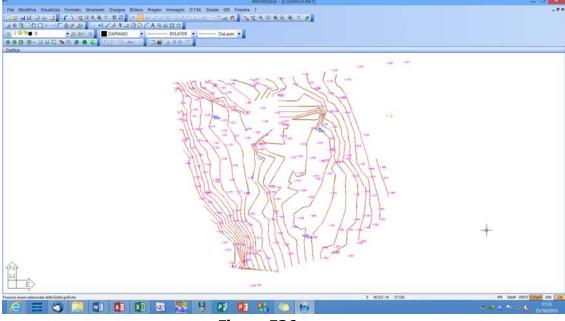
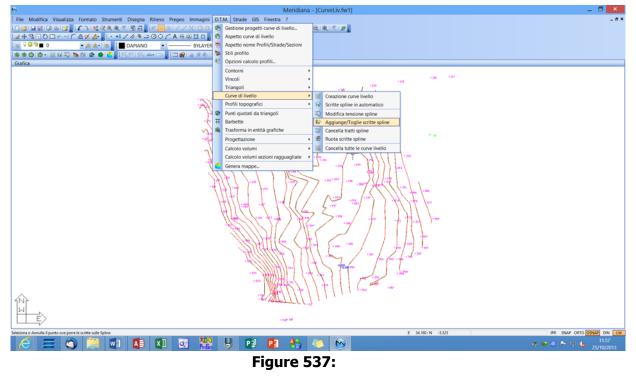


Figure 536:

• Add/Remove spline texts: this can be activated from the D.T.M. | Level curves menu.

This function is used, whether the spline texts were inserted automatically or not, to add some or eliminate others if the project is not blocked. To add texts on the splines the user must click on the point of the spline where to execute the addition; it is important to remember that texts cannot be added anywhere, in fact, it is necessary that there is enough space along the spline section. Elimination of the text can be done by clicking on the spline to eliminate.

The **Rotate spline text** function from the **D.T.M. | Level curve** menu is used to rotate the text previously inserted on the spline in the opposite direction, again, given that the project is not blocked.



Format|Level curves appearance

Activating the **Format | Level curve appearance** function will open a window composed of three pages used to change the settings associated with the active project.

The first page is used to set the filters for the design or display or hide the various elements by selecting/deselecting the specific check box placed to its side.

Also, the color can be selected (uniform) for the various elements by clicking on the box where the color is shown (note that for triangles and curves a gradation in color can be used and this is managed only on the **Triangles** page for triangles and **Level curves** page for the level curves).

Aspetto	curve di livello	x
Filtri disegno Triangoli Curve di livello		
Visibile		
Vincoli	Magenta	
Contorni Interni	Blu	
Contorni Esterni	Rosso	
🗌 Triangoli		
Simbolo triangoli		
✓ Spezzate	94	
Spezzate Notevoli	84	
✓ Spline	Rosso	
Spline Notevoli	Rosso	
Profili topografici / Sezioni	Blu	
Carica CFG Salva CFG		
	OK Annulla ?	

Figure 538:

On the **Triangles** page, the user can select which symbol is to be inserted within the triangles; the choices are: none, name, barycentric, slope.

If the user selects slope, then the **Text Dim.** box becomes the **Scale** box; in this case, the graphic will represent

the survey slope; the larger the arrow the higher the slope.

In the colors section, the user is able to set a gradation in color in representing the triangles; the coloration is done taking into account the quote and number of selected intervals; the quote intervals can be customized by selecting the specific check box.

ri disegno	Triangoli Curve di livello	J		
Simbolog	a			
Simboli	Nome	~		
Dim. Test	o; 0.5			
	-			
Colori —				
_	azione di colore			
Q	iota	Colore	Aggi	ungi
	Quota minima		Rim	
	Quota massima		Rimi	uovi
	adola massima			
	ersonalizzazione intervalli o	di quota		
Nun	ero intervalli: 4			
			Annulla	2
		ОК	Annulla	?

On the **Level Curve** page, the user can set the text dimension, the number of decimals, and the position of the quote of the dash lines and the splines.

Further, the user can set a prefix or suffix to its side depending on the requirements and set an orientation that can be standard or legible.

If the orientation is standard, based on how the text was positioned, the progression of the terrain can be understood; instead, if a legible orientation has been selected, then the terrain progression is not considered and the program will position this information in a way that makes it most legible.

This page too allows setting a gradation of color for the level curves similar to that for triangles.

iltri disegno Trian		rve di livello	
Quote			
Dim. Testo:	1	Prefisso:	
Num. Decimali:	1	Suffisso:	
Posizione:	Centro 🗸	Orientamento:	Direzione curva 👻
Quota Quo	ota minima	Colore	Aggiungi
Quot	a massima		
	lizzazione intervalli di quota		
Persona	lizzazione intervalli di quota		

Figure 540:

Slope lines

Slope lines are graphic entities used to represent terrain progression; for example, they can be used to delineate escarpments whether natural or artificial; these entities are managed by the program as blocks.

To activate the function of these entities the user must access the **D.T.M. | Slope lines** menu.

Prior to activating the procedure, the user must design the polylines using the **Design | 2D or 3D polylines** command as can be seen in the image below.

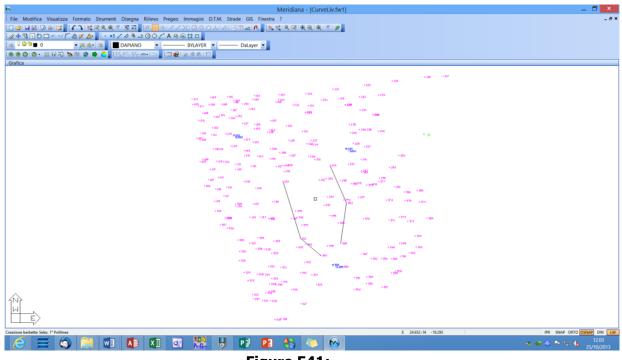


Figure 541:

Once the procedure is activated, the first operation to do is select the next two designed polylines within which the slope lines are created (the first polyline will be specifically the one from which the slope lines begin).

Once this selection is made, the program will open the **Create slope lines** window allowing the user to set the options for creating these entities.

The **Create slope lines** window is divided into three sections:

- In the **Dimensions** section, the user can:
 - set the distance between the sections, that is, between one slope line and another;
 - set the original distance of the section that is, the distance between the first polyline and the beginning of the slope line;
 - set the distance of the end section that is, the distance between the second polyline and the end of the section.
- In the **Options** section, the user can:

1020509-01

- Activate or not the **Close polyline ends** option.

By activating **Close polyline ends**, if the two polylines do not have the same length then the user can design the sections also in those parts that are not shared between the two polylines; the length of the sections will be joined at the juncture between the ends of the two polylines.

- Activate or not the **Approximate curve sections** option.
 By activating **Approximate curve sections**, the bases of the slope lines do not set against the first polyline; in particular, they are places near it so that the sections can be joined.
- Activate or not the **Cut sections intersection** option.

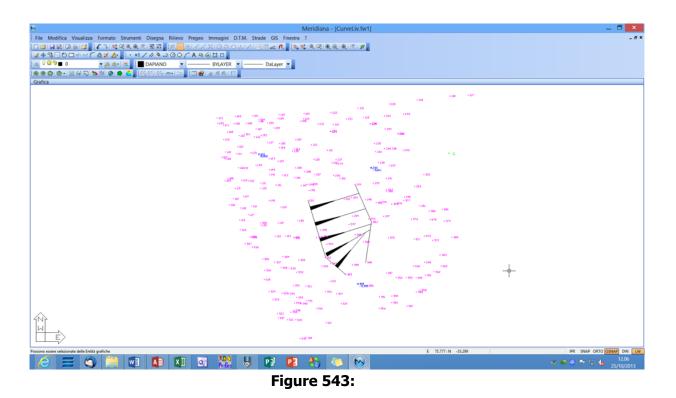
By activating **Cut sections intersection**, if the two polylines form a curve, then the user can eliminate any intersections within the slope line sections.

Creazione barbette			×
Dimensioni Distanza fra tratti Dist, origine tratto	5	Opzioni Chiudi estremi polilinea Approssima tratti su curva	V
Dist. fine tratto	0	Taglio intersezioni tratti	
Tipo tratti per Barbett ⊙ A Triangoli		O Due Linee	
Dim. base triang. Perc. lung. triang.	0.5	Lung, tratto corto Dim. assoluta per tratto corto	
	ОК	Annulla	

Figure 542:

 In the Section type for slope lines section, the user can select the type of section to use in the design; the sections can be triangular in form that ends on a line or represented by two lines (one long and one short).

If the slope lines are to be represented triangles, the user can set the dimension of the triangle bases and the percentage of triangle length in accordance with the total length of the section.



If the slope lines are to be represented as two lines then the user can insert the shorter section length and select whether to treat it as an absolute dimension or as a percentage of the long section.

To eliminate the slope lines, given that they are graphic entities, the user must activate the **Cancel** command found in the **Graphic View** of the **Change** menu.

Elimination can also be canceled by using the **Annul** command found in the **Change** menu.

One last thing to note on slope lines is that because they are graphic entities, they can be changed as such, in particular:

- the user can change their color, move them and rotate them using the graphic menu;
- they can exploded as any block; once exploded, the individual sections will be graphic lines or polylines that can be individually moved, rotated, scaled, etc.

Planning

Meridiana offers the user various functions for three dimensional modeling of parking, plazas, tunnels and general planning works.

The "Excavation Project" command allows the user to create the project by running the following operations:

1. Quote polyline vertices layout

2.Calculate escarpments

3.Create triangles

4.Create peg points.

By obtaining a flattening project bordered by a layout polyline where the sides have escarpments created to enclose the terrain.

The operations executed by the "Excavation Project" procedure can be run also individually using the "DTM|Planning" menu functions.

These functions are used by the planner to have more control over the project and create solutions that the "Excavation Project" command does not offer (excavations on multiple levels, create escarpments with berms, create terracing, create excavations beginning from the external perimeter, create ditches, create projects beginning from open polylines).

The sequence of operations that the user must follow to create the project in general is as follows:

1. Define a beginning graphic polyline

2.Polyline vertices layout quote For this purpose there are three functions available: assign the same quote to all vertices, assign the quote to vertices so they lay on a plane defined by the user, place the polyline onto the current triangulation. In this case, the user can create a project beginning with the external border.

3.Creating an escarpment at a finished height or to intersect the terrain. The extension of the finished height escarpment can be specified in various ways: height and width, height and slope, width and slope or up to a fixed quote.

4.Point 3 can be repeated multiple times beginning from the project as it is created. By doing so, the user can create terraces, ditches, ramps.

5. Creating triangles within the internal part of the project.

6.Extracting points to peg.

Further, the user can also create a triangulation as merger of the project and the current status to properly view the finished project.

Example 1

This example will illustrate the steps to create a finished height escarpment beginning from a fixed quote polyline.

Phase 1 - Assign a fixed quote polyline

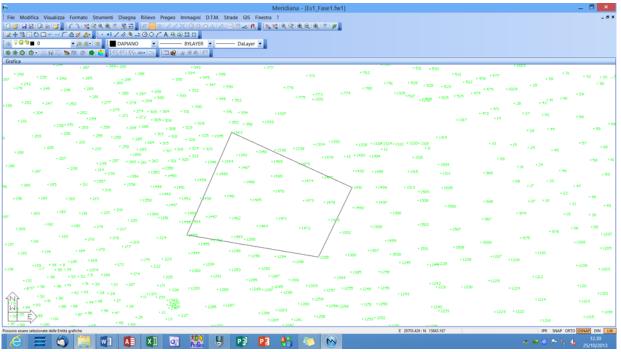


Figure 544:

After designing a closed polyline, activate the "Assign a fixed quote polyline" command and select the polyline; verify that the "Insert quote" window appears and insert 290 as the fixed quote.

Inserime	nto quota 🛛 🗙
Quota [m]:	290
Passo in curva [m]:	
ОК	Annulla

Press OK and the Z coordinate of all the polyline vertices will be set equal to 290.

Meridiana - [Es1_Fase1.fw1]			_ 🗇 🗡
e Modifica Visualizza Formato Strumenti Disegna Rillevo Pregeo Immagini D.T.M. Strade GIS Finestra ?			- 0
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Figure 545: Reference file Ex1_Phase1.fw1

Phase 2 - Create escarpment

Before creating a escarpment the user must add a new project using the "D.T.M./Manage level curve project..." command.

	Gestione progetti DTM	x
Nuovo	≻ Elimina I 🚰 Proprietà	
Nome	V B A	
Rilievo Progetto	ତ ୩୬ ତ ୩୬ 🗸	
	OK Annulla	

Figure 546:

Running the "D.T.M./Planning/Create escarpment" command, the program will display the selection symbol used to select the polyline and then its external point.

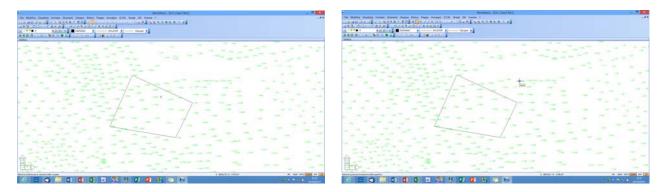


Figure 547:

After selecting the point, the program will display the "Create escarpment" window used to insert the Slope equal to 66,667 and Height equal to 7 as the calculation method.

Press OK.

Genera scarpata						
Modelli del terreno Progetto: Progetto	Direzione					
□Interseca con il modello origine Origine: Rilievo ♥	Modalità calcolo Pendenza e Altezza					
Parametri Passo in curva [m]: Elementi ☑ Genera triangoli ☑ Genera polilinea	Pendenza: 66.667 [%] ▼ Altezza: 7 [m] Larghezza: [m] Quota finale: [m]					
ОК	Annulla					

Figure 548:

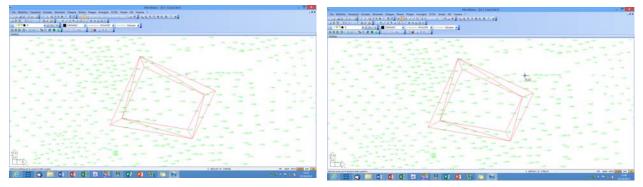
The image to the side shows the result of the excavation highlighted in red using the "Format/Level curve appearance" command.

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*245 528 523 +275 +776 +770 +528 523 +475 +	+ 29 + 38
*280 *297 *89 *199 *199 *199 *199 *199 *199 *199	+10 +20
-139 *202 +247 *270 +277 *278 *350 *350	+ 28 + 12 "
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*201 *201 *201 *201 *201 *201 *201 *201	+26 +11 +59
1314 + 202 + 205 + 275 + 206 + 205 + 327 + 325 + 1354 + 1354	· 24
+200 +225 +255 +100 +112 +122 +120 +138 +10	*15 +25 +15 +60
+1993 +322 +1912 +1912 +193 +1914 +1916	•56 •61
+100 +200 +344 +1150 +1467 +22 +150	+16 +21
+234 +1956 +1450 +1460 +1463 +1450 +1463 +1450	* 16 - 55
24 +365 +187 +211 +1877 +1755 +149 +149 +149 +1465 +1465 +1313 -1505	+00 +23 +17 +47
*1990 *184 +185 +203 +1952 +1952 +1952 +1952 +1951 +1952 +1951 +1952 +19	+ 22 + 18
+140 +140 +147 +148 +146 +180 +1506 +1506	+07 *18 +21 +43
180 *100 +181 +215 +1266 (191 +1457 +1577	+ 974 + 19 + 20
- 162 - 120	+ 06 + 05
1463 1024 129 +224 1445 1148 1192	+ 976 + 1207
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+133 +36 +6 ⁻¹⁰⁷ +172 +222 +1284 +1232 +1284 +1282 +1284	+1209 +1203
+1005 +1246 +1246 +1246 +1246 +1246 +1247 +1005 +1246	+1212
+132 +128 +100 +100 +129 +120 +120 +120 +120 +120 +120 +120 +120	+1224 +128
+12+19 +12+28 +11 ⁻¹ 72 +28 +11 ⁻¹ 72	+1201
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Figure 549: Reference file Ex1_Phase2.fw1

Phase 3 - Create Horizontal Terracing

To create the horizontal terracing, run the "D.T.M./Planning/Create escarpment" command where the program will display the selection symbol used to select the outermost polyline and then a point external to it.





After selecting the point, the program will display the "Create escarpment" window used to insert the Height equal to 0 and the Width equal to 5 as the calculation method. Press OK.

Genera scarpata						
Modelli del terreno Progetto: Progetto	Direzione • A scendere • O A salire					
Interseca con il modello origine Origine: Rilievo	Modalità calcolo Larghezza e Altezza					
Parametri Passo in curva [m]:	Pendenza: 0 [%] V Altezza: 0 [m]					
 ✓ Genera triangoli ✓ Genera polilinea 	Larghezza: 5 [m] Quota finale: [m]					
ОК	Annulla					

Figure 551:

The image below shows the result of the excavation highlighted in red using the "Format/Level curve appearance" command.

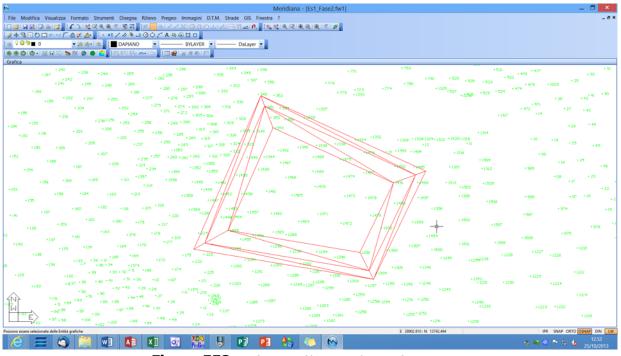


Figure 552: Reference file Ex1_Phase3.fw1

Phase 4 - Create escarpment at DTM

To create the escarpment at DTM, run the "D.T.M./Planning/Create escarpment at DTM" command where the program will display the selection symbol used to select the outermost polyline and then a point external to it.

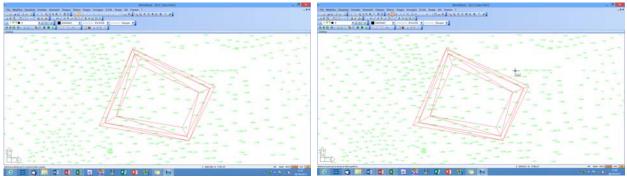


Figure 553:

After selecting the point, the program will display the "Generate escarpment at DTM" window used to insert the excavation slope value equal to 66,667 and the fill slope value equal to 100 as the calculation method.

Press OK.

Genera scarpata a DTM					
Modelli del terreno Progetto: Progetto V Terreno: Rilievo V	Pendenza in: Percentuale (%) Costante per tutti i lati Pendenza sterro: 66.667 Pendenza riporto: 100	~			
Parametri Passo in curva [m]: Considera contorni interni	Variabile per ogni lato Pendenza Sterro Pendenza Riporto				
Elementi I Genera triangoli	1 2 3				
I Genera polilinea OK	4 Annulla	~			

Figure 554:

The image to the side shows the result of the excavation highlighted in red using the "Format/Level curve appearance" command.

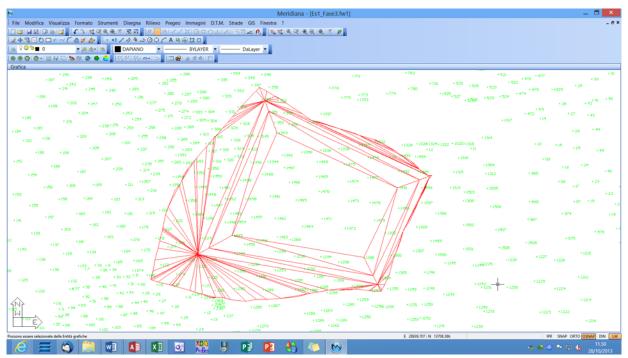


Figure 555: Reference file Ex1_Phase4.fw1

Phase 5 - Create triangles within polyline

To insert triangles within a polyline, the user must activate the "D.T.M./planning/Create triangles within polyline" command.

Executing the command involves graphically selecting the polyline (in our case the innermost).

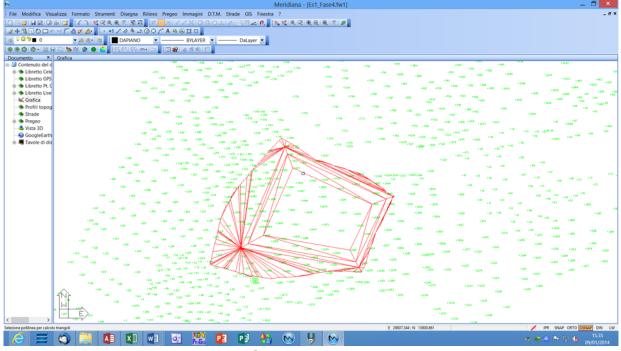


Figure 556:

Once the selection is completed, the program will immediately activate the creation of triangles as can be seen in the image to the side.

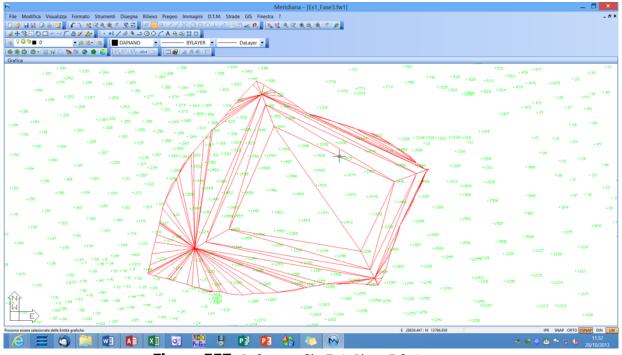


Figure 557: Reference file Ex1_Phase5.fw1

The final result is seen in the image below, after executing the "Display/Fill/Shaded" command.

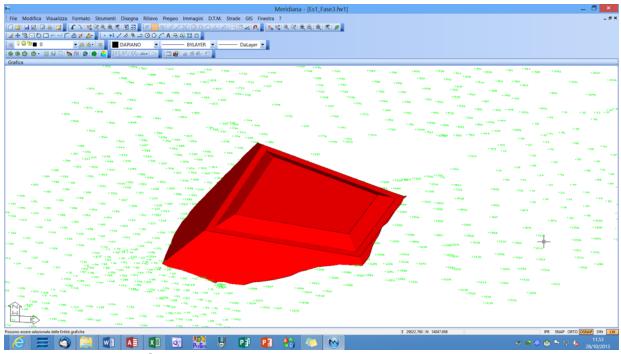


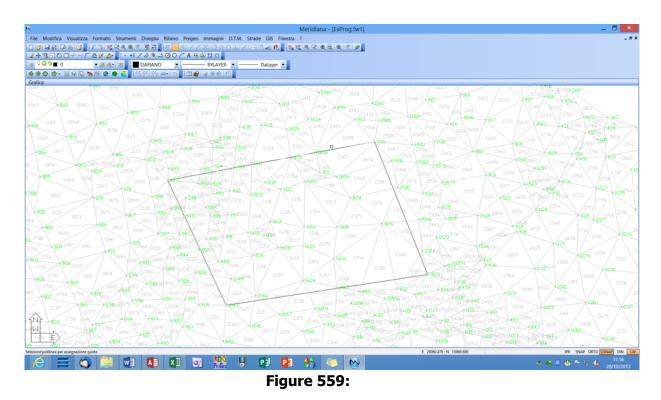
Figure 558: Reference file Ex1_FinalResult.fw1

Example 2

This example illustrates the phases used to create a escarpment beginning from a quoted polyline and arriving at the intersection line with the terrain.

Phase 1 - Assign a quote polyline from plane

After designing a closed polyline, activate the "Assign a quote polyline from plane" command and select the polyline.



Verify that the "Select plane for assigning quote" window appears and then indicate the plane selection at 3 points, continue.

Selezione piano per l'assegnazione della quota	×
Selezione piano Orizzontale Orizzontale Orizinato: per 3 punti Inclinato: valori di pendenza Archi Passo in curva [m]:	
< Indietro Avanti > Annulla	

Figure 560:

Select points 1610, 1612 and 1616: once the selection is completed, the program will display the "Display and Change Points" window. To end, press "End".

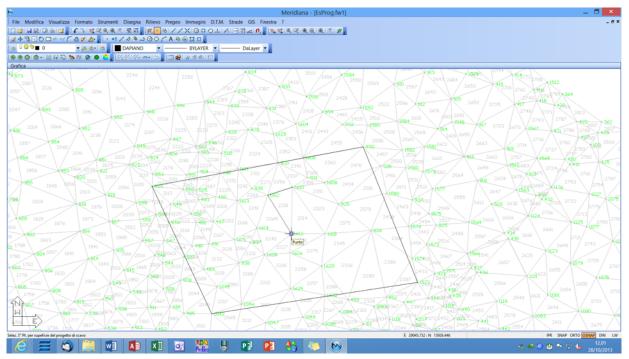


Figure 561:

Visualizzazione e modifica punti					
Punti per l'individu	azione del piano				
	1° Punto	2° Punto	3° Punto		
Coord. Nord (X)	29046.16377860	29033.198067694	29045.73219323		
Coord. Est (Y)	13950.95880246	13946.71623994	13926.44562289		
Quota	324.8040802255	323.4052591719	326.9314424530		
		elections 1	Fine Annul	-	
		< Indietro	rine Annul	а	

Figure 562:

Reference file ExProg1.fw1

Phase 2 - Create triangles within polyline

To highlight the triangles within the polyline the user must first create a new project using the "D.T.M./Manage level curves" command.

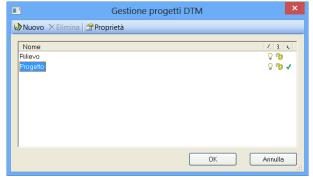


Figure 563:

Activating the "D.T.M./Planning/Create triangles within polyline" command will open the selection symbol used to indicate the polyline within which the triangles highlighted in red will be created, after changing the color with the "Format/Level curve appearance".

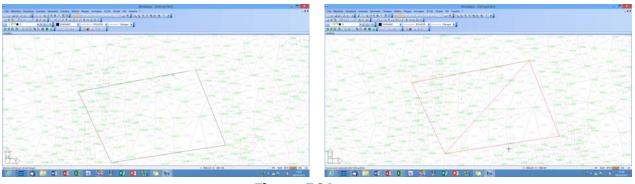


Figure 564:

Reference file ExProg2.fw1

Phase 3 - Create escarpment

After creating the triangles, use the "D.T.M./Planning/Create escarpment" command to first identify the polyline and then a point external to it, for example 829.

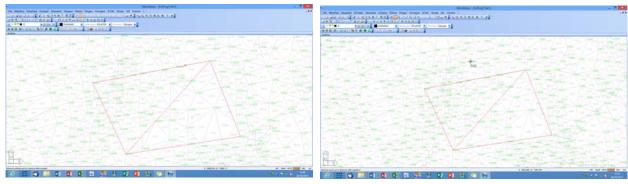


Figure 565:

After selecting the point, the "Create escarpment" window will open, used to insert the Slope equal to 100 and Height equal to 10 as the calculation method; press OK and verify the result of the escarpment.

Outrout outright Director outright Direct	Gener	a scarpata 🛛 🗙
igine: Pilievo Pendenza e Altozza P rometri sso in curva (m) Pendenza: 100 [%] V Altezza: 10 [m] 2 Genera triangoli Larghozza [m]		
isso in curve [m] Pendenze. 100 [%] M menti 2 Genera triangoli [m] Larghezza. [m]		
2 Genera triangoli [m]		
2 Genera politinea Ouoto finole: [m]		Larghozza: [m]
	Genera polilinea	Quota finale: [m]

Figure 566:

Reference file ExProg3.fw1

Phase 4 - Create escarpment at DTM

To create the escarpment at DTM, use the "D.T.M./Planning/Create escarpment at DTM" command to first identify the external polyline and then a point external to it, for example 828.

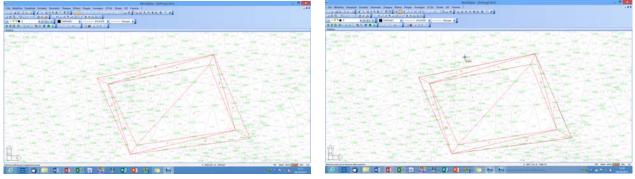


Figure 567:

When the point selection (828) is made, the "Generate escarpment at DTM" window appears used to identify the excavation slope at 100 and the fill slope at 100; press OK and verify the excavation created.

Genera scarpata a DTM					
Modelli del terreno	Pendenza				
Progetto: Progetto	Pendenza in: Percentuale [%]	~			
Terreno: Rilievo 💌	Costante per tutti i lati Pendenza sterro:	_			
Parametri	Pendenza riporto: 100				
Passo in curva [m]:	O Variabile per ogni lato				
Considera contorni interni	Pendenza Sterro Pendenza Riporto	^			
Elementi	1 2 3 4				
	Annulla	×			

Figure 568:

Reference file ExProg4.fw1

See the final result in the image below.

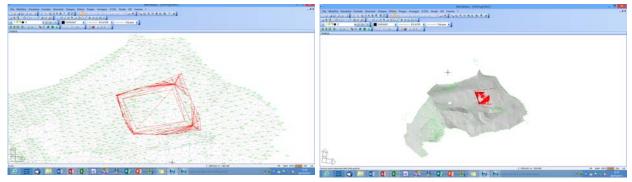


Figure 569:

Example 3 - Excavation project

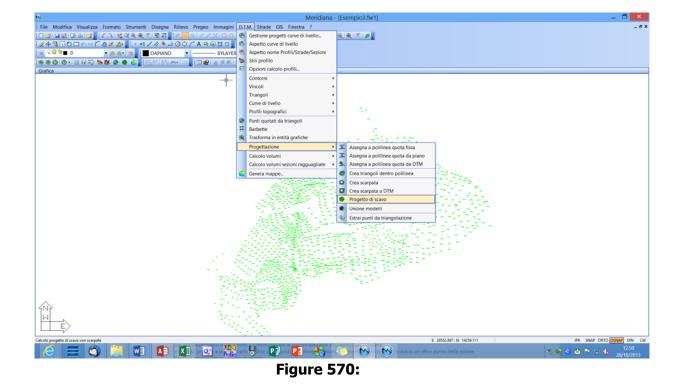
Planning an excavation can be done in two ways:

- -Using the DTM Guided|Planning|Excavation Project procedure;
- -Using the individual commands available in the Planning menu.

Here following is the description of the guided procedure and an example showing the planning of an excavation using both methods.

DTM|Planning|Excavation Project

This guided procedure is used to plan an excavation by identifying a surface and the slopes at the borders to enclose the terrain.



The left part of the window shows the current operation in bold.

In this case, the user must select the beginning project (the destination project is represented by the active one).

Wiz	ard di creazione scave	o - Selezione progetti	×
Selezione progetti Selezione area progetto Selezione pendenze Selezione piano Modifica parametri piano Risultati	Progetti Progetto di partenza: Progetto di destinazione:	Rifievo Progetto	V
		< <u>Indietro</u>	Annulla

Figure 571:

Press the "Forward" button to continue to the window that, pressing the "Activate" button will open the Graphic View and allow the user to define the area where the work will be executed.

Once the area is defined, the program will ask the user to insert the slopes (excavation and fill); these values can be constant for all sides or change for each side.

Wizard	di creazi	one scavo - Se	elezione p	endenze pareti	×
Selezione progetti	Pendenze	andenza in:	Perce	ntuale [%]	
Selezione area progetto		inte per tutti i lati	1 8108	indie [26]	
Selezione pendenze	Pe	endenza sterro	0.1		
Selezione piano	Pe	endenza riporto	1		
Modifica parametri piano	○ Varia	ibile per ogni lato			
Risultati		Pend. sterro		Pend. riporto	^
	1				
	2				
	3				
	4				~
			< <u>I</u> nc	lietro <u>A</u> vanti >	Annulla

Figure 572:

Press "Forward" to open the window for selecting the plane where the user is to indicate to the program the type of plane to be used (horizontal, inclined at three points, or inclined according to the slope values).

Wi	zard di creazione scavo - Selezione piano
Selezione progetti Selezione area progetto Selezione pendenze Selezione piano Modifica parametri piano Risultati	Selezione piano Orizzontale Inclinato: per 3 punti Inclinato: valori di pendenza
	<indietro avanti=""> Annulla</indietro>

Figure 573:

If the user selects to apply a horizontal plane then during the "Change parameters" phase, the quote value must be inserted.

Wizard di cre	azione scavo	- Modifica	i parametri p	iano orizzonta	ale	x
Selezione progetti Selezione area progetto Selezione pendenze Selezione piano	Quota piano ori Quota:	zzontale				
Modifica parametri						J
Risultati						
			< Indietro	Avanti >	Annulla	



Instead, if the user decides to apply an inclined plane at three points, then the three points must be selected in Graphic.

Once the selection is made, the program will display the window shown here to the side where the coordinates of the selected points are summarized (that can also be changed).

Wizard di crea	azione scavo -	Modifica para	metri piano per	3 punti	×
Selezione progetti	Punti per l'individu	azione del piano —			
Selezione area progetto		1° Pt 533	2° Pt 472	3° Pt 42	
Selezione pendenze	Coord. Nord (X)	917.2826187909	28957.54441043	28996.34639242	
Selezione piano	Coord. Est (Y)	13858.21243231	13818.45470616	13825.24215036	
Modifica parametri	Quota	307.7133964318	299.6746961099	310.5637878933!	
Risultati					
		< <u> </u>	ndietro <u>A</u> vanti	> Annulla	
					_

Figure 575:

Finally, if the user tells the program to use an inclined plane by slope values, the user must select two points in Graphic that are used to calculate the slope values.

Once this operation is completed, the program will open a window showing the coordinates of the first selected point, the slopes and calculated directions.

Wizard di creazione	e scavo - Modifi	ca parametri p	iano direzion	e e inclinazioni	×				
Selezione progetti	Punti per l'individua	zione del piano —							
Selezione area progetto	Valori Punto: 814								
Selezione pendenze	Pend. long. %	-13.033	Coord. Nord (X)	28938.527466565					
Selezione piano	Pend. trasv. %	0	Coord. Est (Y)	13913.204075396					
Modifica parametri	Direzione [gradi]	259.1693	Quota	307.81128413276					
Risultati					J				
			dietro Avar	nti > Annulla	5				
				Annula					

Figure 576:

The last window is used by the program to show the user the results of the operation.

One of the main reasons that the final result is not positive is the lack of triangles.

In the "Notable points options" section, the user must specify the name of the group where the created points will be transferred, the name of the points at the base and the name of the points at the summit.

	Wizard di creazione sca	avo - Successo	×
Selezione progetti Selezione area progetto Selezione pendenze	Il calcolo d	ello scavo ha avuto successo.	
Selezione piano Modifica parametri piano Risultati	Nome del gruppo: Nome punti alla base: Nome punti alla sommità:		
	Opzione creazione triangoli — Triangolazione:	Crea triangoli solo del progetto V Non creare triangoli Crea triangoli solo del progetto Crea triangoli fondendo il rilievo	
		<indietro annulla<="" fine="" th=""><th></th></indietro>	

Figure 577:

In the "constraints option" section, the user can select to not create triangles, and to create them only by project and to create them merging the survey.

At the end of the procedure, noted coordinate points will be created on the salient points so as to allow easy calculation of a triangulation representing the created excavation; the result of the procedure can also be viewed directly in the Graphic View.

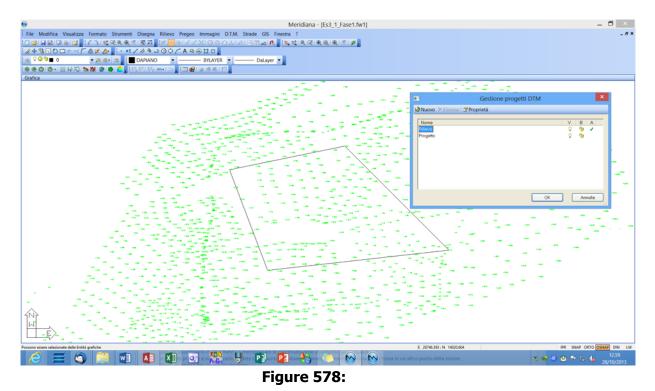
The calculation run can be used to execute the calculation of volumes by simple or complex difference with the original survey.

Examples

1 Method - Excavation project

Before activating the procedure, at least 2 projects must have been created.

In this example, the project area has already been designed (Reference Example Ex3_1_Phase1.fw1).

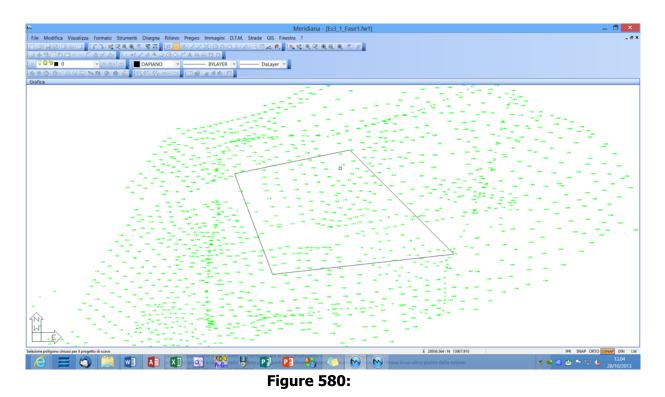


Once the "DTM|Planning|Excavation project" procedure is activated, the program will ask the user to select the beginning project. The destination project is always the active one.

Wiz	ard di creazione scavo	o - Selezione progetti 🛛 🗙
Selezione progetti Selezione area progetto Selezione pendenze Selezione piano Modifica parametri piano Risultati	Progetti Progetto di partenza: Progetto di destinazione:	Rilevo V
		< Indietro Annulla

Figure 579:

Press "Forward>" and the user must identify the area involved in the project: in this case, the user just selects it.



After selecting the area, the procedure asks the user to indicate the excavation and fill slope. In our case, it was determined to leave it constant for all sides and to assign a value of 100 to both.

Press "Forward>" and the procedure will ask the user to indicate the method for identifying the plane to run the calculation.

Wizard	di creazione scavo - Sel	ezione pendenze pareti	×
Selezione progetti Selezione area progetto Selezione pendenze Selezione piano	Pendenze Pendenza in:	Percentuale [%]]
Modifica parametri piano Risultati	Variabile per ogni lato	Pend. riporto	^
	1 2 3 4		
		< Indietro <u>A</u> vanti >	Annulla

Figure 581:

In this example, the horizontal plane was selected and therefore, in the next window, the user must insert the quote (300).

W	/izard di creazione scavo - Selezione piano 🛛 🗙	Wizard di cre	azione scavo	- Modifica parametri piano orizzontale	×
Selezione progetti Selezione area progetto Selezione pendenze Selezione piano Modifica parametri piano Risultati	Selezione piano © Orizzontale O Inclinato: per 3 puné O Inclinato: valori di pendenza	Selezione progetti Selezione area progetto Selezione pendenze Selezione piano Modifica parametri Risultati	Quota piano oriz	zontale 300	[
	< Indietro Avanti > Annulla			<indietro avanti=""> An</indietro>	nulla

Figure 582:

The procedure continues with calculating the excavation and, once completed, opens the window with the results.

Besides this, the user can select whether to create notable points (Group 1) and/or whether or not to run the triangulation (in this example it was determined to create only project triangles).

	Wizard di creazione sc	xavo - Successo x
Selezione progetti Selezione area progetto	Il calcolo i	dello scavo ha avuto successo.
Selezione pendenze Selezione piano	Nome del gruppo:	<u> </u>
Modifica parametri piano	Nome punti alla base:	
Risultati	Nome punti alla sommità:	
	Opzione creazione triangoli	
	Triangolazione:	Crea triangoli solo del progetto
		<indietro annulla<="" fine="" th=""></indietro>

Figure 583:

The result in Graphic View is shown in the image below.

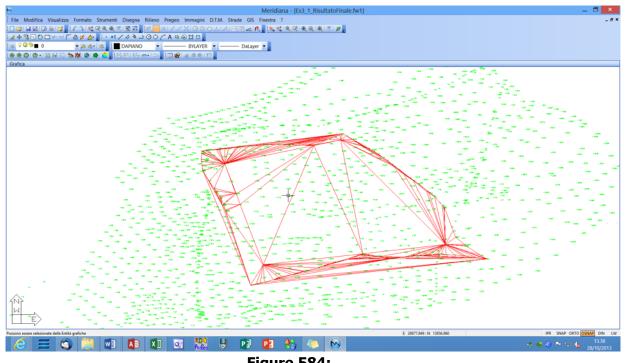


Figure 584:

Reference file Ex3_1_FinalResult.fw1

The result of creating notable points is shown in the image below.

ile Modifica Visualizza Inserisci	Uscite	Opzioni	Finestra ?										-
	6 21	45.00											
	Grupp												
Contenuto del documento		ti Codici]										
B & Libretto Celerimetrico (8 Lav.)	N.	Nome	C. Nord (X)	C. Est (Y)	Quota	Descrizione	Commento	Note	Schizzo	Foto1	Foto _		
 Libretto GPS (0 Grp.) 	1	1	13938.433	28791.816	300.000								
Libretto Pt. Coordinate (2 Grup B d' Gruppo 1000 (1 Pt.)	2	2	13951.492	28918.564	300.000								
B Gruppo 1 (382 Pt.)	3		13970.625	29104.259									
E Dunti di orientamento	4		13719.926	29061.303									
e 🐟 Libretto Livello Digitale (0 Gru	5										_		
🛁 Grafica	-		13721.929	29007.372									
Profili topografici	-	6	13729.768	28796.284									
Strade ∋ Strade	7		13836.448	28794.000									
	8	8	13849.098	28793.729	300.000								
SoogleEarth	9	1	13953.441	28925.945	301.182								
Tavole di disegno	10	2	13954.508	28931.229	301.702								
	11	3	13955.062	28933.237	302.047								
	12	4	13957.692	28943.880	303.572								
	13	5	13962.520	28959.706	306.753								
	14	6	13962.638	28960.078	306.833								
	15		13962.686	28960.278									
	16		13962.743	28960.466									
	17		13965.822	28970.030									
											_		
	18		13968.159	28979.539									
	19		13968.346	28980.121									
	20		13968.688	28981.229									
	21	13	13970.461	28987.124	311.842								
	22	14	13972.847	28994.635	313.446								
	23	15	13973.183	28995.232	313.719								
	24	16	13973.292	28995.683	313.781								
	25	17	13975.757	29000.560	315.733								
	26	18	13976.290	29003.841	315.927								
	27		13978.055	29010.703	316,980								
	28		13980.505	29021.879									
	29		13980.701	29022.700									
>	30	22	13980.872	29023.352	318.486								
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		كا الله			dimense.	y i							28/10/201

2 Method - Excavation project

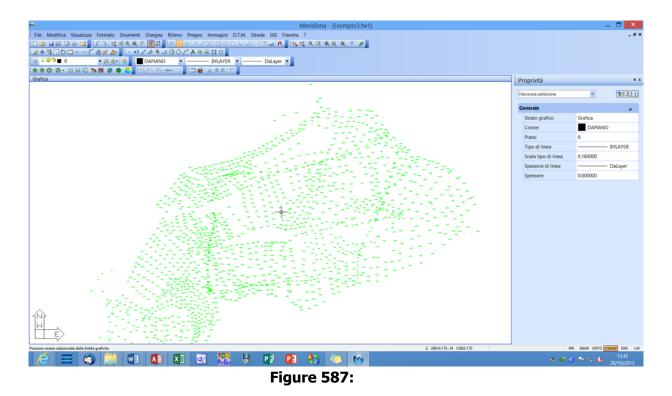
Phase 1 - Created projects

Before activating the procedure, at least 2 projects must have been created.

•	Gestione progetti DTM	×
🕸 Nuovo 🗙 Elimina 🔮	Proprietà	
Nome Bilitevo Progetto		V B A 0 79 V 0 79
,	ОК	Annulla

Figure 586:

The reference example is "Example3.fw1".



Phase 2 - Design polyline

Use the "Design/2D Polyline" command and with the connect point instrument design a closed polyline with the points: 817,72, 1473, 737.

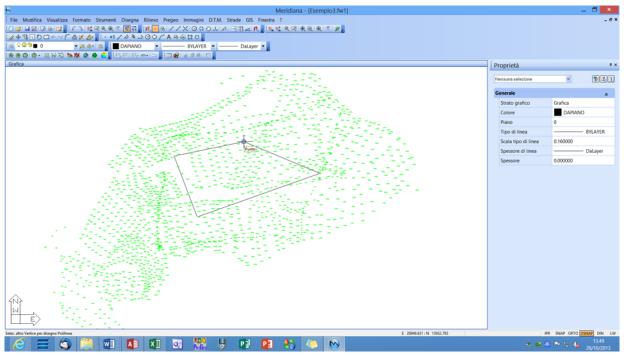


Figure 588: Reference file: Es3_2_Phase2.fw1

Phase 3 - Assign a quote from plane

Use the "DTM/Planning/Assign polyline quote from plane" command to select the created polyline and select the horizontal plane in the Select Plane window for assigning the quote. Press "Forward>".

Selezione piano per l'assegnazione della quota
Selezione piano Orizzontale Inclinato: per 3 punti Inclinato: valori di pendenza Archi Passo in curva [m]:
< Indietro Avanti > Annulla

Figure 589:

Insert the next horizontal plane quote value equal to 300 into the next window; then End.

li	nserimento quota del piano orizzontale 🛛 🗙
Quota piano oriz	zontale
Quota:	300
	< Indietro Fine Annulla

Figure 590:

Phase 4 - Generate escarpment from DTM

Use the "DTM/Planning/Create escarpment from DTM" command to select the polyline and then a point external to it, verify that the "Generate escarpment at DTM" window opens used to insert 100 for the excavation slope and 100 for the fill slope.

Gene	ra scarpata a DTM	×				
Modelli del terreno Progetto: Progetto	Pendenza Pendenza in: Percentuale [%]	~				
Terreno: Rilievo	Costante per tutti i lati Pendenza sterro: 100	_				
Parametri	Pendenza riporto: 100					
Passo in curva [m]:	Variabile per ogni lato Pendenza Sterro Pendenza Riporto					
Elementi	1 2	-				
🗹 Genera triangoli 🗹 Genera polilinea	3 4	×				
OK	Annulla					

Figure 591:

Observe the result in the image below.

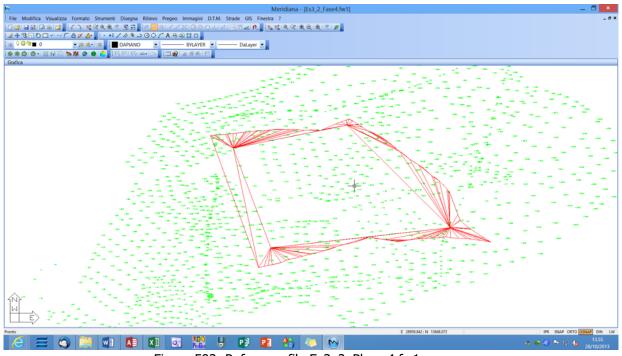


Figure 592: Reference file Ex3_2_Phase4.fw1

Phase 5 - Create triangles within polyline

Use the "DTM/Planning/Create triangles within polyline" command to select the polyline and verify the creation of the triangles, as seen in the image below.

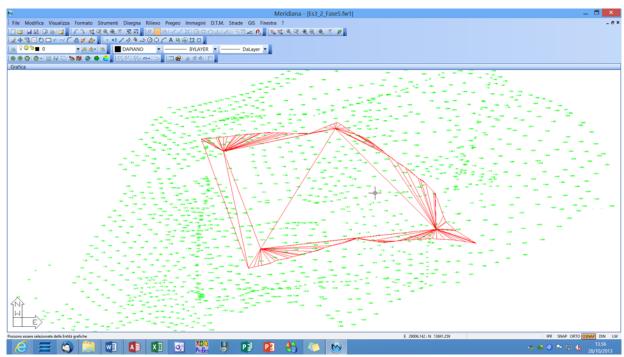


Figure 593: Reference file Ex3_2_Phase5.fw1

Phase 6 - Extract pt. from triangles

Use the "DTM/Plannin command and the "As immediately appear, us the group name and t	sign na sed to io	mes to p lentify th	ooints" v ne refere	windov ence pr			Assegnazione Progetto: Nome del gruppo: Nome dei punti:	nome ai punti Progetto 1 2000	× •
The result of creating below.			own in		age	ase5.fw1)	ОК	Annulla	
Documento III. Id Contenuto dei docum	× Gruppo 2.1								
* - Dibretto Celerimet	ico (8 La N Nome	C. Nord (0) C. Ent (1)	Quota Descrizione	Commento Note	Schizzo Foto1	Foto_			~
 Libretto GPS (0 Gr Libretto Pt. Coordi 		13938.433 28791.81	5 300.000						
# 📑 Gruppo 1000 (Pt) 2 2	13951.492 28918.56							
e di Gruppo 1 (361		13970.625 29104.25							
· Districto Livelio Di		13719.926 29061.30 13721.929 29007.37							
- 🐱 Grafica # 👁 Profili topografici	6. 6	13729.768 28796.28							
- Strade	7 7	13836.448 28794.00							
Pregeo 	8.8	13849.098 28793.72	9 300.000						
SoogleEarth	9 1	13953.441 20925.94							
iii 📲 Tavole di disegno	10 2	13954.508 20931.22							
	11 3	13955.062 20933.23 13957.692 20943.88							
	13 5	13962,520 20959.70							
	14 6	13962,638 28960.07							
	15 7	13962.686 28960.27	306.859						
	16 8	13962.743 20960.46	5 306.897						
	17 9	13965-822 28970.03							
	18 10	13968.159 20979.53							
	19 11 20 12	13968.346 28980.12 13968.688 28981.22							
	21 13	13970.461 28987.12							
	22 14	13972.847 28994.63							
	23 15	13973.183 28995.23	2 313.719						
	24 16	13973.292 28995.68							
	25 17	13975.757 29000.56							
	26 18	13976.290 29003.64 13978.055 29010.70							
	28 20	13960.505 29021.87							
	29 23	13980.701 29022.70							
c	30 22	13960.872 29023.35	2 318.466						
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									any fur ow to

Calculate volumes

There are two types of calculation available in the program:

- 1.Calculate absolute volumes;
- 2.Calculate volumes between models.

Here below is a description of these two procedures that can be activated in the Graphic View using the "D.T.M." menu.

Calculating volumes is done by using the current triangulation; as such, it is necessary that it has already been calculated when executing either one of the two commands for calculating volumes.

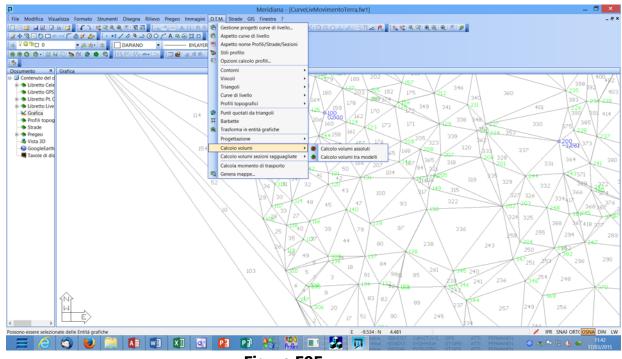


Figure 595:

Calculate absolute volumes

The calculation is run on the active project; executing the command will launch a guided procedure where the user, in the first window, can select whether to consider all triangles for the calculation or whether to select a polygon.

If the user selects the polygon then the perimeter must be defined in Graphic. The program will proceed as if tracking a polyline, the design terminates either by selecting the polygonal end point or by pressing the right mouse button or by selecting the Close Polyline instrument.

In all cases, the point selected is joined to the first; if the right mouse button is pressed without having selected any points then the program will proceed to the selection method allowing the user to select a close polyline considered as perimeter.

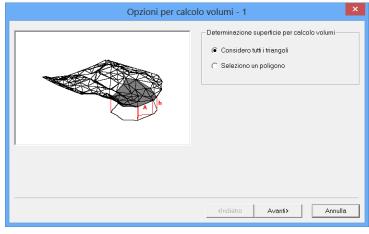


Figure 596:

In the second window of the procedure the user can select the method for running the options calculation and the method used for identifying the reference plane; in total there are nine combinations.

Opzioni per	calcolo volumi - 2
I calcolo del volume sarà effettuato: Per un piano fisso Per il piano di compenso (Sterro = Riporto) Per un piano individuato dal programma	Modalità di individuazione piano Orizzontale Indinato: per 3 punti Indinato: valori di pendenza
	rispetto ad un piano orizzontale orrerà fornire la quota.
	<indietro avanti=""> Annulla</indietro>

Figure 597:

The appearance of the third window depends on the selected method of calculation.

If the calculation method includes identifying an inclined plane between two or three points, the program will first proceed to a third window asking the user to graphically select the points.

The calculation run varies depending on the method used to identify the plane; in particular:

1. Absolute calculation by fixed plane:

•Horizontal: the calculation is done according to a horizontal plane for which the quote must be supplied;

•Inclined by 3 points: the calculation is done according to an inclined plane; the user must graphically identify three points by which the plane will pass;

•Inclined slope values: the calculation is done according to an inclined plane; the user must first identify two points indicating the direction and angle of the slope. Next the slope values are selected;

2. Absolute calculation by compensation plane (excavation=fill):

•Horizontal: the calculation is done according to a horizontal plane. The program will identify the quote by which the excavation comes up as equal to the fill.

•Inclined by 3 points: the calculation is done according to an inclined plane. The three points must be graphically identified. The program will find the plane parallel to it that makes the excavation equal to the fill.

•Inclined slope values: the calculation is done according to an inclined plane. A direction must be identified (two points) and the slope values inserted. The program will find the compensation plane with the desired slope and direction.

3.absolute calculation by plane identified by program:

•Compensation plane and minimum earth movement: the calculation is done in accordance to an inclined plane. This plane is identified by the program so that not only is it compensated (excavation=fill) but it minimizes the movement of earth.

•Compensation plane and minimum excavation: the calculation is done according to an inclined plane. This plane is identified by the program so that not only is it compensated (excavation=fill) but it minimizes the maximum excavation.

•Absolute minimum earth movement plane: the calculation is done in accordance to an inclined plane. This plane is identified by the program to minimize the movement of earth without being compensation, that is, the excavation may be different from the fill.

Here is the description of the next windows.

If a horizontal plane was selected and the quote must be furnished, this window will include an edit field used to insert specifically the value of this quote.

	Opzioni per calcolo volumi - 3
- Quote del rilievo	Min. = -8.97 - Max. = 4.49
	IVIII 0.07 IVID 10
Valori per il calcolo	8
Quota piano orizzontale [m]	
	<indietro avanti=""> Annulla</indietro>

Figure 598:

If, instead, it was selected to use an inclined plane passing for three points, then the user must first select the three points in the Graphic View and then confirm them or change them using the window seen below.

	Min. = -8.97 - Max. = 4.49		
Punti per l'individuazione del	piano		
	1° Pt 139	2° Pt: 147	3° Pt 149
Coord. Nord (X)	-16.002	-9.479	-10.941
Coord. Est (Y)	6.598	12.851	15.176
Quota	-0.031	-0.861	-2.342

Figure 599:

Finally, if the inclined plane was selected, the user must initially select two points using the Graphic View. When the selection is completed, the procedure suggests the window seen here to the side that includes:

1) the coordinates of the first selected point;

2) the slope values along the direction identified graphically;

3) the slope values transversally and at the angle of direction;

All of this data can be found using the two points selected in Graphic.

	Opzioni per calcolo	volumi - 3	×
Quote del rilievo			
	Min. = -8.97 - Max. = 4	1.49	
Punti per l'individuazione del piano-			
	Valori		Punto: 139
Pendenza longitudinale %	-8.485	Coord. Nord (X)	-16.002
Pendenza trasversale %	0.000	Coord. Est (Y)	6.598
Direzione [gradi]	142.8185	Quota	-0.031
		dedictro Aug	nti> Annulla
		< <u>I</u> ndietro <u>A</u> ∨ar	Annulia

Figure 600:

If the user decides to run the calculation using the compensation plane (excavation=fill) or to run the automatic calculation, then the next window will display an edit box for inserting the volume coefficient value between the excavation and the fill.

	Opzioni per calcolo volumi - 3
Quote del rilievo	Min. = -8.97 - Mex. = 4.49
Valori per il calcolo Coefficiente Sterro / Riporto	a
	<indietro avanti=""> Annulla</indietro>

Figure 601:

After showing various examples of the third procedure window, here is the description of the fourth window.

In the "Graphic Options" section, the user can tell the program whether to print the results obtained or to print partials.

To also print the partials, the user has three options: the first is to report the partial results "with coordinates" that is, reporting also the coordinates of the elementary triangle vertices; the second "with side length" reports the length of the sides and semi-perimeter of the individual elementary triangles; the third, finally, will print both sets of information (in this case it is advisable to use a horizontal print layout).

Opzioni per ca	alcolo volumi - 4
Opzioni di Grafica ✓ Stampo risultati finali ✓ Stampo risultati parziali	Creazione Dtm Dtm delle differenze Filievo Aggiungi
C Con lunghezza lati C Con coordinate + lunghezza lati Opzioni di Stampa C Creo linee Sterro/Riporto	Dtm di spianamento Rilievo Aggiungi
	<indietro avanti=""> Annulla</indietro>

Figure 602:

In the "Print Option" section the user can select whether or not to create the Excavation/Fill lines; in particular, if the option is activated then a series of graphic lines will be created that separate the excavation area from the fill area.

There will also be a small line designed in the middle of these lines (along the halfway part of the dimensions of the celerimetric text) oriented toward the fill area; the two types of lines will be respectively placed in the "EXC-FIL-1" and "EXC-FIL-2" planes created specifically for this; these lines can be changed or eliminated like any other graphic line.

In the "Create DTM" section, the user can decide whether to create a "DTM of differences" in the quote between the primary DTM and the plane selected for calculation and/or create a "Flattening DTM" defined by the DTM primary points quoted on the selected plane for the calculation.

Here following is an example of the results preview of a volumes calculation; in this case the user selected to also print the partials (with coordinates) along with the finals (which are shown on the last page).

-	Looper Looper						GEOPRO				1.704	9.000	30.72	11.40	18.29	
-							are the	10							0000	
Linne									7.901 -27.001	-10.402	8.252	8.009				
	Ban disks and all all all								+22.000	-8.428	2.040	0.000			100.21	
	Reg Crabitation	-						1000			2.104	8.000	48.18	48.58	14.42	
		a providente						11	-17.868	1.611	4.474	0.000			9-1222	
	-								-14.111	1.02	1.198	8.008				
									-19.141	1.714	3.878	8.001				
								110			8,384	8.800	8.90	7.88	25.48	
CALCO	DLO VOLU	IMI						100	-41.592	8.008	8.142	8.003				
									-17.949	1.601	4.476	8.005				
	Seed (2)	E++ (1)	Sec. 1	Acres and		lupert falian To	tions million		-27.081	-4.530	2.292 2.963	0.000	2.41	8.43	10.04	
	Note (E)	Ees. (T)	Dens's	Queta Bif.	Depert fare 1	(m2)	lane Solide	14								
									-49.882	8.881	4.421	8.008				
1		-4.310	1.212	8.884					-44.002	4.247	4.112	8.008				
	-27.381	-2.004	2.012	E. 200						2.001	4.255	8.800	1.00	1.44	1.6	
	-23.188	-2.301	1.840	0.000				- 14							200201	
			2.478	8.895	3.05	4.34	8.64		-41.592	3.003	8.152	8.009				
	-29.188	-2.004	2.822	8.000					-17.048	1.411	6.476	0.000				
	-27.081	-8.150	1.151	0.000				1.000			4.245	8.000	4.74	8.77	21.42	
	-35.163	1.714	5.878	8.000				- D -	-11.192	1.168	2.776	0.008			2010	
			2.357	8.000	8.86	4.20	38.28		-15.181	1.714	8.878	8.008				
	-21.454	0.403	0.784	6.000					+12.71.8	4.451	1.008	8.888				
	-29.188	-2.301	1.940	8.888				- 14			2.884	8.886	8.90	8.87	10.00	
	-24.240	4.903	0.038	8.800	12.97	11.42	12.54	1.00	-11.782	1.168	2.776	8.003				Second and the second s
									-28.158	-2.004	2.822	6.000				Stile Formato Testo Righe Colorne
	-27,083	-4.158	9,252	0.000					-19.182	1.714	8.878	0.000	4.27	8.15	14.41	
	-25.259	-2.462	2.044	8.000				17								Orientamento
			2.425	8.000	8.62	2.54	3.25		-82.718	4.002	1.888	8.008				
	-22,800	-1.411	8.000	0.000					-24.842	4.903	8.828	5.008				Verticale
	-28.819	-2.462	2.144	5.000							1.490	8.808	34.40	18.18	25.43	C Orizzontele
	-21.414	0.408	0.744	8.000				- 19	12101		1000					
			3.984	8.895	8.72	8.26	17.08		-21.458	8.608	8.744	8.009				
1	-28.068	-2.462	2.044	8.000					-20.004	8.828	0.121	0.000			97.985	Margini [mm]
	-22.900	-1,421	\$.040	0.000				100			8.400	8.000	38.24	18.52	4.10	Superiore 5+ Interiore 5+
	-27.081	-4.150	8.292	8.000	4.00	8.25	10.00		-12.718	4.000	1.888	8.008			1000	and a set a set and a set
					4.44	1.25			-10.100	1.714	8.878	8.008				
	-21.454	0.403	0.788	8,884					-14.111	8.692	1.138	5.003	4.11	1.41	13.82	Siristro 5 Destro 5
	-28.803	-2.882	2.044	8.355				20			*	a	•.0.	8,45	AL	No want to be an
			1.303	8.005	0.88	3.44	1.81	1.00	-11.782	3.168	2.776	8.003				er Donti
									-24.042	4.902	8.115	0.000				1 Statistics
	-22,900	-8.428	5.040	8,000					-48.138	-4.004	1.878	8.000	\$7.78	18.78	28.17	Attive bond
	-20.810	0.401	0.742	8.000				25							9969	
			1.814		8.11	2.23	8.20		-41.592	8.008	8.142	0.008				
	10.000	1.101	1.111						-44.002	4.047	4.010	5.005				

Figure 603:

The final results of the calculation include the following information:

•Total horizontal surfaces: represents the area projected on the horizontal plane of the region considered for the volumes calculation.

- •Total solid surfaces: this is the sum of the surface of all faces of the considered triangles.
- •Total excavation volume: represents the quantity of the calculated excavation.
- •Total fill volume: represents the quantity of the calculated fill.
- •Residual excavation volume: indicates the residual quantity of excavation or fill.

The final results printout will also show:

•The text "All triangles were considered" if at the beginning of the calculation the "Consider all triangles" option was activated.

•Otherwise the text "A border was defined" is printed.

•If the option "By 3 points" was selected, then the text "By inclined plane" is printed, followed by the coordinates of the selected three points.

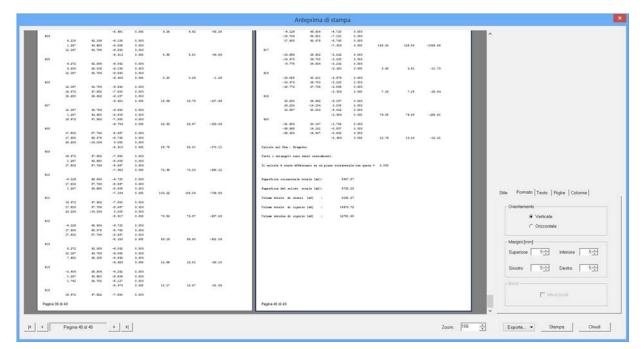


Figure 604:

Once the preview is printed or closed, the no. 5 window appears where the user can select whether or not to create project points and in which Coordinates Points Booklet group to insert them.

The quantity of points created will correspond to the quantity of triangle vertices that fall within or on the polygon vertices taken into consideration for the calculation (or all of them if all triangles have been used).

The plane coordinates of the created points will be identical to the triangle vertices while the quote values will be identified by the plane used as reference for the calculation or identified automatically by the program (for example, compensation plane).

Press the "Complete" button will conclude the procedure and the results of the calculation can be seen in the graphic while the Coordinates Points Booklet can be checked to verify the project points (if selected to create them).

Opzioni per calcolo volumi - 5	x
Creazione punti progetto	
Creo punti di progetto	
Nome del Gruppo dei Punti di Coordinate note in cui creare i punti	-
<indietro annulle<="" completa="" td=""><td>1</td></indietro>	1

Figure 605:

Example 1

The example offered is the "Quoted Plane.fw1" available in the customization file examples (?|Explore customization file).

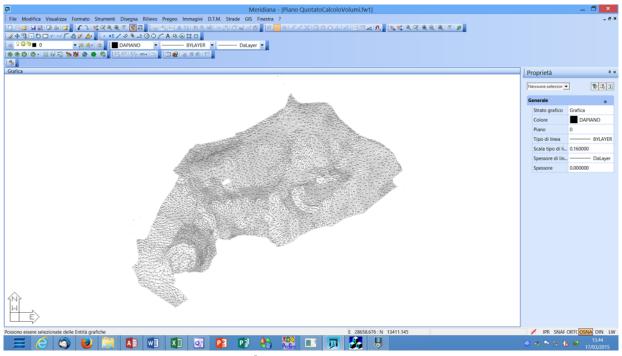
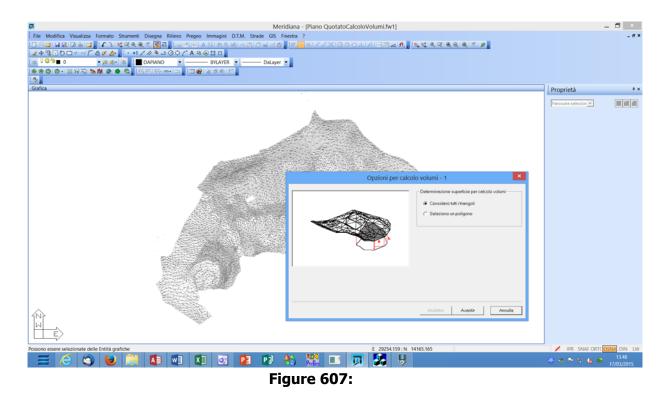


Figure 606:

This example has the volumes calculation run on all triangles.



After specifying the surface on which to run the calculation, the user must indicate the method for running the calculation as well as the method for identifying the reference plane.

In this example the calculation is run on the horizontal plane and the program will identify a quote by which the excavation will be equal to the fill.

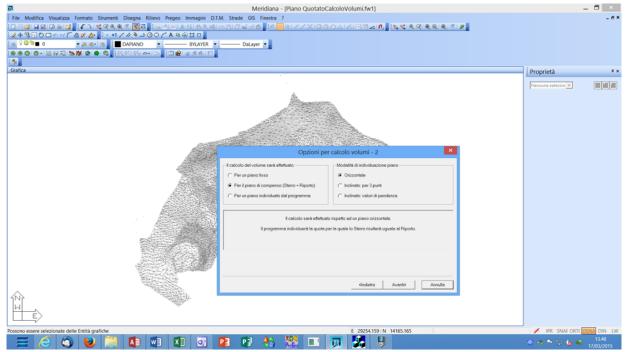


Figure 608:

In the next window the user must insert the Excavation/Fill Coefficient.

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Figure 609:		

Press "Forward>" and the procedure will run the calculation and then display the window where the user can set the print options.

In this case, the selection was made to print the final results and create the Excavation/Fill lines.

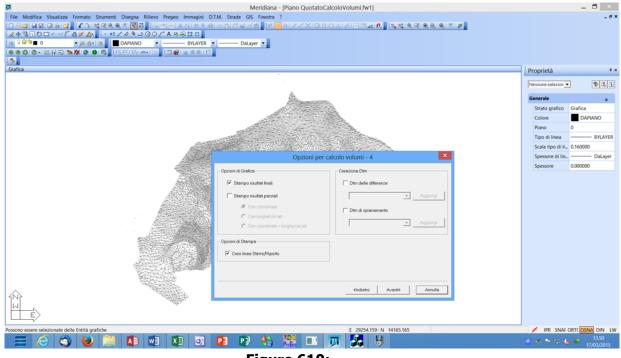


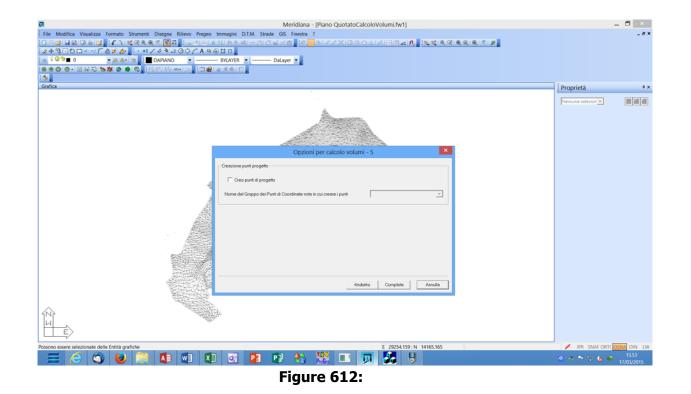
Figure 610:

Final result.

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Figure 611:

This example selected to not create project points.



Example 2

The example offered is the "Quoted Plane.fw1" available in the customization file examples (?|Explore customization file).

In this example we suggest running the volumes calculation on a polygon that must be selected graphically.

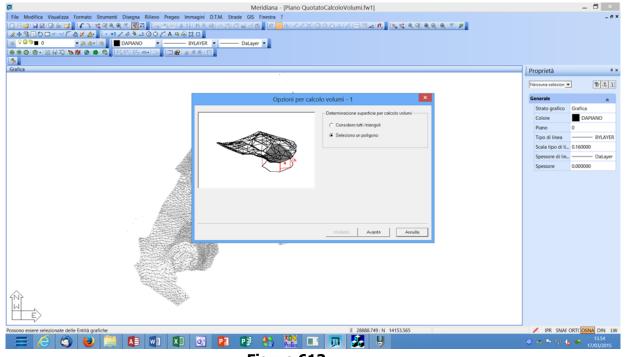
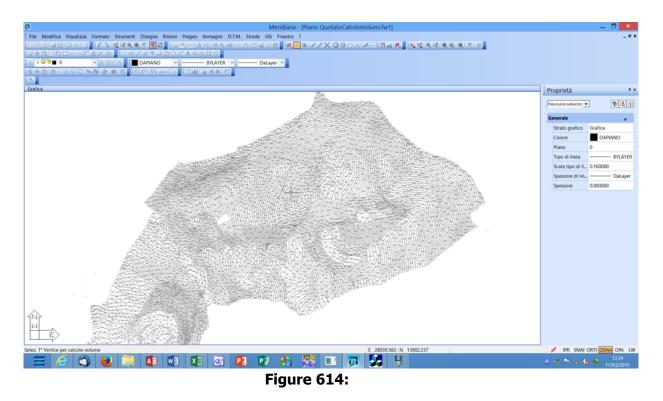


Figure 613:

In fact, pressing "Forward>" the procedure will activate the Graphic View specifically to select the polygon on which to run the calculation.



Once the design is complete the user can select the calculation method (for a fixed plane) and identify the plane (Inclined: slope values).

Given that identification of the plane is done by the slope values, the user must select 2 points that indicate the direction and angle of the slope.

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Figure 615:

Press "Forward>" and the procedure will reactivate the Graphic View specifically to identify the two points.

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Figure 616:

Once the selection is completed, the procedure will suggest values for the slope, for the direction and the coordinates of the first selected point.

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Pendenza trasversale %	0.000	Coord. Est (Y)	28980.156
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Figure 617:

Press "Forward>" and the final window will appear where the user can set the print options. In this case, besides printing the final results, we decided to also print the partials "With coordinates".

Opzioni per ca	alcolo volumi - 4
Opzioni di Grafica	Creazione Dtm Dtm delle differenze Dtm di spianamento Aggiungi Aggiungi
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Figure 618:

Final result.

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		the providence							12947.342	28827.188	314.837	\$1.4.898				
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Figure 619:

Once the printout is complete, the user can decide to create project points.

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Figure 620:

The image below shows that the project points were created and inserted into Group 1 of the Noted Coordinates Points Booklet as indicated in the last window of the procedure.

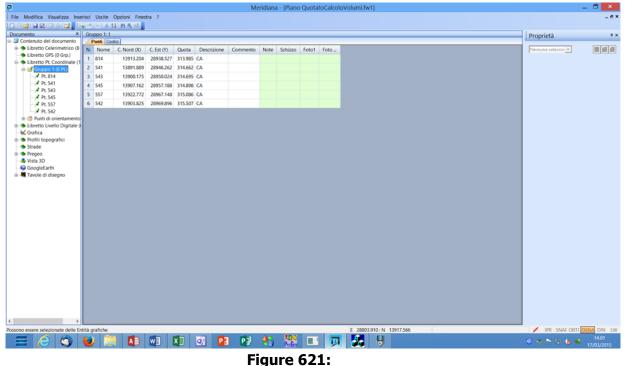


Figure 021.

Calculate volumes between models

The calculation of the volumes between models allows the user to determine the volume contained in the current DTM and another one selected by the user. As such, if it was necessary to have already calculated the triangulation for the current project to run the absolute volume calculation then in this case it will be necessary to have calculated the triangulation also for the other project used in the calculation.

A typical use case for this command is determining the quantity removed in an excavation by comparing the survey of the first map with that of the second map created at the end of the works.

To run this command it is indispensable that the two surveys are oriented according to the same reference system and that they can be overlayed at least partially, this is because the calculation is run exclusively in the areas where there are triangles from both DTMs; the areas where there are triangles from just one of the two DTMs are completely ignored.

The calculation is done in the following method:

1. First of all the user must determine whether to run the calculation on all triangles or just one region bordered by a closed polyline;

2. The program examines each triangle found in the second survey; for each one of these it identifies the triangle or portions thereof corresponding to the first survey. The program will calculate the prismoid volume determined as follows;

3. The calculation is run on all triangles enclosed within the selected region and totals the partial results.

Once the calculation is completed, the program will be able to:

- 1. Create graphic separation lines between the excavation and fill areas;
- 2.separately display the excavation volume and the fill volume;
- 3.Create the DTM of the differences.

As said previously, the program uses the active project as survey of the first map.

The survey of the second map, though, can be selected using a specific window where the user can select either a project found in the file currently under work or a project found in another file.

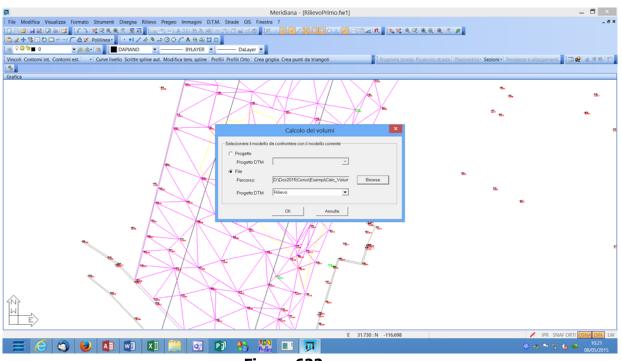


Figure 622:

Once the selection is confirmed the program will ask the user to identify a region to border the area where to run the calculation (the region can be defined on all triangles or with a closed polyline that may be designed or selected graphically).

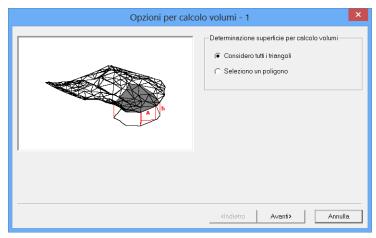


Figure 623:

The "Options for volumes calculation-4" is used to specify:

1. The information to include in the print report;

2. Whether to create the excavation/fill lines;

3.Whether to create the DTM of the quote differences between the two models.

In the volumes calculation between models a DTM of flattening cannot be created (see Absolute volumes calculation)

Opzioni per cal	Icolo volumi - 4
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🥅 Stampo risultati parziali	Aggiungi
Con coordinate	Dtm di spianamento
C Con lunghezza lati	
🔿 Con coordinate + lunghezza lati	Aggiungi
Opzioni di Stampa	
Creo linee Sterro/Riporto	
	<indietro avanti=""> Annulla</indietro>

Figure 624:

The print preview of the final results includes:

•The horizontal area considered (intersection between two surveys, that is, the parts shared by the two triangulations taken into consideration by the program for the calculation);

- •The solid surface (intersection between two surveys);
- •fill values.
- •excavation values.
- •difference between excavation and fill.

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Figure 625:

Analyzing the partial results it can be seen that first the coordinates of the vertices for each individual triangle of the second project are reported and then the coordinates of the triangles and their portions of the first project are reported with which they are intersected; finally, the volumes calculated portion for portion are reported.

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	-138,765	67.398	1.336	0.676					Modello
	-138.582	67.120	1.337	1.337					modero
			1.337	1.185	0.00	0.00	0.00		Modello corrente
	-138.568	67.104	1.338	1.338					
	-138.765	67.398	1.336	0.878					Intestazione
	-144-281	#/+d/b	1.391	0.869	0.01	0.01	0.01		C Intestazione su tutte le pagine
	-138,567	67.097	1.338	1.376	0194				
	-138,558	67.092	1.339	1.339					Intestazione solo sulla prima pagina.
	-130,568	67.104	1.338	1.338					C Nessuna intestazione
			1.338	1.351	0.00	0.00	-0.00		
26123	<u>1</u>		REQ Prefes		1 👔	*	8	Zoom: 151 🔹	Esporta.

Example 1

This example is the suggestion to run the calculation of the volumes between models. After opening the first file, run the "Calculate volumes/Calculate volumes between models" command.

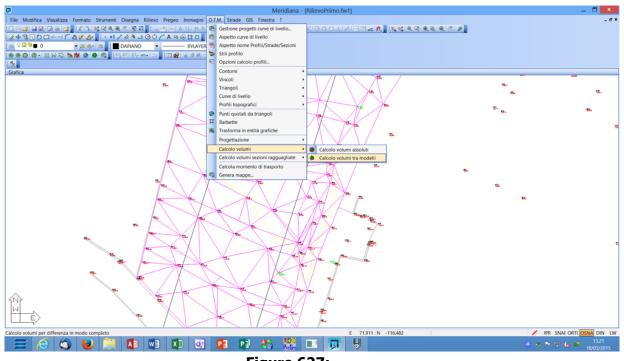


Figure 627:

The command displays a window used to select the second file.

Calcolo dei volumi	8	File	FW1 per calcolo differenz	a volume	×
Selezionare il modello da confrontare con il modello corrente	Cerca in:	📜 Calc_Volumi		▼ ← 🗈 📸 🖛	
C Progetto	œ.	Nome	A	Ultima modifica	
Progetto DTM		by EsPerGenera	aMappe.fw1	30/07/2013 15.21	
(File	Risorse recenti	险 PianoQuota	toCalcoloVolumi.fw1	29/10/2013 11.13	
Percorso: Browse		🔊 RilievoPrimo		30/07/2013 15.21	
Progetto DTM	Desktop	RilievoSeco	ndo.fw1	30/07/2013 15.21	
Progetto DTM					
	Raccolte				
OK Annulla					
	Computer				
	Rete				
		<			>
		Nome file:	RilievoSecondo.fw1	Apri	
		Tipo file:	Meridiana/Andromeda (*.fw1)	✓ Annulla	а

Figure 628:

Press OK and verify that the window appears used to select "Consider all triangles".

Calcolo dei volumi	Opzioni per calcolo volumi - 1
Selezionere il modello da confrontare con il modello corrente Progetto Progetto Progetto Progetto Progetto Procorso: D:\Doc\2014\Corso\Esempi\Calc_Volur Progetto DTM OK	Determinazione superficie per calcolo volumi Considero tutti i triangoli Seleziono un poligono
	< <u>Indietro</u> <u>Avanti></u> Annulla

Figure 629:

 $\ensuremath{\mathsf{Press}}$ "Forward" and the program will display the "Options for volumes calculation" window used to select whether:

- to print the final results;
- to print the partial results;
- or not to create the excavation or fill lines;
- or not to create the DTM of the differences.

Opzioni per ca	colo volumi - 4
Opzioni di Grafica	Creazione Dtm
🔽 Stampo risultati finali	Dtm delle differenze
🗌 Stampo risultati parziali	Aggiungi
Con coordinate	🔲 Dtm di spianamento
O Con lunghezza lati	Aggiungi
Con coordinate + lunghezza lati	
Opzioni di Stampa	
Creo linee Sterro/Riporto	
	<indietro avanti=""> Annulla</indietro>

Figure 630:

Below is the image of the final results printout.

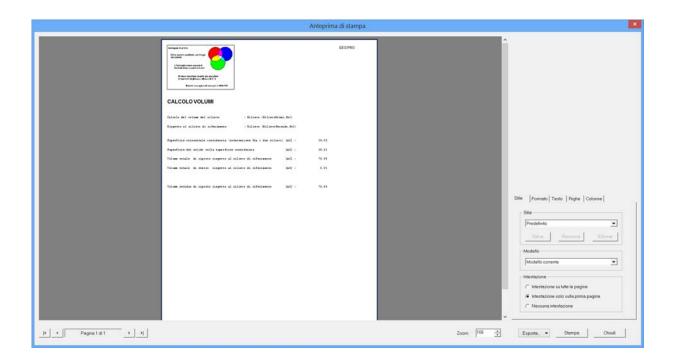
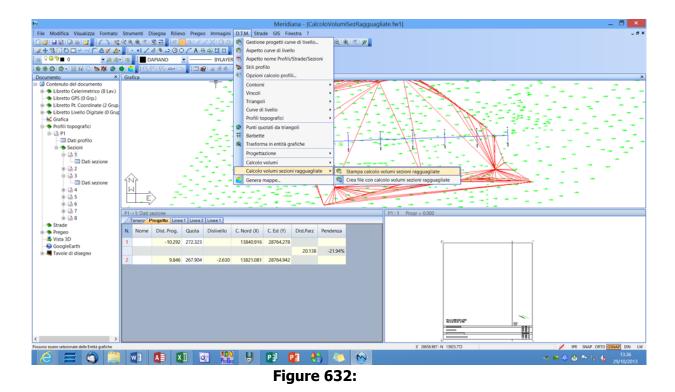


Figure 631:

Calculate leveled sections volumes

Print calculation of leveled sections volumes

The calculation of volumes is done with the leveled sections method .



To run the printout of the leveled sections the user must first select the Profile where the sections and profiles were calculated.

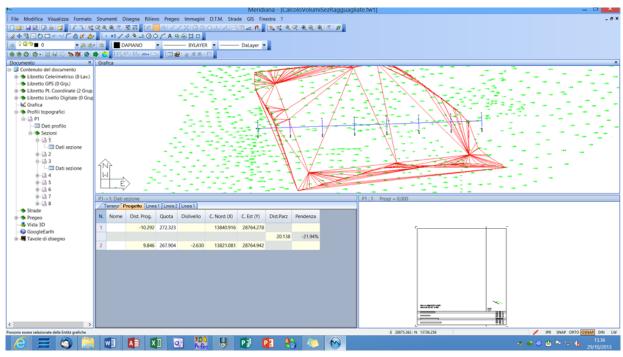


Figure 633:

After selecting the profile, the program launches the print display.

The printout includes the analytical calculation section by section of the calculations executed.

For each section, the volume compensated between excavation and fill is calculated and its algebraic total with the values of the previous sections.

Immagine & pro-		-							GEOPRO)			
Deve sessers a	estilate con il loge												
der cherke													
E Bernages Refinite be	n dirve asserte in ng a colori o hy tim												
To do un	repetters quarte pai	pession											
10000	arta berghozza - uncza												
	Oucoits immagine ad	complet a network	·										
CALCO	LO VOLU	MI STRA	DA - PF	ROFILO): P1								
SEZIONE	AREA (m		AREA MEDIA		DESTANZA (m)	VOLUME			PENS. (m3) S				
	SCAVO	RIPORTO	\$CAVO	RPORIO		SCAVO	RIPORTO	SCAVO	RIPORTO	SCAVO	RIPORTO		
15	6.159												
25	7.018		6.589		50.00	329.450		329.450		329,450			
25	7.018												
рр. Зг	0.000	0.000	3.509	64778	2.57 47.43	9.018	3072.421		3053.403		2733.953		
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													Stie
3r pp.	0.000	129.555		64.778	30.99		2007.470						Predefinito
45	79.485		39.743		19.01	755.514			1251,956		3985.909		Integento
													Salva Pinsmina El
48	70.405												
56	107.164		93.325		50.00	4666.250		4666.250		680.341			Modello
													Modello corrente
	107.164												
56	318.109		212637		50.00	10631.850		10631.850		11312.191			Intestazione
56 68													Intestazione su tutte le pagine
													Intestazione solo sulla prima pagina
	318.109		323.747		50.00	16187.350		16187.350		27499.541			C Nessuna intestazione
6s	318,109 329,304												



Create file with leveled sections volumes

The functionality of this command is similar to "Print Adjusted Section Volumes Calculation" with the difference being that the result must be stored on an ASCII or DOC/HTML file.

Here to the side is an image of the DOC/HTML format print preview.

					04		OLUMI ST				
SOME PR	OFILO:P1										
Sezione	Area(m2) Scavo	Area(m2) Riporto	Area Media (m2) Scavo	Area Media (m2) Riporto	Distanza (m)	Volume(m3) Scavo	Volume(m3) Riporto	Volume Compens. (m3) Scavo	Volume Compens. (m3) Riporto	Somma Algebrica (m3) Scavo	Somma Algebrica (m3) Riporto
s	6.159										
s	7.018		6.589		50.00	329.450		329.450		329.450	
2s	7.018										
p.	0.000	0.000	3.509		2.57	9.018					
r		129.555		64.778	47.43		3072.421		3063,403		2733.953
r		129.555									
p.	0.000	0.000		64.778	30.99		2007.470				
s	79.486		39.743		19.01	755.514			1251.956		3985.909
s	79.486										
5s	107.164		93.325		50.00	4666.250		4666.250		680.341	
5s	107.164										
is	318.109		212.637		50.00	10631.850		10631.850		11312.191	
is	318.109										
s	329.384		323.747		50.00	16187.350		16187.350		27499.541	
's	329.384										
ls	0.000		164.692		47.80	7872.278		7872.278		35371.819	
Sommano						40451.710	5079.891				



Calculate transport moment

The "Calculate transport moment" command is used to obtain a summary of all values used to prepare the estimate of a work such as, for example, the distance traveled, the volume moved, the number of machinery movements, etc.

Once the command is activated the "Calculate transport moment" window appears used to select:

- The choice of DTM:
 - Current and reference DTM;
 - DTM of the differences generated during the volumes calculation procedure (see paragraph II).

Calcolo momento di tr	rasporto ×
Scelta Dtm	
Dtm corrente e di riferimento 💌 Modello	Progetto 💌
Terrend	o: Rilievo 💌
Opzioni di calcolo	
☑ Suddividi triangoli con lato superiore a [m]:	200.000
Non considerare spostamenti con volume minore di [m]	c]: 0.001
Contorni e vincoli:	Ignora contorni e vincoli 🗨
Statistiche Grafica	
✓ Intervali per distanza 50.000 [m] □ D	isegna spostamenti in grafica
✓ Intervali per volume 10.000 [mc]	🗹 Elimina entità esistenti
Annulla	

Figure 636:

• Options for the calculation:

Subdivide triangles with larger side at [m]: this is a parameter to be used especially when the survey was not done on a regular grid but rather with a topographic instrument and therefore with irregular points, as such it adjusts the maximum distance for the operating machine to run during the work operations.

Do not consider movements with volumes less than [mc]: indicates the minimum value to consider in decomposing the movements. Normally a value of 0.001 mc is considered and so any volumes lower are ignored during calculations.

Borders and constraints: determines the movements of the machinery within the terrain:

- Ignore borders and constraints the movement from the excavation zone to the fill zone occurs in any direction, even exiting from the border;
- Only borders, the machinery route is controlled so as to never exit from the border of the terrain model;
- Only constraints, the machinery route is controlled so as to not exceed the constraints;
- Borders and constraints, in this case there is a double control, the machinery cannot exit the border and cannot cross the constraints such as ditches, roads, etc.

If the earth movement is set as Only borders, Only constraints and Borders and constraints then the notice window shown below appears.

Calcolo momento di trasporto	
 Dovendo considerare vincoli e/o contorni, il calcolo potrebbe richiedere molto tempo. Proseguire con il calcolo? 	
Sì No	

Figure 637:

Check the Design movements option in graphic to enable the display of the graphic representation showing the machinery movements.

In the Statistics section the user can include in the report the display of movements per pass of x meters section with the associated average volume moved (Intervals by distance); and the number of movements per pass of x cubic meters of volume and the associated average distance (Intervals by volume).

Press "OK" once all calculation parameters are set and the program will display the movement that the machinery must execute to complete the work.

	Anteprima di stampa
	OCOMP OCOMP International internatine international inte
	Model by Spokenemi in Bare and Adda Spokenemi i Valume medo (mc)
	and the step intervent water a step intervent
k K Pagina1 di1 3 3	Zoom 103 📩 Exporta Chudi

Figure 638:

Generate maps

The "Generate maps" command can be activated from the D.T.M. Menu in the Graphic View and is used to create maps of the altimeters, slopes or the exposure beginning with the mathematical model of the terrain corresponding to the active project.

Executing the command will launch a guided procedure described below.

The first window displayed is "Map type" where the user can:

- •Select the type of map to be created (Map of altimeters, slopes, and exposure);
- •Select the name and directory where to save the map (also using the "Search...." button);
- •Identify the map title (using the "Font..." button the user can change the type of font used).

	Tipo mappa
● Ma ○ Ma	pa opa delle altimetrie ope delle pendenze ope delle esposizioni
Immagine Nome:	D:\TestProgramma\DTM\Altimetrie.tif Salva come
Titolo:	Mappa delle altimetrie Carattere
	< Indietro Avanti > Annulla

Figure 639:

Press the "Forward" button to open the "Legend" window used to select whether or not to create a legend to associate with the map by selecting/deselecting the specific check box.

The window is divided into two sections: "Position" and "Quoting".

In the first, the user must indicate where to position the legend (right/left) and its dimensions; in the second, the user must select the interval and number of decimals to use in quoting (in this case too the font used can be changed).

It is important to keep in mind that if the interval selected for the quoting determines the overlay of the legend's text then the program will automatically change it to avoid this inconvenience.

	Legenda	×
Creazione	legenda	
Posizione:	Sinistra	
Larghezza:	40 mm	
Altezza:	80 mm	
Quotatura Intervallo:	10 Carattere]
Decimali:	3	
	< Indietro Avanti > Annulla	

Figure 640:

After the "Legend" window there is a "Resolution" window used to indicate the parameters for defining the resolution of the image (scale, resolution, margins) and the scale of values.

Note that the width, height and dimensions fields cannot be edited and their value depends on the scale, resolution and margins and whether or not there is a legend.

The scale indicates the reduction factor, the resolution indicates the number of pixel per inch, while the margin is the width of the border added to the map (setting the margin at 0 the map is created without an external border).

	Riso	luzione			×
Risoluzione Scala 1: 600 Margini: 5 Scala Valori Scala Valori: Rela Minimo: Massimo:	dpi mm	Larghezza: Altezza: Dimensioni:	2995 2351 20628	Pixel Pixel Kb	
		< Indietro	vanti >	Annulla	

Figure 641:

Selecting the scale of values allows the user to specify the interval to represent (relative, absolute, or defined by the user).

The relative interval has its extremes the minimum and maximum characteristics (altimetry, slope, exposure) of the current model.

The absolute interval, selectable only during creation of the slope and exposure maps, sets the minimum and maximum at preset values to allow a rapid interpretation (0 - 100 for the slope map; 0 - 180 for the exposure map).

The user interval allows setting the value of the extremes based on the user demands.

Once the data on the map resolution are inserted, the next window is "Colors".

This window is used to tell the program which colors to use in the map; the available commands are:

- •"Add" to add a color;
- •"Remove" to remove a color;
- •"Up" and "Down" to change the order of the inserted colors.

The background of the image that holds the map can also be selected (black or white).

Valore	Massimo			Colore	
	Minimo				
	Ag	igiungi	Rimuovi	Sù	Giù
fondo Sfondo:	Nero			_	
	vero			•	

Figure 642:

Press the "End" button and the program will create the map; once the operation is completed, the user is asked whether to load it immediately into the Graphic View; if not, then loading can be done later on using the command "Insert Image/Pregeo Map" from the File menu.

The image below shows the created map and the altimetry map.

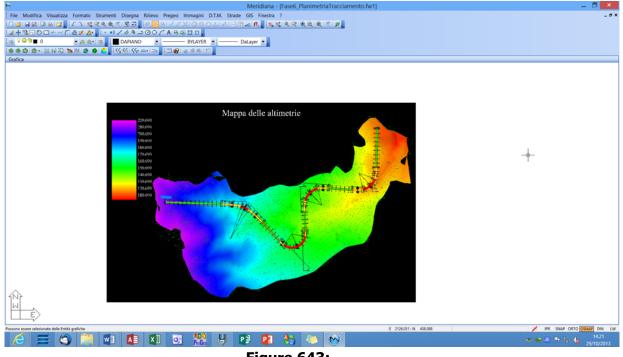


Figure 643:



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