User Manual

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Tersus Geo Office 2 User Manual

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Revision History

Revision	Description	Date	Owner
1.0	Issued for Release	2024/01/22	ZCG
	Added GNSS, Roads, Point Clouds, etc.	2024/03/05	ZCG
1.1	Modified Coordinate System, GNSS Import, GNSS	2024/00/12	700
	Adjustment, etc.	2024/09/13	200

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Tersus Geo Office 2 User Agreement

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1. Overview

- Introduction
- Installation
- Main Interface

1.1 Introduction

Tersus Geo Office 2 is a desktop data processing software based on Windows OS, designed by Tersus GNSS Inc. and all right reserved. Tersus Geo Office 2 (hereinafter referred to as TGO2) has various functions, covering multiple business modules for professional users, supporting GNSS post-processing, online and imported basemap display, road design and inspection, RTK project processing and point clouds data processing.

Main features of TGO2 software:

- Projects, coordinate systems and antennas management.
- Basic view operation, 3-demensionalized display and tool measurement.
- GNSS static data post processing.
- Stop and Go data post processing.
- Road design data import, editing, and visualization.
- Tersus Nuwa projects import and data processing.
- Point clouds data editing, DTM generation and earthwork calculation.



Figure 1.1 Tersus Geo Office 2

1.2 Installation

Installation process:

1. Click on the TGO2 software .exe installation package to enter the installation program.

2. Click and select the installation directory to begin the installation. If there is an older version, the old version will be uninstalled first.

3. Click on the TGO2 icon on the desktop or in the start menu list to enter the software.



Figure 1.2 TGO2 Startup Interface

1.3 Main Interface

After launching TGO2 software, the interface of the software is shown in the figure below. The historical projects are displayed in the Project Manager list. Click on the project in the list to open it directly, create a new project or click to open other local project files.



Figure 1.3 Projects Manager Interface

After opening a project or clicking other menu bar tab buttons, it will jump to the main interface of the software, as shown in the following figure. The main interface is generally divided into five parts: title bar, menu bar, work space, view section and property window.



Figure 1.4 TGO2 Main Interface

2. Quick Start

- New Project
- Edit Coordinate System
- GNSS Post Processing
- Road Data Editing
- Point Clouds Data Processing

2.1 New Project

Click File menu, click [New] button, enter the project name or use current time as the default name, select the directory, click [OK] to create a new project.

Tersus Geo Office	e 2 (x64) TEST.tgo2		- a x
In hime	New Project	Pomit Capadas Toolis adupport	
Doen	New Project		
	Project Name:	2024_01_22_14_05_43	
Save Save	Project Location:	D:/Documents/TG02	
Export .	Company	·	
X Close	Surveyor.		
Project Manager	Description:		
		ОК	
🕀 Exit			

Figure 2.1 Quick Start - Create New Project

When creating new projects, select none coordinate system, or select from drop-down list. If there is no coordinate system that meets the requirement in the list, click [...] to open the coordinate system manager. Select the coordinate system in the predefined list or customized list, click [Add] to add it to the selectable coordinate system list on the left.



Figure 2.2 Quick Start - Coordinate System Manager

2.2 Edit Coordinate System

Click Project Menu after opening a project, click [Coordinates] to check or edit the coordinate system parameters of the current project. Edit the local ellipsoid and datum conversion parameters in Ellipsoid. Edit the projection and parameters such as central meridian, false north, false east in Projection. Select geoid model file in Geoid.

Name: Parameters	с. Б:	ransvers_Mercator		•			
j	Name	Valu	ie	Unit			
Origin Lat		1*000000.00°00	1	DDMMSS			
Central Me	eridian	121°00'00.000000'	121°00'00.000000"E 0 500000				
False Nort	h	0					
False Eas	t	500000					
Scale		1					

Figure 2.3 Quick Start - Edit Coordinate System

Switching the coordinate system by selecting it directly from the drop-down list is also allowed. If there is no coordinate system that meets the requirement in the list, click [...] to open the coordinate system manager. Select the coordinate system in the predefined list or customized list, click [Add] to add it to the selectable coordinate system list on the left.

2.3 GNSS Post Processing

Click GNSS Menu, click [Import] and select GNSS files in RINEX format or TRS format to import. The workspace on the left will show the imported data, containing stations, baselines and loops. The view interface will show the location of stations and baselines.



Figure 2.4 Quick Start - GNSS Data Import

Click [Files] under the GNSS TAB to display the information of files in a list. Click an file, and confirm or edit the station name, receiver information and antenna information of the corresponding station if the properties window on the right.

ile Project View GNSS Roads	Point Clou	ds	Tools Support													
Configuration	figuration or Results	Adjus	Clear Results	B _b Sites	lines I	Loops E Residual	Reports,									
ork Space 🛛 🐼 🗍	IGON CN	ee ¥													Properties	6
GNSS_demo_import.tgo2															∧ Site	
 Sites TTTE 		ID	File	Туре	Site	Start Time	End Time	Duration	Measure to	untenna Meas(m	Antenna Hgt(m)	Manufacturers	Antenna	Serial Number	Site Name 7776	
7776 save.230	Files	1	51800927139B57.23o	Static	A1	2023-05-19 01:57:41	2023-05-19 04:57:42	03:00:01.000	Ant Bottom	1.384	1.384	Unknown	ADVNULL	Unknown		
 A1 § 51800927139857.230 	Sites	2	51800927139G12.230	Static	A1	2023-05-19 06:12:32	2023-05-19 07:09:21	00:56:49.000	Ant Bottom	1.384	1.384	Unknown	ADVNULL	Unknown	∧ Receiver	
51800927139G12.230	∇	3	51800940139C07.23o	Static	A2	2023-05-19 02:07:13	2023-05-19 06:16:39	04:09:26.000	Ant Bottom	0.244	0.244	Unknown	ADVNULL	Unknown	Serial Number	
 ■ 51800940139C07.230 	Baselines	4	51800940139G19.23o	Static	A2	2023-05-19 06:19:10	2023-05-19 07:09:47	00:50:37.000	Ant Bottom	0.244	0.244	Unknown	ADVNULL	Unknown	Receiver Type	BX40C
51800940139G19.230	Loops	5	51804793139C22.230	Static	DN	2023-05-19 02:21:48	2023-05-19 06:59:36	04:37:48.000	Ant Bottom	1.894	1.894	Unknown	ADVNULL	Unknown	Receiver Version	
E 51808134139C41.230		6	51808130139C39.230	Static	PL	2023-05-19 02:38:57	2023-05-19 07:20:02	04:41:05.000	Ant Bottom	1.894	1.894	Unknown	ADVNULL	Unknown		
 DN 51804793139C22.230 		7	51808132139C28.23o	Static	DR	2023-05-19 02:28:01	2023-05-19 07:22:14	04:54:13.000	Ant Bottom	1.894	1.894	Unknown	ADVNULL	Unknown	∧ Antenna	
* • DR		8	51808134139C41.230	Static	DB	2023-05-19 02:41:01	2023-05-19 07:17:35	04:36:34.000	Ant Bottom	1.894	1.894	Unknown	ADVNULL	Unknown	Measure to	Ast Botton
 E 51808132139C28230 PL 		9	7776_save.23o	Static	7776	2023-05-19 03:59:14	2023-05-19 07:42:03	03:42:49.000	Ant Bottom	1.96	1.96	Tersus GNSS	TRSOSCA	Unknown	Antenna Measured	d(m) 1.96
E 51808130139C39.23o															Antenna Height(m) 1.96
V BL_1[51800927139B57.23															Serial Number	
V BL_2[51800927139B57.23															Manufacturer	Tersus GRSS Inc
V BL_4[51800927139B57.23															Antenna Type	TRODUCAREU
V BL_5[51800927139B57.23																
EL_7[51800927139G12.23																
V BL_8 [51800927139G12.23 V BL 9 [51800927139G12.23															Apply to: Current Fil	e *
V BL_10[51800927139G12.2															Antenna Measure	ment
V BL_11 [51800927139G12.2 V BL 12 [51800927139G12.2															Antenna Height	
V BL_13[51800927139G12.2															Antenna Type	
V BL_14 [51800940139C07.2																
V BL_16[51800940139C07.2																
V BL_17[51800940139C07.2																
V BL 19 [51800940139C07.2 V BL 19 [51800940139G19.2																
BL_20 [51800940139G19.2																
V BL_21[51800940139G19.2 V BL_22[51800940139G19.2																
V BL_23 [51800940139G19.2																
V BL_24 [51804793139C22.2																
V BL_26 [51804793139C22.2																
T DL 07/5400/7004000000																

Figure 2.5 Quick Start - GNSS Data Edit

Click [Process] under the GNSS TAB to perform baseline processing. Baselines in the view will be highlighted, indicating the baselines have been processed. Click [Baselines] under GNSS TAB to display the detailed information of the baselines in a list.

emove Files	guration Results	Adjustmen	Configuration	By Baselines	Re Loops	Residual	Reports,											
	iew GN	ss X	djustment		Lasts and to	Ner'ts	Jeyer t											
demo_baseline.tgo2		10 8-	-English Tu	Church .	Sec.	Onter	Dunting	Dette	A.65 /	Desard	Declary	Cad Durlan)	Dr/m)	(hdfha(m)	Defen	(telDe(ex)	(Vinter or (m)	Hand
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L_1[51800927139857.230	•	10	DI 2 010	60 A1	DN	Fired	02.25:00.000	0.1	0.5	Record	37.0700	0.0046	25 124	0.0067	41 6421	0.0042	61 5215	Vec
R_3[51800927139B57.230 -	Sites	12	01_2 010		Div.	Filed	02.33.00.000	0.1	0.0	Passeu	-37.0700	0.0040	-20.124	0.0001	-41.0431	0.0042	01.0210	100
L_5[51800927139B57.230 - g		23	BL_3 Sta	IC A1	PL	Fixed	02.18:00.000	4.0	8	Passed	28.2013	0.0082	25.0373	0.0084	-00.1008	0.0052	00.8200	Tes
L_6 [51800927139B57.230 -		28	BL_4 Sta	lic A1	DR	Fixed	02:29:00.000	6.4	9.8	Passed	49.57	0.0068	3.7838	0.0091	-6.6988	0.0082	50.1634	Yes
L_8 [51800927139G12.230 -	Loops	29	BL_5 Sta	lic A1	DB	Fixed	02:16:00.000	8.1	10.8	Passed	-3.61	0.0054	-38.5983	0.0058	6.9939	0.0064	39.3926	Yes
L_9[51800927139G12.230 -		30	BL_6 Sta	lic A1	7776	Fixed	00.58:00.000	163	9	Passed	-16.0168	0.0212	-12.5862	0.0258	8.4433	0.0205	22.0509	Yes
L_11 [51800927139G12.230		31	BL_7 Sta	lic A1	A2	Fixed	00:04:00.000	5.4	5.4	Passed	-17.4574	0.0025	-10.9185	0.0042	0.4657	0.0027	20.6044	Yes
L_12[51800927139G12.230		32	BL_8 Sta	lic A1	A2	Fixed	00:50:00.000	4.5	6.3	Passed	-17.4649	0.0024	-10.9239	0.0038	0.4682	0.0038	20.6052	Yes
L_14[51800940139C07.230		33	BL_9 Sta	lic A1	DN	Fixed	00:47:00.000	4.4	8.1	Passed	-37.6699	0.0033	-25.1298	0.0049	-41.6513	0.0023	61.5253	Yes
L_15[51800940139C07.230 1 16[51800940139C07.230		2 1	SL_10 Sta	lic A1	PL	Fixed	00:56:00.000	3	6.3	Passed	28.2175	0.004	25.0296	0.0033	-55.1717	0.0033	66.8328	Yes
L_17 [51800940139C07.230		3 1	BL_11 Sta	IC A1	DR	Fixed	00:56:00.000	4.6	10.9	Passed	49.5765	0.0029	3.7798	0.0074	-6.699	0.0074	50.1696	Yes
L_18 [51800940139C07.230 L_19 [51800940139G19.230		4 1	BL 12 Sta	ic A1	DB	Fixed	00.56:00.000	3.9	11.8	Passed	-3.6184	0.004	-38.5748	0.007	7.016	0.0061	39.3743	Yes
L_20 [51800940139G19.230		5 1	a 13 Sta	lc 41	7776	Fired	00:56:00.000	105.6	6	Passed	15 4455	0.0085	-12 0184	0.0129	6 6958	0.0091	20 6843	Yes
L_22 [51800940139G19.230		6 1	a 14 Sta	IC 42	DN	Fired	03:54:00.000	82	8.8	Passed	-20 2089	0.0033	-14 2128	0.0061	-42 1168	0.0034	48.8286	Yes
8L_23 [51800940139G19.230		7 1	N 15 010	- 10	01	Circud	02.27.00.000	24	0.0	Dessed	45 0700	0.0074	25.0546	0.0073	55 6370	0.0041	00 4647	Vee
L_25 [51804793139C22.230			ata ata	ic n2	PL.	Filed	03.31.00.000	3.1	0.2	Fasseu	40.0720	0.0074	30.0010	0.0073	-00.0376	0.0041	00.4017	Tes
R_26 [51804793139C22.230		8 1	st_16 Sta	IC A2	UR	Fixed	03:48:00.000	4.5	10.6	Passed	67.0373	0.0041	14./01	0.0097	-7.1623	0.0072	69.0031	res
R28 [51808130139C39.230		9 1	BL_17 Sta	lic A2	DB	Fixed	03:35:00.000	7.6	11.2	Passed	13.8573	0.0052	-27.6814	0.0112	6.5238	0.0066	31.6361	Yes
L_29 [51808130139C39.230		10	BL_18 Sta	lic A2	7776	Fixed	02.17:00.000	114.2	7.3	Passed	2.8795	0.0017	-1.901	0.0023	7.2531	0.0016	8.032	Yes
L_31[51808132139C28.230		11 1	BL_19 Sta	lic A2	DN	Fixed	00:40:00.000	4	8.6	Passed	-20.205	0.0042	-14.2136	0.0066	-42.1188	0.004	48.8293	Yes
L_32[51808132139C28.230 L_33[51808134139C41.230		13	BL_20 Sta	lic A2	PL	Fixed	00:50:00.000	6.6	7.1	Passed	45.6837	0.0048	35.9498	0.0051	-55.6395	0.0032	80.4682	Yes
6		14 1	SL_21 Sta	lic A2	DR	Fixed	00:50:00.000	2.5	11	Passed	67.0383	0.0021	14.702	0.0051	-7.1657	0.0046	69.0046	Yes
		15 1	BL_22 Sta	lic A2	DB	Fixed	00:50:00.000	3.6	12.2	Passed	13.843	0.0078	-27.6548	0.0084	6.5477	0.0084	31.6115	Yes
		16 1	BL_23 Sta	lic A2	7776	Fixed	00:50:00.000	326.1	6.6	Passed	2.0771	0.0023	-0.8146	0.0042	6.1034	0.0028	6.4984	Yes
		17 1	3L_24 Sta	ic DN	PL	Fixed	04:20:00.000	6.7	9.9	Passed	65.8838	0.0053	50.1627	0.0066	-13.5179	0.0047	83.903	Yes
		18 1	3L 25 Sta	tic DN	DR	Fixed	04:31:00.000	8.5	10.4	Passed	87 2397	0.0054	28.9182	0.0154	34,9601	0.0099	98.3323	Yes
			-															

Figure 2.6 Quick Start - GNSS Baselines

If the baseline can not get a fixed solution, or the RMS value in the baseline processing result is large, select the baseline and right click on [Residual Plot]. Click the satellite or click [Previous] and [Next] to display the residuals of each satellite. According to the residuals, set the satellite unused, or draw a box to delete part of the observation data of the satellite and re-process it to get a more accurate result.



Figure 2.7 Quick Start - GNSS Baseline Residual Processing

After the baselines processing is completed, start network adjustment next. If there are control points, click [Sites] and select control points in the list, click [Constraint] in the right properties window, select WGS84 Constraint or Local Constraint and enter the constraints coordinates, then the known points in the sites list will be labeled.

Proje	a view G	VSS Roads	Point Clou	ts Too	is Su	ipport												
en Save	New Export	Information	Coordinates	1 Import	Export	fills Import Map	timport Code	fi Import Road	View Project Code Library	Settings								
Space	10100	88	10mm GNS	x e			Jun Internet			arrente.							Properties	
2024_	9_13_10_52_16	tgo2 ^															Basic Const	
· · Site	8 7776			ID ons	trair	Site	Local N(m)	Local E(m)	Local Alt(m)	Local Lon(DDMMSS)	Local Lat(DDMMSS)	Local Hgt(m)	WGS84 X(m)	WGS84 Y(m)	WGS84 Z(m)	VGS84 Lon(DDMI	A Constant of Local APPA	-1.
1	3 7776_save.2	30	Files	4												121*35'35.478420	Constraint Local VEN	
- •	A1			8		A1	3452229.4942	556519.93	38.4612	121"35'34.733373'E	31°11'25.240026'N	38.4612	-2860982.6408	4651737.5979	3283984.748	121*35'34.733373	WGS84 Lat(DDMMSS)	31*1125.4909
	5180092713	9857.230	Silles			40	3450000 0400		20 50 47		2010/07/07/07/07/201	20 50 47	0054000 4457		2002005 4072	40413535 540354	WGS84 Lon(DDMMS9	0 121*35'35.478
· .	A2	1012.230	V			14	3452230.0492	556540.550	30.5947	121 35 35.5 1220 I E	31 11 20 204407 N	30.5947	-2001000.1407	4031720.0950	3203903.1973	121 35 35.5 1226 1	WGS84 Hgt(m)	40.2785
	5180094013	9C07.230	Baseilles	7		DB	3452251.699	556543.130	1 15.5219	121*35'35.614088'E	31°11'25.956932'N	15.5219	-2850985.2321	4651698.9271	3283991.7559	121*35'35.614088	WG984 Y/m)	-2860998 160
	5180094013	G19.230		2		DN	3452194.9641	556565.387	1 15.4327	121"35'36.443192'E	31*11'24.110993'N	15.4327	-2861020.3146	4651712.4406	3283943.0761	121*35'36.443192	in occer signify	2000000.100
	8 5180813413	C41.230	Cooks	6		DR	3452235.3047	556475.698	15.5315	121*35'33.064011'E	31°11'25.436378'N	15.5315	-2860933.0762	4651741.3768	3283978.0462	121'35'33.064011	WGS84 Y(m)	4651725.1786
- 4	DN			2			2452470 7004	FFE (03.0F3	45 400	40412522 2207057	24144222 60760201	45 400	0050054 4004	4004700 004	2002000 6700	40413533 330705	WGS84 Z(m)	3283992.3008
	5180479313	9C22.230		3		PL.	3452110.7001	000403.003	10.492	121 35 33.330725 E	31 11 23.59/523 14	15.492	-2000934.4304	4051702.031	3203929.5100	121 35 33 3307 25	Local Lat(DDMMSS)	31*11/25.4909
	5180813213	C28.230															Local Lon(DDMMSS)	121*35'35.478
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Ω,	BL_3[51800927	139B57.23															Covar C(III)	330338,013
2	BL_4[51800927	139B57.23															Local Alt(m)	40.2785
1 1 1 1	BL_5[51800927	139857 23																
5	BL_7[51800927	139G12.23																
2	BL_8[51800927	139G12.23																
16	BL_9 (51800927 BL_10 (5180093	139G12.23 7139G12.2																
ŭ	BL_11[5180092	7139G12.2																
2	BL_12[5180092	7139G12.2																
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- <u>16</u>	BL_14[5180094	0139C07.2																
ž	BL_16[5180094	0139C07.2																
ŭ	BL_17[5180094	0139C07.2																
2	BL_18 [5180094	0139C07.2																
2	BL_19[5180094	0139G19.2																
<u>\6</u>	BL_20[5180094	0139G19.2																
4	BL_21[5180094	0139619.2																
12	RI 2315180094	0130619.2																
ŭ	BL 24[5180479	3139C22.2																
ŭ	BL_25 [5180479	3139C22.2																
S7	BL_26 [5180479	3139C22.2																
2	BL_27 [5180479	3139C22.2																

Figure 2.8 Quick Start - GNSS Constraints

Click [Adjustment] under the GNSS TAB, select [Auto] to perform adjustment according to the constraints. Click [Report] to open and view the report in browser, or click [Reports] under GNSS TAB and select other reports from the drop-down menu to open.



Figure 2.9 Quick Start - GNSS Network Adjustment

2.4 Road Data Editing

Click [New Road] under the Roads TAB and enter a road name to create a new road, or click [Import] and select a local road file in .trd format to import.

st	
OK	Cancel
	st

Figure 2.10 Quick Start - New Road

Click [Alignment] under the Roads TAB, input the starting point parameters of the road in properties window on the right side, and input the center line parameters in the road design window at the bottom in Intersection Method or Elements Method. After inputting, the graph of the alignments corresponding to the inputted parameters will be displayed in the view window.



Figure 2.11 Quick Start - Road Alignments Parameters Editing

Click [Equations], [Vertical], [Cross Section] and other buttons under the Roads TAB to input the parameters of the road and display the corresponding graphics.



Figure 2.12 Quick Start - Road Cross Sections Parameters Editing

Click [Coordinate List] to check the edited road coordinates. Click [3D View] to view the edited road graphics. Then click [Export] to export edited road in .trd format and send it to Tersus Nuwa App to stake the road on field.

				COOld	mates	of Points of	Centenine and S				
Index	Chainage(m)	Chainage	o Cen	N (m)	E (m)	Side Height (m)	Side Roadbed Height (m)	Azimuth (DD MM SS)	Note		
		Centerline	0	0.0000	0.0000	0.0000	0.0000				
		Driveways	10	0.0000	-10.0000	-0.2000	-0.2000				
		Green Belt	11	0.0000	-11.0000	0.8000	0.8000				
1	К0+000	Cycle Lane	14	0.0000	-14.0000	-0.2000	-0.2000	0°00'00.000000206"			
		Driveways	10	0.0000	-10.0000	-0.2000	-0.2000				
		Green Belt	11	0.0000	-11.0000	0.8000	0.8000				
		Cycle Lane	14	0.0000	-14.0000	-0.2000	-0.2000				
		Centerline	0	20.0000	0.0000	-1.0000	-1.0000				
		Driveways	10	20.0000	-10.0000	-1.2000	-1.2000				
		Green Belt	11	20.0000	-11.0000	-0.2000	-0.2000				
2	K0+020	Cycle Lane	14	20.0000	-14.0000	-1.2000	-1.2000	0°00'00.000000206"			
		Driveways	10	20.0000	-10.0000	-1.2000	-1.2000				
		Green Belt	11	20.0000	-11.0000	-0.2000	-0.2000				
		Cycle Lane	14	20.0000	-14.0000	-1.2000	-1.2000				
		Centerline	0	39.6805	0.0000	-1.9840	-1.9840				
		Driveways	10	39.6805	-10.0000	-2.1840	-2.1840				
		Green Belt	11	39.6805	-11.0000	-1.1840	-1.1840				
3	K0+039.6805	Cycle Lane	14	39.6805	-14.0000	-2.1840	-2.1840	0°00'00.000000206"	P1_ZH		
		Driveways	10	39.6805	-10.0000	-2.1840	-2.1840				
		Green Belt	11	39.6805	-11.0000	-1.1840	-1.1840				
		Cycle Lane	14	39.6805	-14.0000	-2.1840	-2.1840				

Figure 2.13 Quick Start - Road Coordinates

2.5 Point Clouds Data Processing

Click [New Clouds] under the Point Clouds TAB, to create a new point clouds data first.

🖮 Create Po	vints Cloud		×
name	e: test		
	Create	Cancel	

Figure 2.14 Quick Start - Create Point Clouds

Click [Edit Clouds] to open the Point Clouds windows. Click on the Las source files [+] to select one or more .las files to import.

File Project View	GNSS Roa	ads Poir	nt Clouds Tools Su	pport
New Clouds Edit Cloud	Is			
Vork Space	Ø	X	Baint Clauda V	
r 🗟 pointcloud_demo.tg	02	view		
✓		Winde	W	
ف demo				
		Las so	ource files	+
			name	delete
		p	pk_cloud_3_colorized.las	0
		p	pk_cloud_2_colorized.las	۵

Figure 2.15 Quick Start - Point Clouds LAS Files Import

Click on the Datasets [+] and check the attributes column of the LAS files, enter the name and wait for the data import of the checked attributes to complete.

Source Las Files	Columns
ppk_cloud_2_colorized.las ✔ ppk_cloud_3_colorized.las	 ✓ Location ✓ Color Intensity ReturnNumber NumberOfReturnsGivenPulse ScanDirectionFlag EdgeOfFlightingLine Classification ScanAngleRank UserData PointSourceld GpsTime WavePacketDescriptorIndex ByteOffsetToWaveformData
name demo	Select All Clear Selection

Figure 2.16 Quick Start - Point Clouds Datasets Import

After successful import, the view interface shows the point clouds graph. Use the mouse wheel to zoom, the left mouse button to adjust the view angle, and the right mouse button to move.



Figure 2.17 Quick Start - Point Clouds Display

Select the item in the datasets list to Sample, Mesh, Split. Or click [Edit] for marking, selecting, earthwork calculation or other operations.

🖮 Edit	t DataSet					×
Marks	mark(double click	on point)				
	remove ma	rk	remov	e the po	int	
Select	add selector	cancel s	elector			
	remove outter	remove	inner			
Volume	e Volume					
		Close				

Figure 2.18 Quick Start - Point Clouds Data Editing

3. File

- New Project
- Open & Close
- Save & Export
- Project Manager
- Exit Software

3.1 New Project

Click File menu, click [New] button, enter the New Project interface.

🐡 Tersus Geo Office 2 I	(x64)				-	٥	×
File Project View	GNSS Roads	Point Clouds Tools Support					
III New	New Project			_			
Dpen 🖿	-		-	-			
	Project Name:	2024_02_28_16_37_50	C				
🗎 Save	Project Location:	D/Documents/TG02					
Rout	Coordinate System		•				
E CAPOIL.	Company:						
X Close	Surveyor:						
	Description:						
Project Manager	Desempson.						
			OK				
			UN				
Ext							

Figure 3.1 New Project Interface

Project	Enter new project name, default use the current time as the name, click
Name	refresh button C to refresh the current time display.
Project Location	Enter or click to select the local path for new project.
	Select the coordinate system from the drop-down list for new project, or
	click to add more coordinate systems to the list in the
	Coordinate Systems tool to select. Please refer to section 9.1 for the
Coordinate	operation of Coordinate System tool.
System	When creating the new project, if you select none as the coordinate
	system, the software will automatically create a coordinate system with the
	name of WGS84, which uses WGS84 as the ellipsoid and Transverse
	Mercator as the projection after importing GNSS data.
Company	Company information for new project, non-required fields
Surveyor	Surveyor information for new project, non-required fields
Description	Description information for new project, non-required fields

3.2 Open & Close

Click File menu, click [Open] button, select the .tgo2 project file in the local path to open. If a project is currently opened, close the current project first then open another project. Click File menu, click [Close] button, to close currently opened project. If no project is opened, the button can not be clicked.

3.3 Save & Export

Click File menu, click [Save] button, to save currently opened project.

Click File menu, click [Export] button, select the local path to export currently opened project to another path.

If no project is opened, the buttons can not be clicked.

3.4 Project Manager

Click File menu, click [Project Manager] button, to display the list of projects.

Mage Projects Production Image Projects Production				
Image: Discumentar/T00020021, U, U, St, 11, 44, 770021, 12, US, 11, 14, 770021, 12, US, 14, 14, 770021, 14, 14, 14, 14, 14, 14, 14, 14, 14, 1		Manage Projects	Project Name: TEST	
B. D. Documeth/TOCODOLS, dum_geneous/Section (Section Section S		B/D/Documents/TGO2/2023_12_05_11_14_47/2023_12_05_11_14_47.1go2	Creation Time: 2023-12-20 18:06:49 Modified Time: 2024-02-27 10:33:56	
B D.Doument/0700000000000000000000000000000000000		D:Documents/TG02/GNSS_demo_import/GNSS_demo_import.tgo2	De B Company:	
B. D. Documenta/TOGDSD014, denoRes2, etc. no.192 B. B. B. D. Documenta/TOGDSD014, denoRes2, etc. no.192 B. B. B. D. Documenta/TOGDSD014, denoRes2, etc. no.192 B. B. B. Documenta/TOGDSD024, denoRes2, etc. no.192 B. B.		B D:Documents/TGO2/GNSS_demo_baseline/GNSS_demo_baseline.tgo2	B Surveyor.	
B) D0:commetb/00000004_00_00_000004_00_00_00_00_00_00_		Is D.Documents/TGO2Road_demo/Road_demo.tgo2	Description:	
B) D.Dozomes/IT/CO00002, 12, 20, 17, 49, 56 lps2 B B) D.Dozomes/IT/CO00002, 02, 09, 14, 41, 40, 00 lps2 B B) D.Dozomes/IT/CO00002, 02, 09, 14, 41, 40, 00 lps2 B B) D.Dozomes/IT/CO00002, 02, 09, 14, 41, 40, 00 lps2 B B) D.Dozomes/IT/CO00002, 02, 09, 14, 41, 40, 00 lps2 B B) D.Dozomes/IT/CO00002, 02, 09, 14, 41, 40, 00 lps2 B B) D.Dozomes/IT/CO00002, 02, 00, 15, 41, 40, 40 lps2, 42, 20, 10, 44, 90 lps2 B		B; D:/Documents/TGO2/pointcloud_demolpointcloud_demo.tgo2	B	
Internet Interne Internet Internet		B: D:Documents/TGO2/2023_12_20_17_56_55/2023_12_20_17_56_55 tgo2	B	
Interview B D.Documental/ICO000024, 02, 03, 14, 14, 30, 3002 Image: Control of Control		R D/Documents/TGO2/TEST/TEST/1go2	🖝 🖯	
B) D.Doumeetin/T00000014_00_00_11_07_00_11_00_001002 B) D.Doumeetin/T00000004_00_00_10_2_00_11_00_001002	ranager	D/Documents/TGO2/2024_02_05_14_43_30/2024_02_05_14_43_30.tgo2	B	
Ib D.050xumentu/fr0000004_00_20_11_40_090024_00_20		B: D:Documents/TGO2/2024_02_05_17_27_24/2024_02_05_17_27_24 tgo2	• 0	
		IS D/Documents/TGO2/2024_02_20_13_40_09/2024_02_20_13_40_09/go2	B	

Figure 3.2 Project List Interface

Click project in the list to show the project information on the right side.

Double click project in the list to open the project.

Click the folder icon 💌 in list to open the folder where the project data is located.

Click the delete icon in list to remove the project from the list or directly delete the project folder and all data of the project.

3.5 Exit Software

Click File menu, click [Exit] button, to close the currently opened project and exit Tersus Geo Office 2 software.

4. Project

- Project Management
- Coordinate Systems
- Nuwa Project
- Settings

4.1 Project Management

Click Project menu, click [Open] button, select the .tgo2 project file in the local path to open. If a project is currently opened, close the current project first then open another project.

Click Project menu, click [Save] button, to save currently opened project.

Click Project menu, click [New] button, to jump to new project interface.

Click Project menu, click [Export] button, select the local path to export currently opened project to another path.

Click Project menu, click [Information] button, open the project information dialog, displaying project name, creation time, modified time, company, surveyor, description and other information, of which the company, surveyor and description can be modified.

4.2 Coordinate Systems

Click Project menu, click [Coordinates] button, open the coordinate system setting dialog, displaying coordinate system and parameters of the current project.

Name:	Tr	ansvers Mercator		
Parameters:				
Nan	ne	Valu	ie	Unit
Origin Lat		1*000000.00 [°] 00	1	DDMMSS
Central Meridi	an	121°00'00.000000'	Έ	DDMMSS
False North		0		
False East		500000		
Scale		1		

Figure 4.1 Coordinate System Parameters

The name of the current coordinate system. Click to switch to another coordinate system from the drop-down list and parameters of ellipsoid, projection, plane adjustment and height fitting will be changed accordingly.

System Or click to add more coordinate systems to the list in the Coordinate Systems tool to select. Please refer to section 9.1 for the operation of Coordinate System tool.

Coordinate

Ellipsoid

The local ellipsoid of of the current project, including ellipsoid and datum transformation. When editing ellipsoid parameters, you can select it from the drop-down list, and the parameters such as a and 1/f will be changed accordingly. The datum trans includes None, Three Parameters and Seven Parameters.

In the current project, the ellipsoid and datum trans are used to realize the conversion calculation of Lat/Lon/Hgt coordinates under WGS84 and local system.

The projection of the current project. Select projection type from the drop-down list, and enter parameters according to projection type, such as Origin Lat, Central Meridian, False North, False East, Scale and so on.

Projection In the current project, the projection is used to realize the conversion calculation of Lat/Lon coordinates and North/East coordinates under local system.

The plane adjustment parameters of the current project.

Plane In the current project, the plane adjustment is used to realize the Adjustment conversion calculation of projected North/East coordinates and known coordinates in site calibration.

The height fitting parameters of the current project.

Height In the current project, the height fitting is used to realize the conversion

Fitting calculation of ellipsoidal height coordinates and known altitude coordinates in site calibration.

Geoid The geoid model of the current project.

25

In the current project, the geoid model file selected is used to calculate altitude above mean sea level from ellipsoidal height.

4.3 Nuwa Project

Click Project menu, click [Import] button, open Nuwa Project Import dialog. Select Nuwa project, base map file, road file or code file in local path or connecting device to import. Click Project menu, click [Export] button, open Nuwa Project Export dialog. Select Nuwa project, base map file, road file or code file to export to local path or connecting device. Click Project menu, click [Import Map] button, select base map file in local path or connecting device to import.

Click Project menu, click [Import Code] button, select code file in local path or connecting device to import.

Click Project menu, click [Import Road] button, select road file in local path or connecting device to import.

Click Project menu, click [View Project] button, to display Survey Points, Staking Points, Control Points and Poly Lines in Nuwa project in lists.

Click Project menu, click [Code Library] button, to display code and code list data imported in dialog.

4.4 Settings

Click Project menu, click [Settings] button, open the software settings dialog.

anguages		
anguages Display Configuration Personalized Shortcut Sontrol nput/Output Unit Earth View	Language: English 🔹	

Figure 4.2 Software Settings

Languages	Software display language, select English or Simplified Chinese.
	Coordinates: Select the coordinates display order, the unit, and decimal
	precision of Lat/Lon, Height, North/East coordinates, Elevation, etc.
Display	Time: Select the time display format, the unit and decimal precision of
Configuration	pressure and temperature.
	General: Select the unit and decimal precision of general numbers,
	distance, height, angle, etc.
Porconalizad	Software display theme style, select Standard or Deep Color.
Personalized	Select the display color of different data in the view in different states.
Shortcut	Enable and define shortcuts operations.
Control	Turn on or off the display of position coordinates in the view.
Input/Output	Coloct the unit for importing base man files
Unit	Select the unit for importing base map files.
Forth Viow	Configure the image source in Earth View, choose online ArcGIS, Google
Earth View	Map and other maps to display the data and images overlaid.

5. View

- Select
- Scene
- Earth View
- Measurement
- Windows

5.1 Select

Click View menu, click [Select] button, to tap or box the data elements in the view, to perform processing on the selected data.

Click View menu, click [Move] button, to drag the display area in the view.

Click View menu, click [Rect Select] button, to construct a polygon selection range in the view with the left mouse button and complete the selection range with the right mouse button, to perform processing on the selected data.

Select, Move and Rect Select functions are also available in the view by clicking the right mouse button.

5.2 Scene

Click View menu, click [Zoom All] button, adjust the display area in the view to show all data elements.

Click View menu, click [Zoom Center] button, adjust the display area in the view to center the left mouse button click position.

Click View menu, click [Show Grids] button, to show or hide the coordinate grid in the view.

Click View menu, click [Zoom Out] button, and then click the left mouse button to zoom out the view centered on the click position.

Click View menu, click [Zoom In] button, and then click the left mouse button to zoom in the view centered on the click position.

Zoom All, Show Grids, Zoom Out and Zoom In functions are also available in the view by clicking the right mouse button.

5.3 Earth View

Click View menu, click [Earth View] button, open the earth view interface.

In earth view interface, use the mouse wheel to zoom the display. Use the left mouse button to drag the display and the right mouse button to rotate the display, to adjust the 3D display angle of Earth View.



Figure 5.1 Earth View

5.4 Measurement

Click View menu, click [Distance] button, select two or more points with the left mouse button in the view to measure the distance value, and exit measurement with the right mouse button.

Click View menu, click [Area] button, select three or more points with the left mouse button in the view to measure the area value, and exit measurement with the right mouse button. Click View menu, click [Angle] button, select three or more points with the left mouse button in the view to measure the angle value, and exit measurement with the right mouse button.

Click View menu, click [Clear Results] button to clear all measurement results displayed on the view.

5.5 Windows

Click View menu, click [Work Space] button to show or hide the Work Space window. The Work Space window displays all the data and their relationships in the project, and the display of each data can be configured.

Click View menu, click [Log Info] button to show or hide the Log Info window.

The Log Info window displays errors, warnings and information prompts in the operation.

Click View menu, click [Properties] button to display or hide the Properties window. The Properties window displays the attribute parameters of selected data, and the attribute parameters can be configured in properties window.
6. GNSS

- Import
- Baselines
- Adjustment
- Lists and Charts
- Report

6.1 Import

6.1.1 Import Data

Click GNSS menu, click [Import] button, select GNSS observation files in local path and import them. RINEX format and TRS format are supported, and multiple files selection is supported by CTRL or SHIFT keys.

▼ 新建文件夹					811 👻 🛄	
開片メヘ	名称	修改日期	~ ~	大小		
LATEST 🖈	51800927139857.23c	2023/5/19 16:05	23C 文件	57 KB		
此电脑 🖈	51800927139G12.23c	2023/5/19 16:05	23C 文件	25 KB		
2.4.7.0 -release	51800940139C07.23c	2023/5/19 15:57	23C 文件	68 KB		
4. User Manua	51800940139G19.23c	2023/5/19 15:57	23C 文件	25 KB		
2024-01	51804793139C22.23c	2023/5/19 15:57	23C 文件	59 KB		
Nume DVE	51808130139C39.23c	2023/5/19 15:56	23C 文件	70 KB		
INDWATEAF	51808132139C28.23c	2023/5/19 15:55	23C 文件	64 KB		
WPS云盘	51808134139C41.23c	2023/5/19 15:54	23C 文件	63 KB		
OneDrive	51800927139B57.23g	2023/5/19 16:05	23G 文件	19 KB		
chebrive	51800927139G12.23g	2023/5/19 16:05	23G 文件	9 KB		
XH	51800940139C07.23g	2023/5/19 15:57	23G 文件	25 KB		
此电脑	51800940139G19.23g	2023/5/19 15:57	23G 文件	6 KB		
3D 对象	51804793139C22.23g	2023/5/19 15:57	23G 文件	22 KB		
Deskton	51808130139C39.23g	2023/5/19 15:56	23G 文件	23 KB		
HUR	51808132139C28.23g	2023/5/19 15:55	23G 文件	28 KB		
DEAR	51808134139C41.23g	2023/5/19 15:54	23G 文件	24 KB		
國片	51800927139857.23	2023/5/19 16:05	23L 文件	52 KB		
文档	51800927139G12.23l	2023/5/19 16:05	23L 文件	24 KB		
下载	51800940139C07.23l	2023/5/19 15:57	23L 文件	77 KB		
音乐	51800940139G19.23I	2023/5/19 15:57	23L 文件	24 KB		
Windows OS (51804793139C22.23I	2023/5/19 15:57	23L 文件	67 KB		
T (T (D))	51808130139C39.23I	2023/5/19 15:56	23L 文件	79 KB		
89282 (E-)	51808132139C28.23l	2023/5/19 15:55	23L 文件	74 KB		
, sodw (E:)	51808134139C41.23I	2023/5/19 15:54	23L 文件	82 KB		

Figure 6.1 Import GNSS Data

Click Open to start importing the selected files, wait for the process bar to complete.

🖮 Processing		
Alg data in conver	sion	
	10%]
	Stop	

Figure 6.2 Import Data Process Bar

After importing files, if the coordinate system of current project has not been configured, the software will prompt and ask whether to set Transverse Mercator as the default projection. If the central meridian of the configured coordinate system for current project differs greatly from the sites in imported files, the software will prompt whether to modify the central meridian , then the coordinates system configuration dialog will be opened and the central meridian will be set to the average longitude of sites if you click Yes.



Figure 6.3 Prompt for Editing Central Meridian

After importing GNSS files and configuring the correct coordinate system parameters, a graphical representation of the sites, baselines and their relationships will be displayed in projection coordinates in the view interface. Items of sites, files, baselines and loops will be displayed in Work Space window. If a site or baseline is selected in view, the item in work space window will be highlighted and more information will be displayed in properties window.



Figure 6.4 After Data Import

Click GNSS menu, click [Files] button, to display imported GNSS observation files in list. Click to select files in the Files list, to display and modify Site Name, Receiver information and Antenna parameters of the selected file.

t Configuration Import ipace GNSS_demo_import tgo2 Sites • Sites	C C C	onfiguration	-	Contractor	1												
t Remove Files Proces: Tagent goade GNS5_demo_import.tgo2 Sites • 9 7775	s C Jasel	lear Results		an Contragoration	E Stes	L.	ops 🖹 Residual	B									
Space GNSS_demo_import.tgo2 Sites • Sites	20561 (R) (S)		Adjustr	nent 📌 Clear Results	B-Baselin	ies 🖪 Fi	les 🛛 📰 Time Cha	ft Reports									
GNSS_demo_importigo2 Sites 7776		ines		Majusteest		Lists e	ao coerts	Represe t								Properties	
 Sites 7776 	-	View GN	SS X													∧ Site	
- O 7776			ID	File	Type	Site	Start Time	End Time	Duration	Measure to	Intenna Meas(m	Antenna Hgt(m)	Manufacturers	Antenna	Serial Number	Site Name 777	6
E 7770 00		Files	1 3	51800927139857.230	Static	A1 2	023-05-19 01:57:41	2023-05-19 04:57:42	03:00:01.000	Ant Bottom	1.384	1.384	Unknown	ADVNULL	Unknown		
# 0 A1		•													110000000	A Receiver	
E 51800927139857.23	30	Sites	4 3	1000927 1396 12.230	OTHIC	AI 2	023-05-19 00.12.32	2023-05-19 07.09.21	00.55,49.000	Ant Bottom	1.304	1.304	Oliviowi	ADVNULL	Oliviowi	Ordel Humber	(
51800927139G12.23	30	∇	3 8	51800940139C07.230	Static	A2 2	023-05-19 02:07:13	2023-05-19 06:16:39	04:09:26.000	Ant Bottom	0.244	0.244	Unknown	ADVNULL	Unknown	Senal Number	
 A2 E1900040120C07.2 	20	Baselines	4 8	51800940139G19.23o	Static	A2 2	023-05-19 06:19:10	2023-05-19 07:09:47	00:50:37.000	Ant Bottom	0.244	0.244	Unknown	ADVNULL	Unknown	Receiver Type	BX40C
51800940139G19.2	30			400 4703430000 03-	Challer	-			04-27-40-000	fail Dallars	4.004	4 004	Unimar	4704884	1 Internet	Receiver Version	n
- OB		Loops	5 5	1004/93139022.230	OSAUC	UN 2	023-03-19 02.2 1.46	2023-05-19 00.59.36	04.37.46.000	Ant Bottom	1.034	1.034	Oliviowi	ADVNULL	Onnown		
E 51808134139C41.23	30		6 5	51808130139C39.230	Static	PL 2	023-05-19 02:38:57	2023-05-19 07:20:02	04:41:05.000	Ant Bottom	1.894	1.894	Unknown	ADVNULL	Unknown	Antenna	
= 51804793139C22.2	30		7 8	51808132139C28.23o	Static	DR 2	023-05-19 02:28:01	2023-05-19 07:22:14	04:54:13.000	Ant Bottom	1.894	1.894	Unknown	ADVNULL	Unknown	Managements	
* • DR				1000124120041226	Otalic	00 2	022-06-10 02-41-01	2022-05-10 07-17-25	04:26:24:000	Ant Bottom	1 90.4	1 004	Unknown	ADVANUEL	Unknown	measure to	ALL DOLLOS
E 51808132139C28.23	30			1000134133041.230	Charte	00 1	025-05-15-02.41.01	2020-00-10-01-11-00	04.50.54.000	Pen Doson	1.034	1.054	Ginarouni	ADVITULE	Chinician	Antenna Measur	red(m) 1.95
 PL Execention 	24		9	7776_save.23o	Static	7776 2	023-05-19 03:59:14	2023-05-19 07:42:03	03:42:49.000	Ant Bottom	1.95	1.96	Tersus GNSS	TRSOSCA	Unknown	Antenna Height((m) 1.96
7 Baselines	30															Sarial Number	
V BL_1[51800927139857	7.23															Contain Humber	
BL_2[5180092713985]	7.23															Manufacturer	Tersus GRES In
V BL_3 5180092713985	7.23															Antenna Type	TRSOSCAREU
V BL_5[5180092713985"	7.23																
V BL_6 [51800927139857	7.23																
V BL_7 [51800927139G1:	2.23															Apply to: Current I	File *
V BL 9151800927139G1	2 23																
V BL_10 [51800927139G	12.2															Antenna Measu	arement
V BL_11 [51800927139G	12.2															Antenna Height	t
V BL_12[51800927139G	12.2															Antenna Type	
V BL_13[5180092/1396	12.2																
V BL 15151800940139C	07.2																
V BL 161518009401390	07.2																
V BL_17 [51800940139C	07.2																
V BL_18 [51800940139C	07.2																
V BL_19 [51800940139G	19.2																
V BL_20 [51800940139G	19.2																
V BL_21 [51800940139G	19.2																
V BL_22[51800940139G	19.2																
V BL_23[51800940139G	19.2																
V BL_24 51804793139C	22.2																
V BL_25[51804793139C	22.2																
V BL_26[51804793139C	22.2																
V BL_2/151804793139C	22.2																
V BL_28 [51808130139C:	39.2																

Figure 6.5 Files List

When modifying antenna parameters, select [Measure to] [Ant Bottom], which means the vertical height from the ground point to the antenna bottom, or [Slant Height], which means the slant distance from the ground point to 13cm length measuring board. Enter [Antenna Measured], that is the reading in antenna measurement, and the software will automatically calculate [Antenna Height] of the antenna reference point. Select the correct antenna [Manufacturer] and [Antenna Type] for software to calculate the antenna phase center height. After modification, choose to apply to the current file or other more files.

Measure to	Ant Bottom	*
Antenna Measured(m)	1.96	
Antenna Height(m)	1.96	
Serial Number		
Manufacturer	Tersus GNSS Inc	*
Antenna Type	TRSOSCAREU	. *
	TRSAX3702 TRSAX3706 TRSAX4E02 TRSLUKA	
Apply to: Current File	TRSOSCAREU TRSOSCAREU2	
Antenna Measuremei	nt	_
🗌 Antenna Height		
Antonna Tyno		

Figure 6.6 Antenna Parameters Modifying

6.1.2 Import Configuration

_

Click GNSS menu, click import configuration, open the import configuration dialog, where to edit parameters of baselines rules, sites merging rules and loops rules.

Baselines Generation Rules	
Minimum TimeSpan of Baselines:	60 🗘 s
Maximum Baseline Length:	1000 🗘 km
ites Generation Rule	
Sites Location Priority Use:	RINEX File Header Posit 👻
Sites Merging Maximum Distance:	100 🗘 m
oops Generation Rules	
Minimum Sync Time:	600 🗘 s

Figure 6.7 Import Configuration

	Minimum Time	The default is 60 seconds. Software will not generate a
Decelines	Span of	baseline between sites if the synchronization time of sites
Concration	Baselines	is less than this configured threshold.
Buloc	Movimum	The default is 1000 km. Software will not generate a
Rules	Receipe Length	baseline between sites if the distance is greater than this
	Daseline Lengin	configured threshold.
		The default is Autonomous Position, which means the
		calculated value of the autonomous position in the
Sites	Siton Location	observation files will be used as the sites coordinates. It
Generation		could be changed to RINEX File Header Position, which
Rules	Phoney Use	means the calculation of approximate coordinates in
		RINEX file header if recorded will be used as the sites
		coordinates.

The default is 100 meters. When importing two or more files recorded as the same site name, and the distance between their autonomous positions is less than this configured threshold, software will consider the files are observed on the same site at different times and record Sites Merging them under one site in work space window.

Maximum

Distance When importing two or more files recorded at the same name, and the distance between their autonomous position is greater than this configured threshold, software will consider the files are not observed on the same site but wrongly recorded as the same name, then will automatically rename it as a different site.

Loops Minimum Sync Generation Rules Time Rules The default is 600 seconds. If the synchronization time of the three baselines or the three sites that make up the closed loop is greater than this this configured threshold, software will consider the loop to be a synchronous loop, otherwise it is an asynchronous loop.

6.1.3 Remove Files

Click GNSS menu, click remove files, to clear all GNSS data in the current project.

6.2 Baselines

6.2.1 Baselines Process

After importing GNSS files and completing modification, click GNSS menu, click [Process] button, to process all baselines.

🖶 Processing		×
BL_16 Process compl	eted.	
	Stop	

Figure 6.8 Baseline Process

Wait for the process bar to complete. After baselines process, baselines will be displayed in different colors in view interface to indicator that baselines have been processed. Click [Baselines] under GNSS menu, to show baselines parameters in list.

😁 Tersus Geo Office 2 (x64)GNSS_	demo_bas	eline.tgo2																		-	σ	×
File Project View GNSS	Roads	Point Clo	uds 1	ools Suppor	t																	
Configuration 🗸	7 @ Co	infiguration	4	. O Contig	uration	De Siles	Eg Loops	Residual														
Import Remove Files Proce	ess 🖊 Cli	ear Results	Adjust	ment 🔶 Clear	Results	By Baselines	Files	E Time Char	Reports_													
Ingert Work Space	Baselin	nes		Mjustneat			Lists and C	herts	Report										Properties			63.00
* 🗟 GNSS_demo_baseline.tgo2		View Gr	ISS X																			
 Sites 			ID	Baseline ID	Туре	Start	End	Status	Duration	Ratio	:MS(mm	Passed	Dx(m)	StdDx(m)	Dy(m)	StdDy(m)	Dz(m)	*				
BL_1 [518009271396	B57.230 -	Files	1	BL_1	Static	A1	A2	Fixed	02:50:00.000	5.3	5.9	Passed	-17.4691	0.0034	-10.9103	0.0045	0.475					
BL_2 [51800927139E	857.230 -	Sites	12	BL_2	Static	A1	DN	Fixed	02:35:00.000	9.1	8.5	Passed	-37.6766	0.0046	-25.124	0.0067	-41.6431					
BL_4[51800927139E	B57.230 -		23	BL_3	Static	A1	PL	Fixed	02:18:00.000	4.5	8	Passed	28.2073	0.0082	25.0373	0.0084	-55.1658					
BL_5[51800927139E	B57.230 -	Baselines	28	BL_4	Static	A1	DR	Fixed	02:29:00.000	6.4	9.8	Passed	49.57	0.0058	3.7838	0.0091	-6.6988					
BL_7[518009271390	G12.230 -		29	BL 5	Static	A1	DB	Fixed	02:16:00.000	81	10.8	Passed	-3.61	0.0054	-38 5983	0.0058	6,9939					
BL_8 [518009271390	G12.230 -	Loops	30	BL 6	Static	A1	7776	Fixed	00.58.00.000	163	9	Passed	-16.0168	0.0212	-12 5862	0.0258	8 4 4 3 3					
BL_10 [51800927135	9G12.230		21	DI 7	Otolic	41	42	Etrad	00-04-00-000	6.4	6.4	Parred	47.4674	0.0025	-10.0195	0.0042	0.4657					
BL_11 [51800927139	9G12.230		31	DL_/	our	-	742	Filled	00.04.00.000	3.4	0,4	Passed	-17.4074	0.0025	-10.9165	0.0042	0.4007					
BL_13 [51800927135	9G12.230		32	BL_8	S1900	A1	AZ	Fixed	00:50:00.000	4.5	6.3	Passed	-17.4649	0.0024	-10.9239	0.0038	0.4682					
G BL_14[51800940135	9C07.230		33	BL_9	Static	A1	DN	Fixed	00:47:00.000	4.4	8.1	Passed	-37.6699	0.0033	-25.1298	0.0049	-41.6513					
BL_16[51800940139	9C07.230		2	BL_10	Static	A1	PL	Fixed	00:56:00.000	3	6.3	Passed	28.2175	0.004	25.0295	0.0033	-55.1717					
V6 BL_17 [51800940135 V6 BL_18 [51800940135	9C07.236 9C07.236		3	BL_11	Static	A1	DR	Fixed	00:56:00.000	4.6	10.9	Passed	49.5765	0.0029	3.7798	0.0074	-6.699					
BL_19[51800940135	9G19.230		4	BL_12	Static	A1	DB	Fixed	00:56:00.000	3.9	11.8	Passed	-3.6184	0.004	-38.5748	0.007	7.016					
BL_20 [51800940135	9G19.230		5	BL_13	Static	A1	7776	Fixed	00:56:00.000	105.6	6	Passed	-15.4455	0.0085	-12.0184	0.0129	6.6958					
BL_22 [51800940135	9619.230		6	BL_14	Static	A2	DN	Fixed	03:54:00.000	8.2	8.8	Passed	-20.2089	0.0033	-14,2128	0.0061	-42.1168					
BL_24[51804793135	9G19,230 9C22.230		7	BL_15	Static	A2	PL	Fixed	03:37:00.000	3.1	8.2	Passed	45.6728	0.0074	35.9516	0.0073	-55.6378					
BL_25[51804793135	9C22.230		8	BL_16	Static	A2	DR	Fixed	03:48:00.000	4.5	10.6	Passed	67.0373	0.0041	14.701	0.0097	-7.1623					
BL_27 [51804793135	9C22.230		9	BL 17	Static	A2	DB	Fixed	03:35:00.000	7.6	11.2	Passed	13.8573	0.0052	-27,6814	0.0112	6.5238					
BL_28 [51808130135	9C39.230		10	BI 18	Static	A2	7776	Fixed	02 17 00 000	114.2	73	Passed	2 8795	0.0017	-1.901	0.0023	7.2531					
BL_30 [51808130135	9039.230		- 11	EI 10	Otalic	42	DN	Fixed	00:40:00.000	4	9.6	Parred	-20.206	0.0042	-14 2126	0.0066	.42 1100					
V BL_31 [51808132139 V BL 32 [51808132139	9C28.230 9C28.230		42	00_10	Otaria	10		Flored	00.40.00.000		7.4	Desered	45 0007	0.0042	05.0400	0.0000	-42.1100					
BL_33 [51808134135	9C41.230		15	BL_20	State	~	PL.	Fitted	00.50.00.000	0.0	7.1	Passed	45.0037	0.0046	33.9490	0.0051	-00/0380					
Loops			14	BL_21	Stanc	A2	DR	Fred	00:50:00.000	2.5	11	Passed	67.0383	0.0021	14.702	0.0051	-7.1657					
			15	BL_22	Static	A2	DB	Fixed	00:50:00.000	3.6	12.2	Passed	13.843	0.0078	-27.6548	0.0084	6.5477					
			16	BL_23	Static	A2	7776	Fixed	00:50:00.000	326.1	6.6	Passed	2.0771	0.0023	-0.8146	0.0042	6.1034					
			17	BL_24	Static	DN	PL	Fixed	04:20:00.000	6.7	9.9	Passed	65.8838	0.0053	50.1627	0.0066	-13.5179					
			18	BL_25	Static	DN	DR	Fixed	04:31:00.000	8.5	10.4	Passed	87.2397	0.0054	28.9182	0.0154	34.9601					
			19	BL_26	Static	DN	DB	Fixed	04:18:00.000	11.4	11.3	Passed	34.0665	0.0101	-13.4704	0.0168	48.6412					
			20	BL_27	Static	DN	7776	Fixed	03:00:00.000	244.9	11.9	Passed	21.9976	0.0123	12.7914	0.0191	49.2014					
			4															1.1				

Figure 6.9 Baseline List

Select one or several baselines in view interface or work space window, click the right mouse button to process only selected baselines.

6.2.2 Residual Process

After baselines process, if some of baselines solution cannot get fixed, or RMS values in baselines solution are large, select the baseline and right-click on [Residual Plot] to open residual plot of the selected baseline to process and improve the precision.



Figure 6.10 Residual Plot

In the residual plot interface, the upper part shows the observation of each satellite and frequency, the lower part shows the residual of satellites compared with the reference satellite in each epoch during the baseline processing. The residual of each satellite can be displayed by clicking on the satellite number in the lower part or by clicking [Previous] and [Next] buttons. The displayed residuals can be zoomed on the vertical axis by using the mouse wheel.

According to the residuals, disable or enable the satellite by click the check box before satellite name in the upper part. Or click and drag to draw a box on the satellite observation data bar to delete the observation data corresponding to the larger part of the residuals. After residuals process, click [Process] to re-process the baseline and check the change in RMS value to see if a higher precision result is obtained.



Figure 6.11 Satellites and Observation Process

6.2.3 Process Configuration

Click GNSS menu, click Process Configuration, open the process configuration dialog, where to edit parameters of baseline process, atmospheric model and baseline processing quality thresholds.

Observations Elevation Mask(*) 10.00	
Elevation Mask(*) 10.00	
Systems V GPS V GLO V BDS V GAL V QZ	S
Interval 60	
Frd X 0	
Frd Y 0	
Frd Z 0	
Accuracy Mode Extremely Reliable	-

Figure 6.12 Process Configuration

	Elevation	The default is 10 degrees. Only satellites with elevation
	Maak	angle greater than this configured threshold will be
	IVIASK	computed during baseline process.
General	Systems	Satellite system used in baseline process.
Observations		The default is 60 seconds. Sampling the observation
	Intorval	data for processing according to the configured interval,
	Interval	and the smaller the sampling interval, the larger amount
		of processed data.

	Frd X /Y / Z	Not configurable.
		The algorithm strategy during baseline process. The
	Acquiracy	options are Rapid Fix, Balanced and Extremely
	Accuracy	Reliable. Rapid Fix, software will prioritize solutions
	Mode	where baselines get fixed. Extremely Reliable, software
		will prioritize the accuracy when baselines are fixed.
Brocoss	Drococc	The options are Auto, Static and PPK. When Auto is
Process	Mada	selected, software will select static or PPK mode
Process mode	Mode	according to the observation file type.
Atmospheric	Troposphere	Not configurable. The Hopfield tropospheric model is
Model	Model	used during baseline process.
Meteorological	Temp / Press	Not configurable. The default parameters is used during
Data	/ Humid	baseline process.
		The default is 0.04 m. If the RMS value in processing
Advanced	RMS Limit	The default is 0.04 m. If the RMS value in processing result is greater than this configured threshold, software
Advanced Quality	RMS Limit	The default is 0.04 m. If the RMS value in processing result is greater than this configured threshold, software will consider it fails.
Advanced Quality Control	RMS Limit	The default is 0.04 m. If the RMS value in processing result is greater than this configured threshold, software will consider it fails. Not configurable. Software automatically determines the
Advanced Quality Control	RMS Limit	The default is 0.04 m. If the RMS value in processing result is greater than this configured threshold, software will consider it fails. Not configurable. Software automatically determines the combination of frequencies during baseline process.
Advanced Quality Control	RMS Limit Frequency Use LC	The default is 0.04 m. If the RMS value in processing result is greater than this configured threshold, software will consider it fails. Not configurable. Software automatically determines the combination of frequencies during baseline process. Not configurable. Software uses a combination of LC

6.2.4 Clear Process Results

Click Clear Process Results under GNSS menu, to clear the processing results of all baselines and revert to the state when they were not processed.

6.3 Adjustment

6.3.1 Constraints

After baseline processing and before network adjustment, if there are sites with known coordinates, click [Sites] button under GNSS menu and select the sites in the list, then click [Constraint] in Properties window to enter known coordinates.

Basic	Const					
Con	straint Local NEh	•	Reset			
WG	S84 Lat(DDMMSS)	31°11′25.49	0976 " N			
WG	S84 Lon(DDMMSS)	121°35′35.4	478420″E			
WG	S84 Hgt(m)	40.2785				
WG	S8 <mark>4</mark> X(m)	-2860998.1	608			
WG	S84 Y(m)	4651725.1786				
WG	S84 Z(m)	3283992.30	008			
Loc	al Lat(DDMMSS)	31°11′25.49	0976" <mark>N</mark>			
Loc	al Lon(DDMMSS)	121°35'35.478420"E				
Loc	al Hgt(m)	40.2785				
Loc	al N(m)	3452237.3	288			
Loc	al E(m)	556539.61	5			
Loc	cal Alt(m)	40.2785				

Figure 6.13 Known Coordinates

According to the adjustment requirements and known coordinates, select to input WGS84 XYZ coordinates, WGS84 Lat/Lon/H coordinates, Local Lat/Lon/H coordinates or Local N/E/h coordinates. Save the constraints and the sites with known coordinates will be marked by red triangle in the sites list.

le F	roject View	GNSS	Roads	Point Clou	ids Tools	Support												
fi) nport	Configuration Remove Files	Process	© Co	nfiguration ar Results	Adjustment	Clear Results	By Baselines	Na Loops 🕞 F	tesidual ime Chart Re	sports_								
ork Space R 20	e 14 09 13 10 52 1	16.1go2	88	View GN	ss 🗙												Properties Basic Const	8
	Sites				ID onstra	ir Site	Local N(m)	Local E(m)	Local Alt(m)	Local Lon(DDMMSS)	Local Lat(DDMMSS)	Local Hgt(m)	WG\$84 X(m)	WG\$84 Y(m)	WG\$84 Z(m)	VG\$84 Lon(DDMI		- 0.00
	8 7776_save	230		Files	1											121135/35.478420	Constraint Local NER	* Reset
*	 A1 Exception 	20057.02-		Siles	2	A1	3452229.4942	556519.93	38.4612	121*35'34.733373'E	31*11/25.240026*N	38.4612	-2860982.6408	4651737.5979	3283984.748	121*35'34.733373	110004 Lai(DDNM00)	51 1125.49097014
	518009271	39G12.230	, ,		3	A2	3452230.0492	556540.5501	38.5947	121*35'35.512261'E	31*11'25.254457'N	38.5947	-2861000.1457	4651726.6956	3283985.1973	121*35'35.512261	WGS84 Lon(DDMMSS	121*35'35.478420'E
-	A2			Baselines	4	DB	3452251.699	556543.1301	15.5219	121*35'35.614088'E	31°11'25.956932'N	15.5219	-2860986.2321	4651698.9271	3283991.7559	121'35'35.614088	WGS84 Hgt(m)	40.2785
	8 518009401	39G19.230	5		5	DN	3452194 9541	556565 3871	15 4327	121*35/36 4431927E	31*11/24 110993/N	15 4327	-2861020 3146	4551712 4405	3283943.0761	121*35/35 443192	WGS84 X(m)	-2860998.1608
*	CE DE			Loops	0	00	0450005 0047	550,550,5611	45 5045	121 33 30 443 122 C	2414402 42227001	45 5045	-2001020.0140	1001712.4400	2002070.0400	121 33 30.443 124	WGS84 Y(m)	4651725.1786
-	DN	39041.230			0	UR	3452235.3047	000470.0903	15.5315	121 35 33.064011 E	31 1125.43637814	10.0310	-2860933.0762	4051/41.3/08	3283978.0462	121 35 33.064011	WGS84 Z(m)	3283992.3008
	8 518047931	39C22.230	•		7	PL	3452178.7081	556483.0634	15.492	121*35'33.330/25'E	31*1123.597523*N	15.492	-2860954.4384	4651762.631	3283929.5788	121*35*33.330725	Local Lat(DDMMSS)	31°11'25.490976'N
	518081321	39C28.234															Local Lon(DDMMSS)	121"35'35.478420'E
*	PL 519091301	10010 22/															Local Hot(m)	40.2785
- 7	Baselines																Local N(m)	2452227 2289
	BL_1[518009	27139857.	23														Locaritony	0402207-0200
	BL_3 [518009	27139857.	23														LOCALE(M)	556539.615
	BL_4[518009	27139857.	23														Local Alt(m)	40.2785
	BL_6 [518009	27139B57.	23															
	BL_7 [5180090	27139G12.	23															
	BL_9[518009	27139G12.	23															
	BL_10[51800	927139G1	2.2															
	BL 12[51800	927139G12	2.2															
	BL_13 51800	927139G1	2.2															
	G BL_14 [51800	940139C07	7.2															
	V6 BL_15[51800	940139C0	7.2															
	BL 17 [51800	940139C0	7.2															
	G BL_18 51800	940139C0	7.2															
	BL_19 [51800	940139G1	9.2															
	V6 BL_20 [51800	940139G19	9.2															
	BL_22 51800	940139G1	9.2															
	G BL_23 51800	940139G19	9.2															
	BL_24 [51804	793139C2	2.2															
	V BL_25[51804	79313902	22															
	BL_27 [51804	793139C2	2.2															

Figure 6.14 Site with Constraints

6.3.2 Adjustment

Click [Adjustment] button under GNSS menu, open the adjustment dialog. Select Auto and click [Adjust], then software will perform network adjustment and generate reports according to the constraints.

If there are no constraints, software only perform free network adjustment and generates Free Network Adjustment Report. If there are WGS84 XYZ coordinates, WGS84 Lat/Lon/H coordinates, Local Lat/Lon/H coordinates or Local N/E/h coordinates as constraints, software will perform free network adjustment and constraint 3D adjustment, then generates Free Network Adjustment Report and Constraint 3D Adjustment Report.

Adio	Configuration
🔿 Manual - Free Network Adjustment	
Manual - 3D Constraint	djust
🔿 Manual - 2D Constraint 🔸 🗌 Height Fitting 📃 💌	
Free Network Adjustment Report	Report
	Directory
	Cancel
Auto: Automatically adjustment based on constraints	
Auto Automatically adjustment based on constraints.	
Manual- Free Adjustment: No need for constraint points.	
Manual- Free Adjustment: No need for constraint points. Manual- 3D Constraint: At least 1 constraint point in local system o	r in WGS84.



Click [Configuration] to open adjustment configuration dialog to modify the parameters during adjustment. Click [Adjust] in adjustment dialog to redo the adjustment. After adjustment, according to requirements and known coordinates, select report and click [Report] to view the report in the browser. Click [Directory] to open the directory where the reports is located. After adjustment, the coordinates in sites list will be displayed according to the adjustment results.

6.3.3 Adjustment Configuration

Click GNSS menu, click adjustment configuration, open the adjustment configuration dialog, where to edit parameters of quality threshold, weights and free network adjustment strategy during adjustment.

Quality	
Enable non-Fixed Baseline	No 👻
Confidence Leval	2 sigma 👻 95.45 %
D Biased	
Adjust 7 Parameters	No
Veighted Strategies	
Weighting	Variance/Covariance Matri. 💌
D Free	
Free Adjustment	Rank Defect Free 💌

Figure 6.16 Adjustment Configuration

Enable	
non-Fixed	The default is No, indicating that the non-fixed baselines will not
Baseline	participate in the network adjustment calculation.
Confidence	The default is 2 sigma, optional 1 / 2 / 3 sigma, indicating confidence
Level	requirements in chi-square test in adjustment.
Adjust 7	
Parameters	Not configurable, indicating that 7 parameters are not used in adjustment.
	The default is Variance / Covariance Matrix, can be changed to Fixed
Weighting	Standard and enter parameters, indicating baseline weighting strategy in
	adjustment.
_	The default is Rank Defect Free, can be changed to Fixed One Point,
Free	indicating whether the coordinates of a site are fixed in free network
Adjustment	adjustment.

6.3.4 Clear Adjustment Results

Click clear adjustment results to clear the results of adjustment and revert to the state when no adjustment was performed.

6.4 Lists and Charts

6.4.1 Sites

Click [Sites] button under GNSS menu, to display sites and sites information in list.

	ID	Constraint	Site	Local N(m)	Local E(m)	Local Alt(m)	.ocal Lon(DD MM SS	Local Lat(DD MM SS)	Local Hgt(m)	WGS84 X(m)	WGS84 Y(m)	WGS84 Z(m)	/GS84 Lon(DE
Files	1		7776	3452240.8901	556540.8217	53.2204	121°35'35.5247160	31°11′25.60639200	53.2204	-2861004.0405	4651732.3987	3284002.0440	121°35′35.524
Sites	2		A1	3452232.8782	556521.5772	51.8220	121°35′34.7962669	31°11'25.34961190	51.8220	-2860989.1312	4651744.9723	3283994.5545	121°35′34.796
∇	3												
Baselines	4		DB	3452255.0376	556544.7571	28.9421	121°35′35.6762131	31°11'26.06504610	28.9421	-2860992.7441	4651706.3754	3284001.5544	121°35′35.676
Loops	5		DN	3452198.3561	556567.0173	28.8285	121°35′36.5054489	31°11'24.22084120	28.8285	-2861026.8042	4651719.8457	3283952.9076	121°35′36.505
Loopo	6		DR	3452238.6906	556477.3365	28.8934	121*35'33.1265670	31°11'25.54602710	28.8934	-2860939.5589	4651748.7558	3283987.8550	121"35'33.126
	7		PL	3452182.0970	556484,7029	28.8503	121*35'33.3933333	31*11'23.70726770	28.8503	-2860960.9199	4651770.0055	3283939.3881	121*35'33.393

Figure 6.17 Sites List

Click to select sites, information and constraints can be modified in properties window. Right mouse click, to open site report, open site report directory or delete the site.

Local Alt(m)	.ocal Lon(DD MM	SS Local Lat(DD MM SS)	Local Hgt(m)	WGS84 X(m)	W
53.2204	121°35′35.5247160	31°11′25.60639200	53.2204	-2861004.0405	465
51.8220	121°35′34.7962669	31°11′25.34961190	51.8220	-2860989.1312	465
	121*35'35.5744581	31°11′25.36496490			465
28.9421	121°35′35.6762	Open Site Report	1421	-2860992.7441	465
28.8285	121°35'36.5054	Delete	1285	-2861026.8042	465
28.8934	121°35′33.1265670	31°11′25.54602710	28.8934	-2860939.5589	465
28.8503	121°35'33.3933333	31°11′23.70726770	28.8503	-2860960.9199	465

Figure 6.18 Sites Right Mouse Click

Open Site	View site report in browser, containing sites information and coordinates
Report	view site report in browser, containing sites information and coordinates.
Open Site	
Report	Open the directory where the site report is located.
Directory	
Delete	Delete selected site, associated observation files, baselines and loops.

6.4.2 Baselines

Click [Baselines] button under GNSS menu, to display baselines and information in list.

	ID	Baseline ID	Туре	Start	End	Status	Duration	Ratio	RMS(mm)	Passed	Dx(m)	StdDx(m)	Dy(m)	StdDy(m)	Dz(m)
Files	1	BL_1	Static	A1	A2	Fixed	02:50:00.000	5.3	5.9	Passed	-17.4691	0.0034	-10.9103	0.0045	0.475
Sites	12	BL_2	Static	A1	DN	Fixed	02:35:00.000	9.1	8.5	Passed	-37.6766	0.0046	-25.124	0.0067	-41.6431
∇	23	BL_3	Static	A1	PL	Fixed	02:18:00.000	4.5	8	Passed	28.2073	0.0082	25.0373	0.0084	-55.1658
aselines	28	BL_4	Static	A1	DR	Fixed	02:29:00.000	6.4	9.8	Passed	49.57	0.0068	3.7838	0.0091	-6.6988
Loops	29	BL_5	Static	A1	DB	Fixed	02:16:00.000	8.1	10.8	Passed	-3.61	0.0054	-38.5983	0.0058	6.9939
	30	BL_6	Static	A1	7776	Fixed	00:58:00.000	163	9	Passed	-16.0168	0.0212	-12.5862	0.0258	8.4433
	31	BL_7	Static	A1	A2	Fixed	00:04:00.000	5.4	5.4	Passed	-17.4674	0.0025	-10.9185	0.0042	0.4657
	32	BL_8	Static	A1	A2	Fixed	00:50:00.000	4.5	6.3	Passed	-17.4649	0.0024	-10.9239	0.0038	0.4682
	33	BL_9	Static	A1	DN	Fixed	00:47:00.000	4.4	8.1	Passed	-37.6699	0.0033	-25.1298	0.0049	-41.6513
	2	BL 10	Static	A1	PL	Fixed	00:56:00.000	3	6.3	Passed	28,2175	0.004	25.0296	0.0033	-55,1717

Figure 6.19 Baselines List

Right mouse click, to manipulate the selected baselines in the menu.

	ID	Baseline ID	Туре	Start	End	Status	Duration	Ratio	RMS(mm)	Passed	Dx(m)	StdDx(m)	Dy(m
Files	1	BL_1	Static	A1	A2	Fixed	02:50:00.000	5.3	5.9	Passed	-17.4691	0.0034	-10.910
Sites	12	BL_2	Static	A1	DN	Fixed	02:35:00.000	9.1	8.5	Passed	-37.6766	0.0046	-25.12
∇	23	BL_3	Static	A1	PL	Fixed	02:18:00.000	4.5	8	Passed	28.2073	0.0082	25.037
aselines	28	BL_4	Static	A1	DR	Fixed	02:29:00.000	6.4	9.8	Passed	49.57	0.0068	3.783
	29	8L_5	Static	A1	DB	Fixed	02:16:00.000		10.8	Passed	-3.61	0.0054	-38.598
Luopa	30								Revert			0.0212	
	31	BL_7	Static	A1	A2	Fixed	00:04:00.000	5.4	Set Disa	ble		0.0025	-10.918
	32	BL_8	Static	A1	A2	Fixed	00:50:00.000	4.5	Process	Selected Bas	elines	0.0024	-10.923
	33	BL_9	Static	A1	DN	Fixed	00:47:00.000	4.4	Process	Configuratio	n	0.0033	-25.129
	2	BL_10	Static	A1	PL	Fixed	00:56:00.000	3	Open P	ocessing Rep	port	0.004	25.029
	3	BL_11	Static	A1	DR	Fixed	00:56:00.000	4.6	Open P	ocessing Rep	oort Direcroty	0.0029	3.779
	4	BL_12	Static	A1	DB	Fixed	00:56:00.000	3.9	Clear B	seline Proces	sing Results	0.004	-38.574
	5	BL_13	Static	A1	7776	Fixed	00:56:00.000	105.6	Delete		10.1100	0.0085	-12.018
	6	BL_14	Static	A2	DN	Fixed	03:54:00.000	8.2	8.8	Passed	-20.2089	0.0033	-14.212

Figure 6.20 Baselines Right Mouse Click

Revert	Revert baselines direction by change start and end sites.							
Sot Enable/Disable	Enable or disable baselines, disabled baselines do not							
Set Ellable/Disable	participate in processing.							
Process Selected Baselines	Perform baseline process on selected baselines.							
Process All Baselines	Perform baseline process on all baselines.							
Process Configuration	Open baseline process configuration dialog.							
Open Processing Report	Open baseline process report for selected baselines.							
Open Processing	Open directory where baseline process reports are located							
Report Directory	Open directory where baseline process reports are located.							
Clear Baseline	Clear baseling processing results							
Processing Results	Clear baseline processing results.							
Delete	Delete the selected baselines, and corresponding loops.							

6.4.3 Loops

Click [Loops] button under GNSS menu, to display loops and information in list.

	Name	Туре	Quality	Length(m)	X Error(m)	X Error Limit(m)	Y Error(m)	Y Error Limit(m)	Z Error(m)	Z Error Limit(m)	Total Error(m)	Tota *
Files	BL_1			20.6017								
Sites	BL_10			66.8328								
	BL_20			80.4682								
Baselines	∆_C_70	Async	Passed	139.7744	-0.008	0.026	0.011	0.026	0.012	0.026	0.018	
	BL_1			20.6017								
Loops	BL_11			50.1696								
	BL_16			69.0031								
	¹ ² ℃_71	Async	Passed	139.7759	-0.007	0.026	0.012	0.026	0.008	0.026	0.016	
	BL_1			20.6017								
	BL_11			50.1696								
	BL_21			69.0046								
	C_72	Async	Passed	91.6121	0.007	0.026	-0.017	0.026	-0.017	0.026	0.025	

Figure 6.21 Loops List

Right mouse click, to open loop report, open loop report directory or delete the loop.

gth(m)	X Error(m)	X Error Limit(m)	Y Error(m)	Y Error Limit(m)	Z Error(m)	ZI
.6017						
.8328						
4682						
9.7744						
6017			Open Loop Repo	rt .		
1696			Delete	rt Directory		
.0031						
3.7759	-0.007	0.026	0.012	0.026	0.008	

Figure 6.22 Loops Right Mouse Click

	View	loop	report	in	browser,	containing	loops	parameters	and
Open Loop Report									
	inspe	ction i	nformat	ion					

Open Loop

Open the directory where the loop report is located.

Report Directory

Delete Delete selected loops.

6.4.4 Files

Click [Files] button under GNSS menu, to display files and information in list.

View	GNSS	×												
		ID	File	Туре	Site	Start Time	End Time	Duration	Measure to	Antenna Meas(m	Antenna Hgt(m)	Manufacturers	Antenna	Serial Number
Files		1	51800927139B57.23o	Static	A1	2023-05-19 01:57:41	2023-05-19 04:57:42	03:00:01.000	Ant Bottom	1.384	1.384	Unknown	ADVNULL	Unknown
Sites		2	51800927139G12.230	Static	A1	2023-05-19 06:12:32	2023-05-19 07:09:21	00:56:49.000	Ant Bottom	1.384	1.384	Unknown	ADVNULL	Unknown
∇		3	51800940139C07.230	Static	A2	2023-05-19 02:07:13	2023-05-19 06:16:39	04:09:26.000	Ant Bottom	0.244	0.244	Unknown	ADVNULL	Unknown
Baseline	es	4	51800940139G19.230	Static	A2	2023-05-19 06:19:10	2023-05-19 07:09:47	00:50:37.000	Ant Bottom	0.244	0.244	Unknown	ADVNULL	Unknown
Loops		5	51804793139C22.230	Static	DN	2023-05-19 02:21:48	2023-05-19 06:59:36	04:37:48.000	Ant Bottom	1.894	1.894	Unknown	ADVNULL	Unknown
		6	51808130139C39.230	Static	PL	2023-05-19 02:38:57	2023-05-19 07:20:02	04:41:05.000	Ant Bottom	1.894	1.894	Unknown	ADVNULL	Unknown



Right mouse click, to manipulate the selected files in the menu.

art Time	End Time	Duration	Measure to	Intenna Meas(m	Antenna Hgt(m)	Manufa
5-19 01:57:41	2023-05-19 04:57:42	03:00:01.000	Ant Bottom	1.384	1.384	Unkr
5-19 06:12:32		00:56:49.000	Ant Bottom	1 384		
5-19 02:07:13	2023-05-19 06:16:39	Open File	Directory		0.244	Unkr
5-19 06:19:10	2023-05-19 07:09:47	(Open Qu	ality Check Repo	ort	0.244	Unkr
5-19 02:21:48	2023-05-19 06:59:36	Open Qu	ality Check Repo	ort Directory	1.894	Unkr
5-19 02:38:57	2023-05-19 07:20:02	C Delete			1.894	Unkr
5-19 02:28:01	2023-05-19 07:22:14	04:54:13.000	Ant Bottom	1.894	1.894	Unkr
5-19 02:41:01	2023-05-19 07:17:35	04:36:34.000	Ant Bottom	1.894	1.894	Unkr
5-19 03:59:14	2023-05-19 07:42:03	03:42:49 000	Ant Bottom	0	0	Unkr

Figure 6.24 Files Right Mouse Click

Open File View files in notepad.

Open File

Open the directory where the file is located.

Directory

Open Quality View quality check report in browser, containing rate and multi-path

Check Report information.

Open Quality

Check Report Open the directory where the quality check report is located.

Directory

Delete Delete the selected files, corresponding sites and baselines.

6.4.5 Residual

Select the baseline after processed, click [Residual] button under GNSS menu, to display residuals during baseline processing.



Figure 6.25 Residual Plot

In residual interface, modify the satellites and observations according to residuals to improve the precision.

6.4.6 Time Chart

After importing GNSS files, click [Time Chart] button under GNSS menu, to display time and synchronization coverage of files.



Figure 6.26 Time Chart

6.5 Report

6.5.1 Tolerance Configuration

Click GNSS menu, click [Reports] button, and then click [Tolerance Config] in the drop-down menu to open Tolerance Configuration dialog. Configure tolerance parameters, software will calculate error limits of loops according to the fixed error and scaling error to determine whether loops passes or not.

reas	Default *	Level Default	*		Reset
		Fixed Error (mm):	5.00	\$	
		Scaling Error (ppm):	3.00	\$	
	1	Default	OK	ſ	Cancel

Figure 6.27 Tolerance Configuration

6.5.2 Quality Check Report

Select observation file in files list, click [Reports] button under GNSS menu, and then click [Quality Check Report] in the drop-down menu, to open quality check report of selected observation file in the browser, containing rate and multi-path information.

-						
		Quality Check Report				
Basic Info						
Name	Value					
Jser Name	Tersus					
Coordinate Sy	vstem CGCS2000					
Project Name	GNSS_demo_baseline.tgo2					
Distance Unit	m					
Height Unit	m					
		510000 10120 510 22				
		51800940159019.230				
SV	Possible observations(138222)	Actual Observations(127081)	Rate(92%)	MP1(m)	MP2(m)	MP3(m)
G03	1013	1006	99	0.09	0.07	0.16
G04	3038	3030	100	0.14	0.22	0.26
G05	747	742	99	0.06	0.46	0
G06	3038	3038	100	0.02	0.02	0.03
609	3038	2038	100	0.08	0.08	0.05

Figure 6.28 Quality Check Report

6.5.3 Baseline Process Report

Select one or several baselines in baselines list, click [Reports] button under GNSS menu, and then click [Baseline Process Report] in the drop-down menu, to open baseline process report in browser, containing baselines information and processing results.

रहरेक्रिक	
	Baseline Processing Report
Basic Info	
Name	Value
User Name	Terus
Coordinate System	CGCS2000
Project Name	GNSs_demo_baseline.tgo2
Distance Unit	m
Height Unit	m
	Paceline Commany
	Baseline Summary
Baseline Info	
Name	Value
Baseline Number	2
Longest Baseline(m)	BL 3166.8265
Shortest Baseline(m)	BL2:61.5215
Weakest Baseline	BL 3
Weakest Baseline MSE	1/5211

Figure 6.29 Baseline Process Report

6.5.4 Loop Report

After baselines processing, click [Reports] button under GNSS menu, and then click [Loop Report] in the drop-down menu, to open loops report in browser, containing loops parameters and inspection information.

Sync Loop Results		
C_1 (BL, 1(511000927198857.230- >51100940195077.230, BL, 2(511009527198857.230- \$51106793195022.230), BL, 1(4)5100940195077.230- \$51106793195022.230)		
Name	Value	Limit
Туре	Sync Loop	
Quality Check	Passed	
X Error(m)	-0.001	0.002
Y Error[m]	0.001	0.002
Z Error(m)	0.001	0.002
C_2 (BL,1(511000927139857,236->51800940139C07,236), BL_3(51800527139857,236->51808130139C39,236), BL_15(51800940139C07,236->51808130139C39,236))		
Name	Value	Limit
Туре	Sync Loop	
Quality Check	Failed	
X Error[m]	-0.004	0.002
Y Error(m)	0.004	0.002
Z Error(m)	0.003	0.002



6.5.5 Adjustment Report

After network adjustment, click [Reports] button under GNSS menu, and then click [Adjustment Report] in the drop-down menu, to open adjustment report in browser, containing adjustment results and sites coordinates.

5. Adjusted Geodetic	Coordinates	in Local System																			
Site Name	Notes	La	titude(DD MM SS)	Longitude(DD M	M SS)		H(m	0	Lat Error(DI	MM SS)		Lon Error(DD	MM SS)		H Error	(m)	3D Error(m)				
7776		31	11'25.570727100'N	121*35'35.426966	000°E		48.85	32	00*00/00.035	664900*S		000*00/00.0977	50000"W		-4.367	2	5.194				
A1		31	11'25.313946700"N	121°35'34.698516	500°E		47.45	49	00°00'00.000	000700"N		000000000000000000000000000000000000000	00500"E		0.000)	0				
A2		31	11'25.329299800"N	121°35'35.476708	200"E		47.58	32	00°00'00.000	1900200*S		000°00′00.0154	31800"W		-1.208	2	1.2761				
DB		31'	11'26.029381400'N	121*35'35.578462	700°E		24.57	49	00*00/00.044	161400"N		000*00'00.0145	78700"E		-3.380	5	3.6643				
DN		319	11'24.185175400"N	121°35'36.407699	500"E		24,4613		00°00'00.035595400"N			000°00'00.0189	83500"E		-3.778	0	3.9658				
DR		31	11'25.510361500'N	121°35′33.028815	200°E		24.52	62	00°00'00.041202500"S			000°00'00.0765	587200"E		-7.274	9	7.6581				
PL		311	11'23.671600800"N	121*35'33.295582	200"E		24.48	32 00°00'00.051948800'N		948800"N	000°00'00.014413800"W				-5.070	8	5.4313				
 Adjusted Grid Coor 	dinates in Lo	ocal System																			
Site Name		Notes	N(m)	E	(m)			h(m)	N Er	ror(m)	E Erro	r(m)	h	Error(m)		3	D Error(m)				
7776		3452239.7778		5565	556538.2395			48.8532	0.	2479	0.20	60		0.2315			0.3968				
A1			3452231.7659	5565	18.9949			47.4549	0.	0.0757		44		0.0644			0.1184				
A2		3452232.3492		3452232.3492		5565	556539.5964		556539.5964			47.5832	0.	1217	0.10	38		0.1113			0.1949
DB			3452253.9253	5565	42.1749		24.5749		0.2438		0.2369		0.23				0.4115				
DN			3452197.2438	5565	64.4351			24.4613	0.	1882	0.14	53		0.1731			0.2941				
DR			3452237.5783	5564	74.7542			24.5262	0.	2331	0.25	08		0.2513			0.4248				
PL			3452180.9846		82.1207			24.4832	0.	2455	0.17	19		0.1947			0.3574				
7. Weakest Baseline a	nd Site																				
Weakest Base	line		Start End			DX(m)		Std.DX(m)	DY(m)	Std.DY(m)	DZ(m)	Std.DZ(m) Sla	int(m)	MSE(m)	F	elative MSE(m)				
BL_31			51808132139C28.23o -> 51808	134139C41.23o		-53.1825	5	0.0041	-42.3687	0.006	13.7024	0.0056	65	.3631	0.7287		1/95				
Weak	est Site Nam	e	N(m)	N MSE(m)		E(m)		EM	E(m)	Height(m)		Height Error	m)		Sit	e Position M	SE(m)				
	DR		3452238.6907	0.2670		556477.336	54	0.3	055	28.8934		0.3222				0.5181					

Figure 6.31 Adjustment Report

6.5.6 Site Report

Click [Reports] button under GNSS menu, and then click [Site Report] in the drop-down menu, to open sites report in browser, containing sites information and coordinates.

ल्हेड								
				Sites R	eport			
Basic Info								
Name		Value						
Jser Name		Tersus						
Coordinate System		CGCS2000						
Project Name		GNSS_demo_baseline.tr	go2					
Distance Unit		m						
Height Unit		m						
			Geo	detic Coordin	hates in WGS84			
Site Name	Notes	Latitude(DD MM SS)	Longitude(DD MM SS)	H(m)	Lat Error(DD MM SS)	Lon Error(DD MM SS)	H Error(m)	3D Error(m)
7776		31°11'25.606392000"N	121°35'35.524716000"E	53.2204	00°00'00.000547000"N	000°00'00.000547000"E	0.0144	
A1								0.025
A2		31*11'25.349611900'N	121*35'34.796266900'E	51.8220	00*00/00.007649000"N	000*00'00.007459000*E	0.2228	0.025
		31*11'25.349611900'N 31*11'25.364964900'N	121*35'34.796266900'E 121*35'35.574458100'E	51.8220	00°00'00.007649000''N 00°00'00.007117000''N	000*00'00.007459000'E 000*00'00.006902000'E	0.2228	0.025 0.359 0.3333
DB		31°11'25.349611900'N 31°11'25.364964900'N 31°11'26.065046100'N	121°35'35.574458100'E 121°35'35.574458100'E 121°35'35.676213100'E	51.8220 51.9504 28.9421	00°00'00.007649000'N 00°00'00.007117000'N 00°00'00.010552000'N	000°00'00.007459000°E 000°00'00.006902000°E 000°00'00.011283000°E	0.2228 0.2070 0.3112	0.025 0.359 0.3333 0.5124
DB		31*11'25.349611900'N 31*11'25.364964900'N 31*11'26.065046100'N 31*11'26.220841200'N	121*35'34.796266900'E 121*35'35.574458100'E 121*35'35.676213100'E 121*35'35.656213100'E	51.8220 51.9504 28.9421 28.8285	00100100.0076490001N 00100100.0071170001N 00100100.0105520001N 00100100.0092430001N	000°00'00.007459000'E 000°00'00.005902000'E 000°00'00.011283000'E 000°00'00.002761000'E	0.2228 0.2070 0.3112 0.2689	0.025 0.359 0.3333 0.5124 0.43
DB DN DR		3111125.349611900'N 3111125.364964900'N 3111126.065046100'N 3111124.220841200'N 3111125.546027100'N	121'33'34.796266900'E 121'35'35.574458100'E 121'35'35.676213100'E 121'33'36.302448900'E 121'35'33.126567000'E	51.8220 51.9504 28.8421 28.8285 28.8934	00100100.0076490001N 00100100.0071170001N 00100100.0105520001N 00100100.0092430001N 00100100.0101340001N	000*00*00.007459000*E 000*00*00.00690200*E 000*00*00.011283000*E 000*00*00.0076100*E 000*00*00.01159600*E	0.2228 0.2070 0.3112 0.2689 0.3222	0.025 0.359 0.5124 0.43 0.5181



6.5.7 Open the Report Directory

Click [Reports] button under GNSS menu, and then click [Open the Report Directory] in the drop-down menu, to open directory where reports are located in.

7. Roads

- Road File
- Road Design
- Data Lists
- Calculation
- 3D View

7.1 Road File

7.1.1 New Road

Click Roads menu, click [New] button to open New Road dialog. Input the name of the new road and click [OK] to complete the road creation. The new road will be added to the list of roads in Work Space window. Since the parameters of the new road has not been entered yet, the road curve will not be displayed in the view interface.

New Road		
Name	Test Road	

Figure 7.1 New Road

7.1.2 Import Road

Click Roads menu, click [Import] button and select the road file in local path or connected device to import the road if you already have a road .trd file to be edited. After successful import, the imported road will be added to the list of roads in Work Space window and the road curve will be displayed in the view interface.



Figure 7.2 Import Road

7.1.3 Export Road

After finishing the edit and checking the parameters of the road, click [Export] button under Roads menu to export the edited road to the selected local path or connected device, then the road can be field staked in application such as Nuwa software.

7.2 Road Design

7.2.1 Alignment

After creating or importing the road, click [Alignment] button under Roads menu to edit the center line of road in the form.



Figure 7.3 Alignment Parameters

Click the road in the Work Space window, input the start point, offset and other parameters of the road in the Properties window on the right.

Input the road center line parameters in the road design form according to Intersection Method or Elements Method. Then to road center line image will be drawn in the view interface according to the alignment parameters.

7.2.2 Equations

After creating and importing the road, click [Equations] button under Roads menu to edit the parameters of the equations of the road in the form.

7.2.3 Cross Section

File Pro	ject View	GNSS Roa	ads Point Cloud	s Tools	Support												5 1
46	fi Import	Alignment	~ CrossSection	I) Widening	# Structures	Slopes	1* Controls	G Chainage List	Intersection L	st 🕋	17	A					
New Road	Er Export File	•• Equations	P" Vertical	SuperElev Toad Design	Cone Slopes	Slopes Lib	Assist	Coordinate List	Elements Lis	Clothiod C:	I U-Curve Cal Calculation	Oval Line Cal	3D View Sreae				
View C	oss Sections	x															
4																	
				-	1			7	$\overline{\mathbf{T}}$								
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			3			10				8			8		3		
4																	
-20	1	-16		-12		-8	-4		0		4	8		12	16	20	k
Cross Sed	ion X								Cross \$	ections							
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1 Driveware	e widin(m)	-2	0 0	seigni OBSEI(m)	False					1 Driveways	-2	Stope(%) Thic	ness(m) Height On	False			
2 Green Be	t 1	0	0 1		False					2 Driveways 8	-2	0	0	False			
3 Cycle Lan	e 3	0	0 -1		False					3 Green Belt 1	0	0	1	False			
4						1			-	4 Cycle Lane 3	0	0	-1	False			
Set as Righ	t			Insert	Delete	Up Do	wn						Insert Dele	le Up I	Down		Set as Left

Click [Cross Section] button to edit the cross sections parameters of road in the form.



Input parameters of plates, the cross section graphic will be drawn in cross sections view.

7.2.4 Vertical

	View	GN55 R0	Point Clou	us 100(S S	noque			1 -	-							
1	li Import	Alignment	~ CrossSection	Widening	# Structures	Slopes	1+ Controls	Chainage List	Intersection List		17					
dĒ	P Export	•• Equations	P" Vertical	SuperElev	Cone Slopes	Slopes Lib	Red Lines	Coordinate List	Elements List	Clothiod Cal	U-Curve Cal	Oval Line Cal	3D View			
Vartic	al Profile 3			NORO DESI DI			635131		Sentary .		Chryslettor		Joene			
Terroco	arrione y															
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ige(m) Height	(m) Radius (n)													
_	0															
	-	450														
	20	150														
	0	0														
	-20	150														

Click [Vertical] button to edit the vertical profile parameters of road in the form.

Figure 7.5 Vertical Profile

Input parameters of vertical profile, the graphic will be drawn in vertical profile view.

7.2.5 Widening & Super Elevation

Click [Widening] and [Super Elev] buttons to edit the parameters of the width and elevation changes of the cross sections at different mileages in the forms.



Figure 7.6 Widening

Enter the change parameters relative to standard cross section in the form, then drag the mileage progress bar on the right side of form to show cross sections change in the view.

7.2.6 Structures

Click [Structures] button to enter the structure parameters and preview it in the form.



Figure 7.7 Structure

7.2.7 Cone Slopes

Click [Cone Slopes] button to edit parameters of cone slope in the form and preview it.





7.2.8 Slopes & Slopes Lib

Click [Slopes Lib] button to edit slopes library in form.

Click [Slopes] button to edit slope parameters and select using template from Slopes Lib, and then preview in slopes view.

7.2.8 Controls & Red Lines

Click [Control Points] button to edit the road control points in the form.

Click [Red Lines] button to edit the red line of land acquisition on the left and right sides of road in the form.

7.3 Data Lists

After editing roads parameters, click [Chainage List] button under Roads menu to display Chainage and Coordinate List, where shows coordinates and parameters of center line at different mileages according to interval set in properties window.

ère a	Chainage List					-1	×
		Cha	inage	and Co	ordinates List		
	Chainage(m)	N (m)	E (m)	Height(m)	Azimuth (DD MM SS)	Note	*
1	K0+000	100.0000	0.0000	0.0000	0°00′00.000000206*		
2	K0+020	120.0000	0.0000	4.0000	0°00′00.000000206*		
3	K0+039.6805	139.6805	0.0000	7.9361	0°00′00.000000206*	P1_ZH	
4	K0+040	140.0000	0.0000	8.0000	0°00'10.530345014"		
5	K0+059.6805	159.6006	1.3295	11.9361	11°27'32.961249626"	P1_HY	
6	K0+060	159.9136	1.3940	12.0000	11*49'31.153809618*		
7	K0+080	178.1624	9.2473	15.6667	34°44′37.076308457*		
8	K0+100	191.9125	23.5872	17.0000	57*39'42.998807295*		
9	K0+118.2203	198.6705	40.3994	15.8934	78*32'27.038750581*	P1_YH	
10	K0+120	198.9939	42.1494	15.6667	80°29'22.258456807"		
11	K0+138.2203	200.0000	60.3195	12.3559	89*59'60.000000000	P1_HZ	
12	K0+140	200.0000	62.0993	12.0000	90*00'00.000000000*		
13	K0+160	200.0000	82.0993	8.0000	90°00'00.000000000"		
14	K0+180	200.0000	102.0993	4.0000	90*00'00.000000000*		
15	K0+200	200.0000	122.0993	0.0000	90°00'00.000000000"		
16	K0+217.5812	200.0000	139.6805	-3.5162	90°00'00.000000000"	P2_ZH	
17	K0+220	200.0024	142.0993	-4.0000	89*49'56.614068436*		
18	K0+237 5812	201 3295	159 6006	-7 5162	78"32'27 038750581"	P2 HY	Ŧ

Figure 7.9 Chainage List

Click [Coordinate List] button under Roads menu to display Coordinates of Points on Center-line and Side-line List, where shows coordinates and parameters of points on cross sections at different mileage.

Chainage	m) Chainage	Distance to Centerline(m)	N (m)	E (m)	Side Height (m)	Side Roadbed Height (m) Azimuth (DD MM SS)	Note	
	Centerline	0	100.0000	0.0000	0.0000	0.0000			
	Driveways	10	100.0000	-10.0000	-0.2000	-0.2000			
	Green Belt	11	100.0000	-11.0000	0.8000	0.8000			
K0.000	Cycle Lane	14	100.0000	-14.0000	-0.2000	-0.2000	0200200 0000000000		
10,000	Driveways	10	100.0000	-10.0000	-0.1600	-0.1600	0.00.000000208		
	Driveways	10	100.0000	-10.0000	-0.3200	-0.3200			
	Green Belt	11	100.0000	-11.0000	0.6800	0.6800			
	Cycle Lane	14	100.0000	-14.0000	-0.3200	-0.3200			
	Centerline	0	120.0000	0.0000	4.0000	4.0000			
	Driveways	10	120.0000	-10.0000	3.8000	3.8000			
	Green Belt	11	120.0000	-11.0000	4.8000	4.8000			
K0+020	Cycle Lane	14	120.0000	-14.0000	3.8000	3.8000	0*00/00 000000206*		
10.020	Driveways	9.6	120.0000	-9.6000	3.8464	3.8464	0 00 00.000000200		
	Driveways	11.2	120.0000	-11.2000	3.8208	3.8208			
	Green Belt	12.2	120.0000	-12.2000	4.8208	4.8208			
	Cycle Lane	15.2	120.0000	-15.2000	3.8208	3.8208			
	Centerline	0	139.6805	0.0000	7.9361	7.9361			
	Driveways	10	139.6805	-10.0000	7.7361	7.7361			
	Green Belt	11	139.6805	-11.0000	8.7361	8.7361			
K0+039 68	Cycle Lane	14	139.6805	-14.0000	7.7361	7.7361	0*00'00 000000206*	P1 7H	
	Driveways	9.2064	139.6805	-9.2064	7.8250	7.8250			

Figure 7.10 Coordinate List

Click [Intersection List] button under Roads menu to display Intersection Points and Parameter List, where shows intersection parameters of road alignment.

-	Intersection Points List											- 0	×	
		Intersection Points and Parameters List												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1					Line Length and Azimuth		Turn Angle			Curve Param				
2				Intersection Chainage(m)	Point Distance(m)	Calculated Angle(DD MM SS)	Line Length(m)	Angle(DD MM SS)						A2
3														
4														31.6228
5						3°45′00.000000000"		3°44'59.9999999991"						31.6228
6	END		200.0000			0°00'00.00000009"	39.6805							

Figure 7.11 Intersection List

Click [Elements List] button under Roads menu to display Elements List, where shows elements and parameters of road alignment.

-	Elements List													10		1	×
		Elements List															
Γ	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	Point Name	Stack(m)	Chainage(m)	N (m)	E (m)	Length(m)	Turn	Start Radius(m)	End Radius(m)	Start Curve	End Curve	Start Bearing(DD MM SS)	End Bearing(DD MM SS)	Туре		Index	
2	ST			100.0000	0.0000												
3	P1_ZH		39.6805	139.6805	0.0000	39.6805				0°00′00.000000000°	0°00′00.000000000"	0°00'00.00000003"	0°00′00.00000003″				
4	P1_HY		59.6805	159.6006	1.3295	20				0°00′00.000000000°	0°01′12.000000000"	0°00'00.00000003"	0°12'00.00000003*		31.6228		
5	P1_YH		118.2203	198.6705	40.3994	58.5398				0°01'12.000000000°	0°01'12.000000000"	0°12'00.00000003"	1°22'14.866776462"				-0
6	P1_HZ		138.2203	200.0000	60.3195			50		0°01'12.000000000"	0°00′00.0000000000	1°22'14.866776462"	1°34'14.866776462"	22	31.6228		
7	P2_ZH		217.5812	200.0000	139.6805	79.3609				0°00'00.000000000"	0°00′00.000000000"	1°34'14.866776462"	1°34'14.866776462"				
8	P2_HY		237.5812	201.3295	159.6006	20				0°00′00.000000000°°	0°-1'12.000000000"	1°34'14.866776462"	1°22'14.866776462"		31.6228		
9	P2_YH		296.121	240.3994	198.6705	58.5398				0°-1'12.000000000"	0°-1'12.000000000*	1°22'14.866776462"	0°12′00.00000003*				0.
10	P2_HZ		316.121	260.3195	200.0000					0°-1'12.000000000"	0°00′00.000000000"	0°12'00.00000003"	0°00′00.00000003*		31.6228	34	
11	END_ZZ		355.8015	300.0000	200.0000	39.6805				0°00'00.000000000	0°00'00.000000000"	0°00'00.00000003"	0°00′00.00000003*			44	

Figure 7.12 Elements List

7.4 Calculation

Click [Clothoid Cal] button under Roads menu to open Clothoid Calculation tool, where to calculate parameters of clothoid.

Parameter A O Start Radiu	s 🔵 End Radius		
Clothoid Length			
Parameter A			
Start Radius			
End Radius			
	Calculate	Clos	se

Figure 7.13 Clothoid Cal

Click [U-Curve Cal] button to open U-Curve Calculation tool, where to decompose virtual

intersection of u-curve into two intersections for normal input in intersection method.

🐡 U-Cuve Calculation			– 🗆 ×
Parameters			
Name N(m) E(m) Clothe Radiusion Clothes din Length(m) 1 1 1 1 1 3 1 1 1 1 4 1 1 1 1	Clothoid DutLengthrmin Clothoid In Start Radius(m)	Clobhold Qui End Radius(m) 11 12	Note: 1. When the turning angle is close to 180 degrees, input tangent length 11 can control the calculation error. 2. When the turning angle is greater than 180 degrees, T1 must be entered.
Results			
Name Hemi E (m) Gride Raduat(m) Globbod in Langth(m) 1	Clothaid Out Length(m) Clothoid In Stuft Radius(m)	Clotheld Out End Radius(m)	If the calculation fails, please cheor: 1. whether parameter 11 is correct. 2. the type is selected correctly
Type: Regular *			Calculate Close

Figure 7.14 U-Curve Cal

Click [Oval Cal] button to open Oval Calculation tool, where to decompose intersection of oval curve into two intersections for normal input in intersection method.

	-	
Parameters		
Name N (m) E (m) 1st Clothoid Length(m) 1st Circle Radius(m) 1st Circle Length(m) 2nd Clothoid Length(m) 2nd Circle Radius(m) 2nd Circle Length(m) 3rd Circle Length(m) 1st Circle Length(m) 2rd Circl	Clothoid Length(m)	
1		
2		
3		
4		
Results		
Name N (m) E (m) Circle Radius(m) Clothoid In Length(m) Clothoid Out Length(m) Clothoid Out Length(m) Clothoid In Start Radius(m) Clothoid Out End Radius(m)	If the calculation fails, j	lease
	CDACK	
1		
2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.whether it is necessa the circle length	ary to enter
	1.whether it is necess: the circle length	ary to enter
	1.whether it is necess: the circle length	ary to enter
	1.whether it is necess: the circle length	ary to enter
	1.whether it is necess: the circle length	ary to enter
	1.whether it is necess: the circle length	ary to enter

Figure 7.15 Oval Cal

7.5 3D View

After editing road parameters, click [3D View] button under Roads menu, open 3D view display. In 3D view interface, use the mouse wheel to zoom the display. Use the left mouse button to rotate the display and the right mouse button to drag the display, to adjust the 3D display angle of road.



Figure 7.16 3D View

8. Point Clouds

- Point Clouds File
- LAS Source File
- Datasets
- Datasets Edit
- Datasets Operation

8.1 Point Clouds File

Click Point Clouds menu, click [New Clouds] button, then enter the name in Create Point Clouds box and click [Create].

Sieate Points (
name : Te	est	

Figure 8.1 New Clouds

After creating clouds, the new clouds will be displayed in Work Space window.

Click Point Clouds menu, click [Edit Clouds] button, to open clouds editing interface for subsequent LAS file import and point clouds datasets editing operations.



Figure 8.2 Edit Clouds

8.2 LAS Source File

Click LAS Source File [+] button to select .las files to import.

dow						
	ØX					
as source files	+	🖮 Select las file				
name	delete	(→ ・ 个 📴 > 比	电脑 > 数据(E:) > LATEST > Tersus(Geo Office 2 → 1. Test Data	→ Cloud data → pttt	
ppk_cloud_2_colorized.las	0	组织 ▼ 新建文件夹				
ppk_cloud_3_colorized.las	0	■ 图片 * ^		修改日期	类型	大小
		💻 LATEST 🛛 🖈	Mount St Helens.las	2018/5/3 1:18	AutoCAD 图层状态	314,543 KB
		💻 此电脑 🛛 🖈	ppk_cloud_1_colorized.las	2023/6/30 14:47	AutoCAD 图层状态	564,505 KB
		2.4.7.0 -release	ppk_cloud_2_colorized.las	2023/6/30 14:47	AutoCAD 图层状态	522,506 KB
		4. User Manua	ppk_cloud_3_colorized.las	2023/6/30 14:47	AutoCAD 图层状态	505,221 KB
		Nuwa+DXF	ppk_cloud_4_colorized.las	2023/6/30 14:47	AutoCAD 图层状态	633,022 KB

Figure 8.3 LAS File Import

After importing, the imported files will be displayed in the Las source file list. And the item could be deleted if the delete icon is clicked.

8.3 Datasets

Click Datasets [+] button, check the LAS files that need to be imported into datasets, and check the column attributes in LAS files to import. Input the name, click [OK] and wait for the import to complete.

DataSets	Merge	+	😁 Create New DataSet	:
Edit	Rename	Сору	Source Las Files	Columns
show V	name demo	delete	 ✓ ppk_cloud_2_colorized.las ✓ ppk_cloud_3_colorized.las 	 ✓ Location ✓ Color Intensity ReturnNumber NumberOfReturnsGivenPulse ScanDirectionFlag EdgeOfFlightingLine Classification ScanAngleRank UserData PointSourceId GpsTime WavePacketDescriptorIndex ByteOffsetToWaveformData WaveformPacketSizeInButes
Sample	Mesh	Split	name test	OK Clear Selection

Figure 8.4 Datasets Import

After datasets importing, the imported datasets will be displayed in the datasets list. And the item could be deleted if the delete icon is clicked. The interface displays the point
clouds graphic for the checked datasets. Use the mouse wheel to zoom the display. Use the left mouse button to rotate the display and the right mouse button to drag the display, to adjust the 3D display angle of point clouds.



Figure 8.5 Point Clouds Display

In datasets list, select item and lick [Rename] to change the name of selected item.

Select item and click [Copy] to copy the selected item, avoiding subsequent edits affecting the original dataset.

Select two or more datasets, click [Merge] and enter the name of merged datasets to merge LAS data contained in the two datasets into one dataset.



Figure 8.6 Datasets Merge

8.4 Datasets Edit

Select dataset and click [Edit] button, open Edit DataSet dialog to edit selected dataset.

Marks	mark(double click	on point)				
	remove mai	k	remo	ve the po	oint	
Select	add selector	cancel s	elector			
	remove outter	remove	inner			
	Valuma					

Figure 8.7 Edit DataSet

Click [Mark] button, and double click on point in point clouds to get coordinates and other information.



Figure 8.8 Mark Point

Click [Add Selector] button, input the center point and size of box, or input center point and radius of sphere, a selector will be displayed on point clouds, to remove the outer part or inner part.



Figure 8.9 Selector Display



Click [Volume] button, to make DTM first in Volume dialog.

Figure 8.10 Make DTM

Then click Areas [+] button, select item in areas list, click [begin select], and double click on point clouds to create the boundary. Input fixed target height or select average height as the target height, software will calculate and show the dig and cut part.



Figure 8.11 Volume Calculation

8.5 Datasets Operation

Under the datasets list, click [Sample] button to open sample dialog. Select function, then software will sample the point clouds in dataset according to configured target percents, and save the result as a new dataset.

target pe	rcents 💳	_0	100%	
init factor	5.00	\$		
make me	esh alpha 0	.1000 🕻	meter	

Figure 8.12 Sample

Click [Mesh] button, select function in dialog to make Mesh for point clouds in dataset and save the result as a new dataset.



Figure 8.13 Mesh

Click [Split] button, select function in dialog to split point clouds in dataset and save the result as a new dataset.



Figure 8.14 Split

9. Tools

- Coordinate Systems
- Antennas

9.1 Coordinate Systems

Coordinate Systems List Name:		Coordinate Systems Library				Parameters	Test Tool			Buil
		Groups	New		Delete	Ellipsoid	Projection	Plane Adjustment	Height Fitting	Geoid
CGCS2000 USA NAD83 North Carolina	< Add	 Predefined Africa America Asia 			<u></u>	Name: Parameter:	Tra s:	nsvers_Mercator		1
		Afgha	anistan enia			Origin Lat	Name	Valu	1e	Unit DDMMSS
		Azert	oaijan ain			Central Me	ridian	117°00'00.000000'	E	DDMMSS
		Bang Bang	pladesh			False Nort	h	0		
	≪ Up	Brun	el			False Eas	t	500000		
	⇒ Down	 Burn Cam 	bodia			Scale		1		
			a IJ54 IAn80 CGCS2000							
	Remove		ianJin2000 IK WGS84 IK1980 IK80 Ienghu Island		•					

Click Tools menu, click [Coordinate Systems] button, to open the coordinate systems tool.

Figure 9.1 Coordinate Systems Tool

The tool is divided into three parts, Coordinate System List on the left, Coordinate System Library in the center and Parameters on the right.

The coordinate systems in Coordinate System List can be displayed and selected directly when creating new project or setting coordinate systems of projects. Click [Add] to add coordinate systems from Coordinate Systems Library to the list. Click [Up] or [Down] to adjust the sorting in the list. Click [Remove] to remove items in the list. Click items in the list, the detailed information will be displayed in Parameters part on the right side.



Figure 9.2 Coordinate Systems List

In Coordinate Systems Library, there are predefined coordinate systems and customized coordinate systems. The predefined coordinate systems are categorized according to continents and regions. Click on predefined coordinate systems, the parameters will be displayed on the right side but cannot be edited.

Coordinate Systems Library	Parameters				Builder	
Groups	Delete	Ellipsoid	Projection	Plane Adjustment	Height Fitting	
Groups New Delete ▼ Predefined		Ellipsoid Name: Parameter Zone Zone Num South Her	Projection Un s: Name bber nisphere	Plane Adjustment inversal_Transverse_M 52 52 52 Yes	Height Fitting	Unit
GDA2020 MGAZone 57 E156-162 GDA2020 MGAZone 58 E162-168 GDA94 MGAZone 48 E102-108 GDA94 MGAZone 48 E108-114 GDA94 MGAZone 50 E114-120 GDA94 MGAZone 51 E120-126						

Figure 9.3 Predefined Coordinate Systems

Select a predefined coordinate system, right click on it and click [Sent to Customized] to copy it from predefined group to customized group. Click on customized coordinate systems, the parameters will be displayed on the right side and can be edited. It is also possible to create groups and create coordinate systems in customized group, then configure and edit coordinate system parameters.

Coordinate Systems Library	Parameters			Builder
Groups New Delete	Ellipsoid Projection	Plane Adjustment	Height Fitting	
Predefined Ø Africa Ø America With the first state stat	Name: U Parameters:	niversal_Transverse_M	ercator	*
Europe	Name	Valu	e	Unit
+ 🥏 Oceania	Zone	52	•	
Customized	Zone Number	52		
BJ54(Modified)	South Hemisphere	Yes	*	
Name New Delete		Save		Cancel

Figure 9.4 Customized Coordinate Systems

There are Ellipsoid, Projection, Plane Adjustment, Height Fitting and Geoid in Parameters part.

Ellipsoid

The local ellipsoid of of the current project, including ellipsoid and datum transformation. When editing ellipsoid parameters, you can select it from the drop-down list, and the parameters such as a and 1/f will be changed accordingly. The datum trans includes None, Three Parameters and Seven Parameters.

In the current project, the ellipsoid and datum trans are used to realize the conversion calculation of Lat/Lon/Hgt coordinates under WGS84 and local system.

The projection of the current project. Select projection type from the drop-down list, and enter parameters according to projection type, such as Origin Lat, Central Meridian, False North, False East, Scale and so on.

Projection In the current project, the projection is used to realize the conversion calculation of Lat/Lon coordinates and North/East coordinates under local system.

The plane adjustment parameters of the current project.

Plane In the current project, the plane adjustment is used to realize the Adjustment conversion calculation of projected North/East coordinates and known coordinates in site calibration.

The height fitting parameters of the current project.

- Height In the current project, the height fitting is used to realize the conversion
- Fitting calculation of ellipsoidal height coordinates and known altitude coordinates in site calibration.

The geoid model of the current project.

Geoid In the current project, the geoid model file selected is used to calculate altitude above mean sea level from ellipsoidal height.

9.2 Antennas

mport File	New Manufacturer N	ew Anter	nna Template	Reset		
North	penence	-		Property	Value	
NovA Bolar	tel Inc.	1	Antenna Type		TRSLUKA	- Radius-
PRIN Qian	, JSC. (un Spatial Intelligence Inc	2	Radome		NONE	
Rusn	avgeoset e Surveving Instrument C	3	3 Manufacturer		Tersus GNSS Inc	
 Sens Septe 	or Systems Inc. entrio Satellite Nacigation.	4	Comment		CONVERTED FROM RELATIV.	. +
 ▶ Sparl ▶ Singt 	Fun Electronics JarXYZ Intelligent Techno.	. 5	Start Time		05-FEB-23	Phase Center Height
San I Sikai	Hose Technology Inc. hulian	6	Radius(m)		0.13	Bottom
 Skye Satla 	Skye Interconnection Satiab GeoSolutions AB		Phase Center Hei	ght H0(m)	76.695	
SMI	NC Ontic alactric Instru	8	Freq GPS L1 North	n(mm)	-0.34	□ / / X́
Sokki	SANDING Optic-electric Instru Sokkia Topcon Co. Ltd.		Freq GPS L1 East	(mm)	0.17	
Space	e Start Technology Co. LTI) 1	0 Freq GPS L1 Up(n	nm)	82.05	
 Stone SWE 	Stonex SWEGEO		1 Freq GPS L2 North	ı(mm)	-0.89	
Thate TiAse	es ahi	1	2 Freq GPS L2 East	(mm)	0.94	
 TIAN Topco 	 TIANYU Optical and Electronic Topcon Corp. 		3 Freq GPS L2 Up(n	nm)	71.35	
 Topo Topco Trimb Tersu T 	map on Positioning Systems In ole Navigation Ltd. Is GNSS Inc RSAX3702 RSAX3706 RSAX4E02	C.				
T T T	RSLUKA RSOSCAREU RSOSCAREU2			OK	Cancel	

Click Tools menu, click [Antennas] button, to open Antennas tool.

Figure 9.5 Antennas Tool

In the tool, antennas in the list are categorized according to manufacturers. Click on antenna item to display properties and values.

When importing GNSS files, software will automatically recognize antenna information recorded in observation files, match the antenna type and parameters in Antennas tool in calculations. If there is no matching antenna type in the tool, you can click [Import File] to import antenna file or click [New Manufacturer] and [New Antenna] and input antenna parameters manually.

10. Support

Click Support menu, click [Help] button to open software user manual.

Click Support menu, click [Release Notes] button to open release notes documentation.

Click Support menu, click [About] button to open the dialog that displays software version,

website, support email and other information.

11. Terminology

Abbreviation	Definition
GNSS	Global Navigation Satellite System
РРК	Post-Processing Kinematic
RINEX	Receiver Independent Exchange format
RMS	Root Mean Squares
RTK	Real-Time Kinematic
WGS84	World Geodetic System 1984

12. File Format

[.exe]:executable program file

[.las]: LIDAR data binary file

[.tgo2]: TGO2 project file

- [.trd]: Tersus Road file format
- [.trs]: Tersus raw observation data file

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