GreenValley International

LiSurvey Software User Guide

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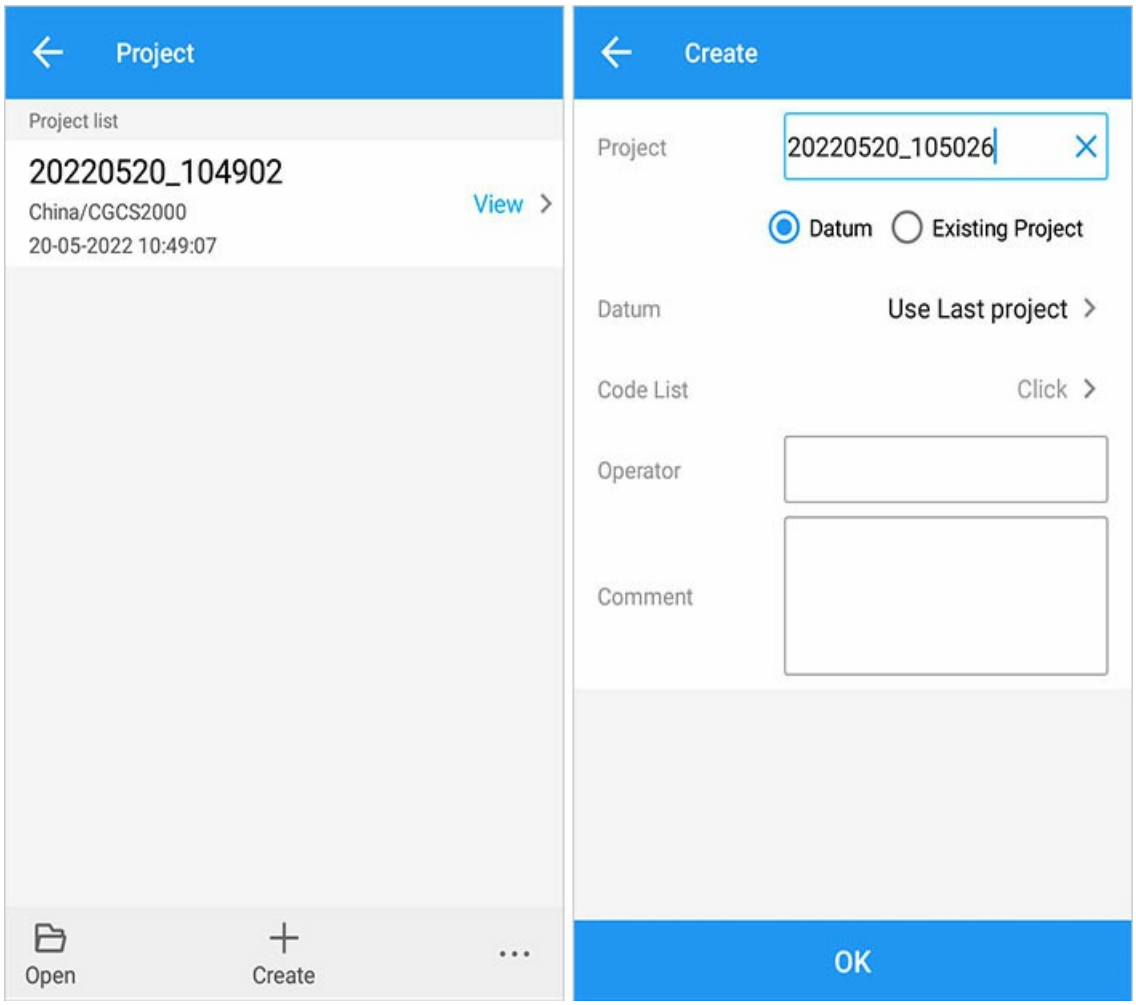
Quick Guide

1. Create Project

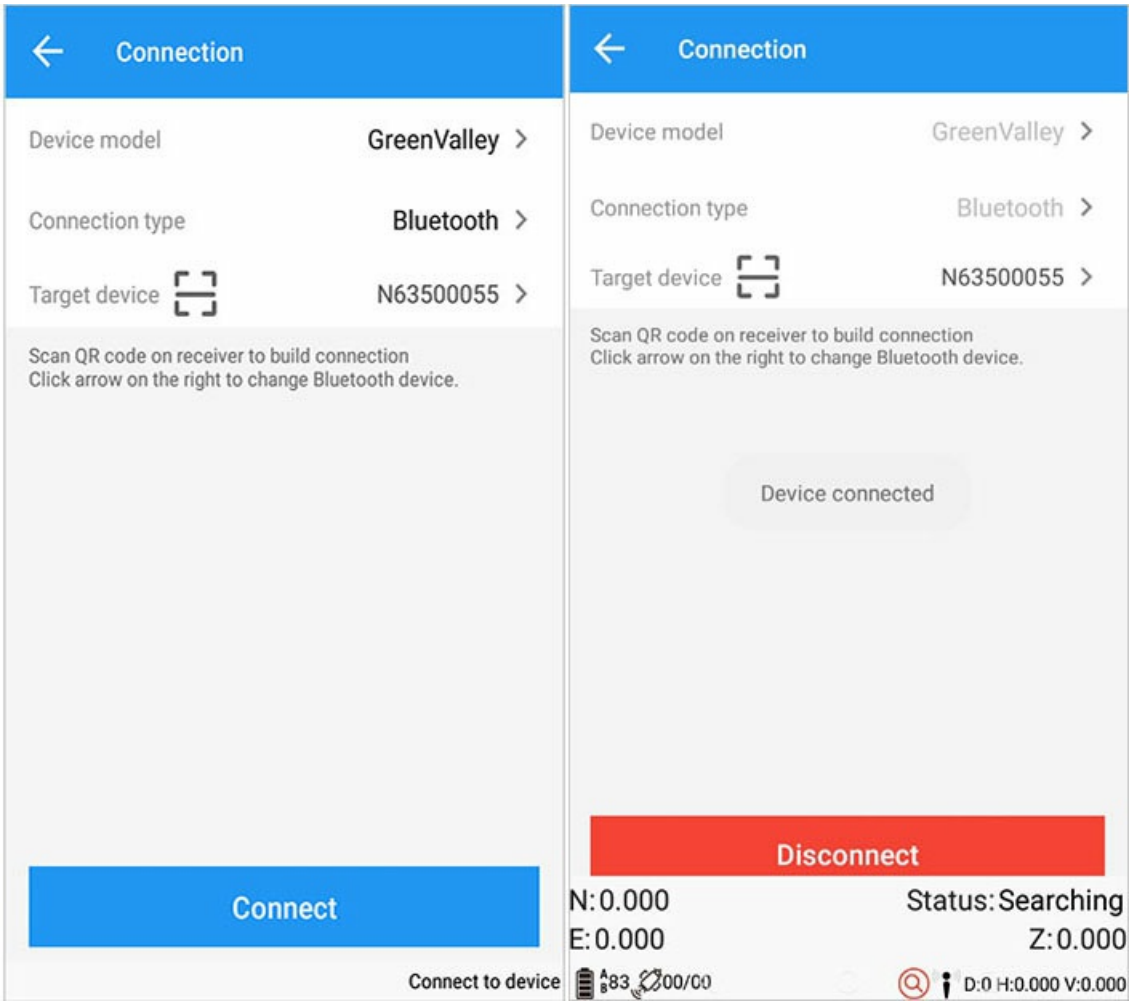
To create a new project, you can go to Main Interface > Project > Project Management > Create, then you enter a project name and select coordinate system: Datum or Existing Project. You can also select Code and enter Operator. Click OK to finish creating project.



2. Connect Device

Go to Device > Connection, then select Connection type >Bluetooth and Target device. When Available devices appears, click it to connect with bluetooth.

> Tip: Click the scan button and you can scan the QR code on the device to connect.



3.Set Base or Rover

3.1. Internal Radio 1+N Mode

1. Base station: Go to Connection > Base station > Default: Internal Radio and select.
2. Rover station: Go to Connection > Rover station > Default: Radio Mode and select.

At this time, the rover station starts to receive the differential data of the base station with the frequency 460.0500 MHz transmitted by the radio channel 6, and the status bar shows: fixed;

3.2. Internal GSM 1+1 Mode

1. Base station: Go to Connection > Base station > Default: InternalGSM and select.
2. Rover station: Go to Connection > Rover station > Default: InternalGSMand enter base station name (default: SN).

3.3. Internal GSM CORS Mode

1. Add working mode At Main interface, go to Device > Rover station > Add > InternalRadio, then enter IP, protocol from CORS center, aquire source list, and enter user name, passwork. Click OK > Save work mode, enter a mode name and click OK.
2. Apply working mode Select work mode from previous step and click Apply.

3.4. External GSM CORS Mode

1. Add working mode At Main interface, go to Device > Rover station > Add > ExternalRadio, then enter IP, protocol from CORS center, aquire source list, and enter user name, passwork. Click OK > Save work mode, enter a mode name and click OK.
2. Apply working mode Select work mode from previous step and click Apply.

> To use external GSM mode, please ensure that handbook have Internet access.

CDL3 external radio channel-frequency table

Channel	frequency （MHz）	Channel	frequency（MHz）
Customize	Customize	5	459.0500
1	455.0500	6	460.0500
2	456.0500	7	461.0500
3	457.0500	8	462.0500
4	458.0500	9	463.0500

4. Calculation and Base Station Translation

Calculation：

When surveying a new area, you can do calculation to match target point to known point coordinates:

4.1 Measure Control Point

Go to Measure Point > Measure times: 5, use default settings for other parameters and click OK. Put the centering rod to the control point, and level it，then enter control point name (e.g. a) and antenna height, click Measure. The data will be automatically saved. Measure three control points one by one.

4.2 Enter Control Point Coordinates

Go to Point Coordinates Datum > Add > Enter point name, coordinates and select control point, enter local plane coordinates and click OK.

> Tip: When the input control point name is consistent with the measurement point, adding a point pair in the subsequent steps can be automatically paired with the measure point.

4.3 Parameter Calculation

Go to Tool > Parameter Calculation, click Add > Manual Pair/Auto Pair, select Known point and GNSS point(input control point and measure point respectively), calibration: horizontal and vertical and click OK. Click calculation and check horizontal residual (residual should be less than 2 cm). If OK, click Apply.

Base Station Translation：

Under below two circumstances, you need base station translation:

1. Base station is reset or moved;
2. Base station is restarted.

Go to Device > Connecion, when rover station is fixed, select Tool> Base station translation > Measure or select GNSS point > select or enter known point > Calculation > Apply.

After base station translation is done, you need to remeasure other control points and compare them with known point to make sure the translation is well down.

5、Measure and Loft

Measure Point

Select Measure > Measure point, click bottom-right button to measure. Click rightside toolbar Point library to check measured points.

Loft Point

Select Measure > Loft point > Coordinate library, select point to be lofted and click bottom-left button to start.

> Click Options to change parameters.
>
> When [Front, Back, Left and Right] and [Handbook electronic compass to determine the forward direction] are enabled (open by default), the top of the handbook screen is the forward direction;

6、Export data

Go to Task > Export data, and export result data, take care of file name and output path. You can also go to Export data to export measure coordinates, such as Cass software data format.

7、Transfer files

Connect Handheld to the computer via USB cable, and select Transfer file. Then open device folder on your computer to transfer files.

> Export data path：`GreenValley/ls/export`
>
> Project path：`GreenValley/ls/Project`

8、Input data

Go to Task > Input data > Select data type, point type, file path > click OK.

> Please notice the suffix you set, especially when you cannot find the file you wish to select.

9、System settings

You can hide it by long pressing the button.

Project

Project includes below modules:

Project

Datum

- Datum Store

Element

Surface

Import

Export

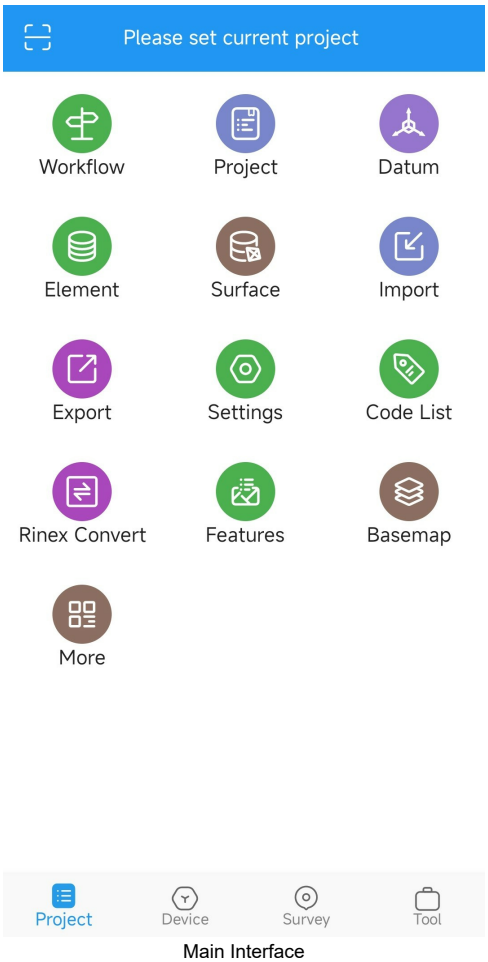
- ExportResult

Setting

Code List

BaseMap

Features



Main Interface

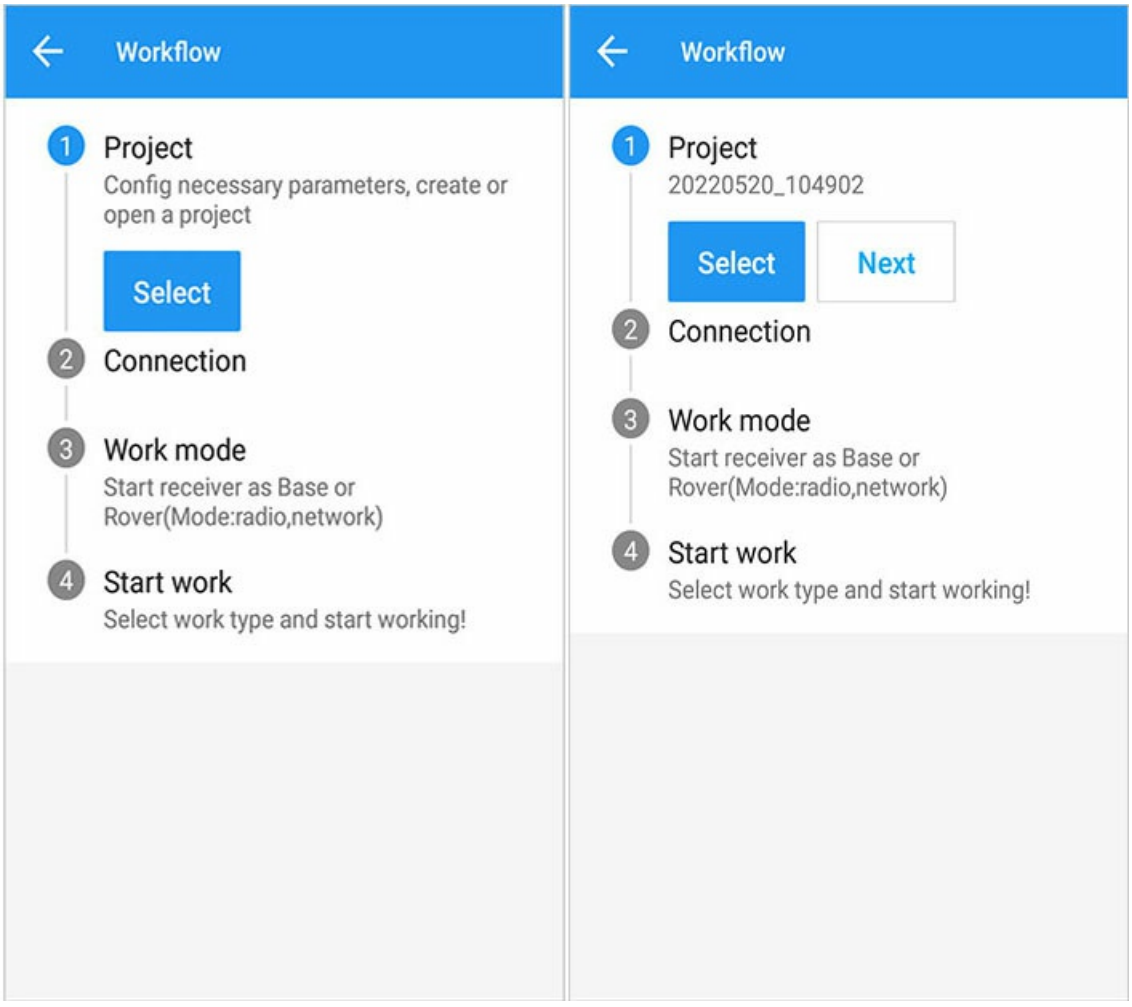
Wizard

In order to make you familiar with the workflow of application faster, a project wizard has been prepared, and you can start working in just 4 steps.

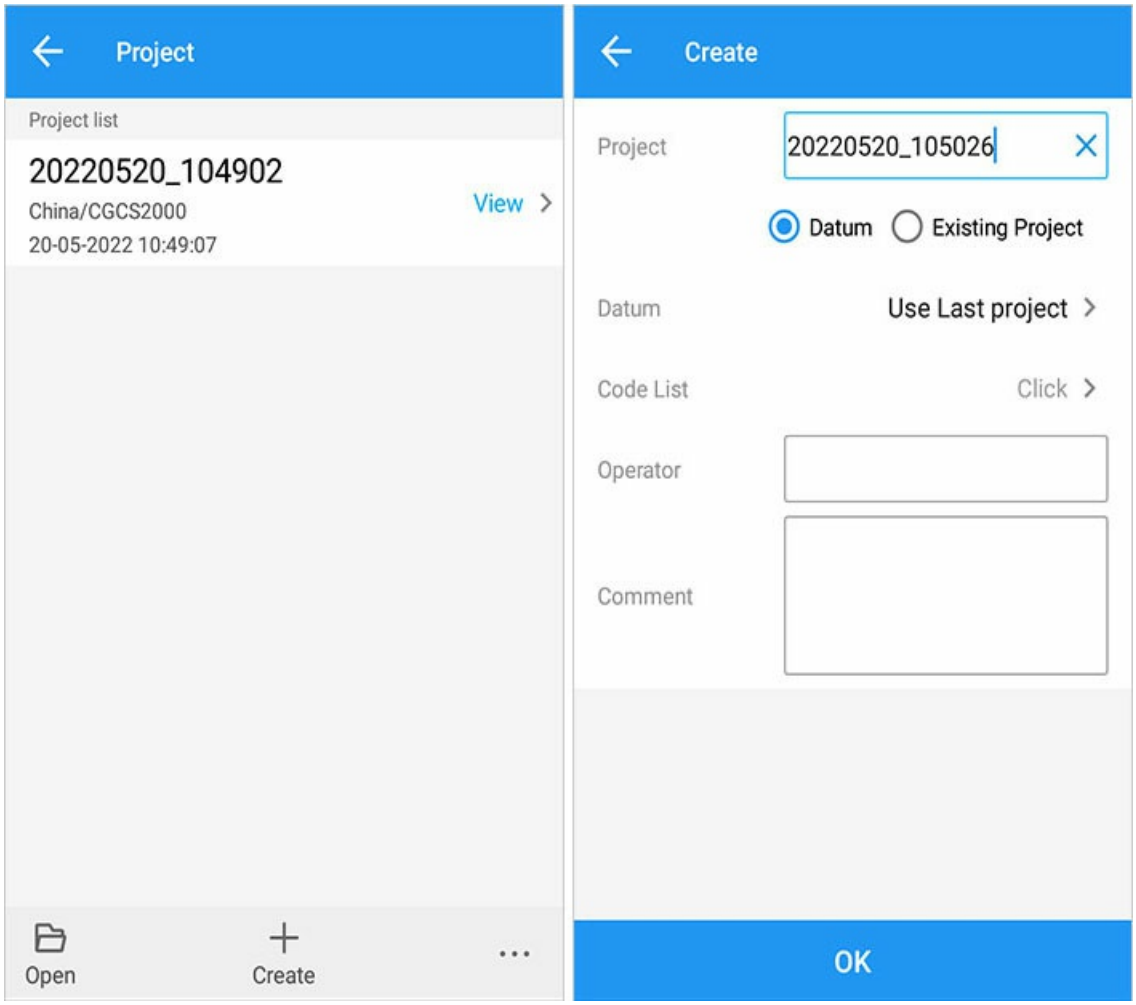
When using the application for the first time, it will automatically jump to the project wizard.

Enter: [Project] -> [Wizard].

1. Project

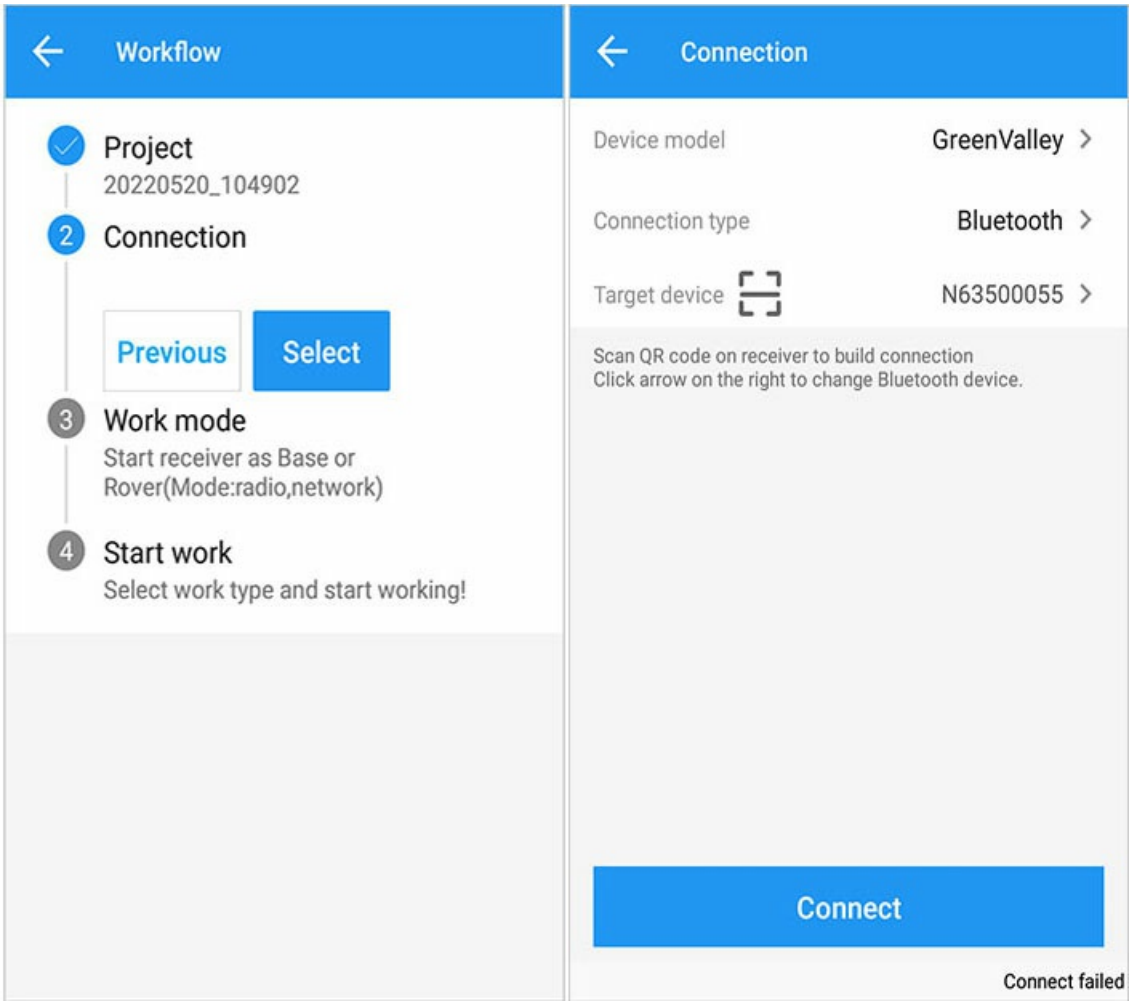


[Select] If there is no project, it will jump to the new project interface; if there is a project, the project management interface will appear, and you can choose to open or create a new project. For details, see: Project. After completion, execute [Next].



2. Connection

After completing the project, enter the connection device: [Previous] Return to the first project or click [Select] Connect the device, please refer to Connection for the specific operation of the device.

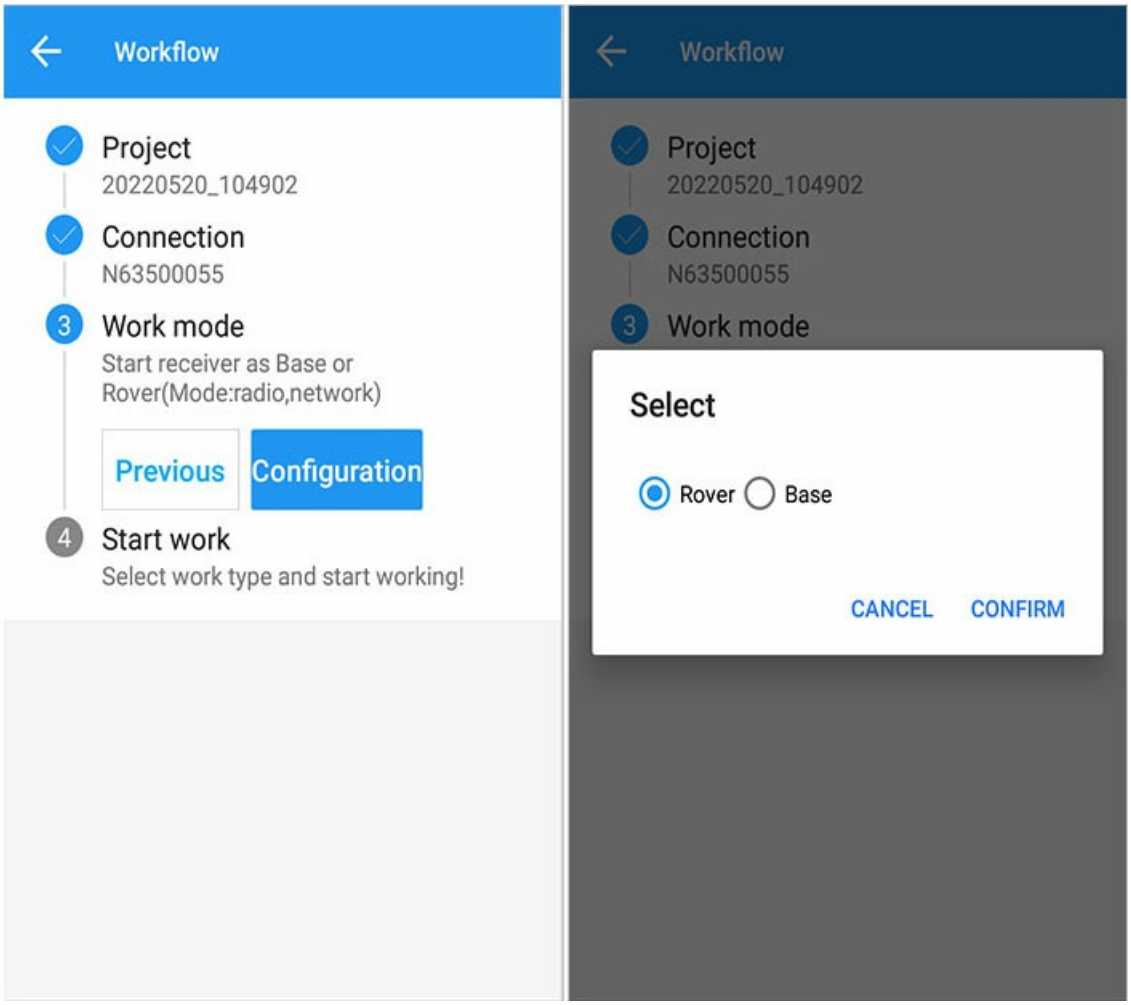


3. Work mode

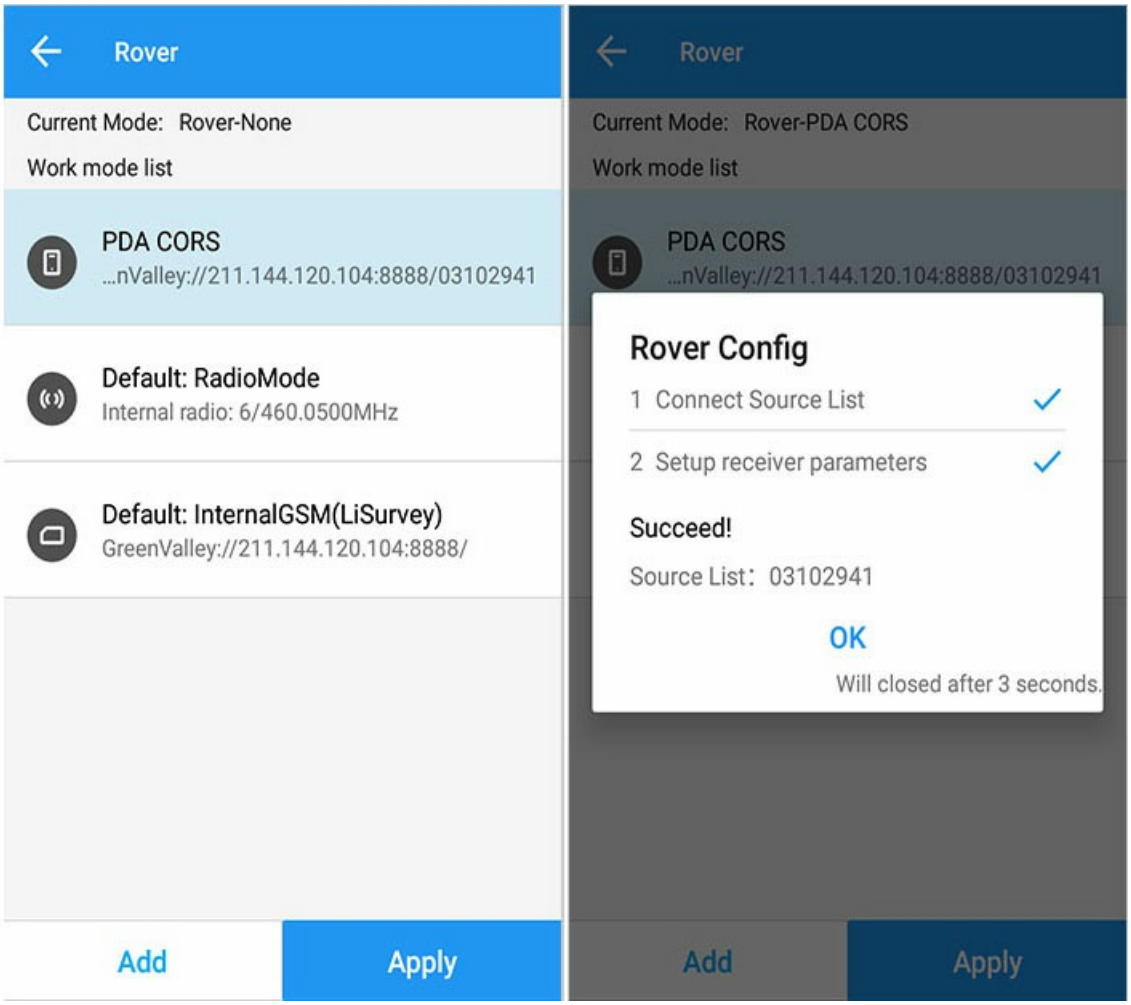
[Previous] Return to connect the device;

[Select] Select a default work mode, or [Add] start the rover or base station after a new work mode;

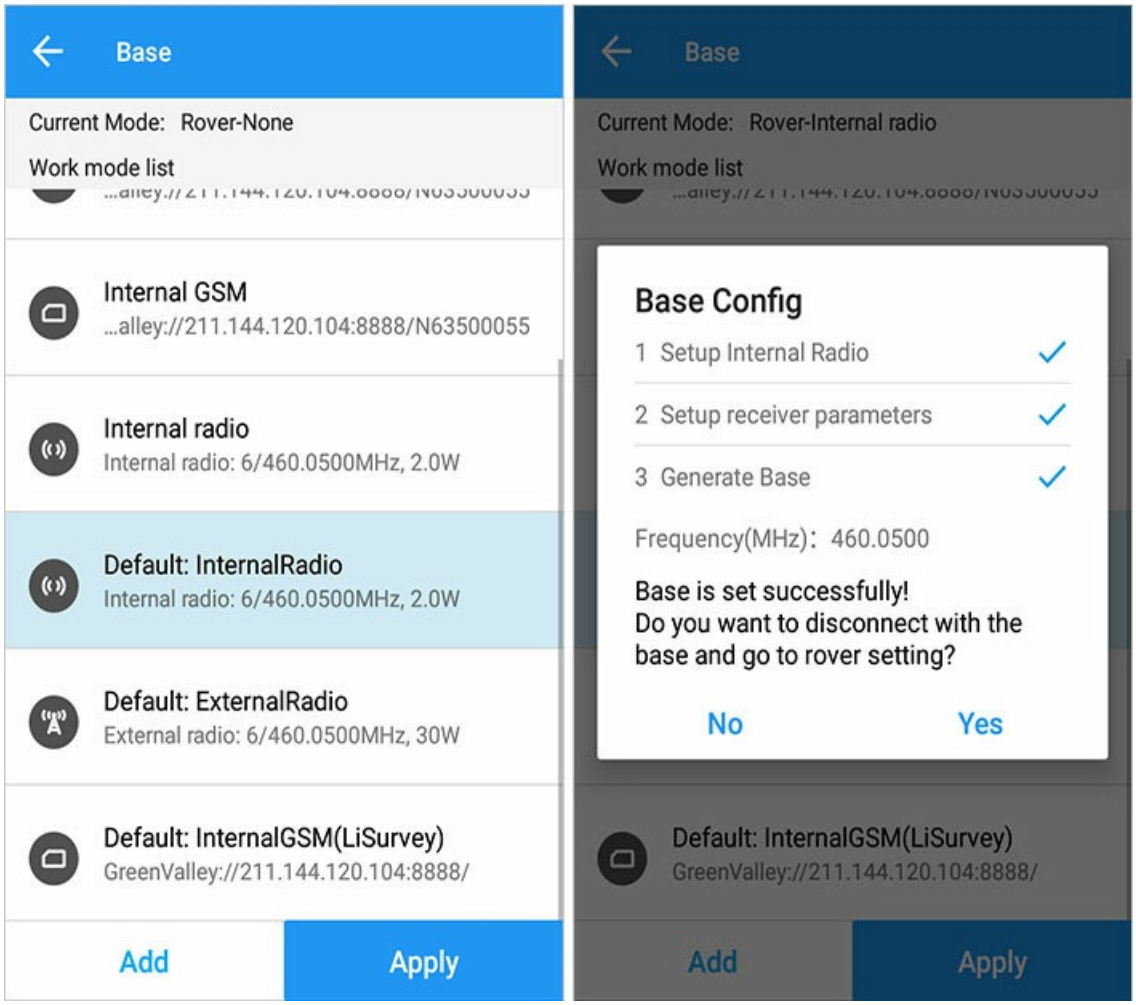
> After completing the working mode, there will be different prompts according to whether the mobile station or the base station is activated;



Choose rover station

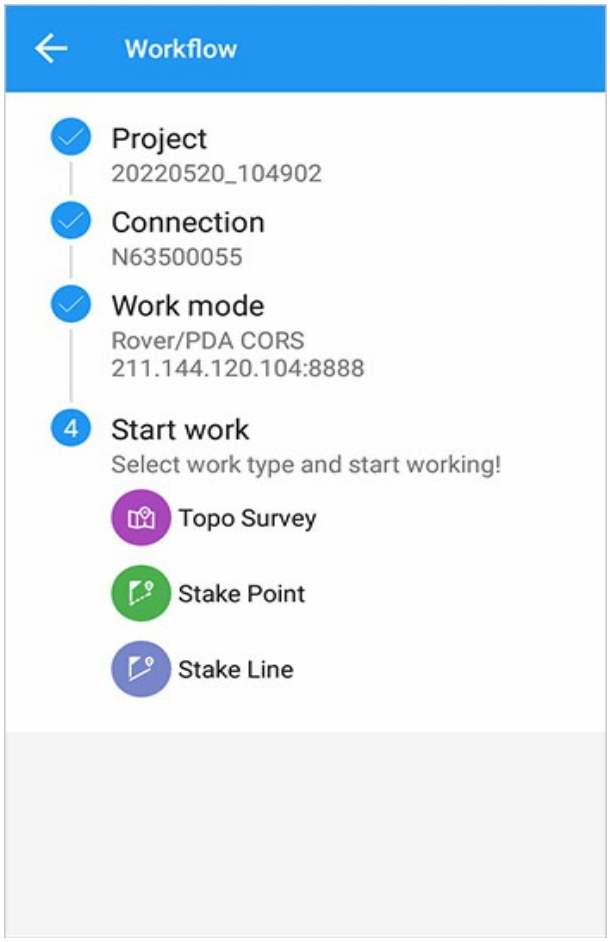


Choose base station



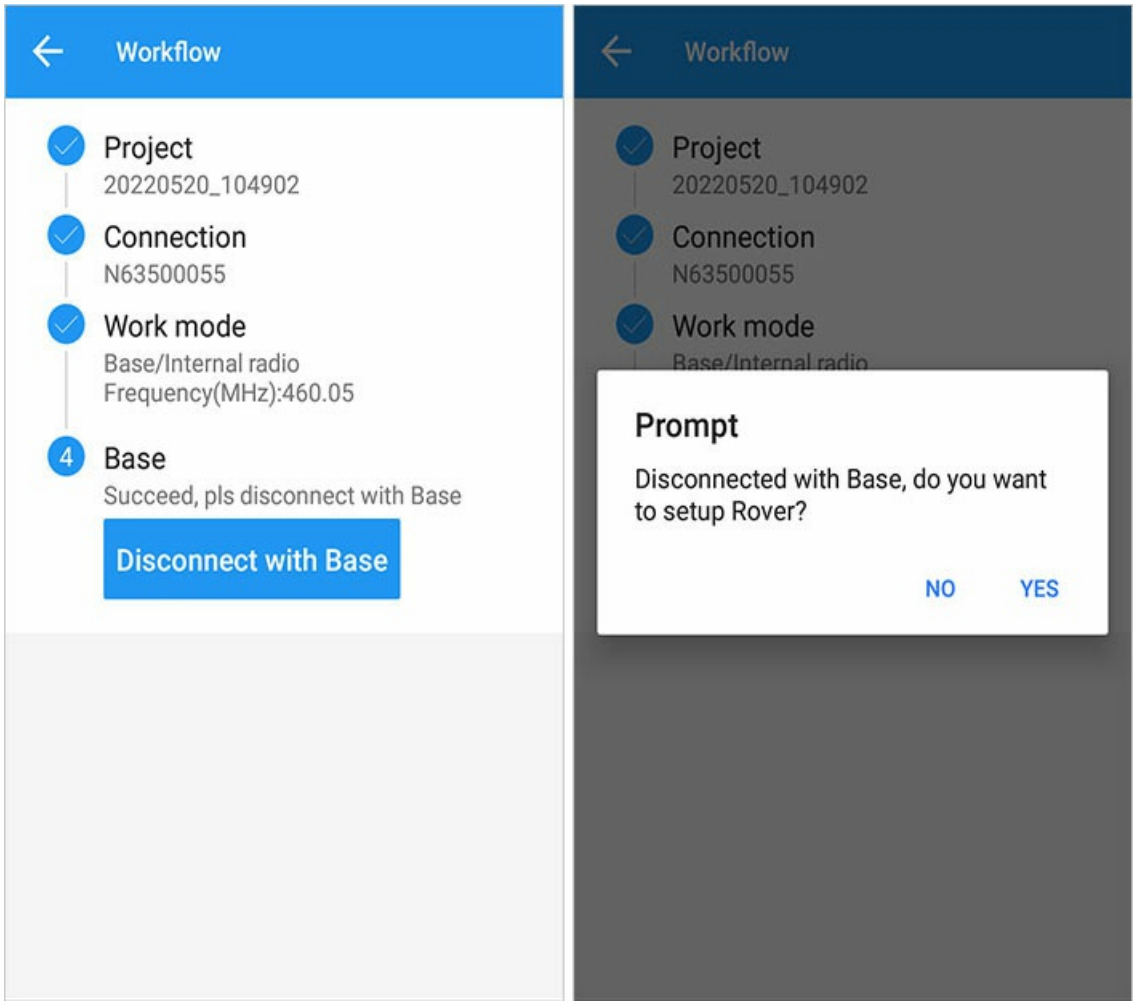
Rover Station

[Next step] Select the type of work to be started [measure point, stake point, stake line].



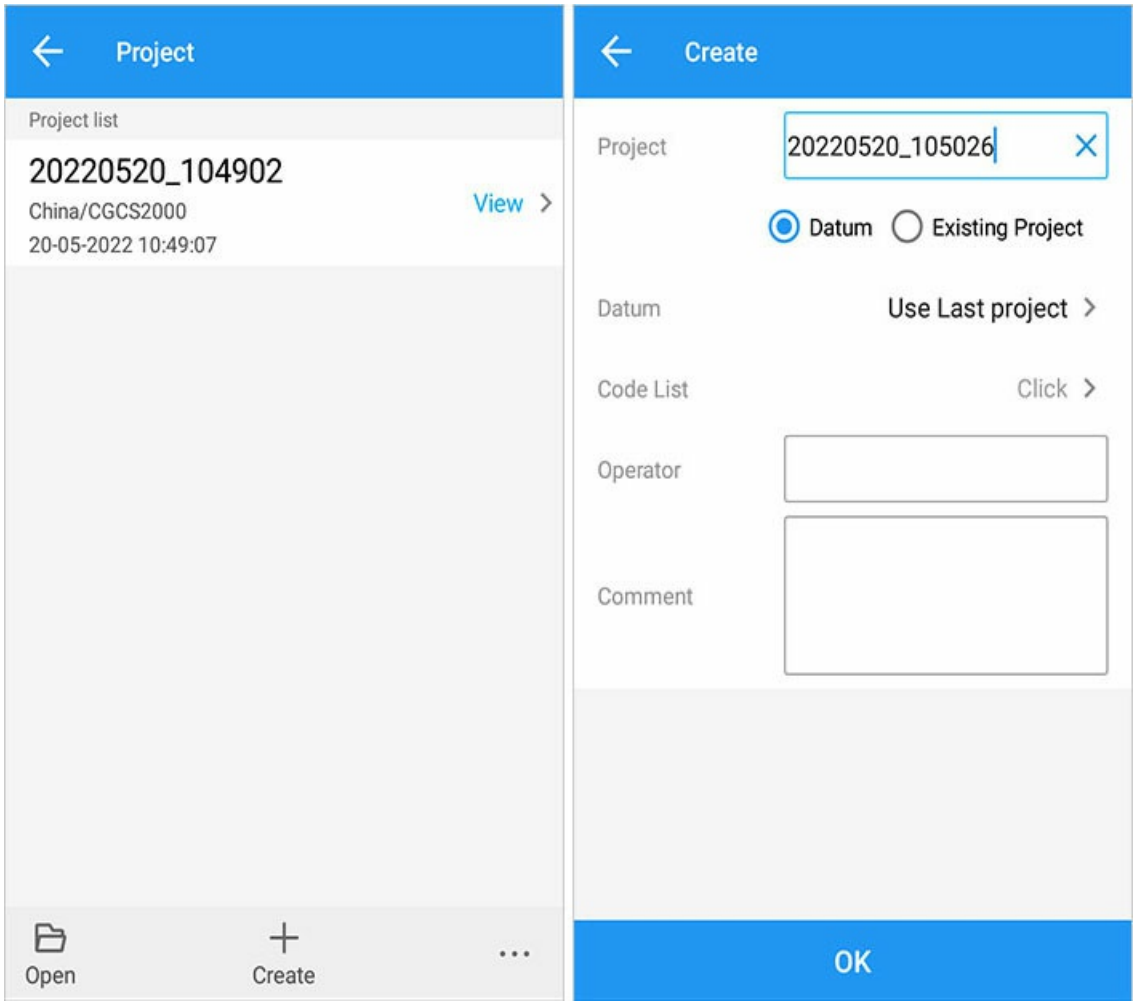
Base Station

[Next] Disconnect the base station, and prompt whether to set the rover station; if you select [Yes], then disconnect the current base station and enter the Connection step, start connecting the rover station and set the working mode.


Workflow
Project
20220520_104902
Connection
N63500055
Work mode
Base/Internal radio
Frequency(MHz):460.05
4
Base
Succeed, pls disconnect with Base
Disconnect with Base
Workflow
Project
20220520_104902
Connection
N63500055
Work mode
Prompt
Disconnected with Base, do you want to setup Rover?
NO
YES

Project Management

A project is a management unit for field data.



1. Create

Click the [Create] button to create a new project.

[Project] Give a meaningful name to the measurement or stakeout work that needs to be carried out at present, which is convenient for later management;

> Default project name: year month day _current time

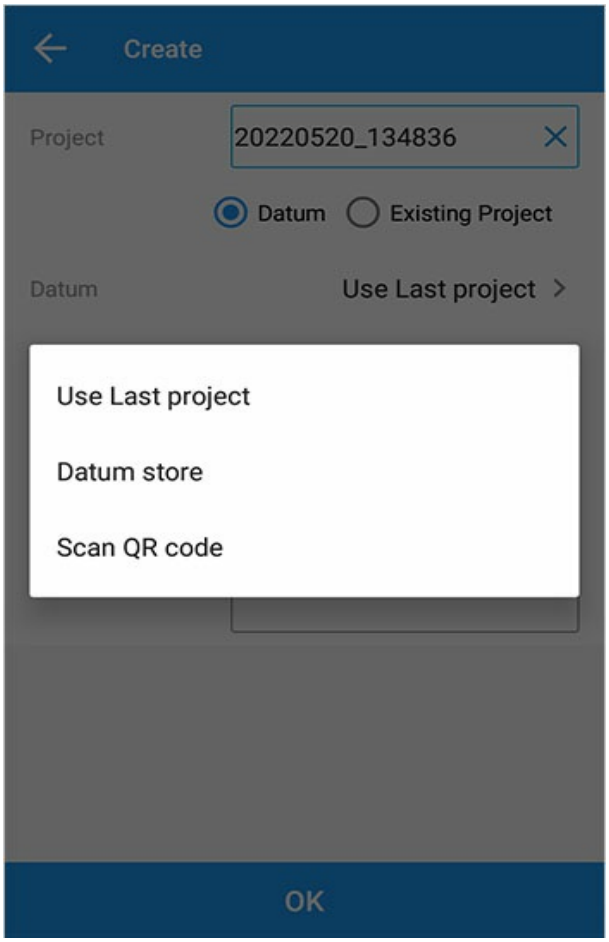
[Datum] The datum supports three methods: [Use Last project], [Datum store], [Scan QR code];

[Code List] Select a code list to provide a default template (CASS); you can also select an imported file after importing (to import a code list file, you must first import a code list in the [Project]->[Code List] function before creating a new file.);

[Operator] Enter the information of the current surveyor;

[Comment] Enter some description information of the current project;

[OK] After the new task is completed, open the task by default and return to the main interface;



1.1. Local Datum

Select a defined datum in the datum list, or enter the datum parameters according to the job requirements in [Add User Defined].

1.2. Use Last Project

Datum parameters used in previous project can be quickly applied.

1.3. Scan QR Code

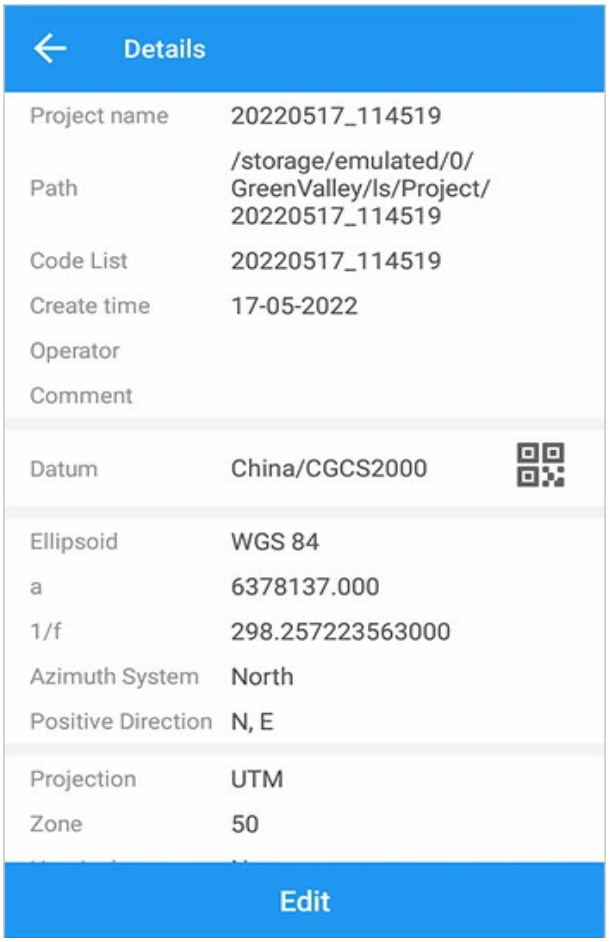
You can quickly apply a certain project datum parameter through the QR code.

2. Open Project

Click the project, it turns gray, click [Open] to switch to the current project.

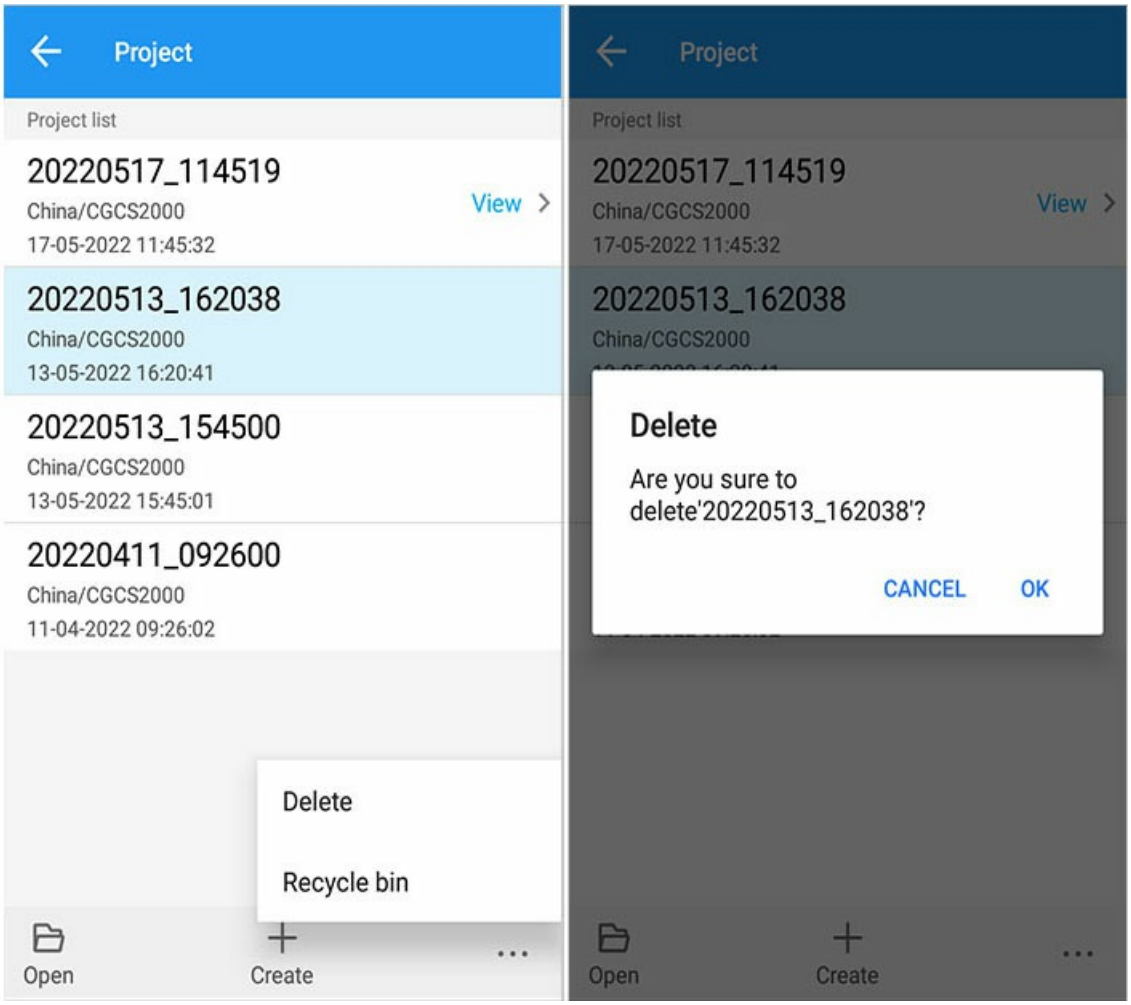
3. View

> Only the current project supports viewing



> Tips: Click the project name in the title bar to quickly enter the current task interface

4. Delete



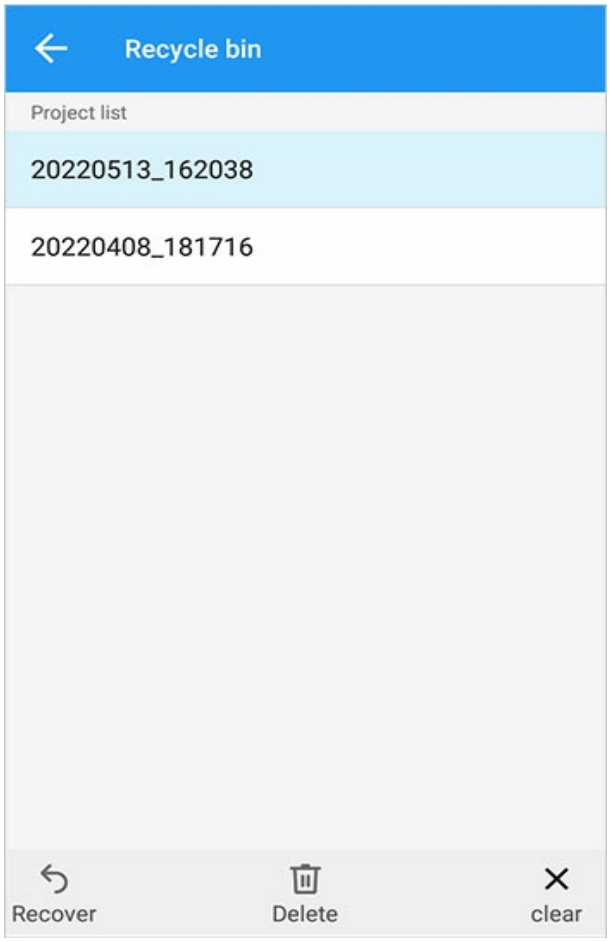
[Project] -> Bottom Menu -> [Three Small Dots] -> [Delete]

5. Recycle Bin

[Recover]: Select any task and click Recover, and the task will be restored to the task list.

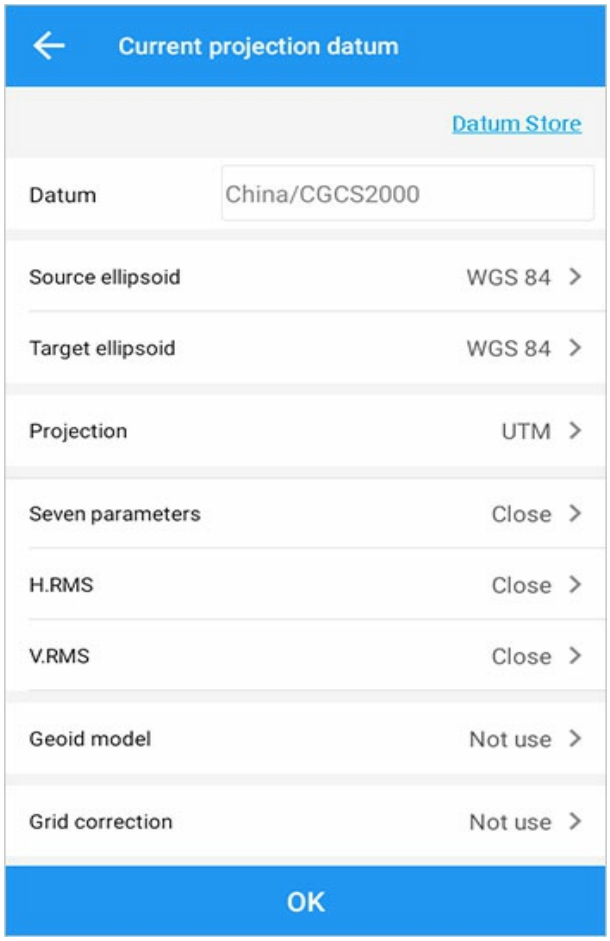
[Delete]: Select any task and click Delete, the task will be permanently deleted.

【Clear】: This function clears all tasks in the recycle bin.


Recycle bin
Project list
20220513_162038
20220408_181716
Recover
Delete
clear

Current projection datum

Home -> [Project] -> [Datum].



1. Current projection datum parameters

The source ellipsoid, target ellipsoid, projection, seven parameters, plane correction, elevation fitting and ground level model parameters can be modified. For settings, please refer to Datum Store.

> The modification of the current projection datum parameters will not modify the datum in the Datum Store.

1. Datum Store

Click [Datum Store] to jump to Datum Store.

Datum Management

Home -> [Project] -> [Datum] -> [Datum Store].

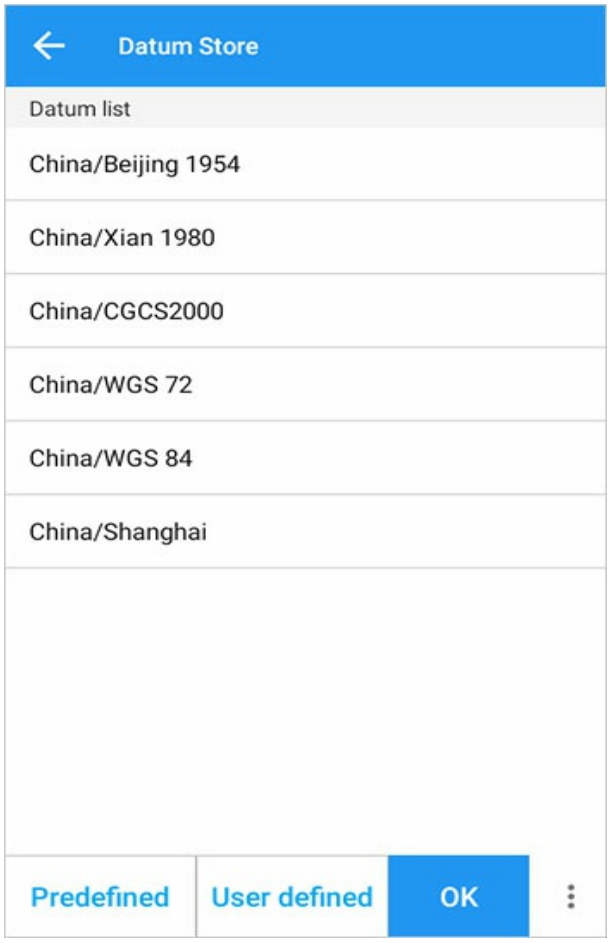
Datum management is managing the datum store. It is different from the datum of the current project. The datum parameters edited in the datum management will not affect he datum of the current project, even if the datum name is the same as the current project. The datum will only be synchronized to the current project when the [OK] button is clicked.；

[Datum list]: Display the datum you have added.

1. Add Predefined Datum

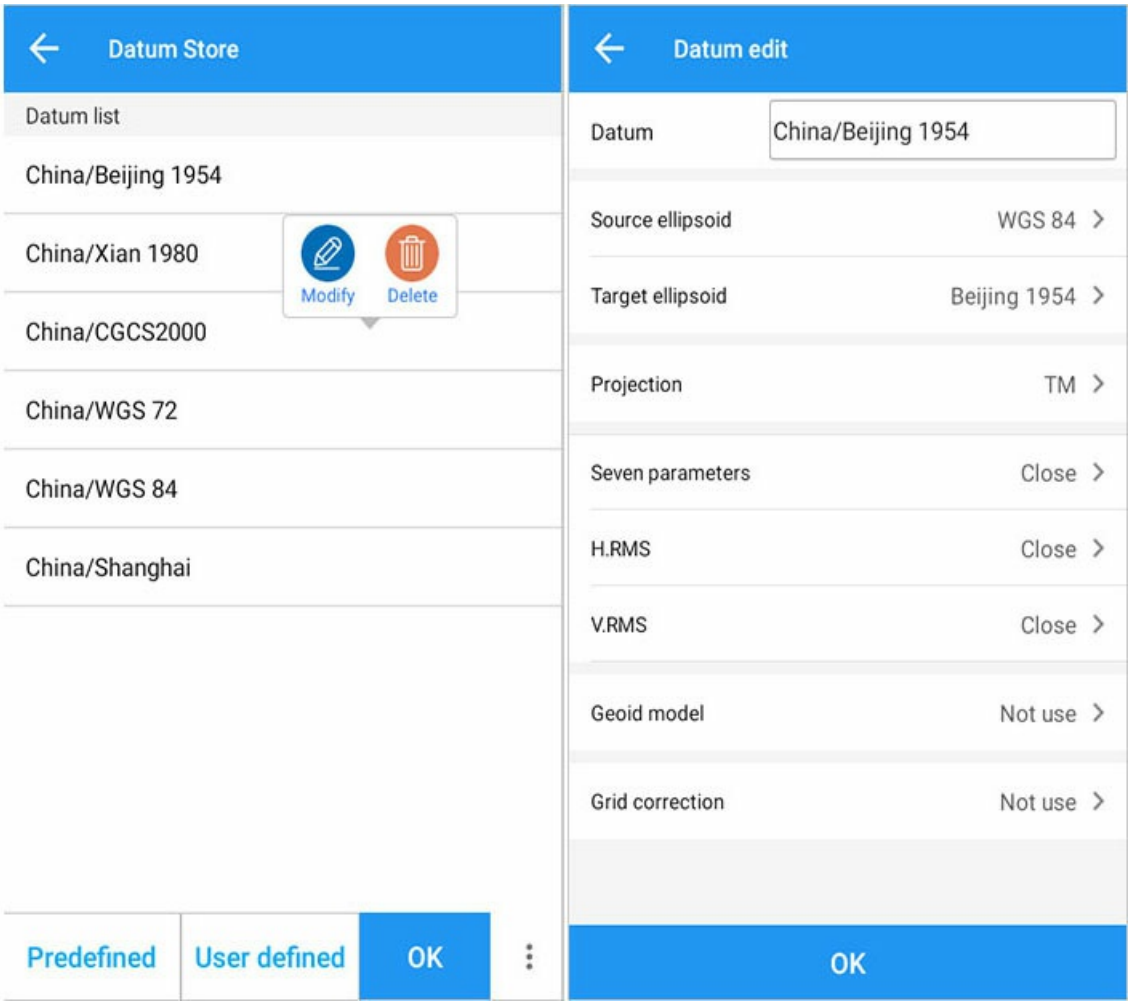
We provide some pre-defined coordinate systems classified by country for you to choose. When you select [Country] -> Click on the datum in the predefined interface, the clicked datum will be added to your [Datum list].

> Modifications in the Datum list are not synchronized to the predefined datum list.



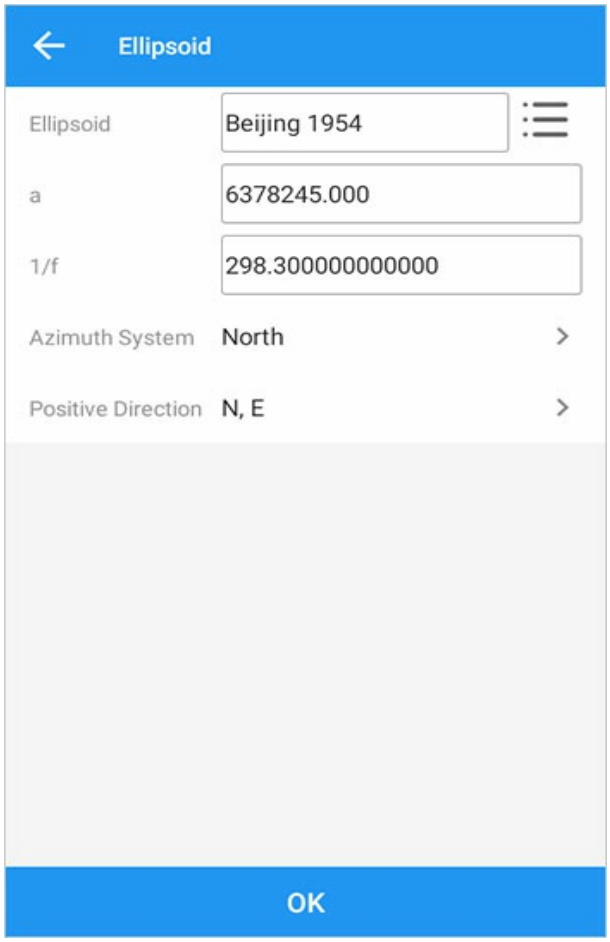
2. Edit Datum

A datum includes parameters such as coordinate system, source ellipsoid, target ellipsoid, projection, seven parameters, plane correction, elevation fitting, etc. Long press the coordinate system in the [Datum list] to pop up the modify and delete menu, and click [Modify] to enter the Datum edit interface.

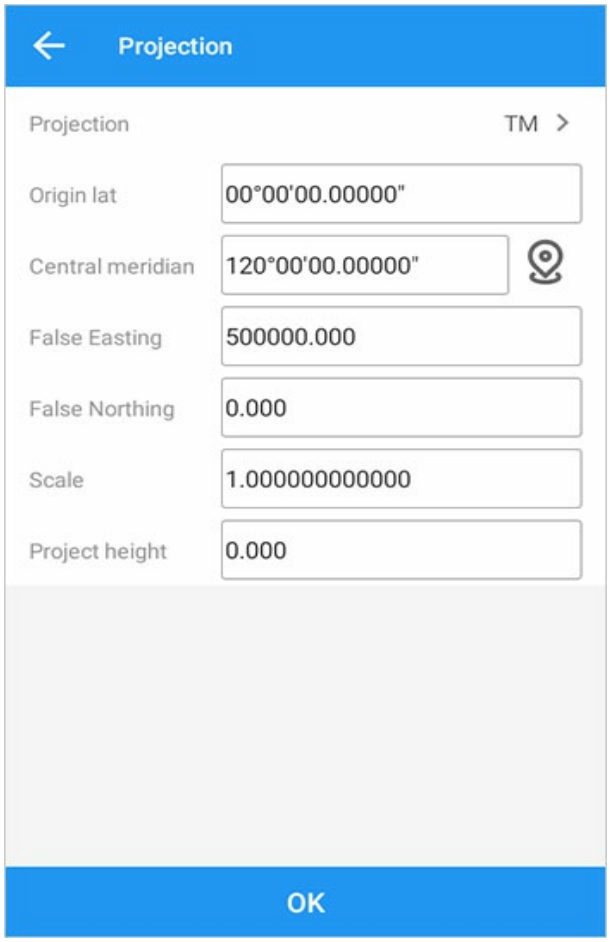


2.1. Ellipsoid Parameters

Both the source ellipsoid and the target ellipsoid can input relevant parameters, or you can select the defined ellipsoid parameters.

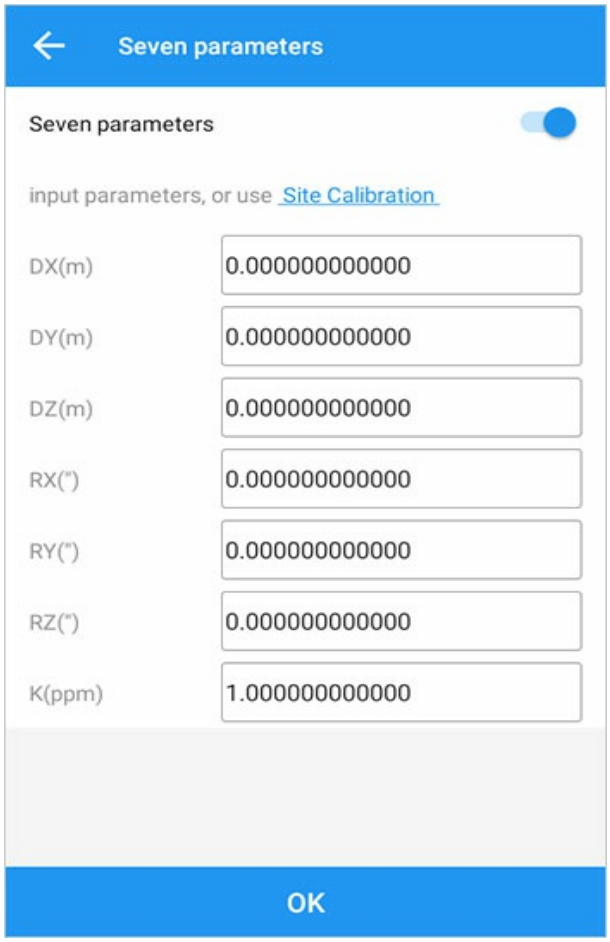


2.2. Projection Parameters



The relevant parameters can be entered and the current central meridian parameters can be obtained based on the receiver position.

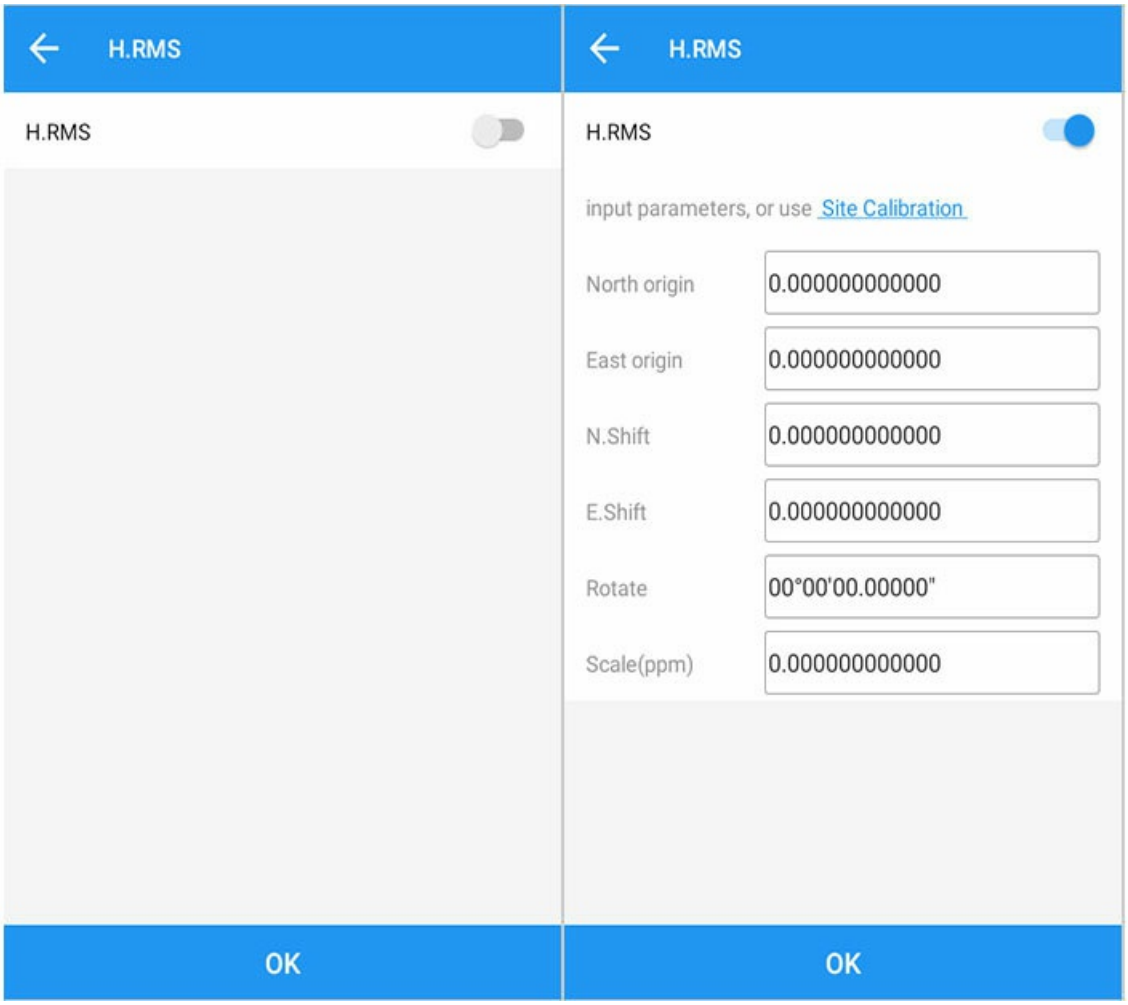
2.3. Seven Parameters

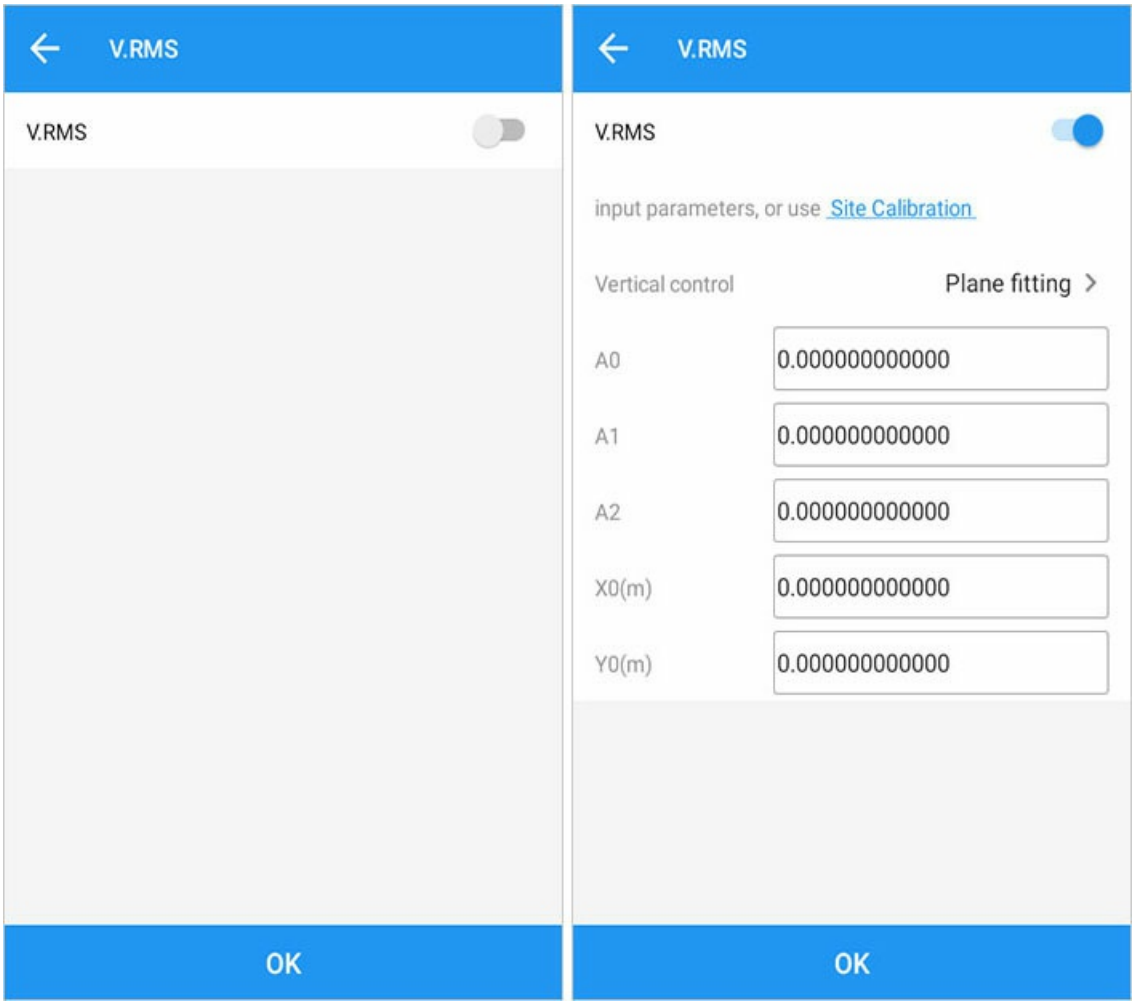


Seven Parameters: The translation, rotation, and scale parameters between the two ellipsoids in the space vector, and the rotation angle should be small, it is a relatively strict conversion model, requiring three points to solve, suitable for WGS-84 to national coordinates system conversion; you can also apply the calculated parameters after parameter calculation.

2.4 H.RMS and V.RMS

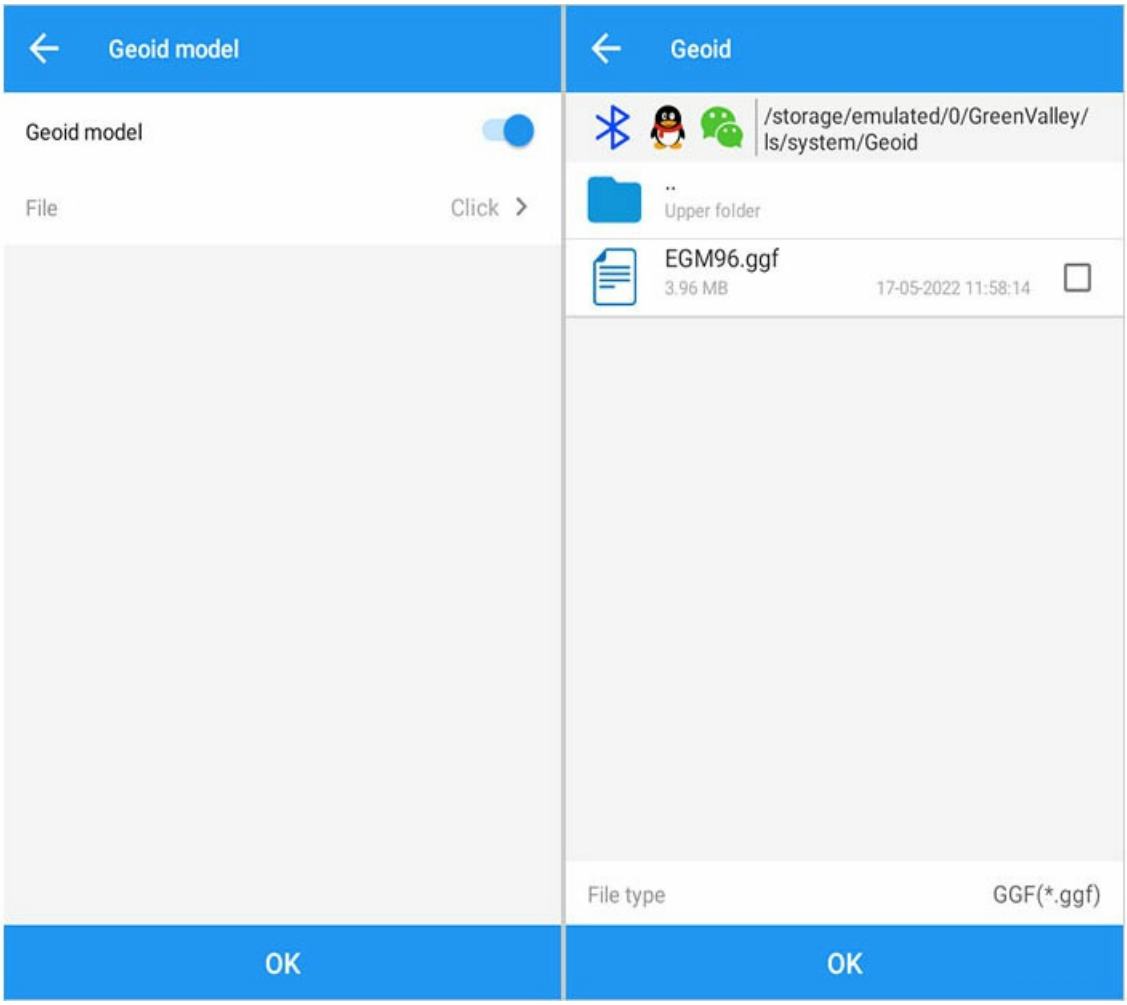
You can manually click to open the horizontal correction and elevation fitting parameters, and then enter the relevant parameters, or you can apply the calculated parameters after Parameter calculation.


H.RMS
H.RMS
OK
H.RMS
H.RMS
input parameters, or use Site Calibration
North origin
0.000000000000
East origin
0.000000000000
N.Shift
0.000000000000
E.Shift
0.000000000000
Rotate
00°00'00.00000"
Scale(ppm)
0.000000000000
OK



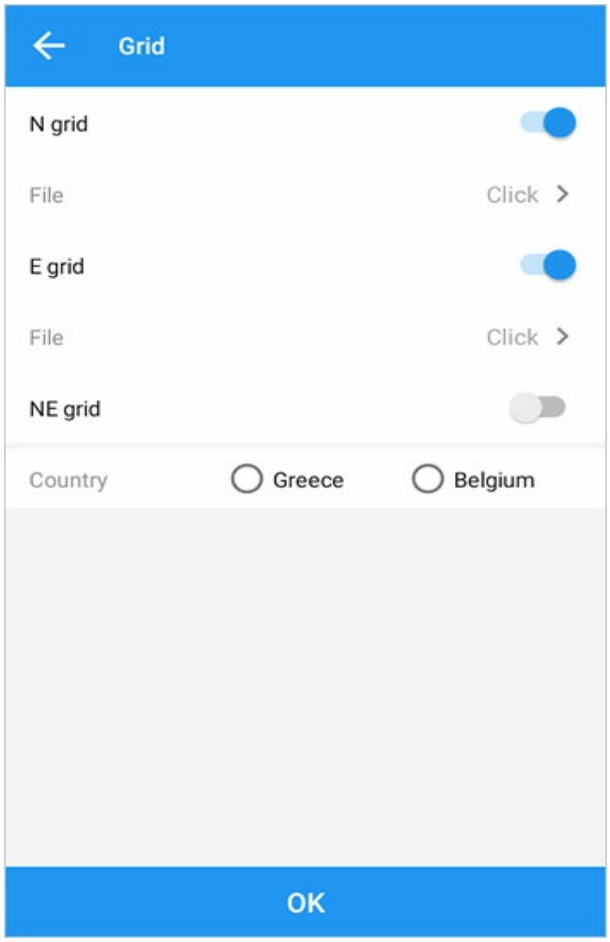
2.5 Geoid Model

The default geoid model is EGM96 and this can also be user-defined.



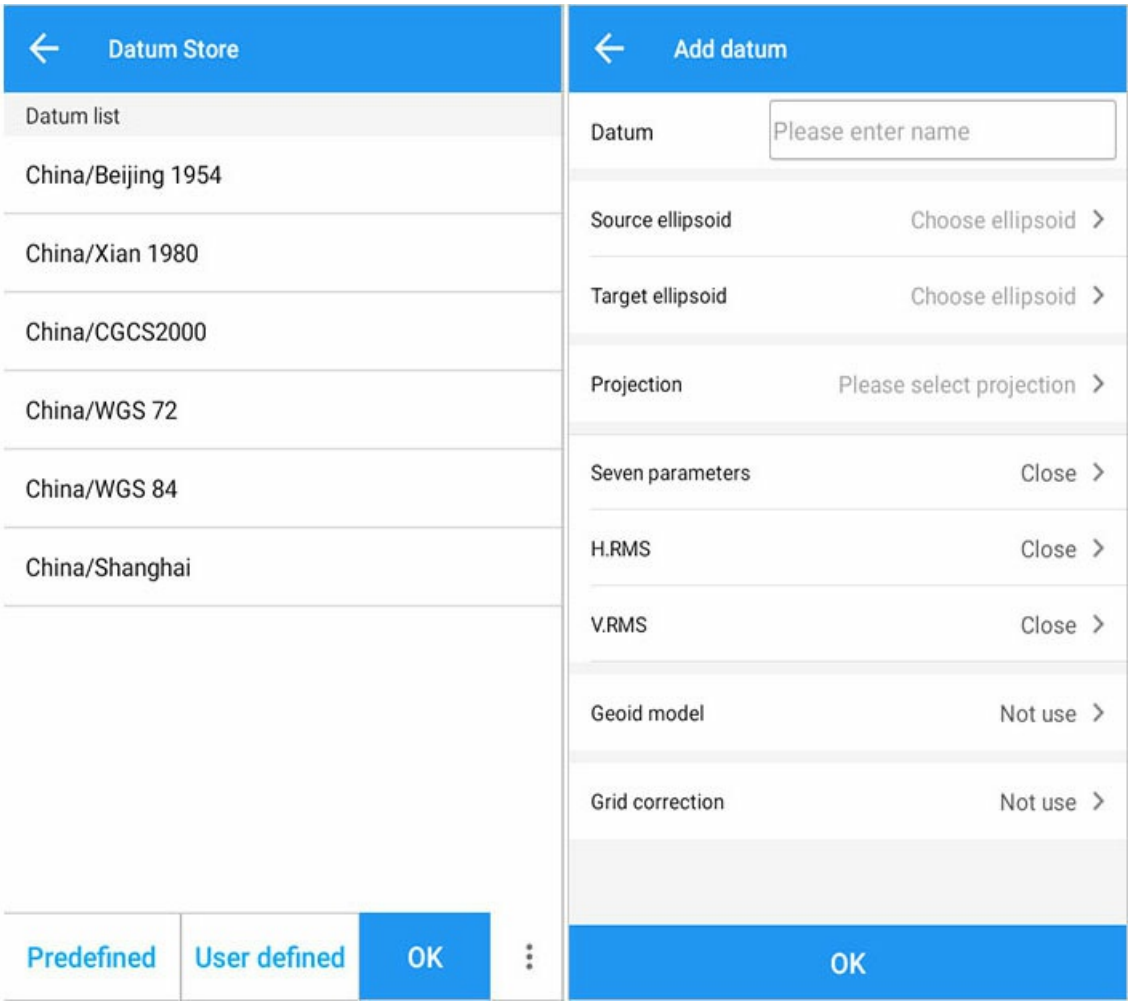
2.6 Grid Correction

Select two files of N grid and E grid respectively, or select a single file of NE grid to perform grid correction.



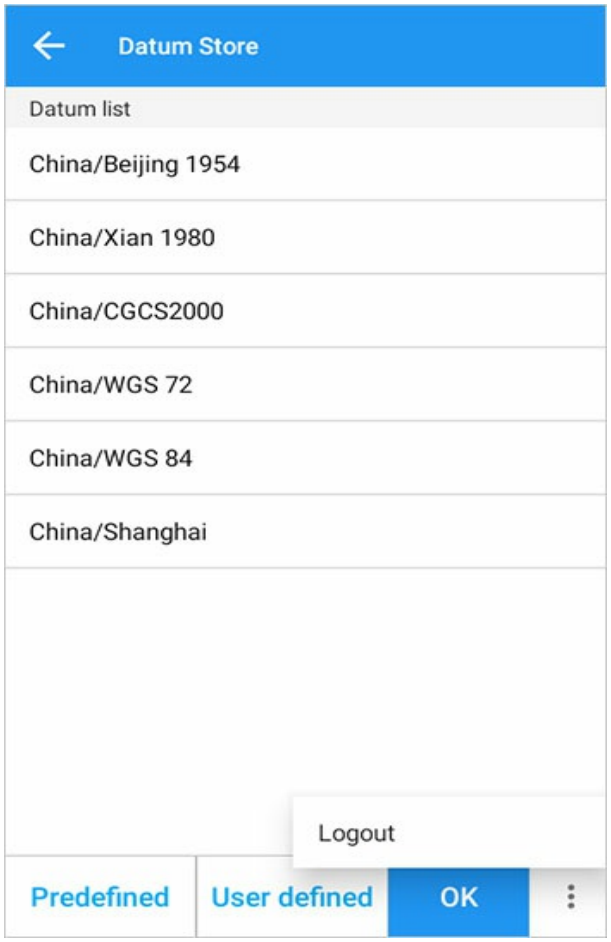
3. Add User-defined Datum

The interface is the same as the Datum edit, and you need to input the complete datum parameters.



4. Logout

In [Datum list], select Coordinate System -> [...] -> [Logout].


Datum Store
Datum list
China/Beijing 1954
China/Xian 1980
China/CGCS2000
China/WGS 72
China/WGS 84
China/Shanghai
Logout
Predefined
User defined
OK

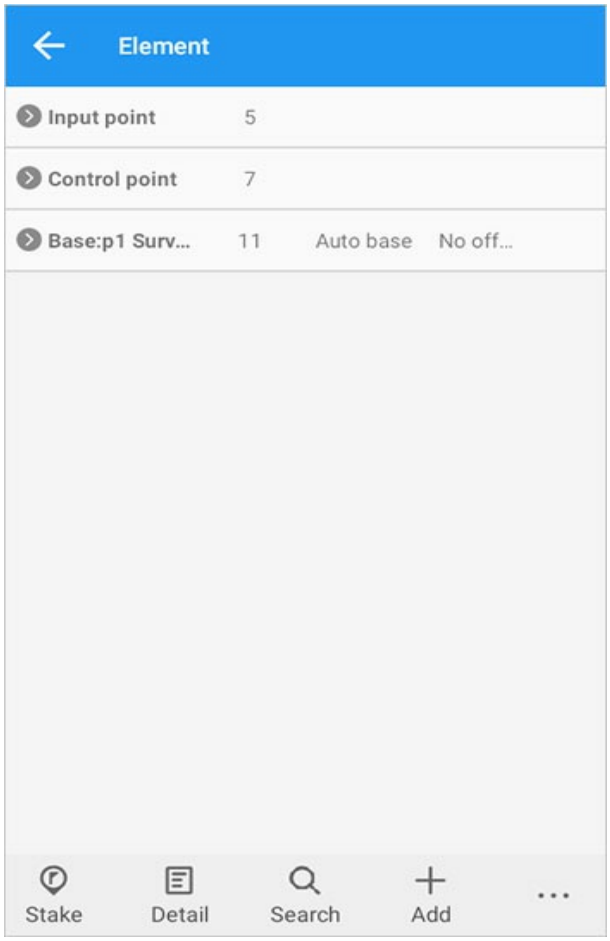
Element

Home -> [Project] -> [Element]

The element library displays and manages input points, control points, measurement point, and stakeout points, and can quickly enter the point stakeout interface.

Symbols

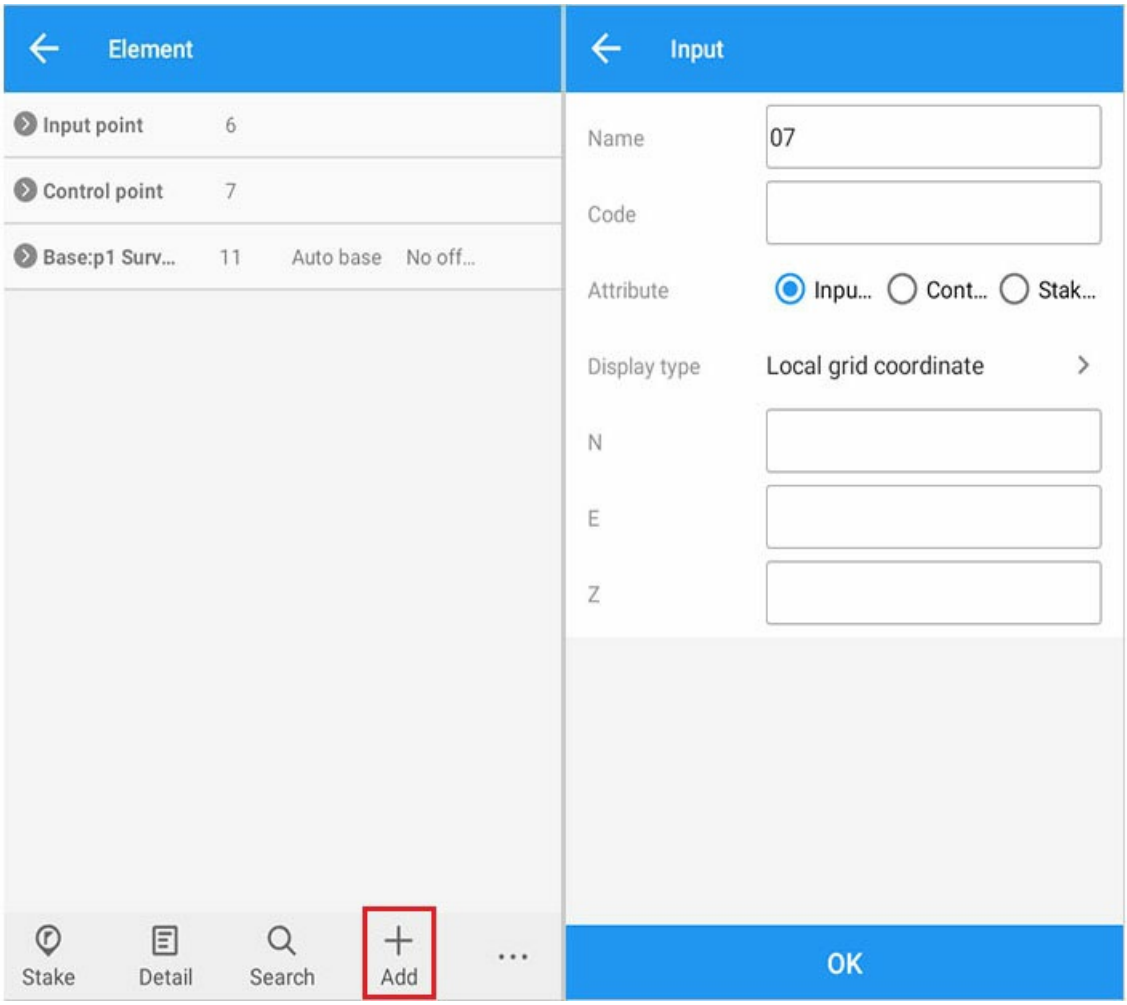
Symbols	Definition
ⓑ	Base Station
•	Input Point
▲	Control Point
×	Normal Measurement Point
→	Automatic Measurement Point
⊙	Stake out point
⊟	Pile Point in the Road
÷	Road Crossing Point



1. Element Library

Click [Project] -> [Element]

1.1. Input Points



Click [Add] to enter the add point interface

> Add points support local plane coordinates, WGS84 latitude and longitude coordinates

Input point name, ocal plane coordinates (N, E, Z) or WGS84 latitude and longitude coordinates (B, L, H)

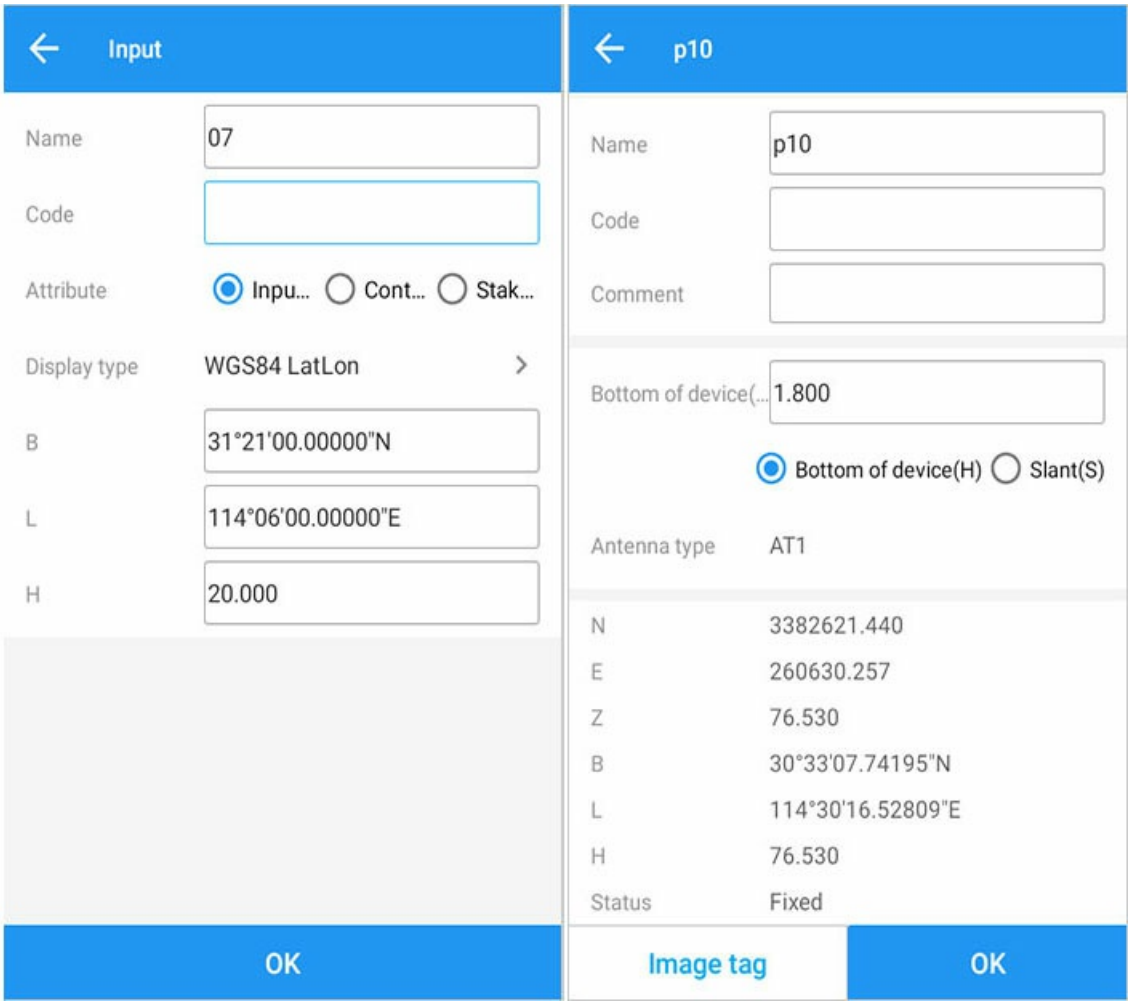
> B, L Input format: `degreesdegreesdegrees.minutesminutessecondssecondssecondssecondssecondsseconds` ; Example: input `32.303022222` (32°30′30.22222″)

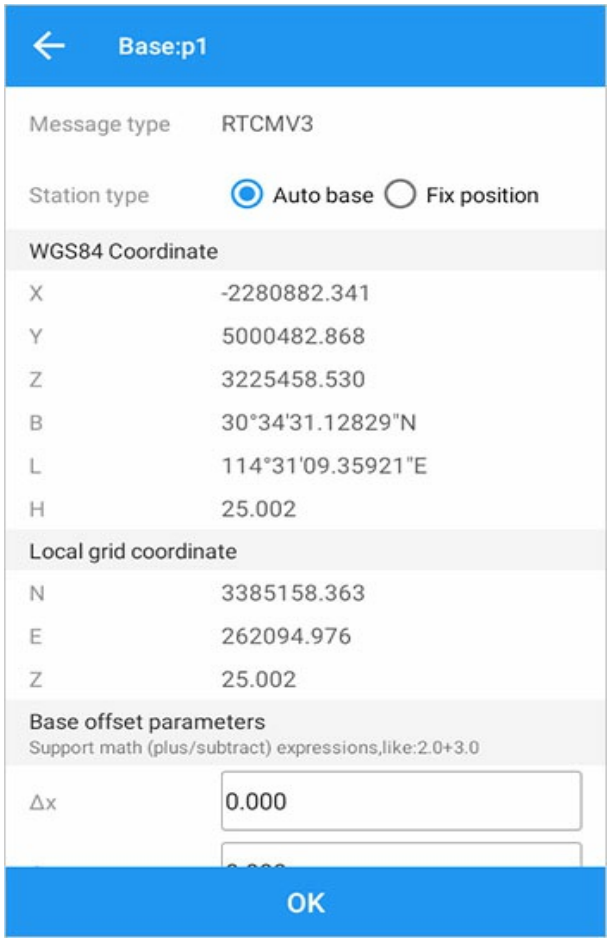
Attribute: Input point, control point, stakeout point

1.2. Detail

Select point -> click [Detail]

- All values can be modified for points under the Input Points, Control Points, No Base Points and Stakeout Points classes.
- The measurement point under the base station category can change the point name (note: it allows points with the same name), code, antenna height and type, click [OK] to complete the change operation.
- The base station can change the base station type and base station shift parameters.


Input
Name
07
Code
Attribute
Inpu...
Cont...
Stak...
Display type
WGS84 LatLon
B
31°21'00.00000"N
L
114°06'00.00000"E
H
20.000
OK
p10
Name
p10
Code
Comment
Bottom of device(...
1.800
Bottom of device(H)
Slant(S)
Antenna type
AT1
N
3382621.440
E
260630.257
Z
76.530
B
30°33'07.74195"N
L
114°30'16.52809"E
H
76.530
Status
Fixed
Image tag
OK

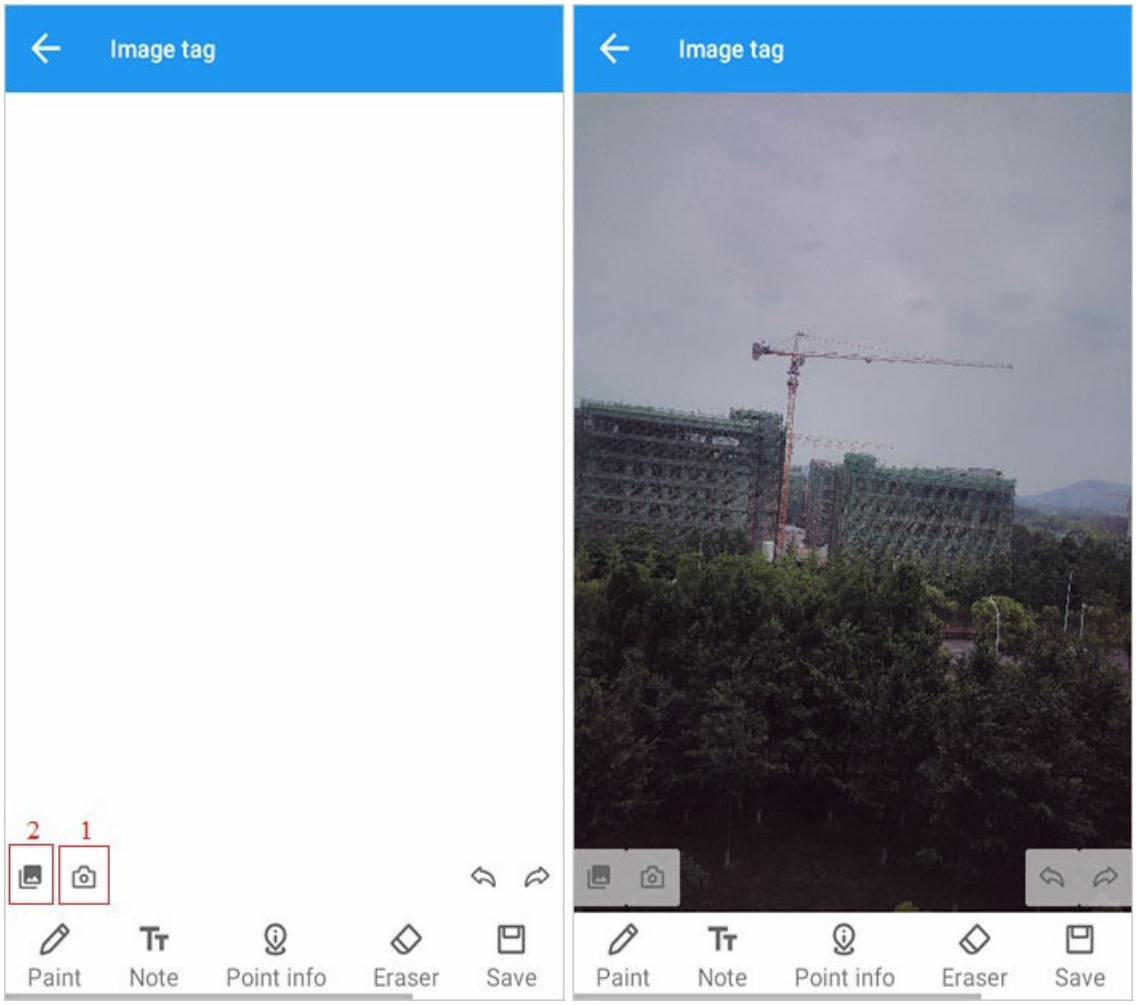


Select the measurement point, click -> [Detail] -> [Image Marker]

Click the icon 1 in the lower left to take a photo, and you can mark the photo on the spot.

Click the icon 2 in the lower left to mark the selected pictures in the album.

Note: After the image is marked, click Save. After returning to the detail interface, click OK to save it permanently.



[Brush]: Click the brush to choose the appropriate color and thickness of the brush line.

[Text]: Click the text to select the appropriate color and font size, and enter the text to mark the text.

[Point Information]: You can choose the color and font size, in addition to this, you can choose to display the point name, code, N, E, Z.

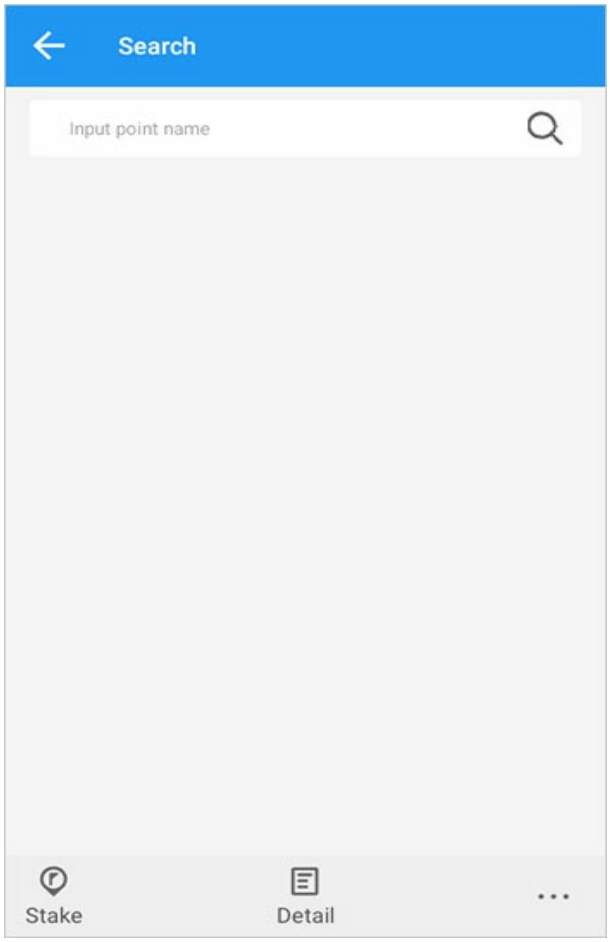
[Eraser]: Selectively erase the lines drawn by the brush.

[Save]: Click save to save the added mark.

[Clear]: Slide the bottom edit box to the left, and the clear button will appear on the far right. Clicking clear will clear all tags (excluding pictures).

[Undo]: You can restore or undo the previous operation, click the button on the left to undo the previous operation, and click the button on the right to restore the previous operation.

1.3. Search

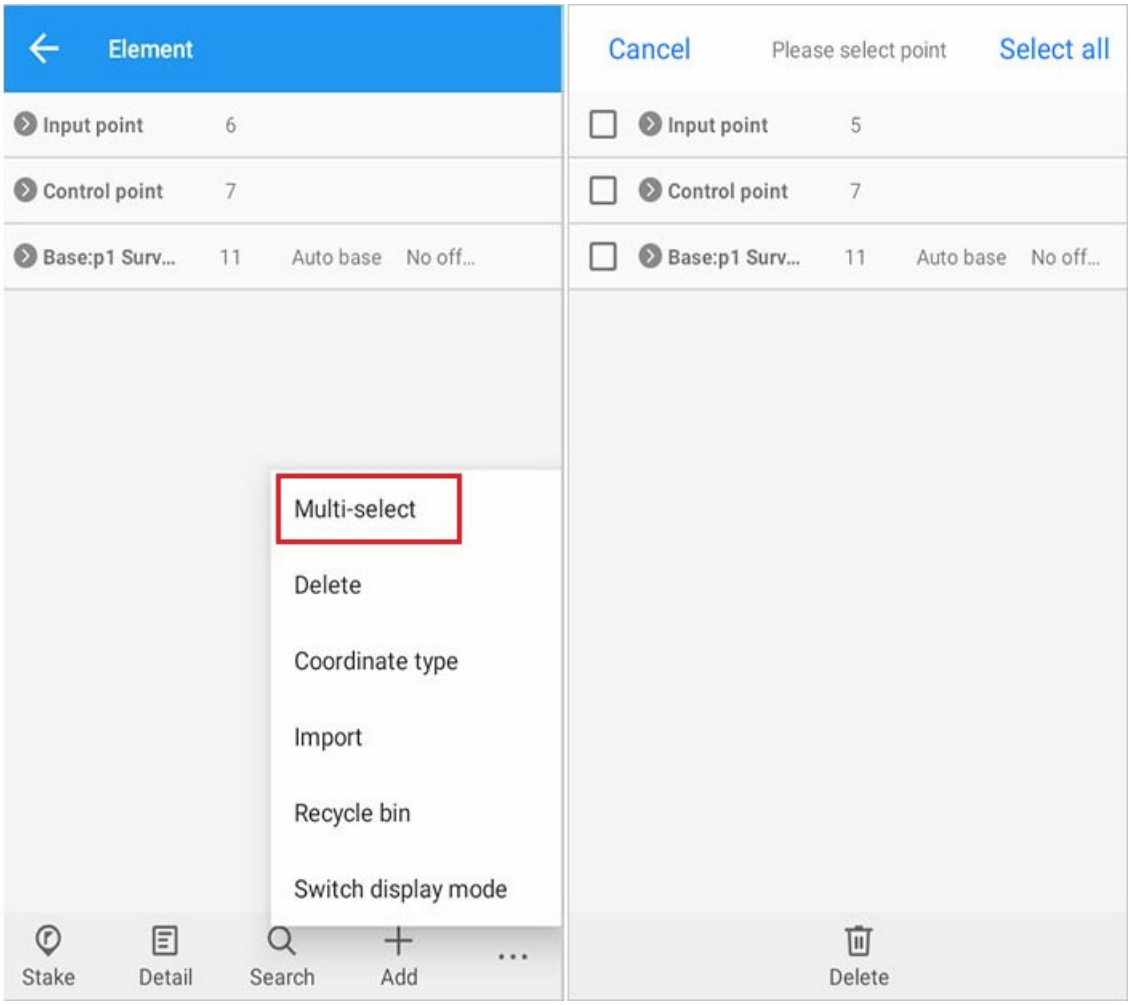


[Search] Enter the point name to query (support fuzzy search)

The queried point can be clicked -> [Detail] the same as the main interface of the element library, 【Multi-select] the same as the main interface of the element library, and [Delete] the same as the main interface of the element library to delete.

1.4. Multi-select

Click [Multi-select] in the three small dots in the lower right corner to enter the multi-select mode, which can be deleted in batches.



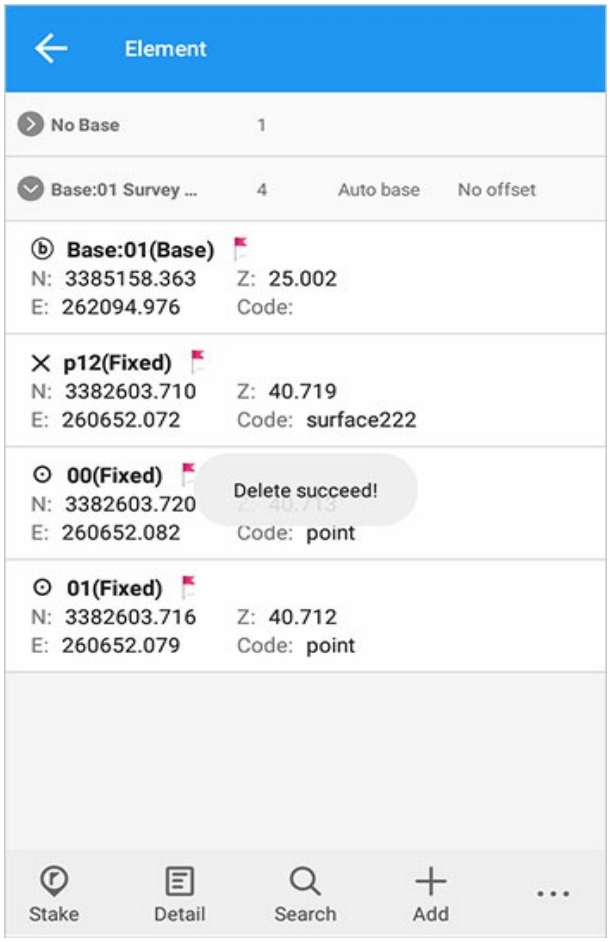
1.5. Stake

Jump to the [Point Stake] interface.

1.6. Delete and Import

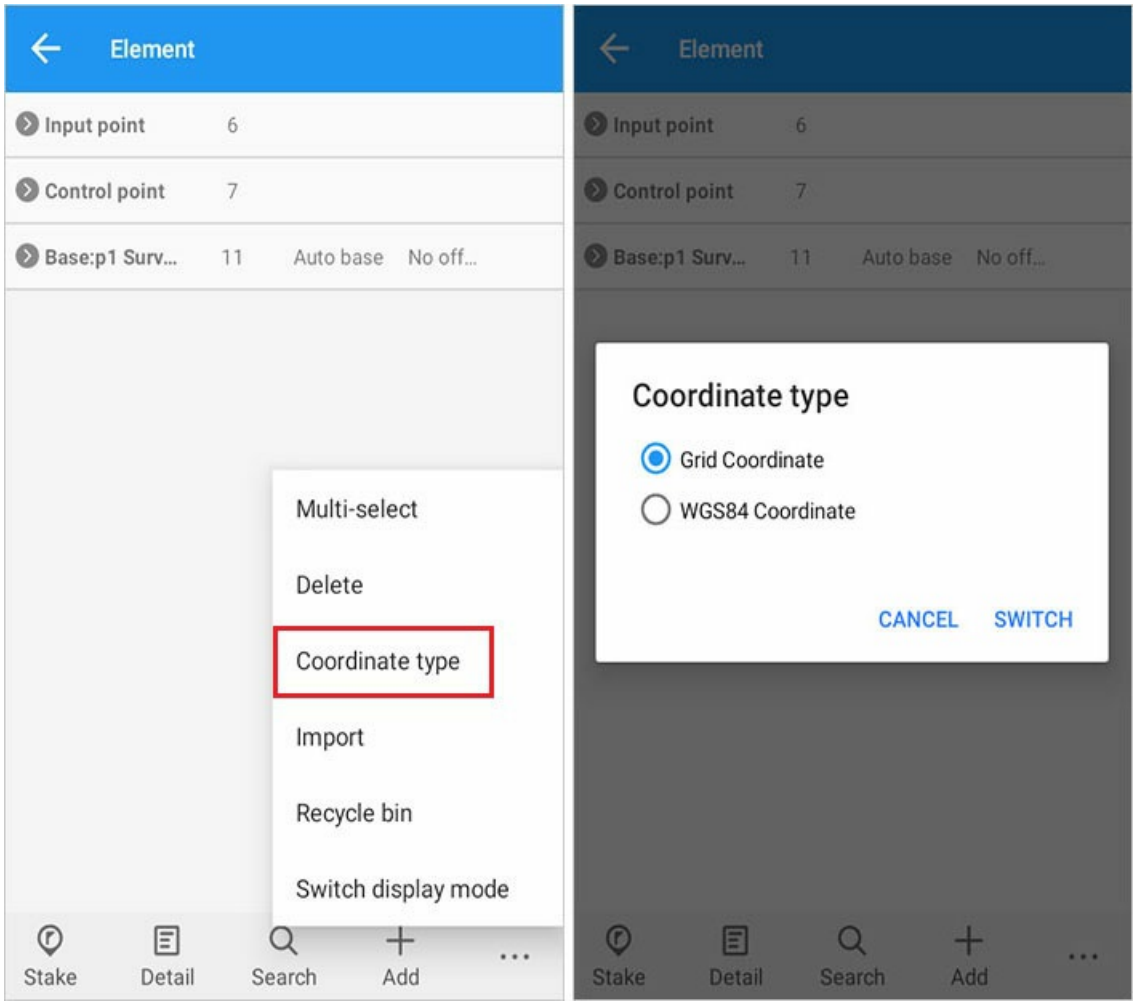
1)Delete: select the point to delete.

2)Import: Refer to Data Import.

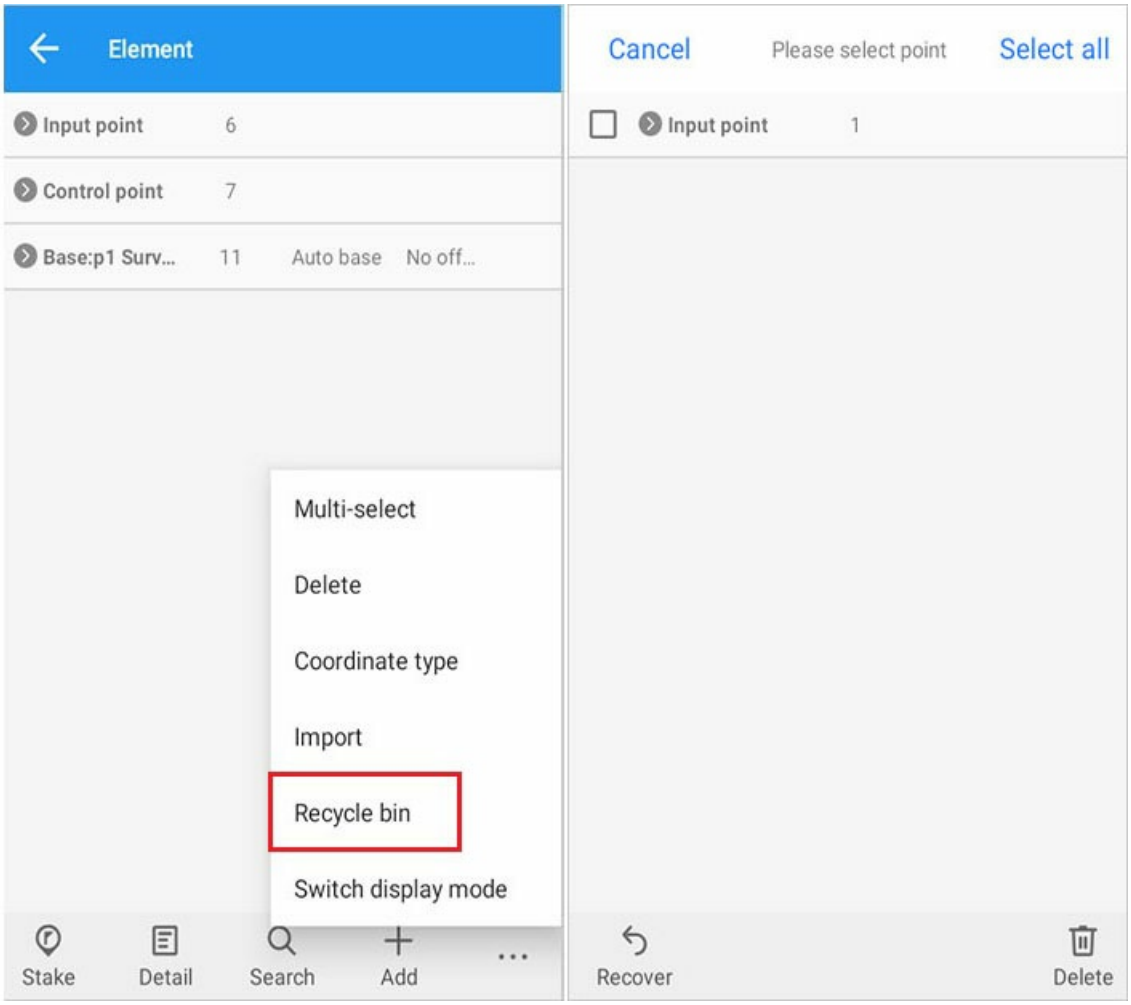


1.7. Coordinate Type

Plane coordinates or WGS84 coordinates.



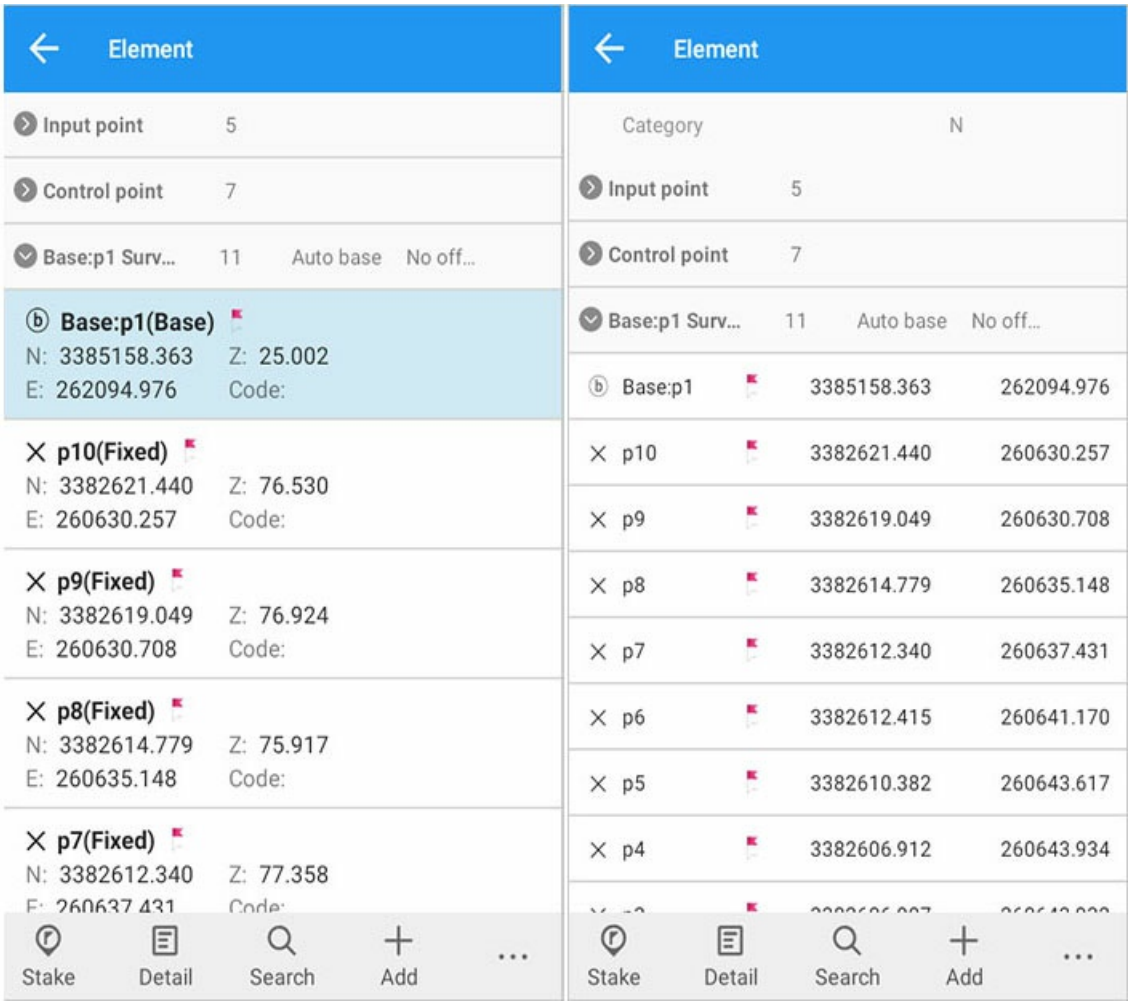
1.8. Recycle Bin



[...] -> [Recycle Bin]

[Restore]: Long press the point -> select point -> [Restore] The restored point will enter the point library. [Delete]: Long press the point -> select point -> [Delete] The deleted point cannot be retrieved, please operate with caution.

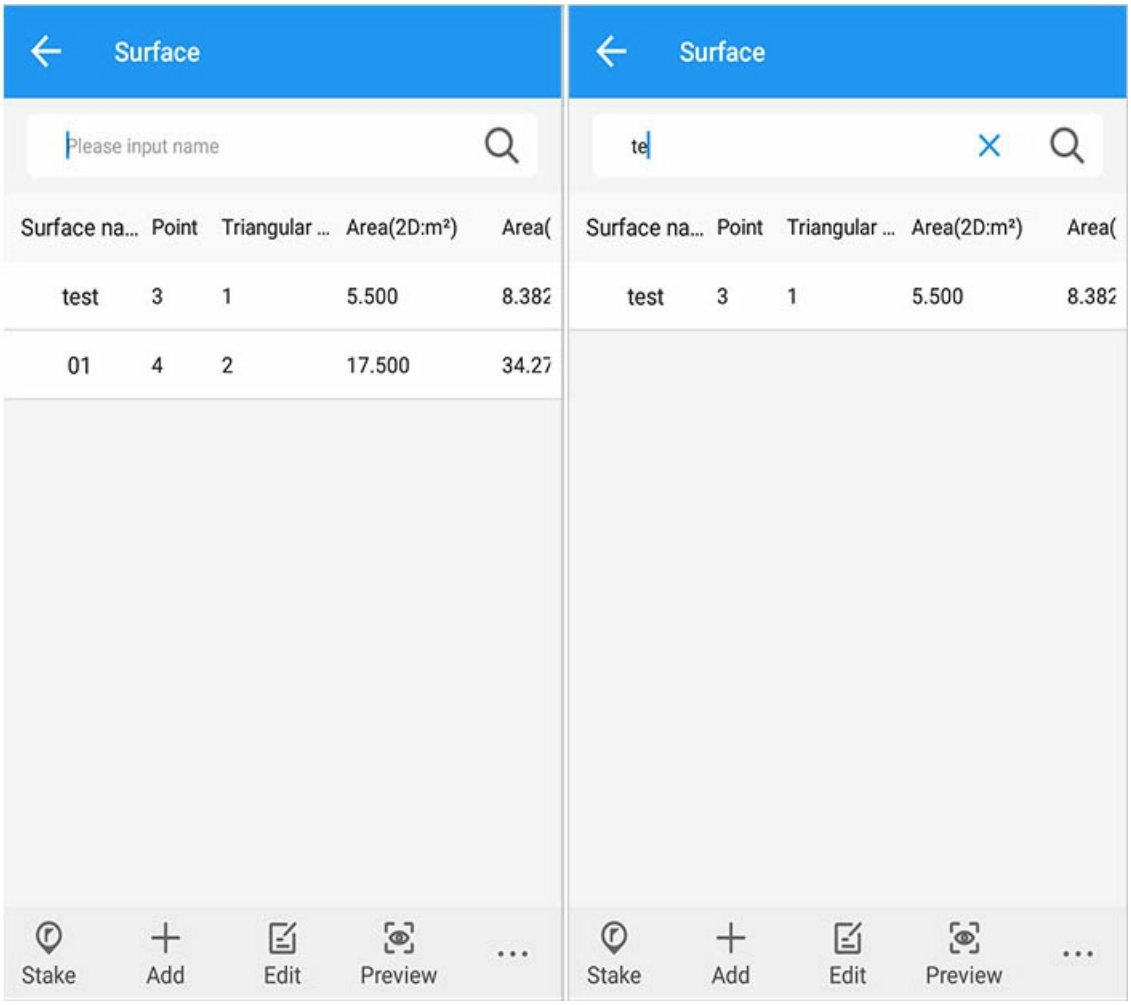
1.9. Switch Display Mode


Element
Input point 5
Control point 7
Base:p1 Surv... 11 Auto base No off...
Base:p1(Base)
N: 3385158.363 Z: 25.002
E: 262094.976 Code:
p10(Fixed)
N: 3382621.440 Z: 76.530
E: 260630.257 Code:
p9(Fixed)
N: 3382619.049 Z: 76.924
E: 260630.708 Code:
p8(Fixed)
N: 3382614.779 Z: 75.917
E: 260635.148 Code:
p7(Fixed)
N: 3382612.340 Z: 77.358
Stake
Detail
Search
Add
Element
Category N
Input point 5
Control point 7
Base:p1 Surv... 11 Auto base No off...
Base:p1 3385158.363 262094.976
p10 3382621.440 260630.257
p9 3382619.049 260630.708
p8 3382614.779 260635.148
p7 3382612.340 260637.431
p6 3382612.415 260641.170
p5 3382610.382 260643.617
p4 3382606.912 260643.934
Stake
Detail
Search
Add

Surface

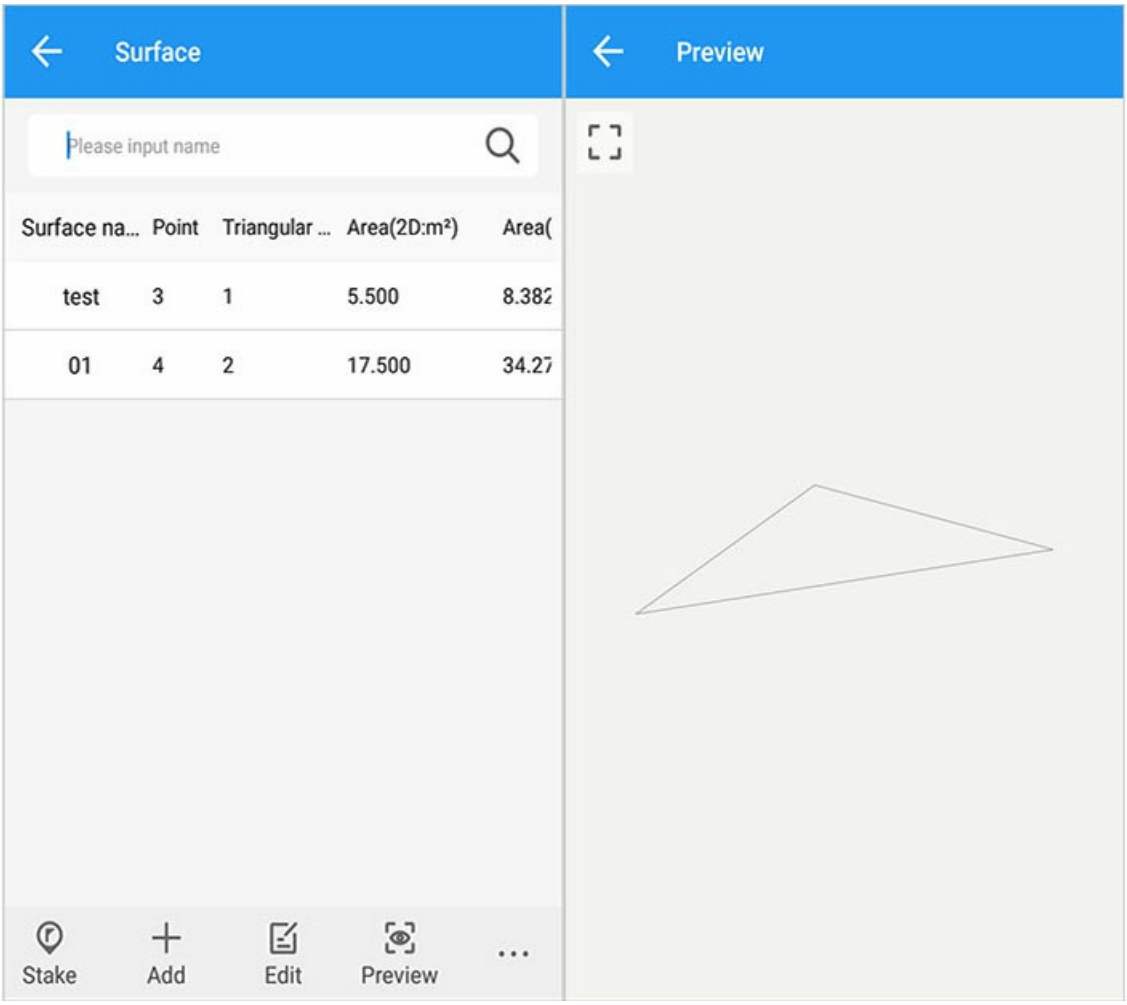
Home -> [Project] -> [Surface].

1. Search



1)[Search]: You can enter a part of the name to search. When there is only a face with this name in the face library, the search is successful.

2. Stake, Delete, Preview



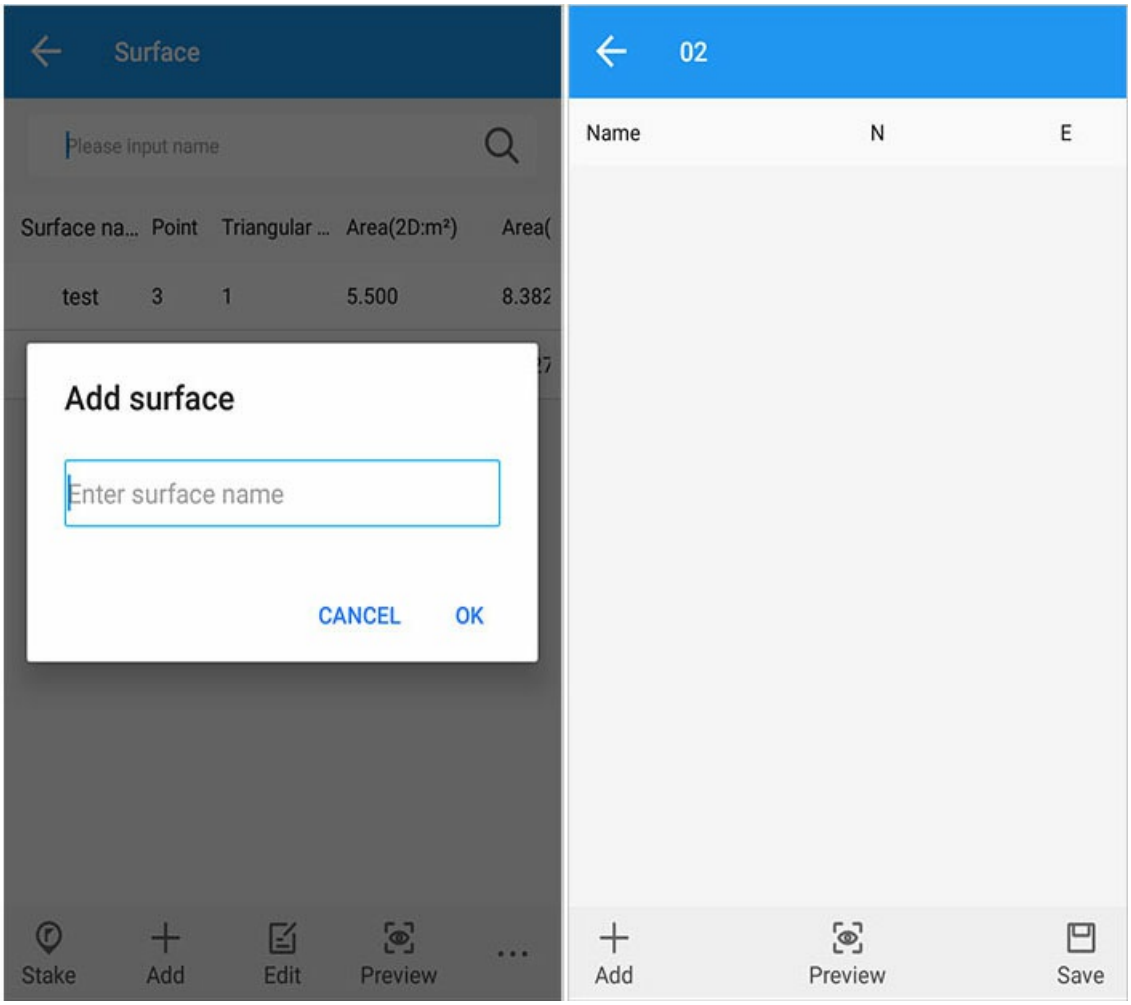
1) Stake: First select the surface to stake out and then click Stake to jump to the surface stake interface. For details of surface stakeout, please refer to Surface Stake.

2) Delete: Select the surface to be deleted and click Delete to delete it.

3) Preview: Select a surface and click Preview to preview the shape and size of the surface.

3. Add, Edit

Click [Add] and enter a surface name.

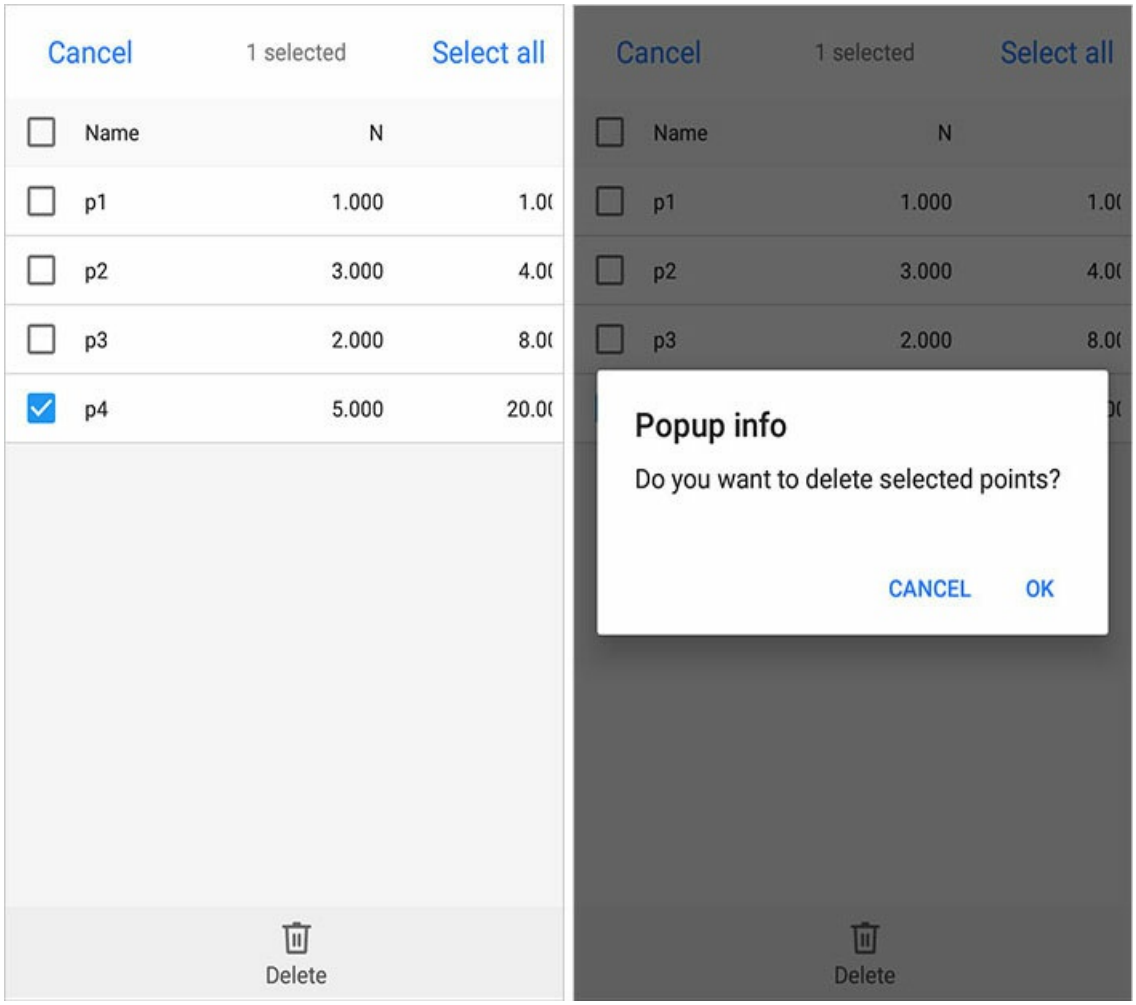


1) Add: Jump to the point library selection interface, select three or more points that make up the surface, you can query the point name and select the desired point.

2) Preview: After adding, click Preview to display the shape of the surface formed by the current point.

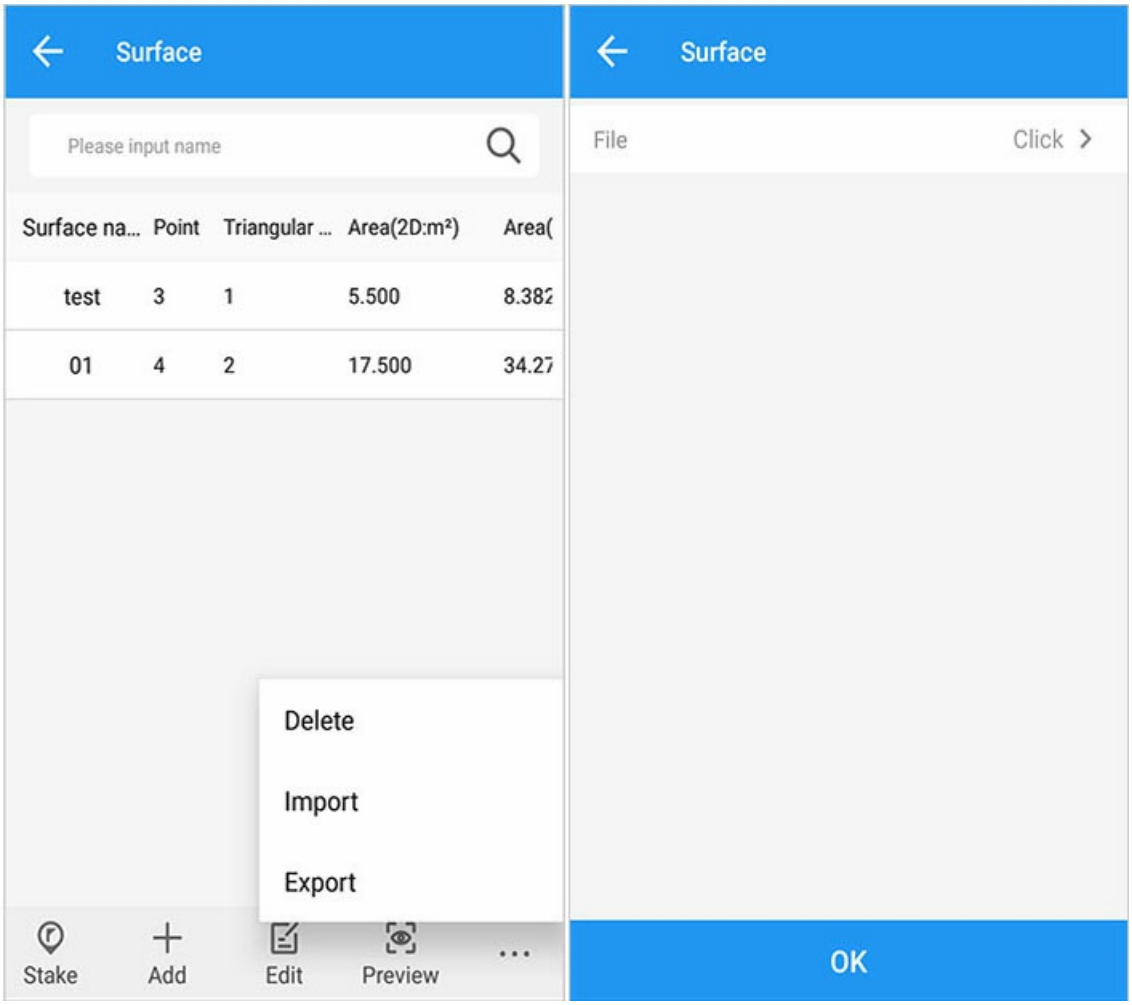
3) Save: Click Save to save the created surface in the surface library.

4) Delete: If you want to delete some points or select a point again, you can long press the selected point to delete it.



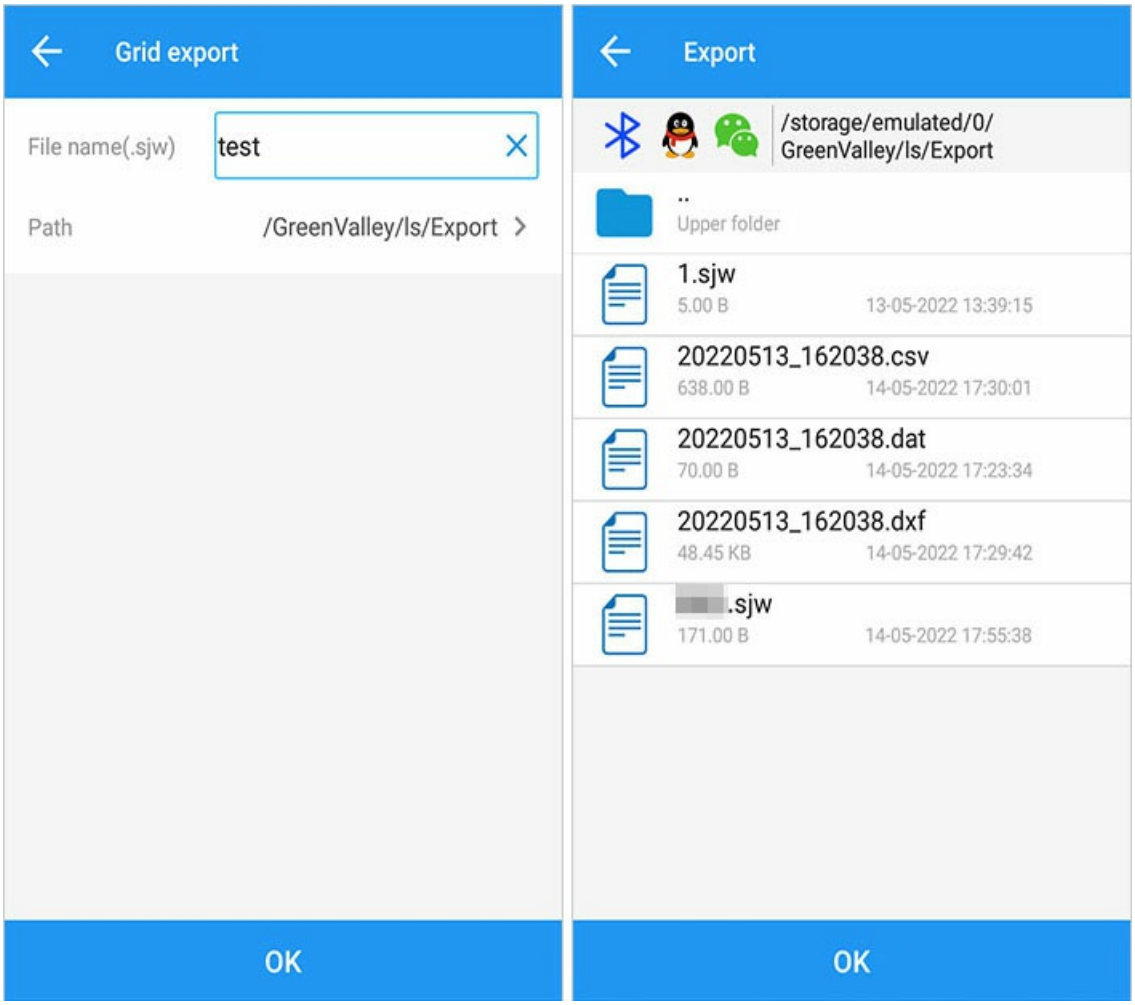
4. Import

Click Import to import surface data. Only .siw and .xml formats are supported here.



5. Export

Select the appropriate surface and click Export to jump to the Grid export interface.



1) File name: It can be input freely, the default name is the original surface name.

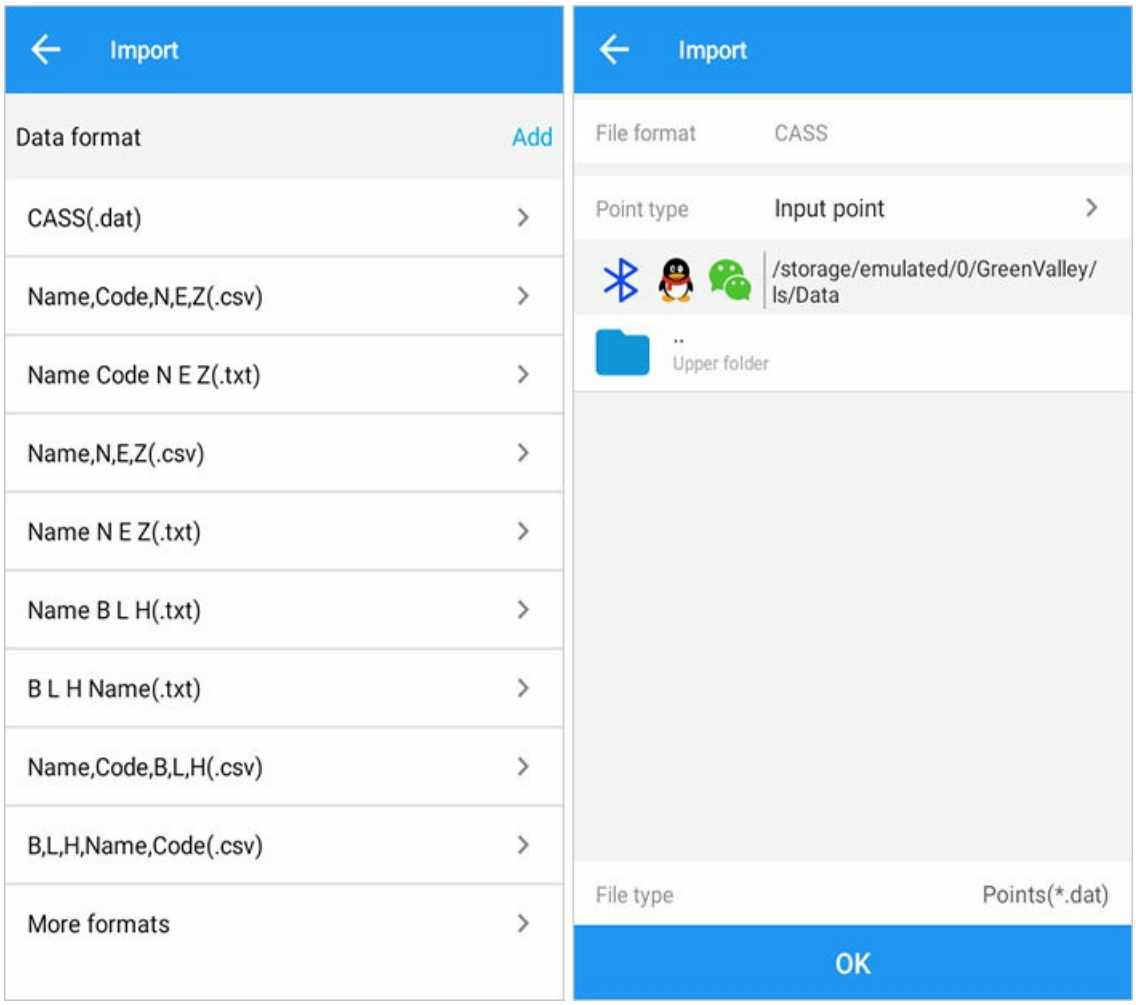
2) Path: You can click the path to choose freely.

Data Import

Home -> [Project] -> [Import]

Data import: Import the points conforming to the file type into the element management, and the imported point type can be selected.

1. Import



[File format]: Select the data format that matches the imported file, and jump to the import interface;

[Point Type]: Select input point, control point and stakeout point;

[Path]: Select the location to import data;

If the import is successful, it will jump to the main interface prompt: data import is successful!

2. Add Format

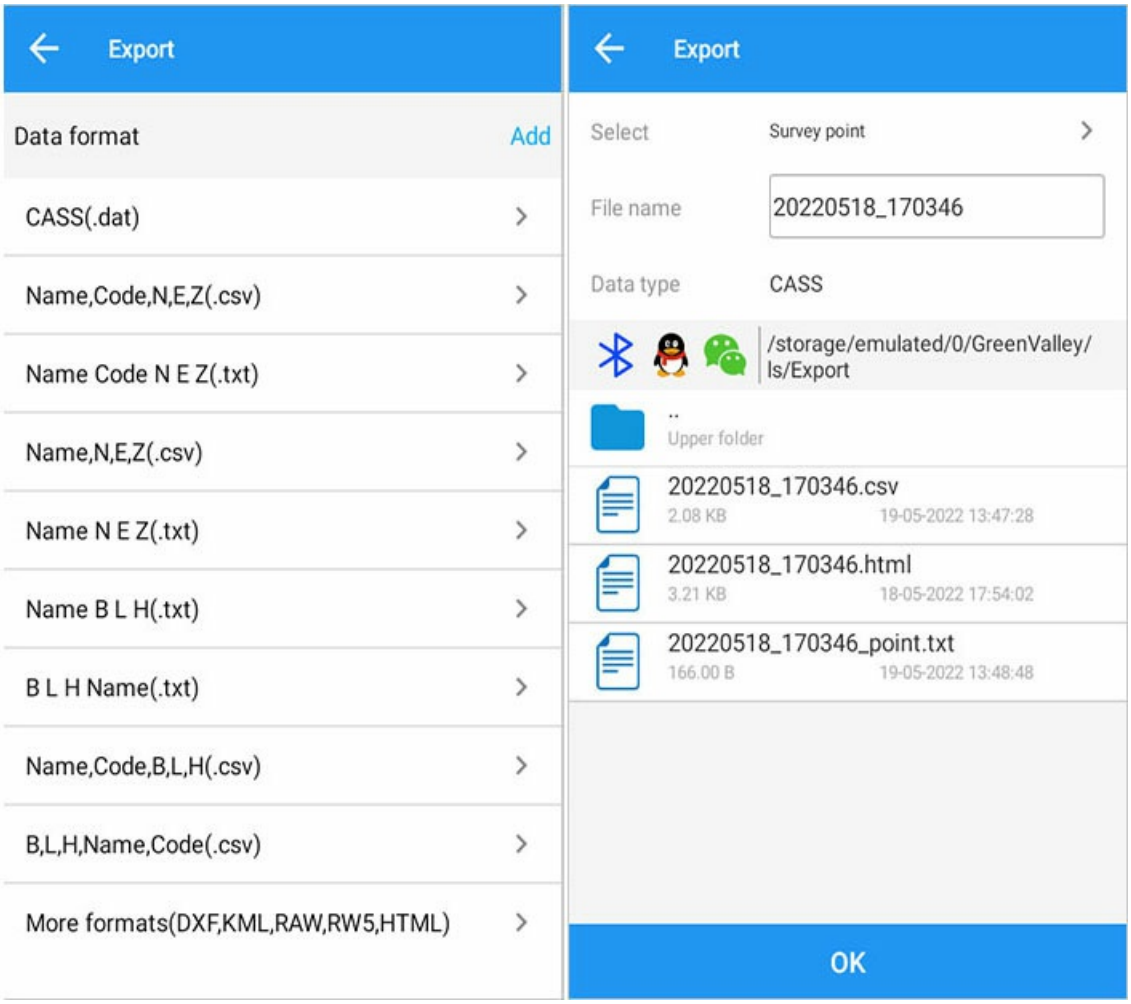
All import methods can be selected and combined according to the needs of the content. After adding, long press to rename or delete.

Data Export

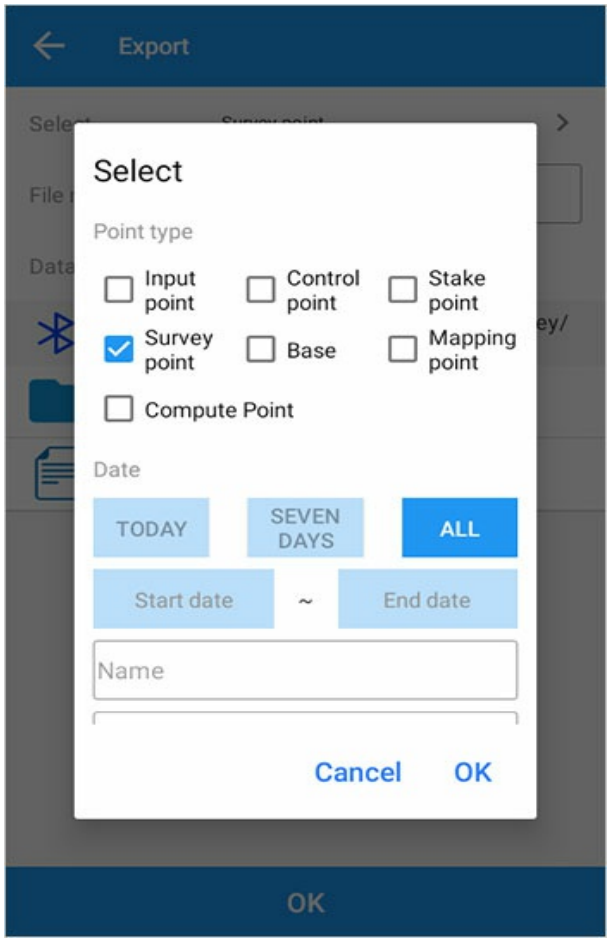
Home -> [Project] -> [Export].

1. Data format

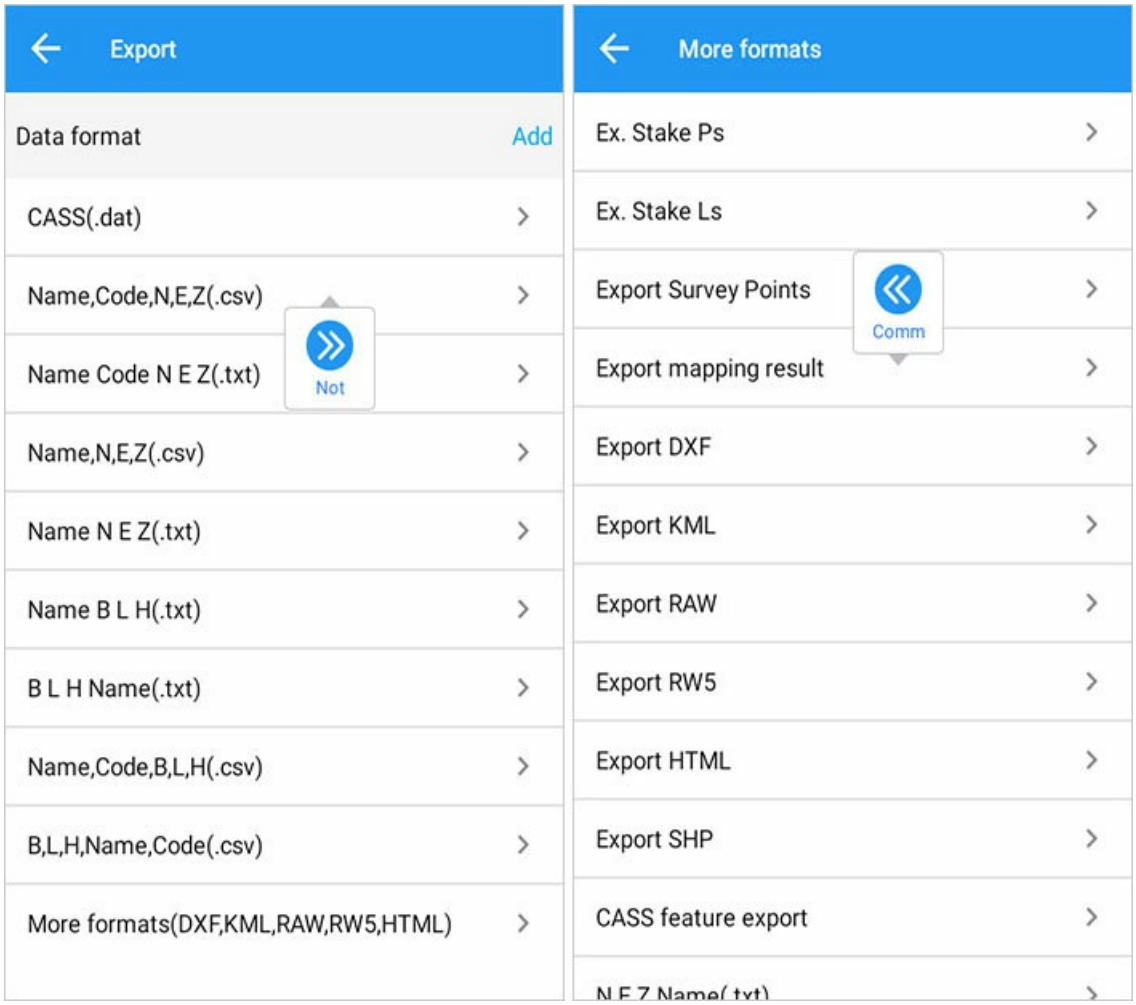
[Data format]: Select the export format, and jump to the export interface.



[Filter]: Select the point type to be exported, the collection time and export according to the keyword.



Press and hold a data format to list it in the uncommon interface (more formats interface); on the contrary, long press on the uncommon interface to list it in the common interface.



2. More Formats

2.1 [Point stakeout results]

Path, file name, and format and content, click [OK] to export the result, you can find the file in the corresponding format under the corresponding path. Currently, the export format supports txt and html formats, which are the clean version and the detail version.

Stake Point Properties

| Column Name | Description | | ---------- | :----------: | | Name | Stake Point Name | | Code | Point Code | | N E

Z | The local plane coordinates of the stakeout point | | Remarks | | | N precision

E precision

Z precision | The local plane coordinate precision of the stakeout point | | rms | Medium Error | | Antenna height | Antenna height during measurement | | Measurement time | Date and time of the measurement point |

Kownn Point

| Column Name | Description | | ---------- | ---------- | | Name | Known Point Name | | Code | Point Code | | N E

Z | Known point local plane coordinates | | Remarks | |

Stake Difference

| Column Name | Explanation | | ---------- | ---------- | | Horizontal distance | Horizontal distance between stakeout point and known point | | dx

dy

00_112708.txt

```
Name            Code            N               E
Z               RMS_x           RMS_y
RMS_h           RMS             Antenna height
Measure time    Name            Code            N
E               Z               Distance_H      dx
dy              dh
p2 ceshi 3382606.405 260654.950 41.000 0.335
0.335 0.252 0.365 1.800 2022/05/20 15:11:23 p1
ceshi 3382606.950 260655.313 40.835 0.655 -0.545
-0.364 0.166
p1 ceshi 3382607.535 260653.373 42.214 0.638
0.638 1.205 1.023 1.800 2022/05/23 15:52:31 p28
3382605.405 260653.950 41.000 2.207 2.130 -0.577
1.214
01 1 3382603.716 260652.079 40.712 0.002 0.002
0.002 0.002 1.800 2022/05/26 16:34:15 009 0523
3382603.015 260652.780 48.823 0.991 0.701 -0.701
-8.111
00 1 3382603.720 260652.082 40.713 0.002 0.002
0.002 0.002 1.800 2022/05/26 16:34:50 009 0523
3382603.015 260652.780 48.823 0.992 0.705 -0.698
-8.110
```

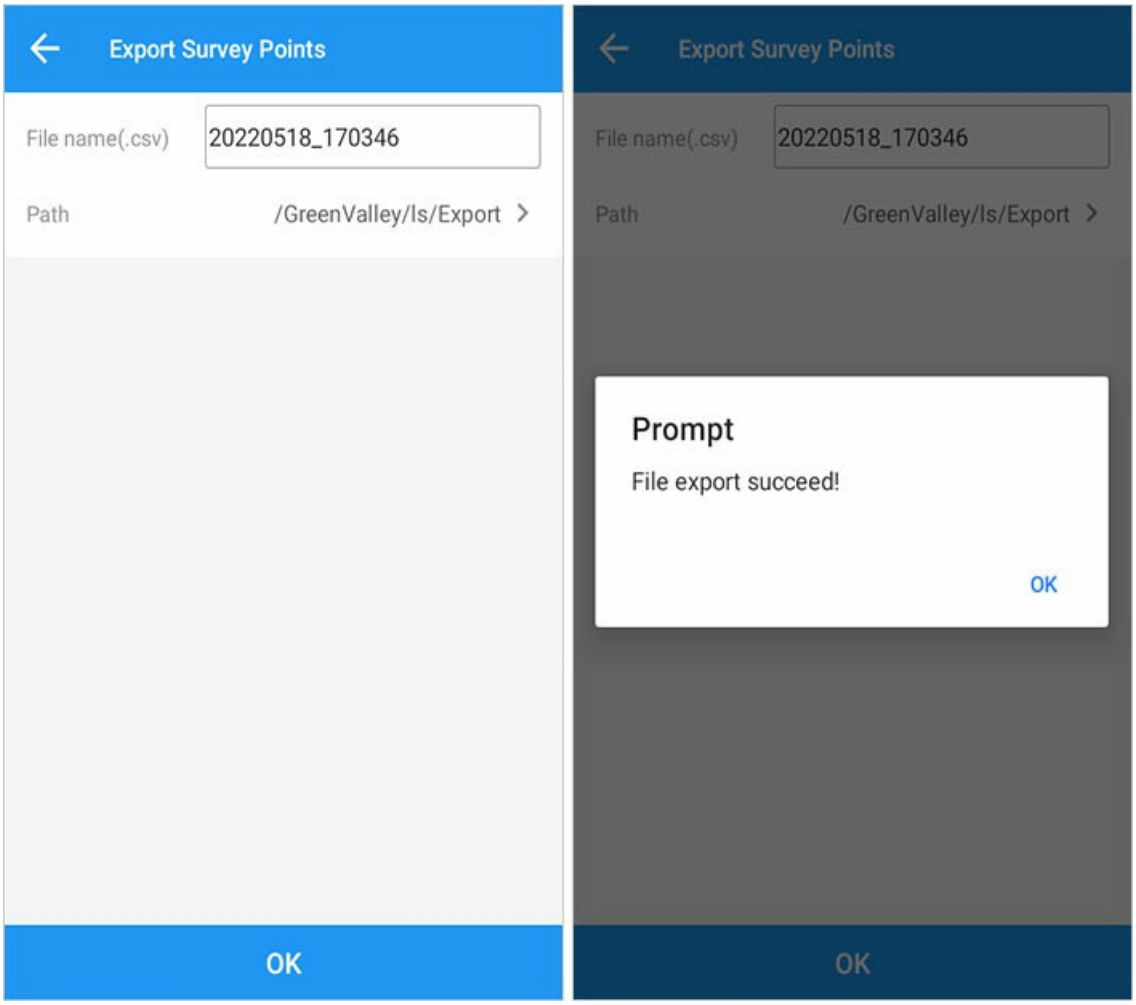
dh | Stake Difference | ![concise](images/export/concise.jpg) **2.2**

[Line stakeout results] The operation is the same as point stakeout.

Stake out export list properties

Column Name	Description
Line Name	Stake Line Name
Length	Distance from start to end
Method	Line Stakeout Method
Start station	Start station of the line
starting point	starting point roll call
Starting point N/E/Z	Starting point local plane coordinates
End Point	Point Name of the End Point of the Line
End point N/E/Z	End point local plane coordinates
Azimuth	Azimuth from start to end point
Slope	Slope from Start to End
Attribution line	Line to which the stakeout point belongs
Distance line	The distance of the stakeout point from the home line
Stake Number	Stake Point Stake Number
From start point	Horizontal distance of stakeout point from start point
Height difference/Cut and fill	Height difference from start point and end point
To the end point	The horizontal distance of the stakeout point to the end point

2.3[Export measurement results], [Export root point results], [Export KML], [Export RAW], [Export RW5], [Export measurement results HTML]



The attributes of the graph root point export list are as follows:

Test Rounds Information Table Properties

Column Name	Description
Roll Call	Tugen Roll Call
Rounds	Number of Rounds
Smooth data	Point coordinates B/L/H, N/E/Z Smooth point error
Average coordinates of measuring rounds	Coordinates of the average point within a measuring round B/L/H, N/E/Z
Average coordinates for each round	Average point coordinates for all rounds B/L/H, N/E/Z

Statistics table properties

Column Name	Description
xrms	x coordinate error
yrms	Y coordinate error
Total number of acquisitions	Number of all smoothed points acquired
Number of Qualified Points	Number of Smoothed Points Not Exceeding the Tolerances of the Plane Root and Elevation Tolerances
Exceeding Points	Number of Smoothing Points Exceeding Root Plane Tolerance and Elevation Tolerance
hP-max(mm)	HDOP: Horizontal accuracy
hP-max(mm)	VDOP: vertical direction accuracy
Pass Rate	Percentage of smoothed points that do not exceed the root plane tolerance and elevation tolerance

Test Returns Poor Information Table Properties

Column Name	Description
"1-2/1-3"	"1" represents the first round, and so on
dB/dL/dH/dN/dE/dZ	Average measurement point difference between two rounds

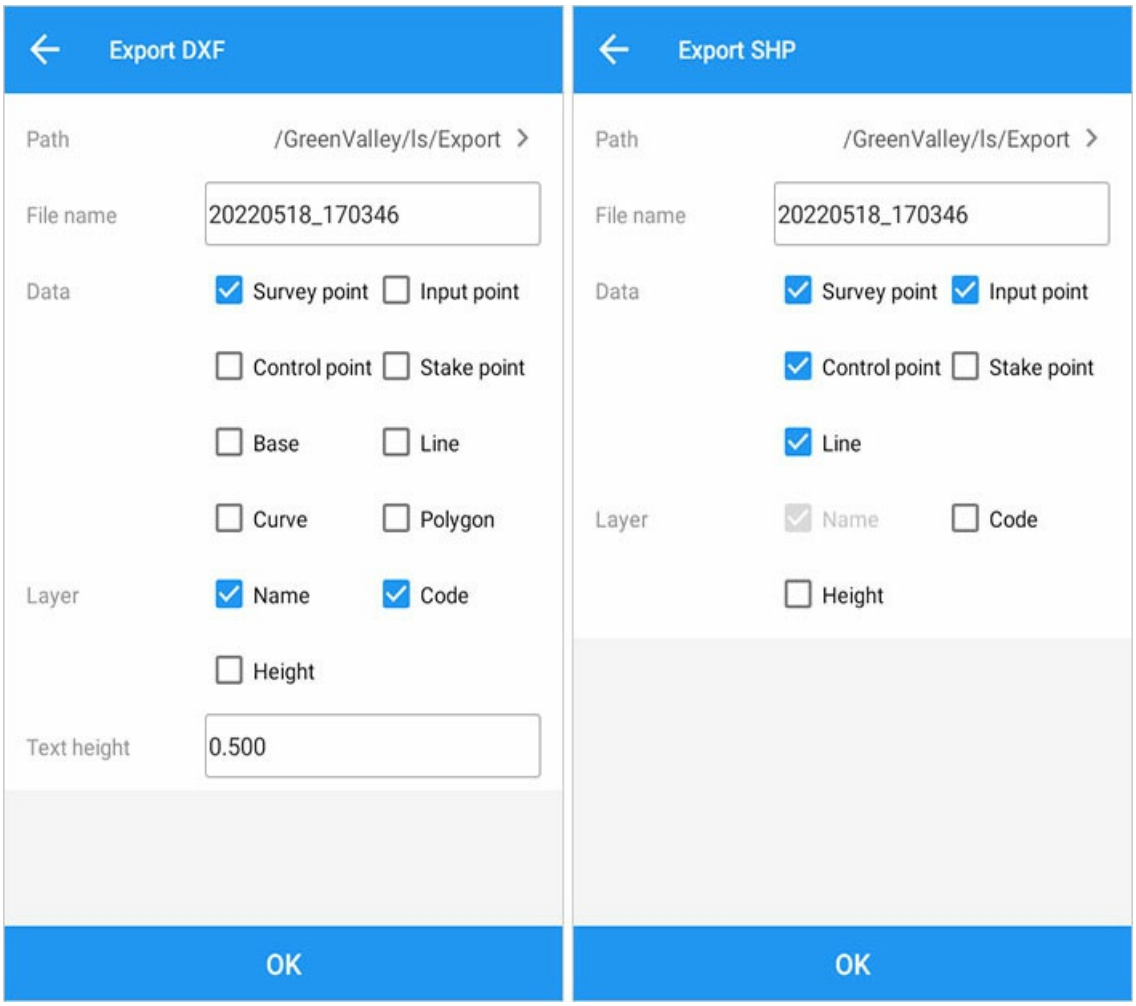
Raw data info table properties

Column Name	Description
Roll Call	Smooth Point Roll Call
Point coordinates	B/L/H, N/E/Z
Solution Type	Point State
HRMS	Elevation Root Mean Square
VRMS	Vertical Residual
Differential age	Delay time for one reset
PDOP	Position Precision Factor
Number of satellites	Number of satellites searched at the current point
Local time	Time information at the measurement point

2.4 [Export DXF], [Export Shapefile]

1) Select the data and layers to export.

2) The text height can be changed in DXF format, the default is 0.5.



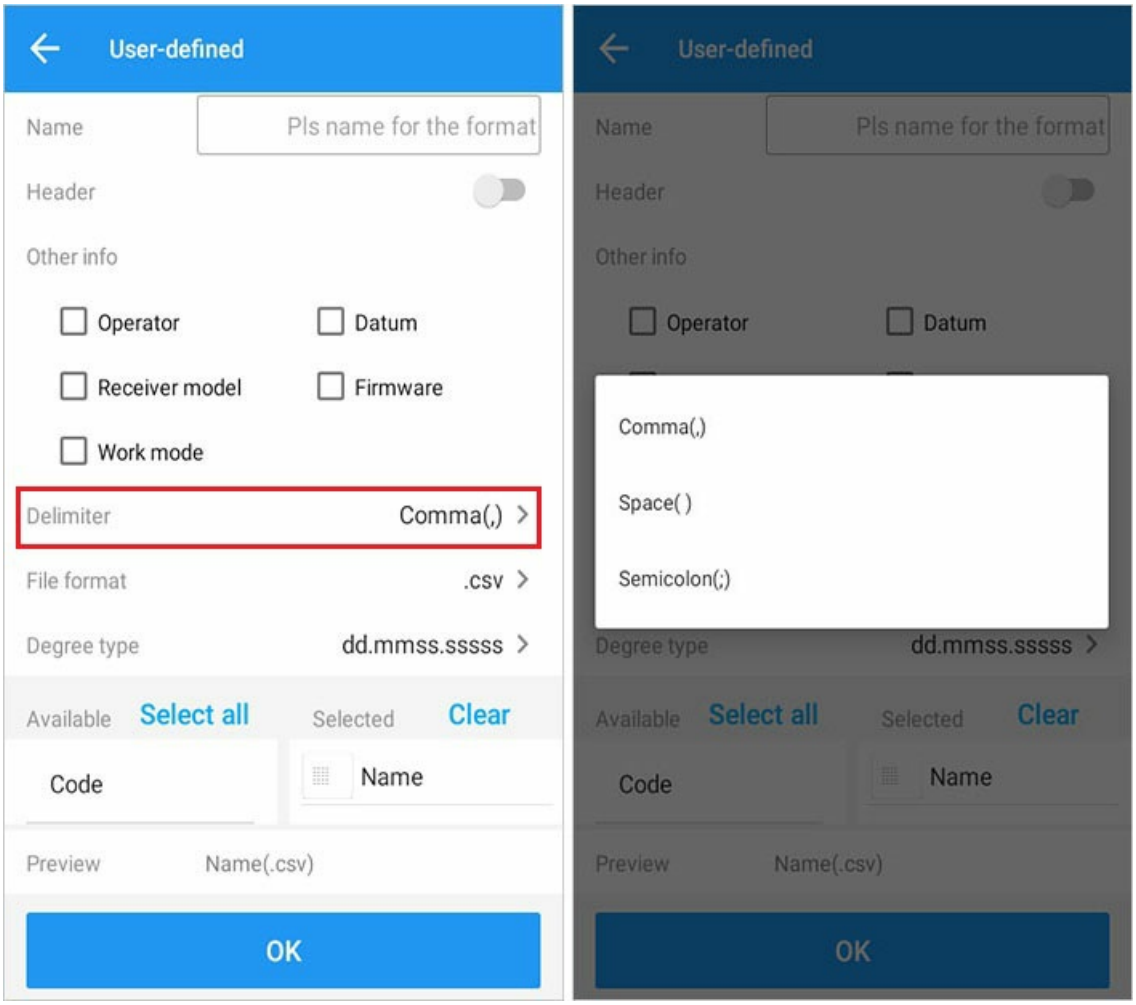
Enter the export file name, the default name is date_task name_coordinate type, the file format: yyyyMMdd_Task_pjk or yyyyMMdd_Task_84, can also be customized. After selecting [Filter] and [Path], click [OK]. The default export path to the SD card or storage is: `GreenValley/ls/Export` **, and you can find the corresponding export file name.**

3. Add Format

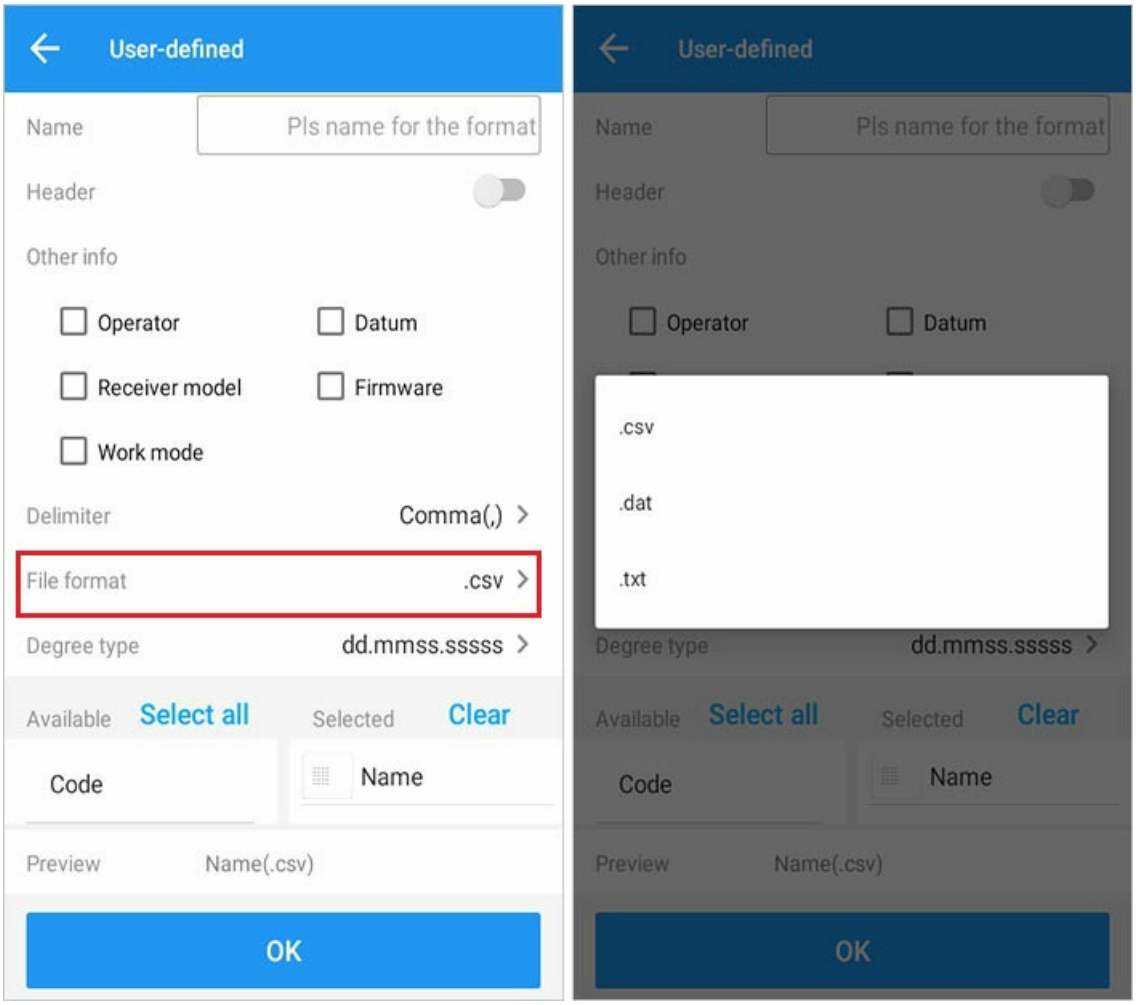
[Name]: Customize the setting name.

[Use header]: You can choose to use the header or not to use the custom setting.

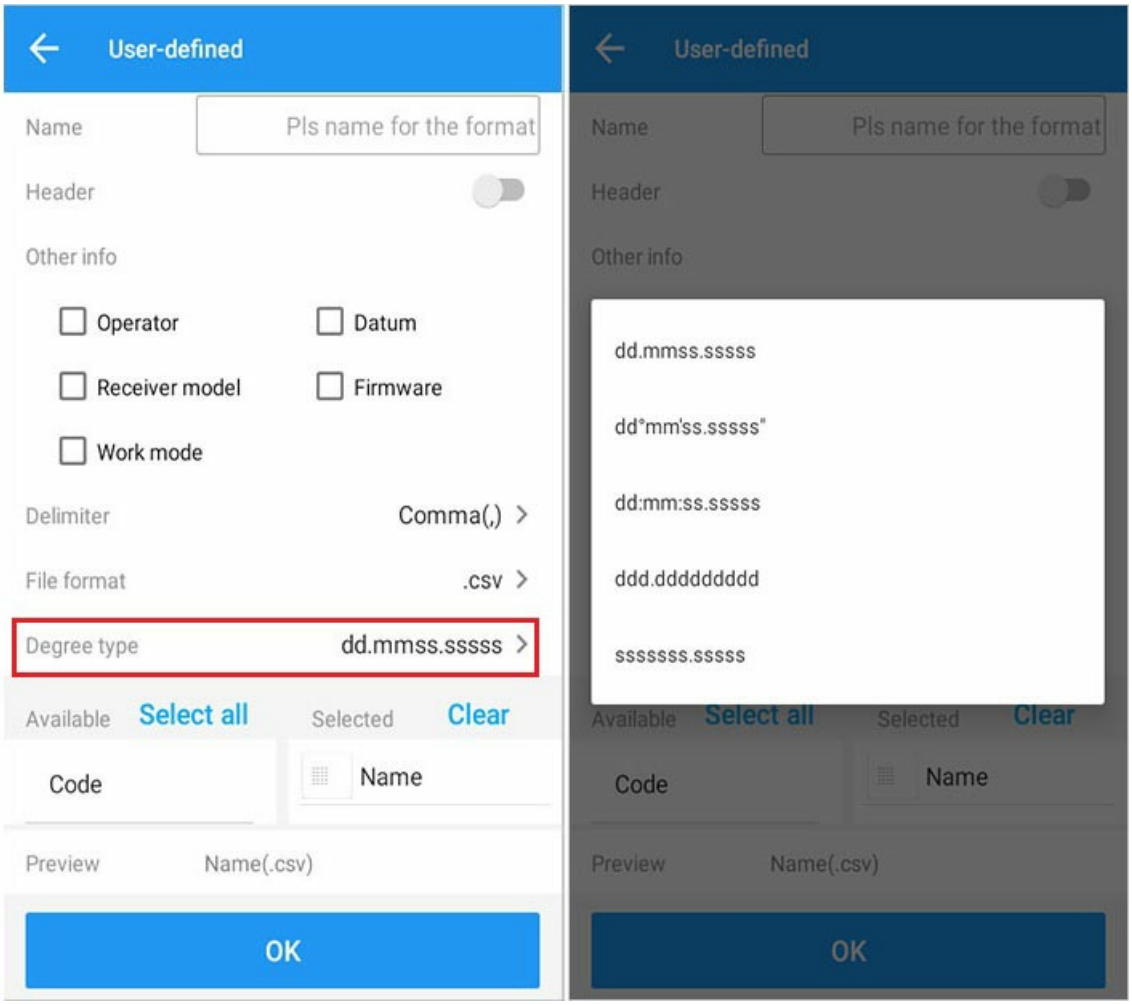
[Separator]: optional comma (,), space (), semicolon (;).



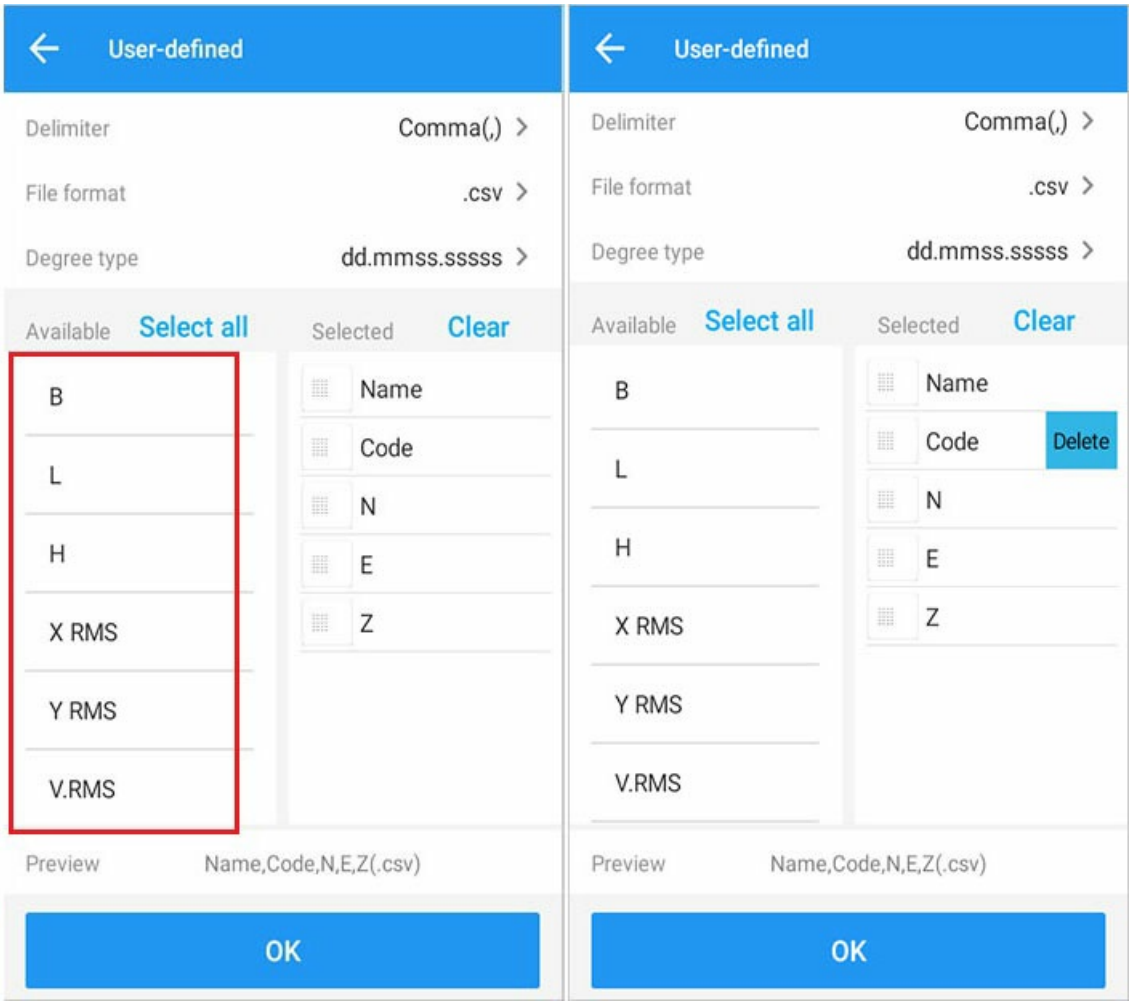
[File format]: .csv, .dat, .txt.



[Angle format]: degrees.minutes seconds, degrees°minutes'seconds", degrees:minutes:seconds, degrees, seconds.



[Attribute selection]: Select the required attributes or select all the attributes to be selected, and the selected attributes can be cleared.

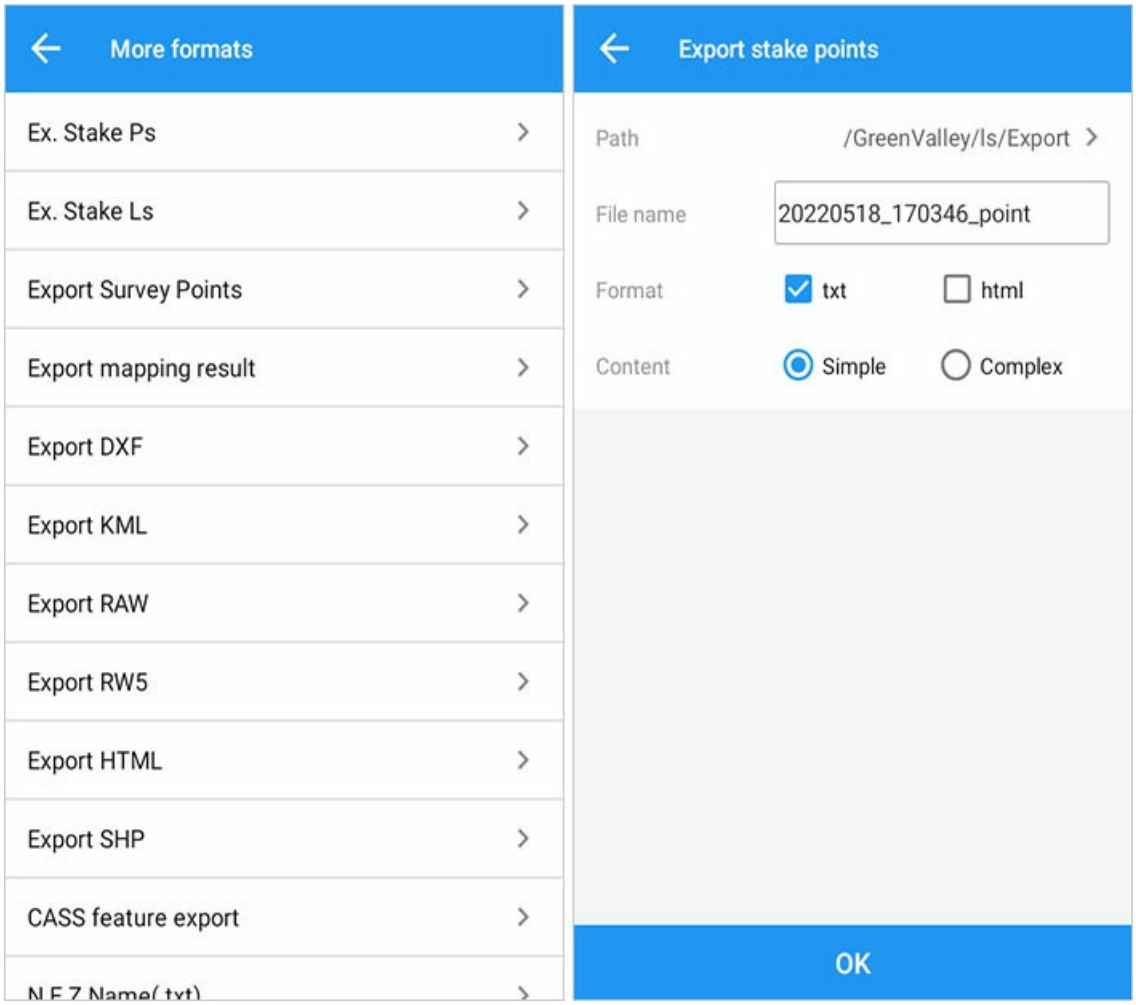


After adding the format, click OK to jump to the main interface of data export and pop up a prompt: The file format is saved successfully!

Swipe left to remove the added format.

Export Result

1. Export of point stakeout results



The path, file name, and format and content, click [OK] to export the result, you can find the file in the corresponding format under the corresponding path. Currently, the export format supports txt and html formats, which are the clean version and the detail version.

1.1 Point Stake Export List Properties

Stake out point

| Column Name | Description | | ---------- | :---------: | | Name | Stake Point Name | | Code | Point Code | | x

y

h | The local plane coordinates of the stakeout point | | Remarks | | | x precision

y precision

h precision | local plane coordinate precision of stakeout point | | rms | Medium Error | | Antenna height | Antenna height during measurement | | Measurement time | Date and time of the measurement point |

Known Point

| Column Name | Description | | ------ | ---------- | | Name | Known Point Name | | Code | Point Code | | x

y

h | Known point local plane coordinates | | Remarks | |

Stake Difference

| Column Name | Explanation | | -------- | ---------- | | Horizontal distance | Horizontal distance between stakeout point and known point | | dx

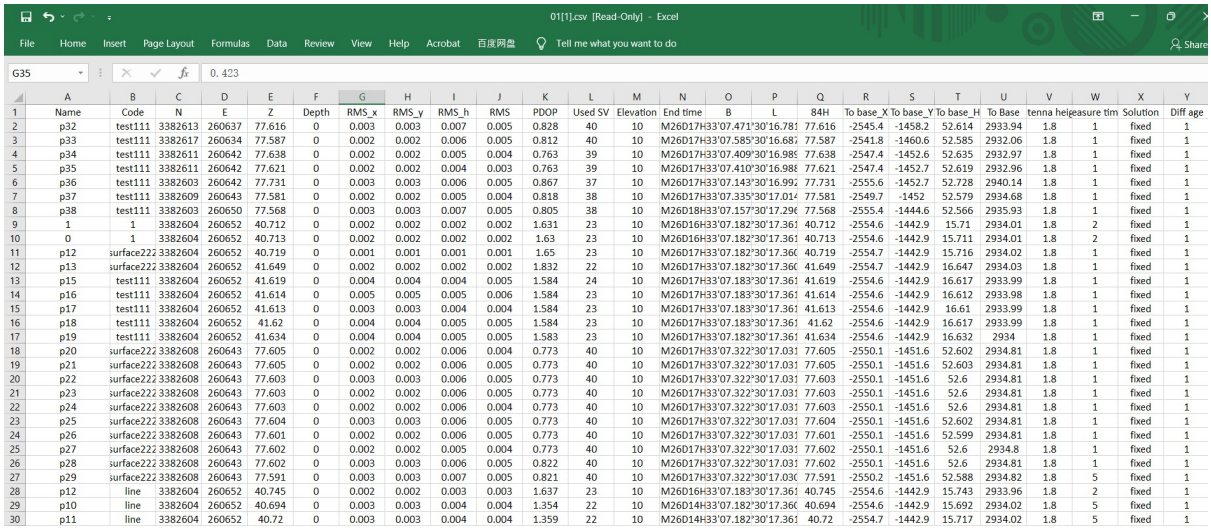
dy

dh | Stake Difference | ## 2. Line stakeout results and measurement results export ![line-loft](images/exportResult/export-stake-

line.jpg) The operation is the same as [Export Point Stakeout Results]

Stake out export list properties

Column Name	Description
Line Name	Stake Line Name
Length	Distance from start to end
Method	Line Stakeout Method
Start station	Start station of the line
starting point	starting point roll call
Starting point x/y/h	Starting point local plane coordinates
End Point	Point Name of the End Point of the Line
End point x/y/h	End point local plane coordinates
Azimuth	Azimuth from start to end point
Slope	Slope from Start to End
Attribution line	Line to which the stakeout point belongs
Distance line	The distance of the stakeout point from the home line
Stake Number	Stake Point Stake Number
From start point	Horizontal distance of stakeout point from start point
Height difference/Cut and fill	Height difference from start point and end point
To the end point	The horizontal distance of the stakeout point to the end point



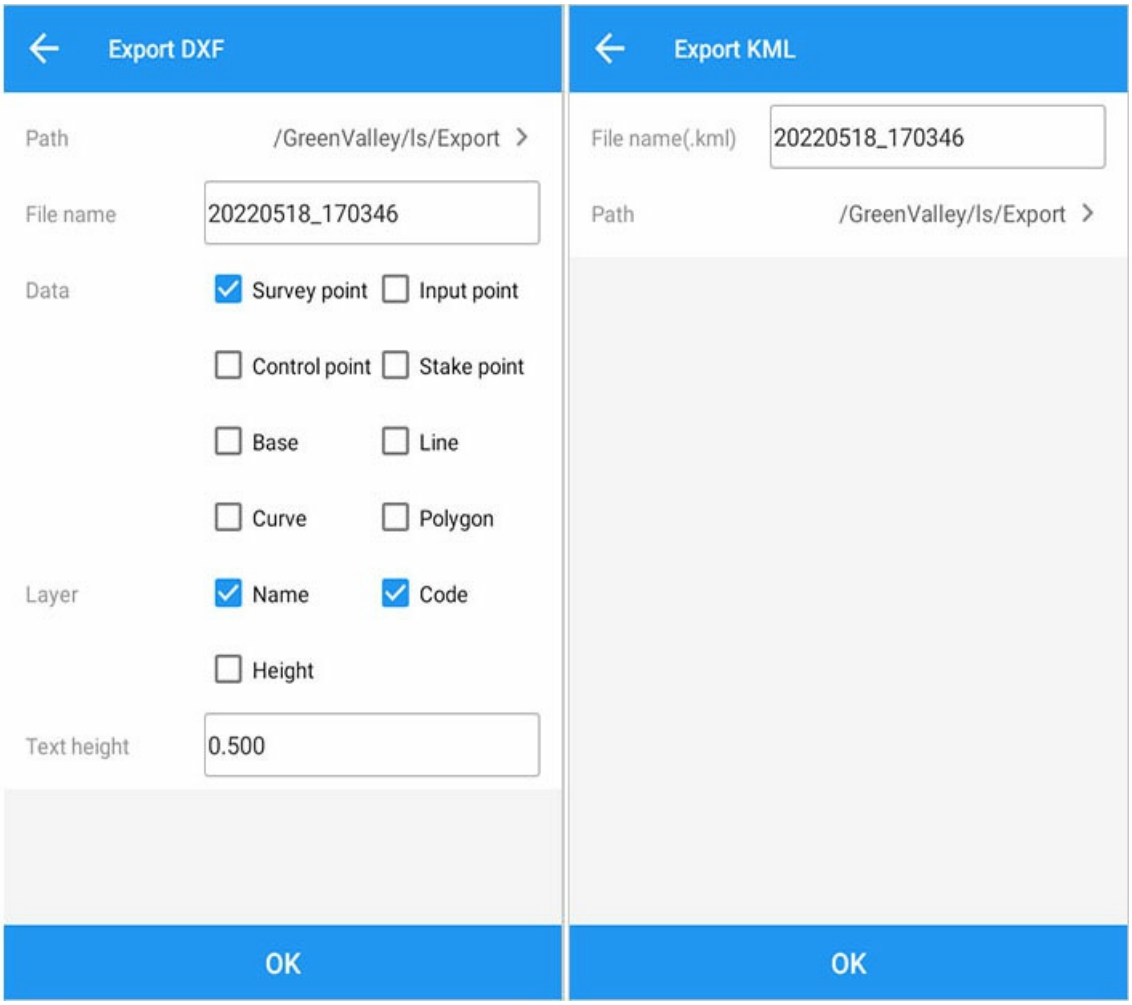
01[1].csv [Read-Only] - Excel

File Home Insert Page Layout Formulas Data Review View Help Acrobat 百度网盘 Tell me what you want to do

G35 0. 423

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	Name	Code	N	E	Z	Depth	RMS_x	RMS_y	RMS_h	RMS	PDOP	Used SV	Elevation	End time	B	L	84H	To base_X	To base_Y	To base_H	To Base	tenna hei	easure tim	Solution	Diff age
2	p32	test111	3382613	260637	77.616	0	0.003	0.003	0.007	0.005	0.828	40	10	M26D17H33'07.471'30'16.78	77.616	-2545.4	-1458.2	52.614	2933.94	1.8	1	fixed	1		
3	p33	test111	3382617	260634	77.587	0	0.002	0.002	0.006	0.005	0.812	40	10	M26D17H33'07.585'30'16.68	77.587	-2541.8	-1460.6	52.585	2932.06	1.8	1	fixed	1		
4	p34	test111	3382611	260642	77.638	0	0.002	0.002	0.005	0.004	0.763	39	10	M26D17H33'07.409'30'16.98	77.638	-2547.4	-1452.6	52.635	2932.97	1.8	1	fixed	1		
5	p35	test111	3382611	260642	77.621	0	0.002	0.002	0.004	0.003	0.763	39	10	M26D17H33'07.410'30'16.98	77.621	-2547.4	-1452.7	52.619	2932.96	1.8	1	fixed	1		
6	p36	test111	3382603	260642	77.731	0	0.003	0.003	0.006	0.005	0.867	37	10	M26D17H33'07.143'30'16.99	77.731	-2555.6	-1452.7	52.728	2940.14	1.8	1	fixed	1		
7	p37	test111	3382609	260643	77.581	0	0.002	0.002	0.005	0.004	0.818	38	10	M26D17H33'07.335'30'17.01	77.581	-2549.7	-1452	52.579	2934.68	1.8	1	fixed	1		
8	p38	test111	3382603	260650	77.568	0	0.003	0.003	0.007	0.005	0.805	38	10	M26D18H33'07.157'30'17.29	77.568	-2555.4	-1444.6	52.566	2935.93	1.8	1	fixed	1		
9	1	1	3382604	260652	40.712	0	0.002	0.002	0.002	0.002	1.631	23	10	M26D16H33'07.182'30'17.36	40.712	-2554.6	-1442.9	15.71	2934.01	1.8	2	fixed	1		
10	0	1	3382604	260652	40.713	0	0.002	0.002	0.002	0.002	1.63	23	10	M26D16H33'07.182'30'17.36	40.713	-2554.6	-1442.9	15.711	2934.01	1.8	2	fixed	1		
11	p12	surface222	3382604	260652	40.719	0	0.001	0.001	0.001	0.001	1.65	23	10	M26D17H33'07.182'30'17.36	40.719	-2554.7	-1442.9	15.716	2934.02	1.8	1	fixed	1		
12	p13	surface222	3382604	260652	41.649	0	0.002	0.002	0.002	0.002	1.832	22	10	M26D17H33'07.182'30'17.36	41.649	-2554.7	-1442.9	16.647	2934.03	1.8	1	fixed	1		
13	p15	test111	3382604	260652	41.619	0	0.004	0.004	0.004	0.005	1.584	24	10	M26D17H33'07.183'30'17.36	41.619	-2554.6	-1442.9	16.617	2933.99	1.8	1	fixed	1		
14	p16	test111	3382604	260652	41.614	0	0.005	0.005	0.005	0.006	1.584	23	10	M26D17H33'07.183'30'17.36	41.614	-2554.6	-1442.9	16.612	2933.98	1.8	1	fixed	1		
15	p17	test111	3382604	260652	41.613	0	0.003	0.003	0.004	0.004	1.584	23	10	M26D17H33'07.183'30'17.36	41.613	-2554.6	-1442.9	16.61	2933.99	1.8	1	fixed	1		
16	p18	test111	3382604	260652	41.62	0	0.004	0.004	0.005	0.005	1.584	23	10	M26D17H33'07.183'30'17.36	41.62	-2554.6	-1442.9	16.617	2933.99	1.8	1	fixed	1		
17	p19	test111	3382604	260652	41.634	0	0.004	0.004	0.005	0.005	1.583	23	10	M26D17H33'07.182'30'17.36	41.634	-2554.6	-1442.9	16.632	2934	1.8	1	fixed	1		
18	p20	surface222	3382608	260643	77.605	0	0.002	0.002	0.006	0.004	0.773	40	10	M26D17H33'07.322'30'17.03	77.605	-2550.1	-1451.6	52.602	2934.81	1.8	1	fixed	1		
19	p21	surface222	3382608	260643	77.605	0	0.002	0.002	0.006	0.005	0.773	40	10	M26D17H33'07.322'30'17.03	77.605	-2550.1	-1451.6	52.603	2934.81	1.8	1	fixed	1		
20	p22	surface222	3382608	260643	77.603	0	0.003	0.003	0.006	0.005	0.773	40	10	M26D17H33'07.322'30'17.03	77.603	-2550.1	-1451.6	52.6	2934.81	1.8	1	fixed	1		
21	p23	surface222	3382608	260643	77.603	0	0.002	0.002	0.006	0.005	0.773	40	10	M26D17H33'07.322'30'17.03	77.603	-2550.1	-1451.6	52.6	2934.81	1.8	1	fixed	1		
22	p24	surface222	3382608	260643	77.603	0	0.002	0.002	0.006	0.004	0.773	40	10	M26D17H33'07.322'30'17.03	77.603	-2550.1	-1451.6	52.6	2934.81	1.8	1	fixed	1		
23	p25	surface222	3382608	260643	77.604	0	0.003	0.003	0.006	0.005	0.773	40	10	M26D17H33'07.322'30'17.03	77.604	-2550.1	-1451.6	52.602	2934.81	1.8	1	fixed	1		
24	p26	surface222	3382608	260643	77.601	0	0.002	0.002	0.006	0.005	0.773	40	10	M26D17H33'07.322'30'17.03	77.601	-2550.1	-1451.6	52.599	2934.81	1.8	1	fixed	1		
25	p27	surface222	3382608	260643	77.602	0	0.002	0.002	0.005	0.004	0.773	40	10	M26D17H33'07.322'30'17.03	77.602	-2550.1	-1451.6	52.6	2934.8	1.8	1	fixed	1		
26	p28	surface222	3382608	260643	77.602	0	0.003	0.003	0.006	0.005	0.822	40	10	M26D17H33'07.322'30'17.03	77.602	-2550.1	-1451.6	52.6	2934.81	1.8	1	fixed	1		
27	p29	surface222	3382608	260643	77.591	0	0.003	0.003	0.007	0.005	0.821	40	10	M26D17H33'07.322'30'17.03	77.591	-2550.2	-1451.6	52.588	2934.82	1.8	5	fixed	1		
28	p12	line	3382604	260652	40.745	0	0.002	0.002	0.003	0.003	1.637	23	10	M26D16H33'07.183'30'17.36	40.745	-2554.6	-1442.9	15.743	2933.96	1.8	2	fixed	1		
29	p10	line	3382604	260652	40.694	0	0.003	0.003	0.004	0.004	1.354	22	10	M26D14H33'07.182'30'17.36	40.694	-2554.6	-1442.9	15.692	2934.02	1.8	5	fixed	1		
30	p11	line	3382604	260652	40.72	0	0.003	0.003	0.004	0.004	1.359	22	10	M26D14H33'07.182'30'17.36	40.72	-2554.7	-1442.9	15.717	2934.02	1.8	5	fixed	1		

3. Export DXF, export KML



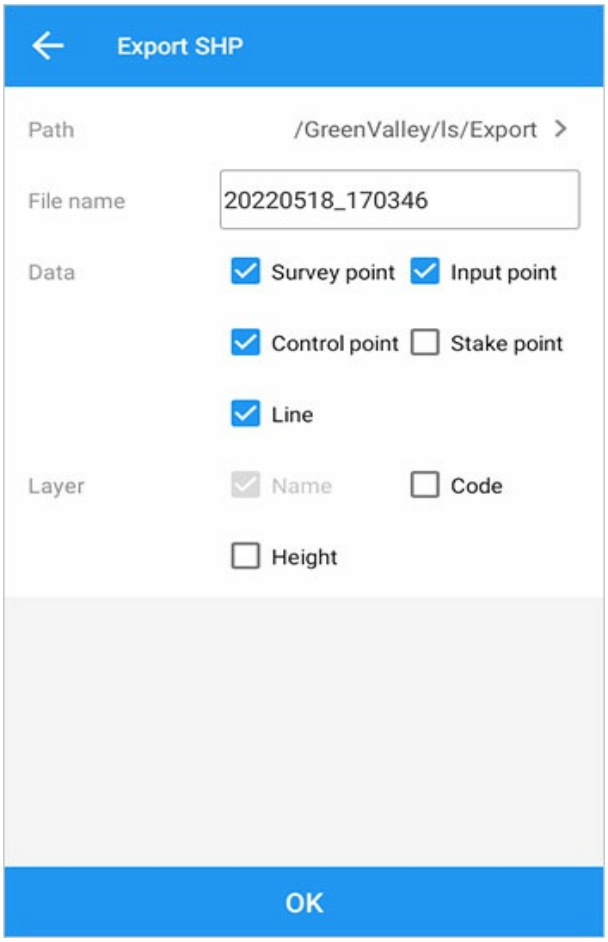
Export can support CAD opening of version 2002 and above (including version 2002) The exported .kml file can be opened directly with GoogleEarth.

4. Export RAW, measurement results export as HTML

1) The exported .RAW file is the original data record file, which needs to be opened with Notepad.

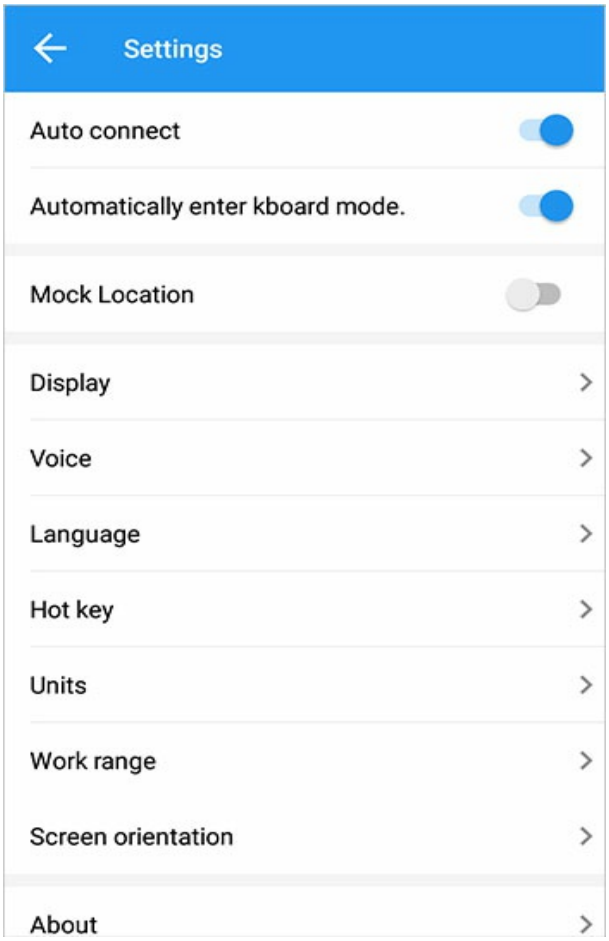
2) The exported .HTML file is a web page format file. It is recommended to use IE9 or later to open it. The content is too large and will not be described here.

5. Export Shapefile


Export SHP
Path
/GreenValley/ls/Export
File name
20220518_170346
Data
Survey point
Input point
Control point
Stake point
Line
Layer
Name
Code
Height
OK

Software Settings

Home -> [Project] -> [Settings].



Auto connect: It is used to automatically connect to the receiver after the Bluetooth is disconnected, and the software starts to automatically connect to the last receiver.

Automatically enter kboard mode: if it is on, the software will automatically enter the suite mode interface when it is connected to the suite, and if it is closed, it will enter the software classic interface.

Mock Location: Used to control software to provide location information to other programs.

Display: It can be switched from NE to EN, and the display method can be selected according to the user's needs.

Language: used to switch the display language of the current software.

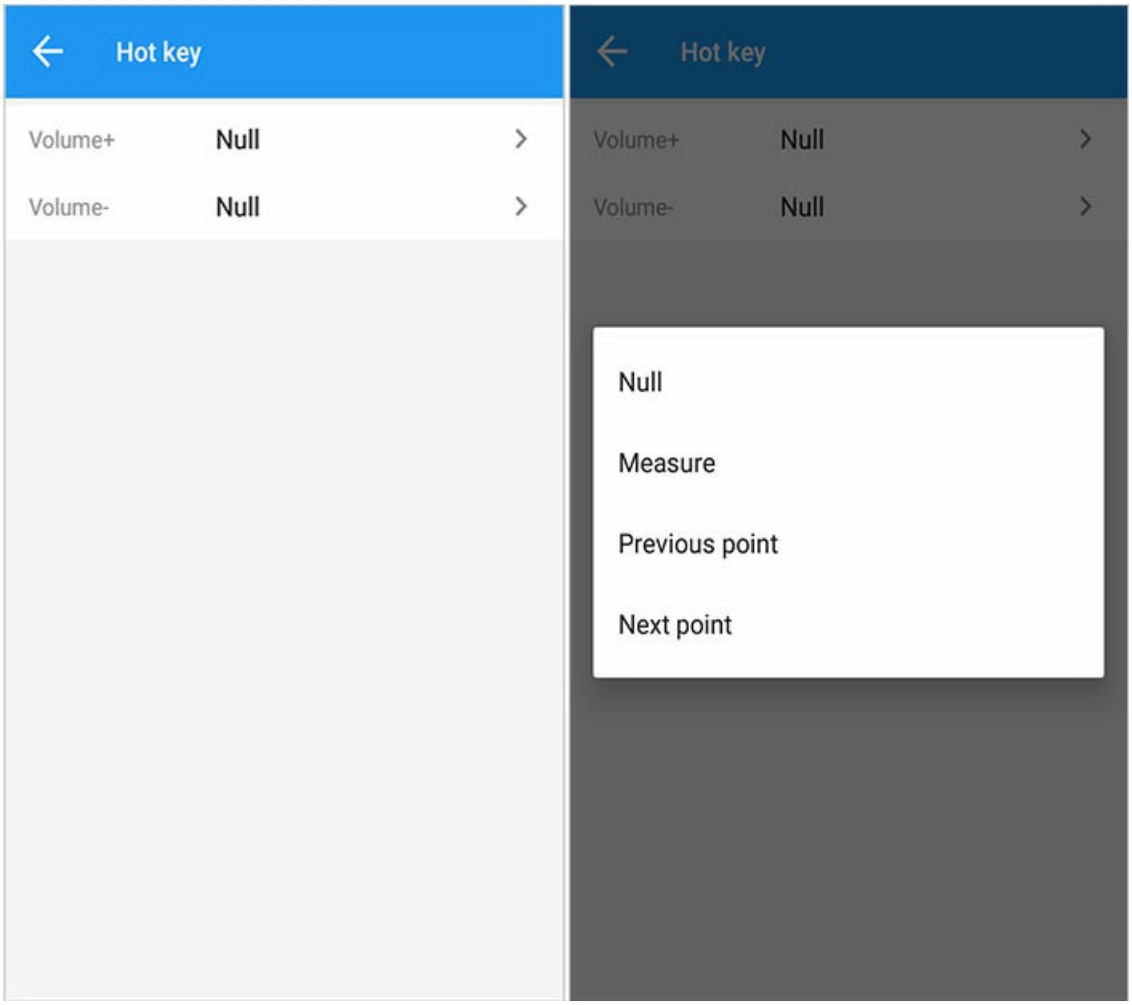
Feedback: User feedback on the software.

Share and rate: You can share the software to third-party programs.

About: Information about the software and app updates.

1. Hot key

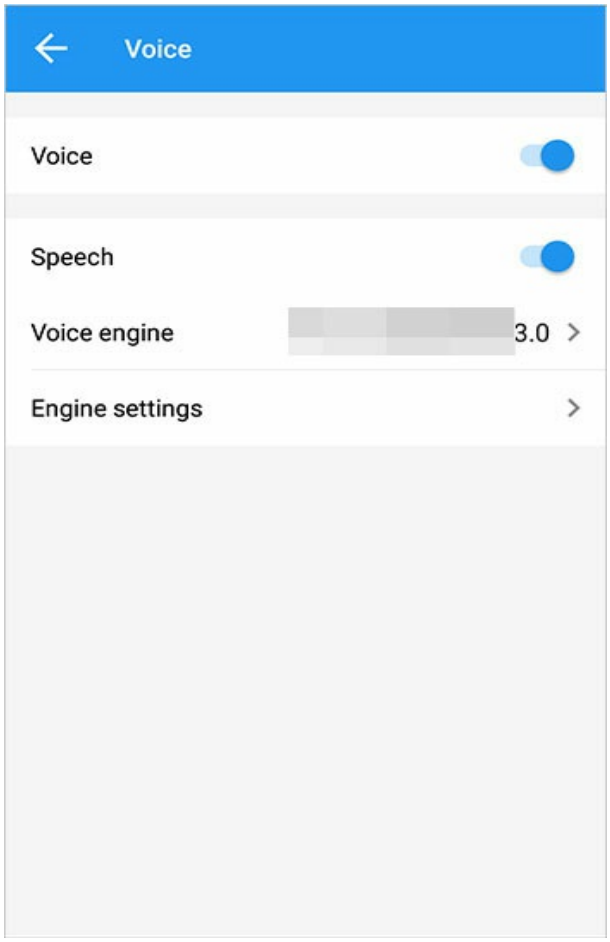
Hot key: Set the function of volume + and volume -.



2. Voice

Speech: prompts for information such as connecting and disconnecting the receiver. Voice Engine: Select the appropriate speech engine.

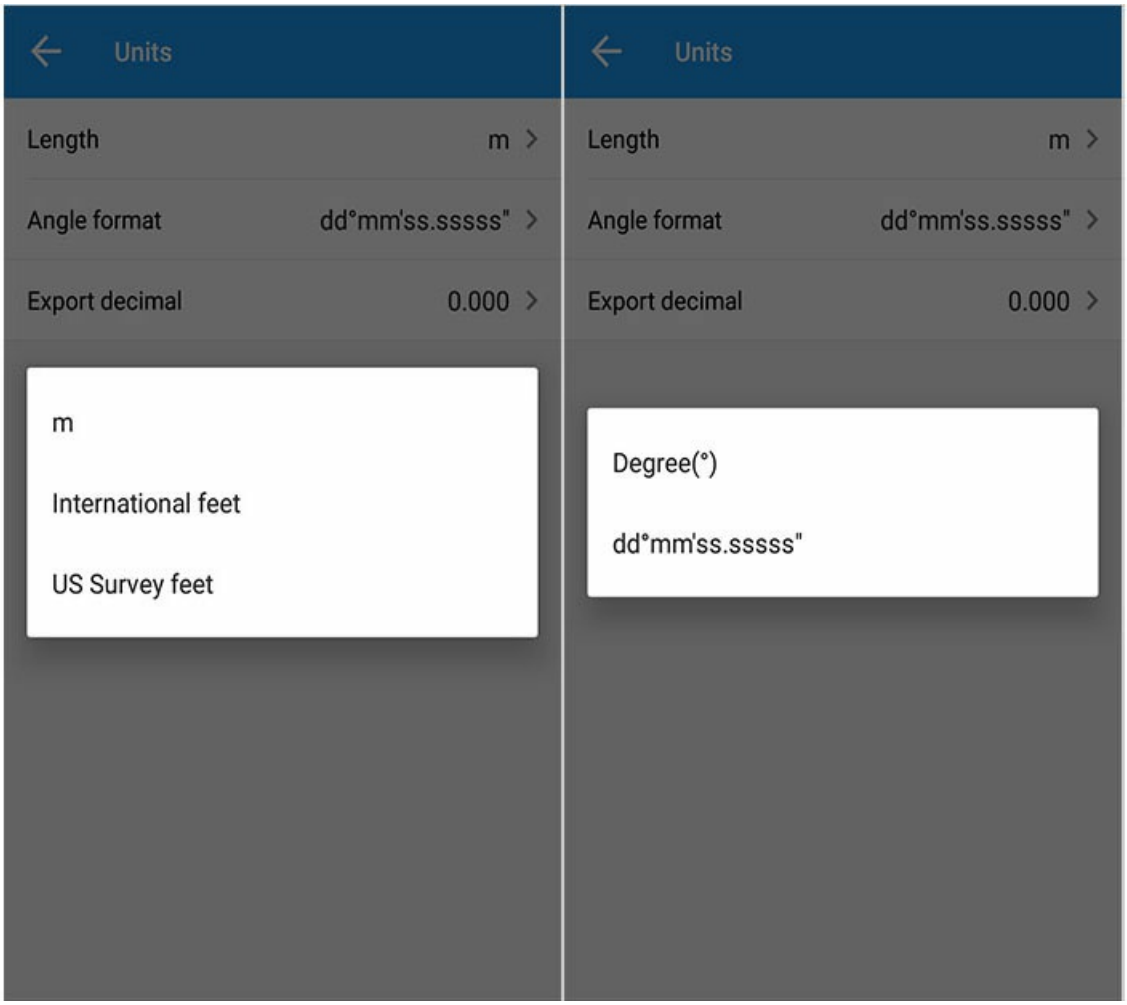
Engine Settings: Set the speech engine.



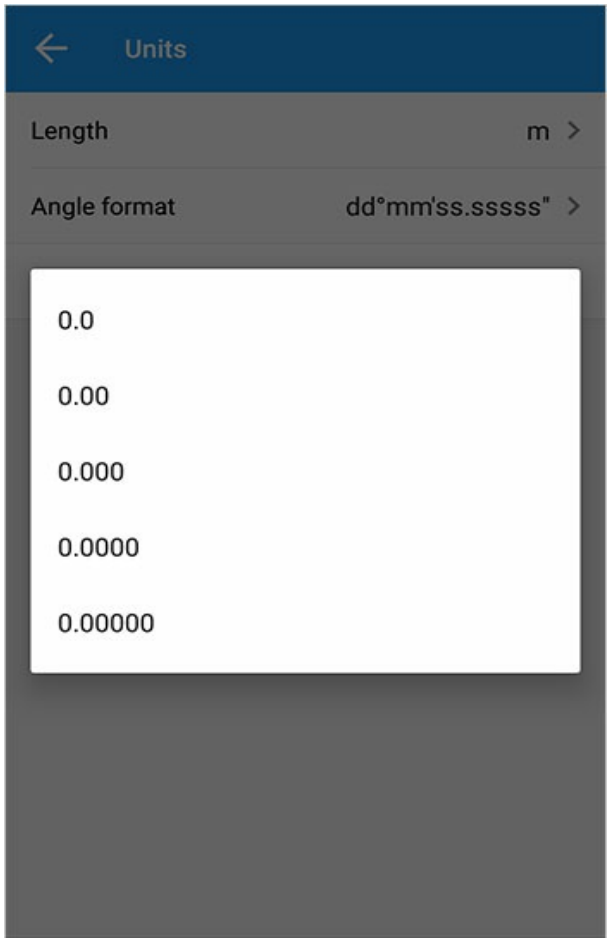
3. Units

Length: It can be set to meters, international feet, and US feet.

Angle format: Set the angle format to degrees or degrees, minutes and seconds.

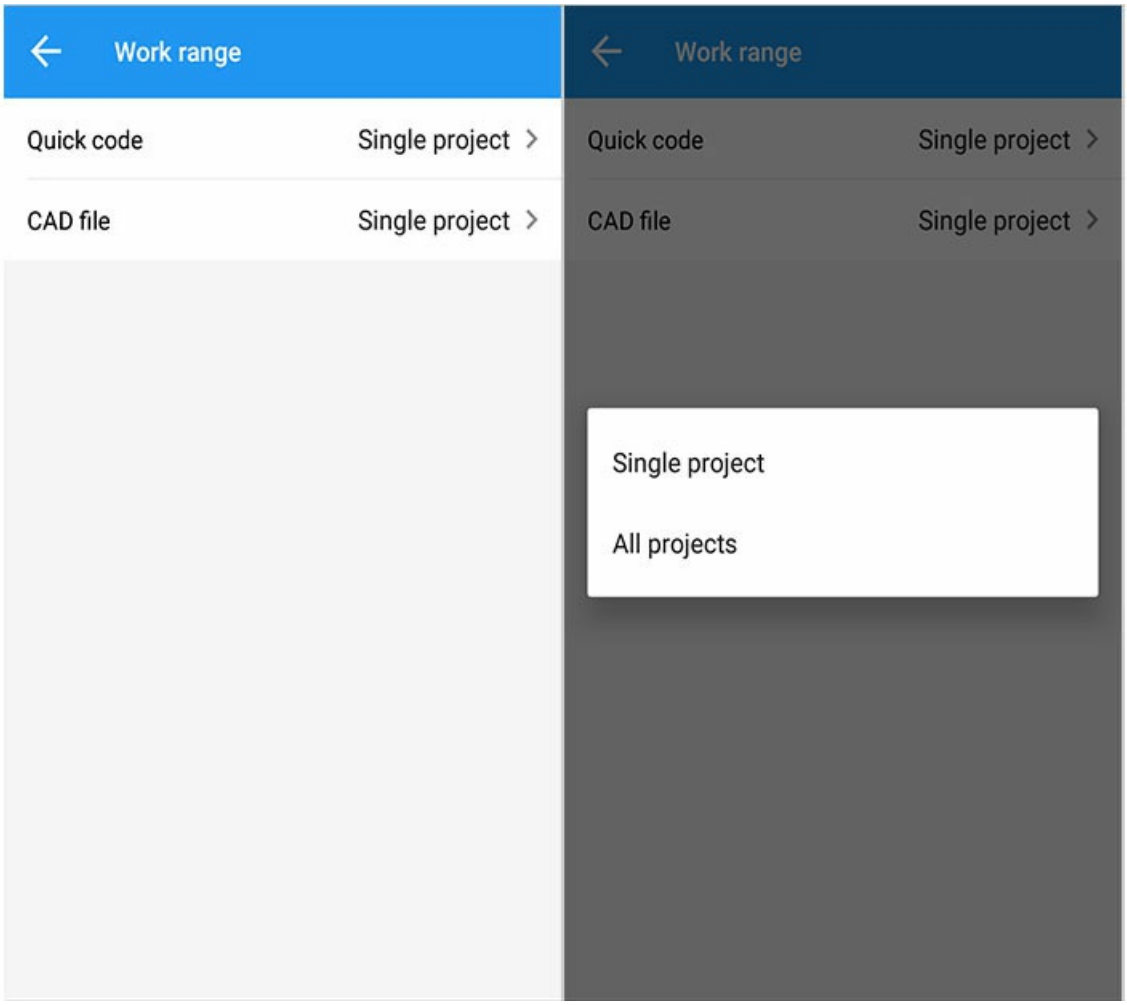


Export dicimal: accurate up to the fifth place after the decimal.



4. Work range

Apply to single project or all projects.

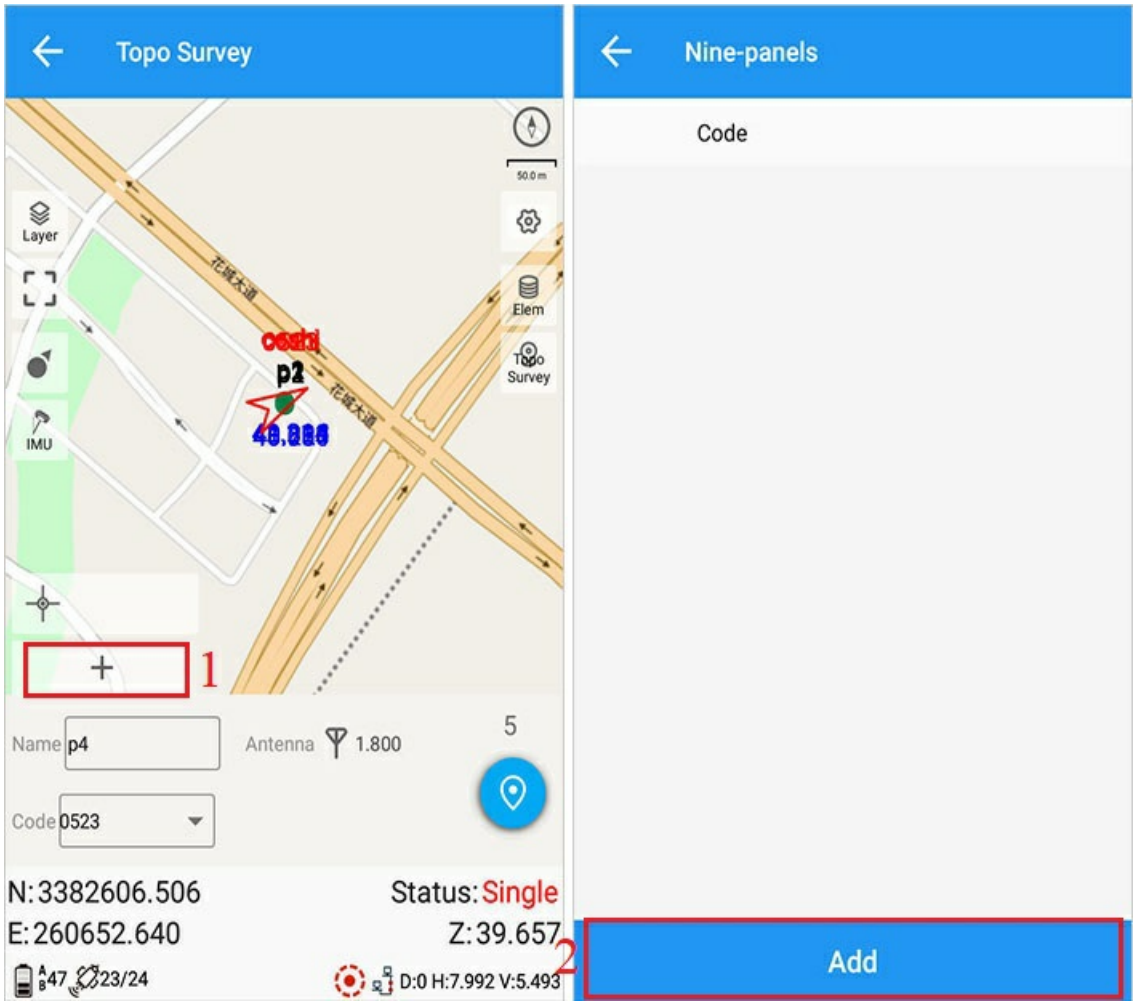


Quick code: that is, the common code in the measurement interface to quickly measure.

Single project: that is, only the current task has the shortcut code set.

All projects: that is, a new project also has a shortcut code that has been set.

The opening method is [Survey]--[Stake Point]--[Measure with Quick Code] to open.



CAD file: The background map of the Stake CAD interface.

Single project: that is, only the current task has the imported CAD background map.

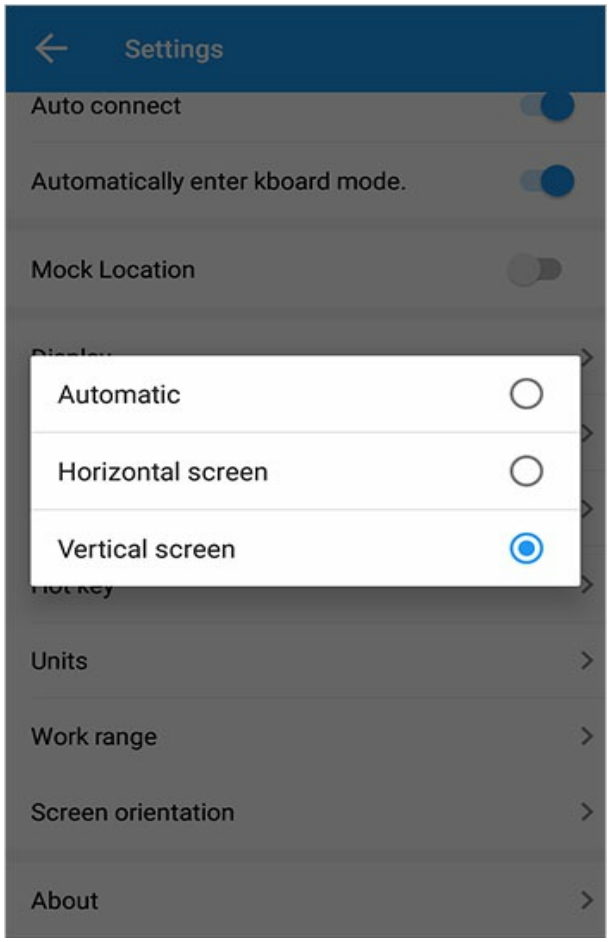
All projects: the imported CAD background map also exists in the newly created project.

The opening method is [Survey]--[Stake CAD]--[Data]--[Import].

Note: This function only supports the CAD staking basemap of the survey interface, and does not support the imported basemap of the project interface.

5. Screen orientation

Automatic, Horizontal, Vertical (default)

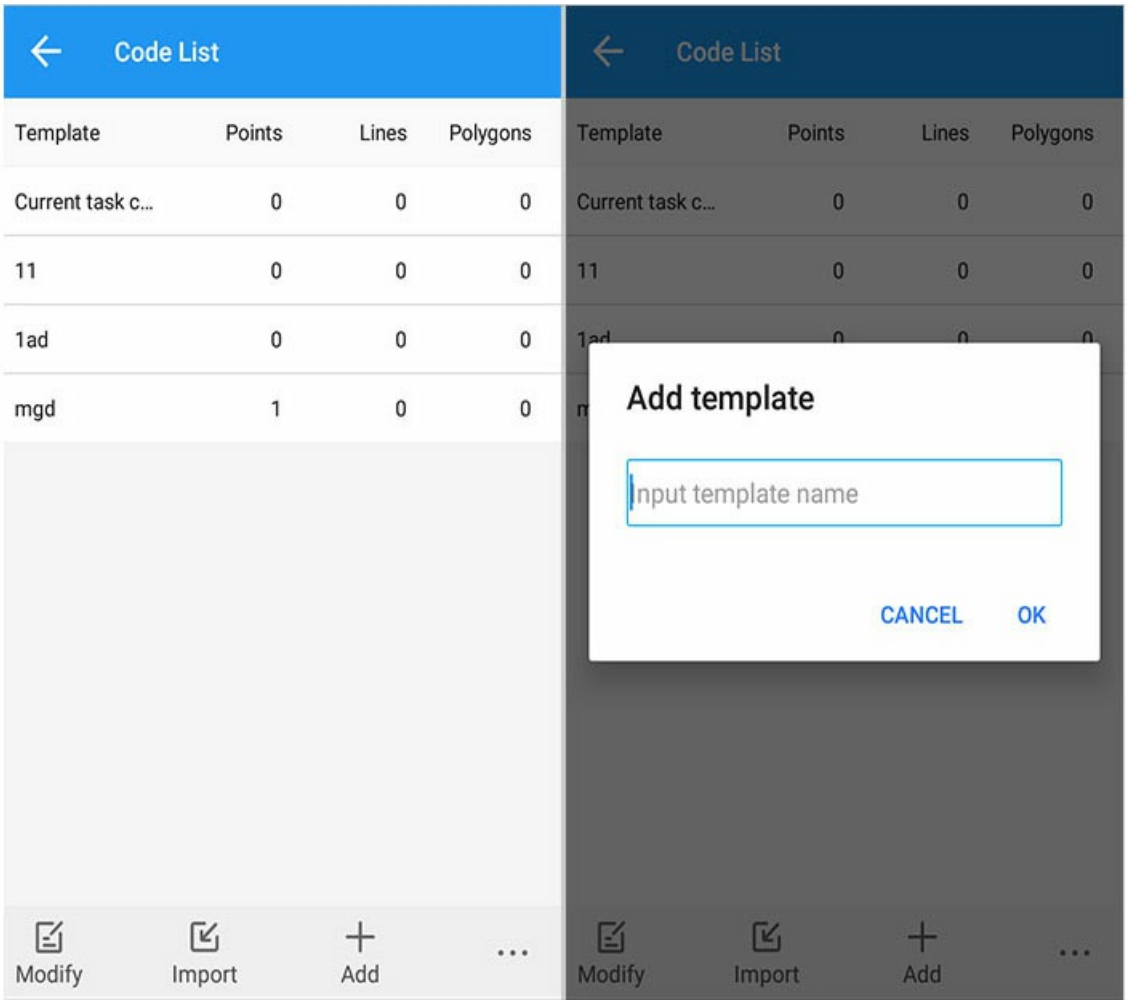

Settings
Auto connect
Automatically enter kboard mode.
Mock Location
Automatic
Horizontal screen
Vertical screen
Units
Work range
Screen orientation
About

Code

Home -> [Project] -> [Code List]

1. Add or import a code list

Code list:



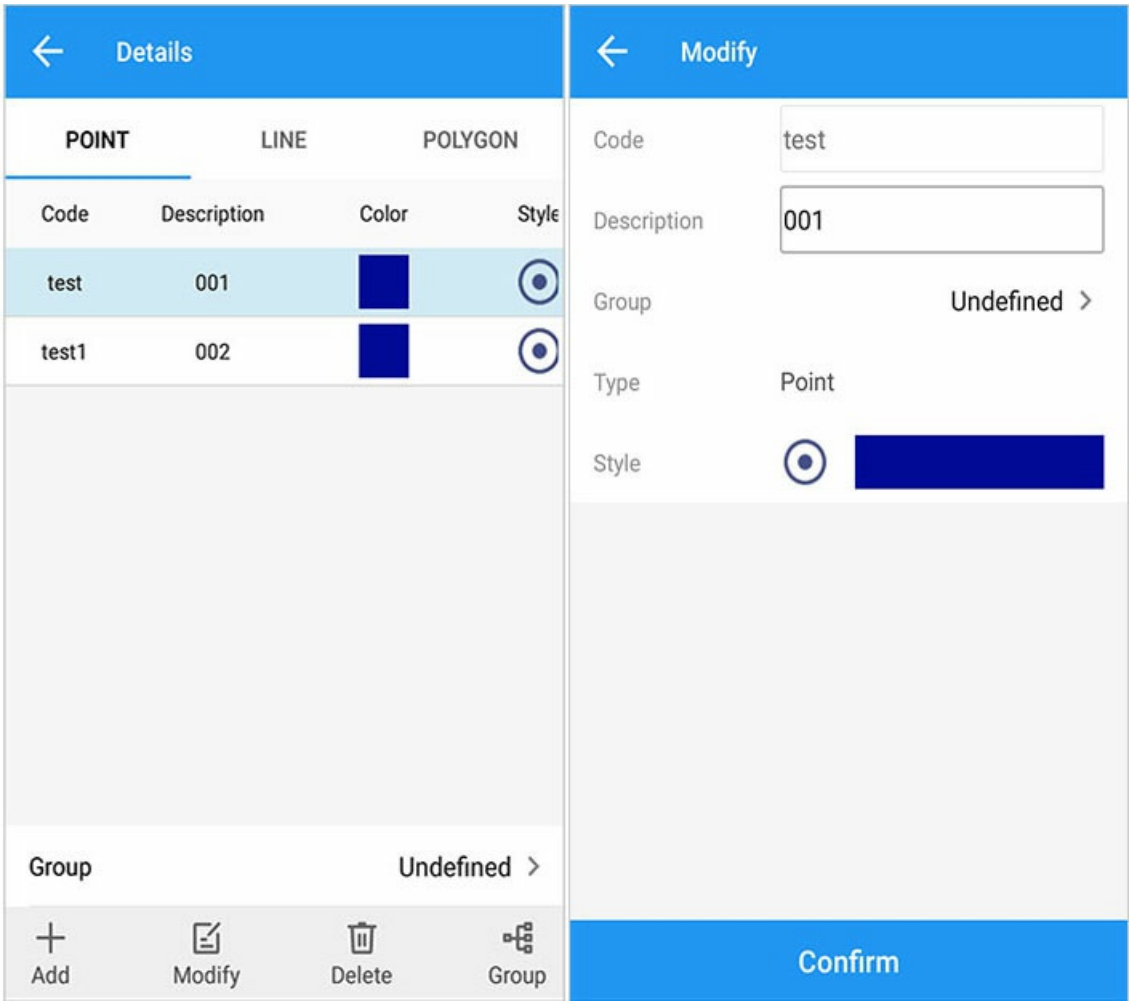
1) Apply: Select the code list to apply to the current task.

2) Import: Click [Import] -> Select File -> [Confirm].

3) Add: Enter the code list name to add a code list.

2. Modify code list

Select a code list and click Modify to enter the code list details.



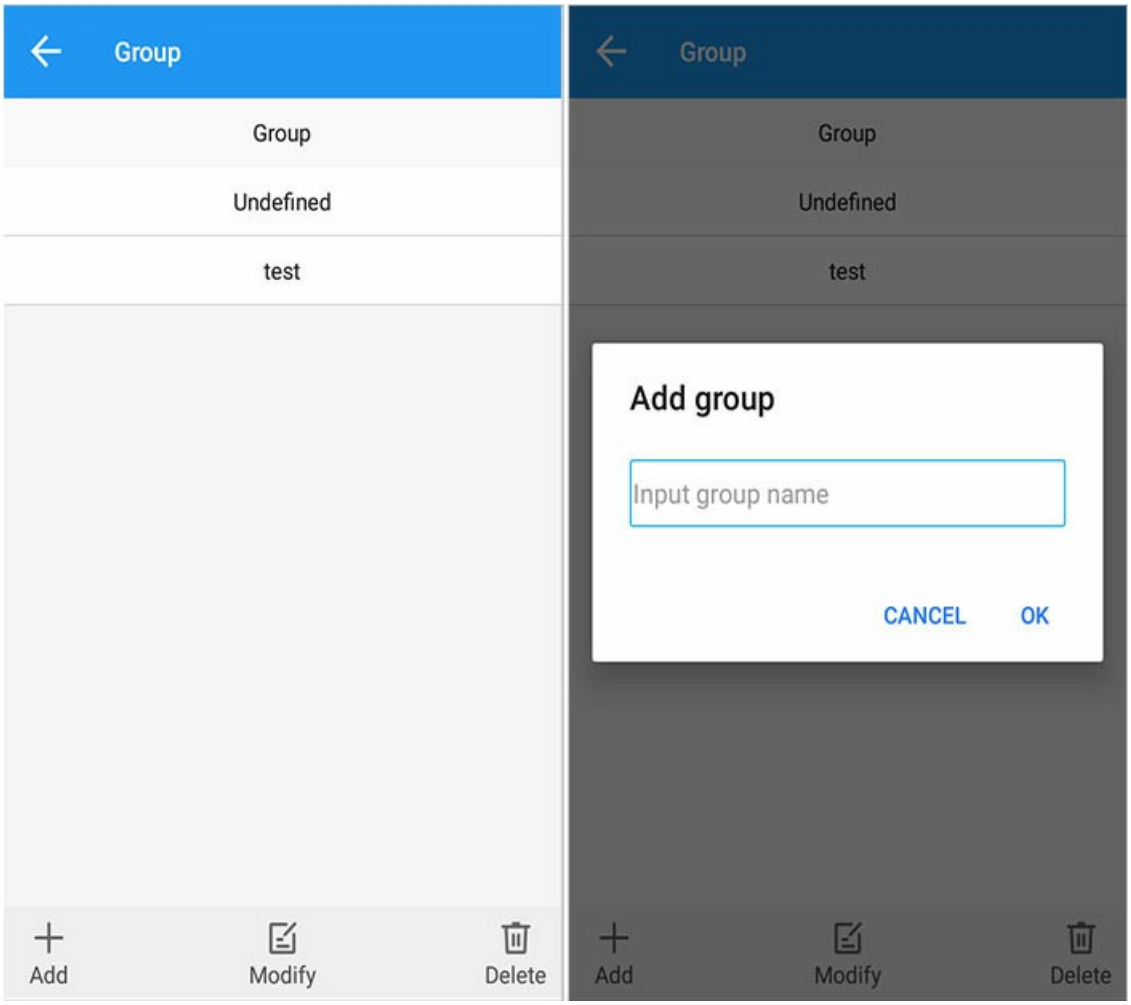
The following operations can be performed on the code in the current code list:

1) Add: Add code.

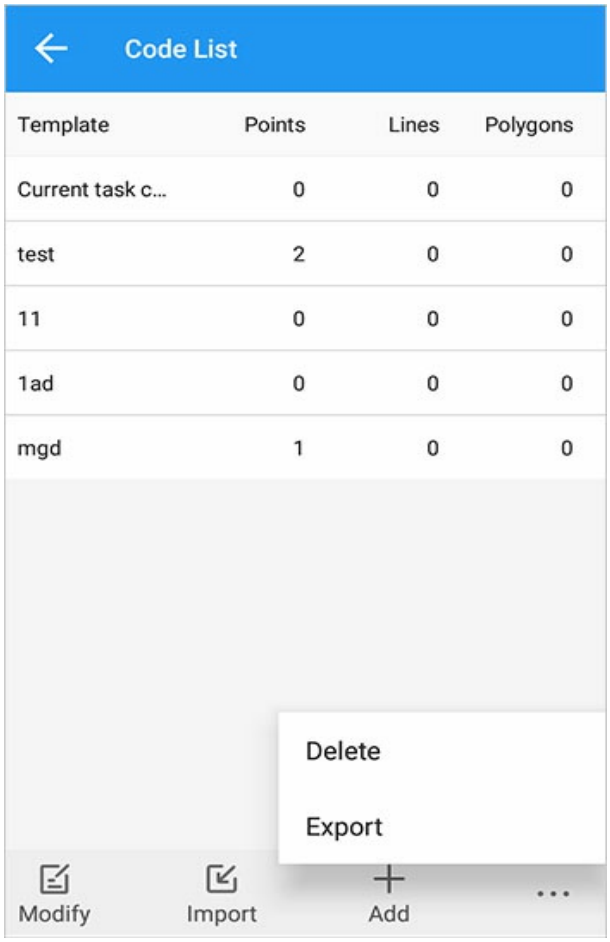
2) Modify: Edit and modify the code.

3) Delete: Delete the code.

4) Group: You can view, add and delete groups.



3. Delete and export

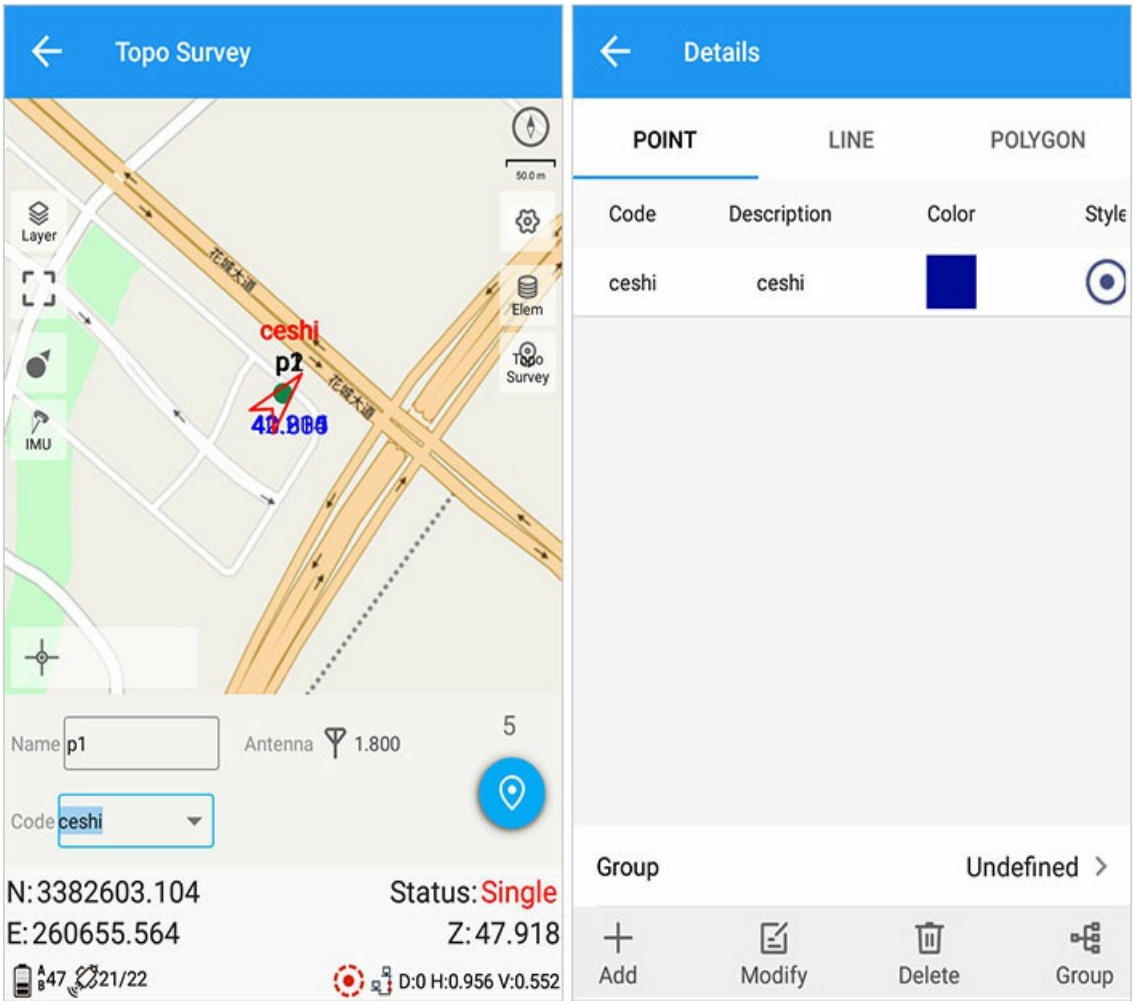


1) Code list deletion: Click to delete the currently selected code list, select "OK" to delete, and select "Cancel" to cancel.

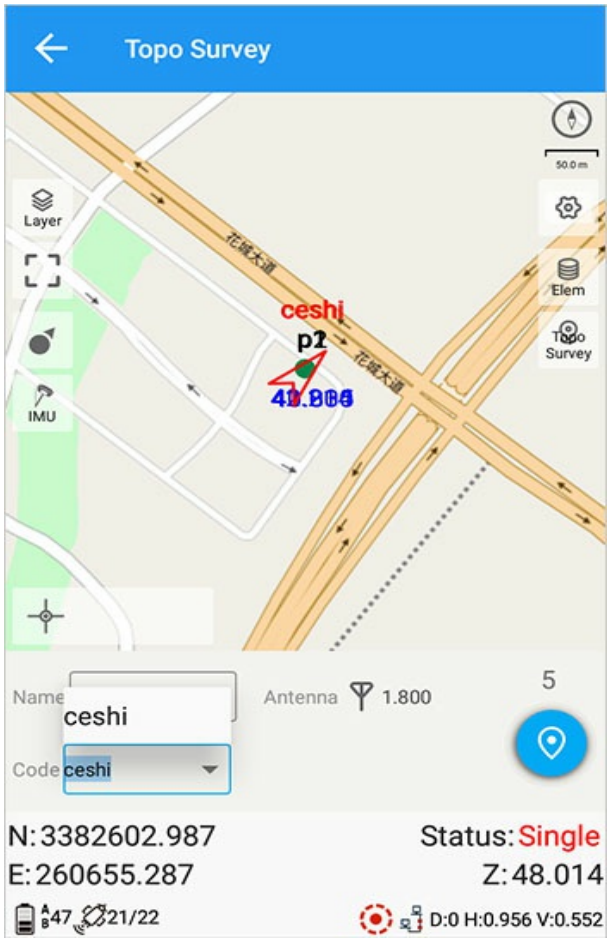
2) Code list export: Click [...] -> [Export] -> enter the file name -> select the export path -> [OK].

The default format is txt, the codes are separated by spaces or , signs.

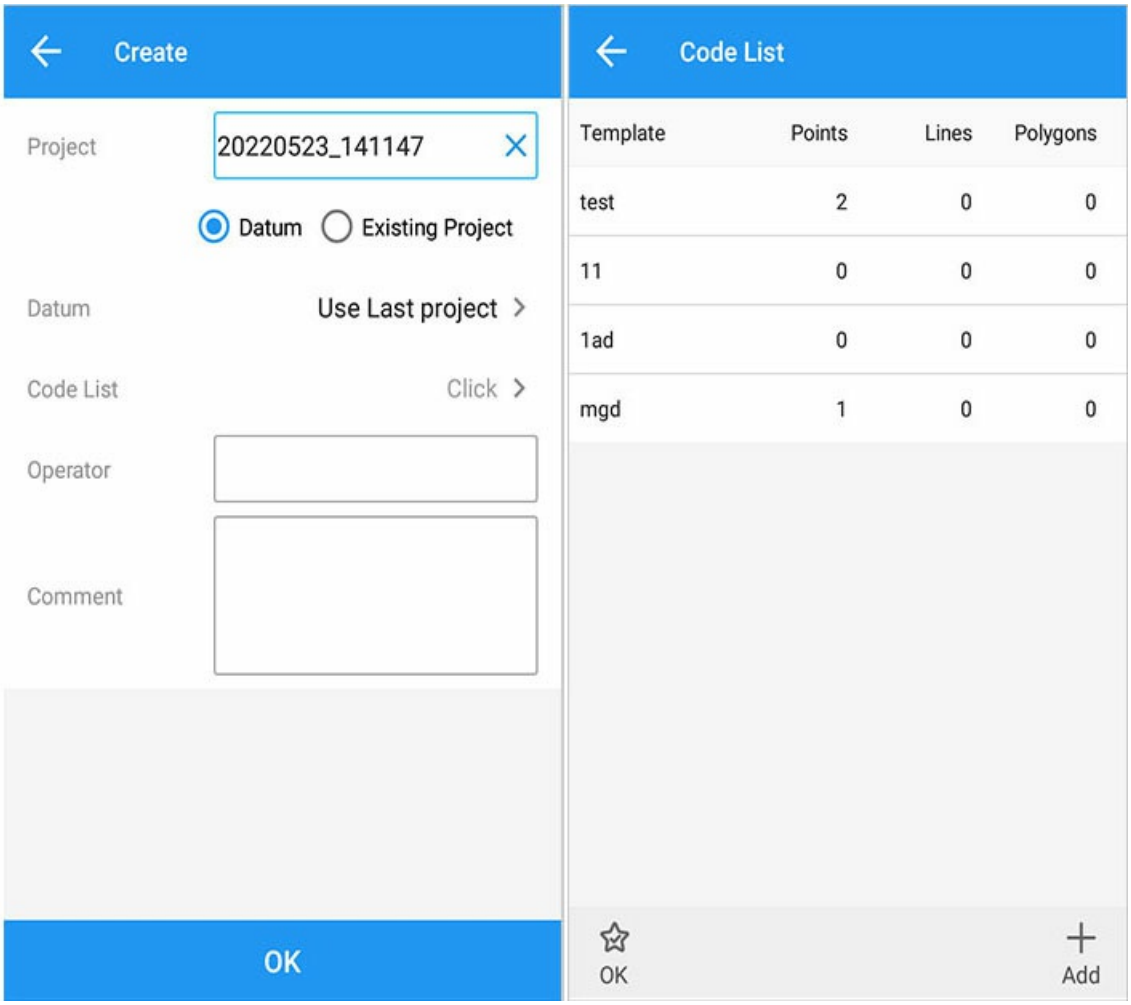
4. Apply



Enter the code in the code box of the measurement interface, click Measure, and the code can be saved to the current task code list.



Click the code box to continue using it without re-entering it.



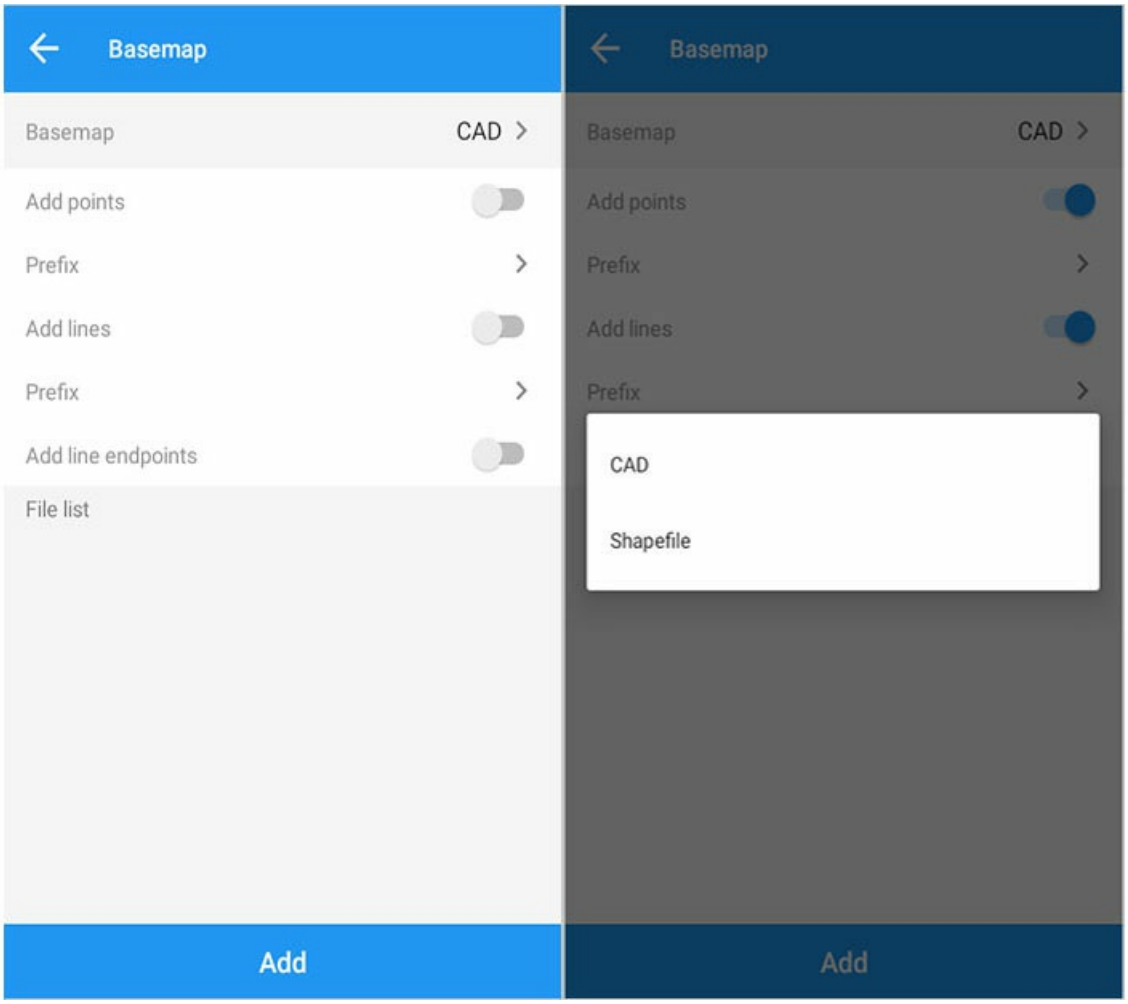
When creating a new project, you can choose to use a code list. This code list can be a default code list, or the code list that has been imported.

Import Basemap

Basemap: Background layer used for measurement and stakeout, which is convenient to observe the position of the current point. The current basemap supports CAD and Shapefile.

Home -> [Project] -> [Basemap]

Click [Basemap] to select the type of imported basemap.

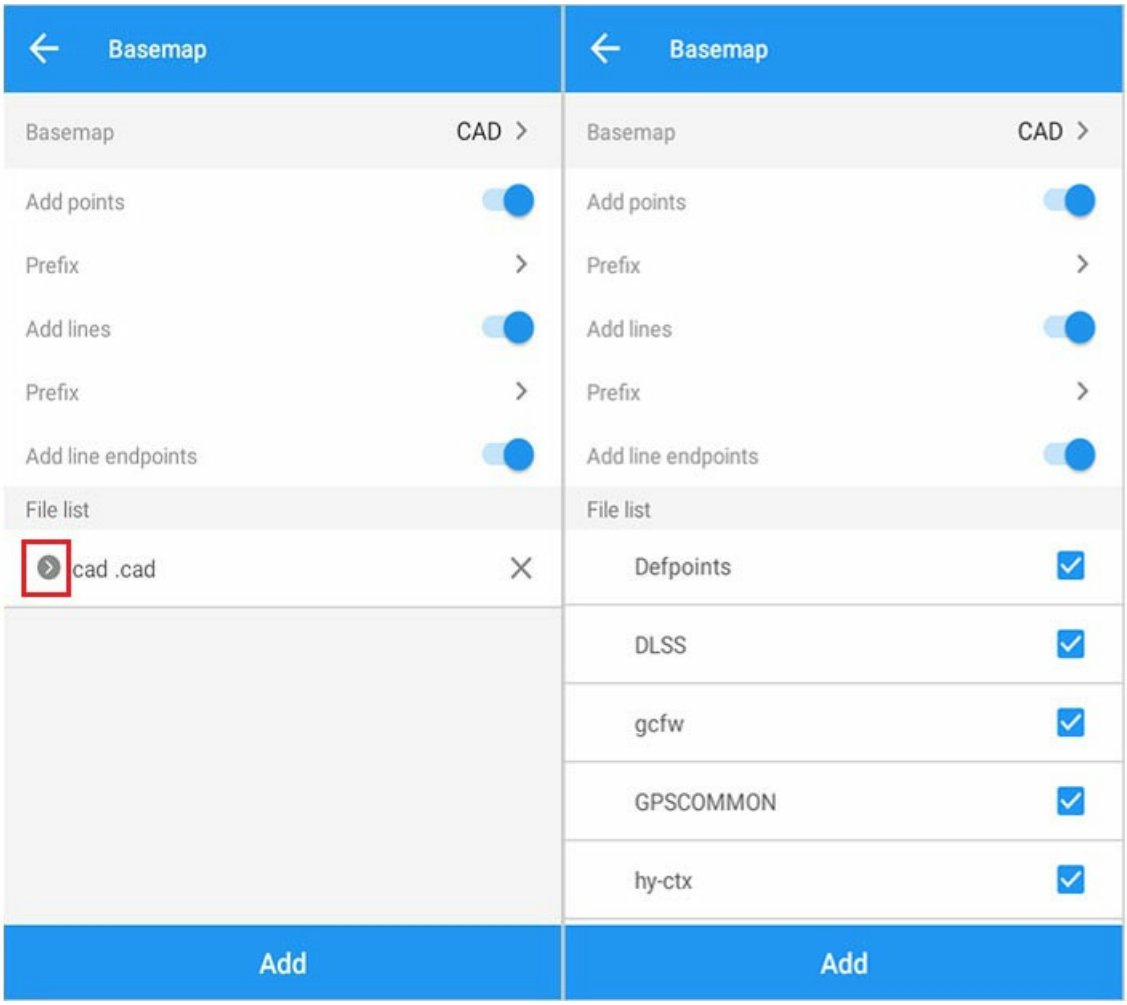


1. CAD

Import CAD

CAD drawings contain files in both .dxf and .dwg formats.

[Basemap] Select CAD, click [Add] to add and import CAD basemap.



After the CAD is imported successfully, you can view all the layers contained in the current CAD, and you can set whether they are visible or not. There is a delete icon after the file list, and the corresponding CAD can be deleted.

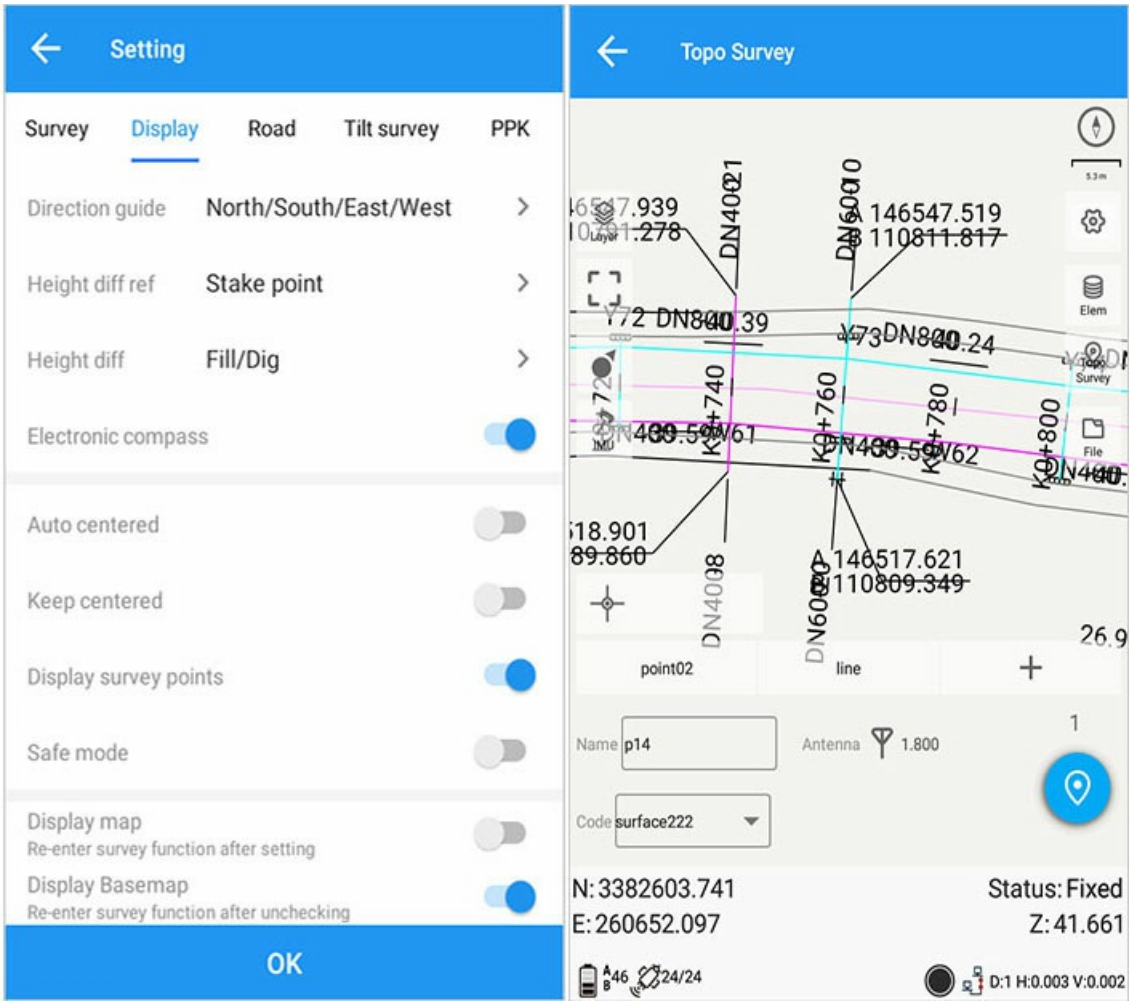
Import points and lines

When importing the CAD basemap, you can choose to save the point-to-point library, save the line to the line library, save the line endpoint to the point library, and you can set the prefix for saving points and lines.

Display basemap

Home -> [Survey] -> [Stake Point] -> [Setting] -> [Display] -> [Display Basemap]

After enabling the basemap display, click [OK] to save the settings. After exiting the measurement interface, re-enter the measurement interface, you can see the imported CAD base map, click the "Panorama" button to zoom the base map.



Export DXF

Home -> [Project] -> [Export] -> [More Formats] -> [Export DXF]

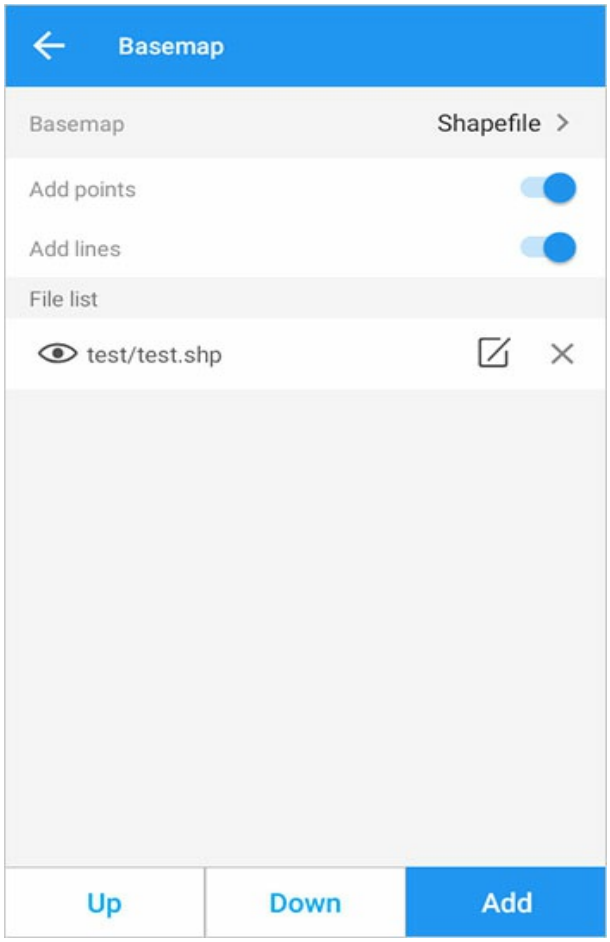
For details, see Data Export

2. Shapefile

Home -> [Project] -> [Basemap] -> [Basemap] -> [Shapefile]

Add: Click the [Add] button to add a basemap.

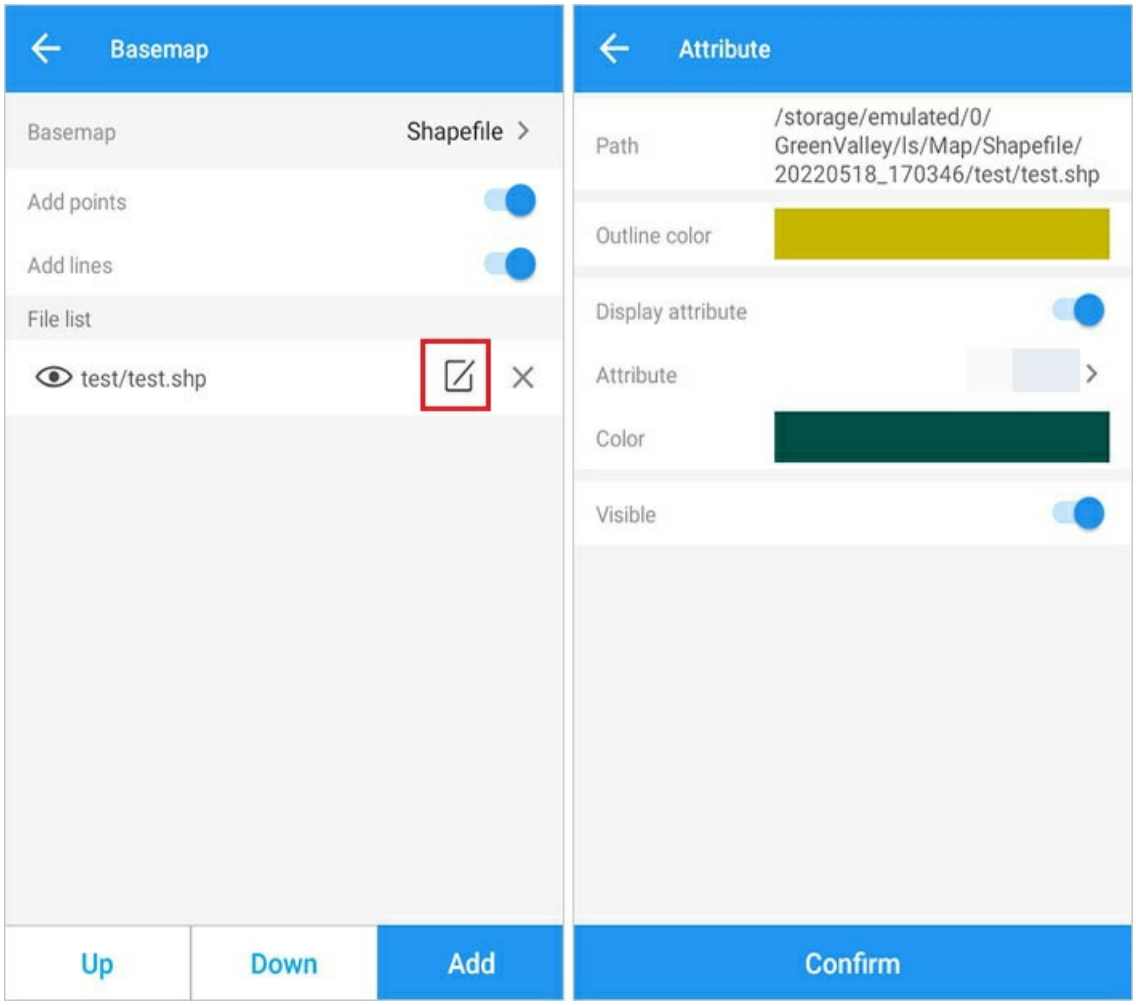
Delete: Click the delete button after the basemap to delete the corresponding shape basemap.



Layer properties

Move Up/Down: Click to select the basemap to move the basemap up or down to control the order in which the shapes are displayed.

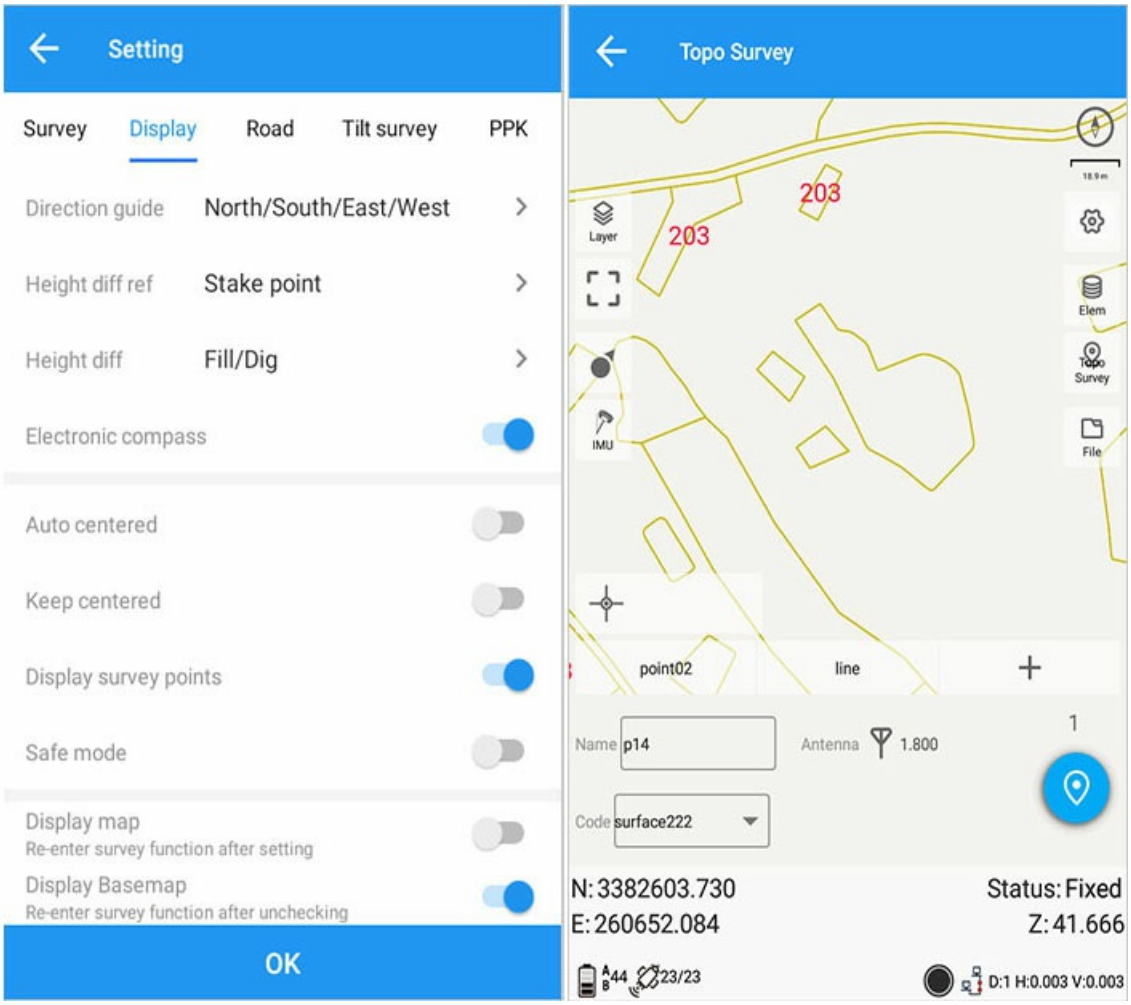
Edit properties: Click the Edit button to enter the property editing interface of the corresponding basemap, where you can edit the displayed colors and properties.



Display shape

Home -> [Survey] -> [Stake Point] -> [Setting] -> [Display] -> [Display Basemap]

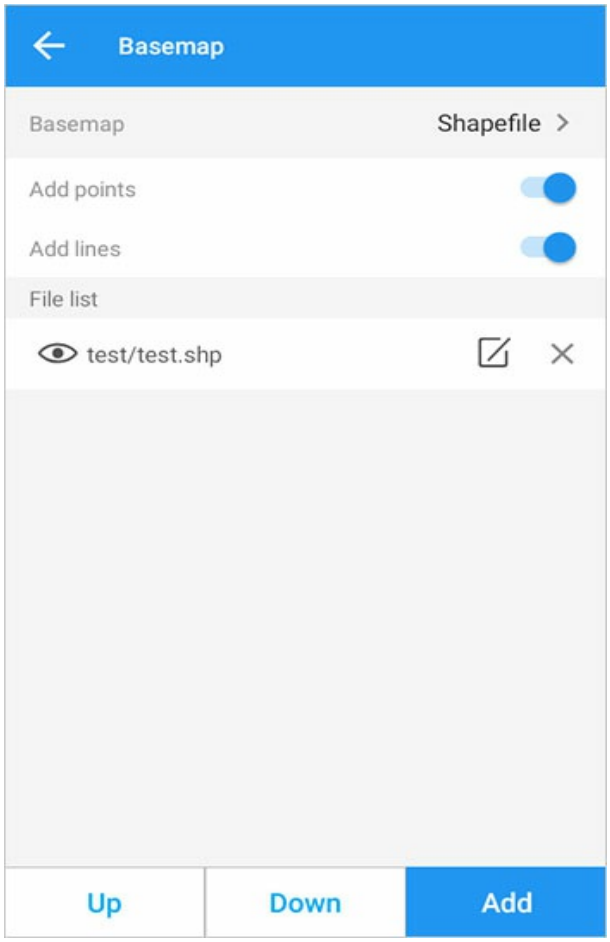
After enabling the basemap display, click OK to save the settings. After exiting the measurement interface, re-enter the measurement interface, you can see the imported shape, and click the [Panorama] button to zoom the base map.



Save Point/Save Line

Turn on the save point to point library option, you can import the points of the shape file into the point library when importing the shape basemap.

Turn on the option to save lines to line library, you can import the lines of the shape file into the line library when importing the shape basemap.



Export Shapefile

Home -> [Project] -> [Export] -> [More Formats] -> [Export Shapefile]

For details, see Data Export

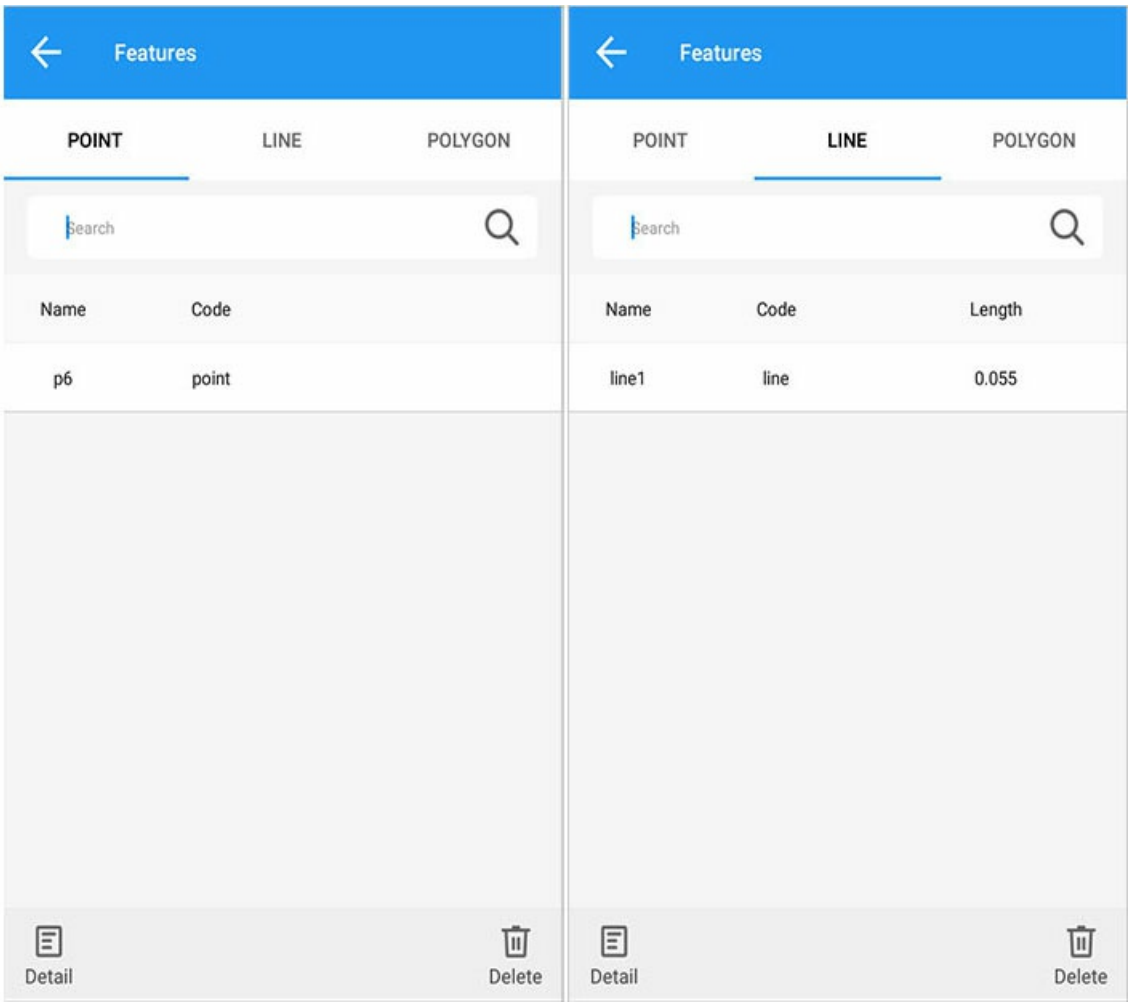
Data: After selecting, the corresponding data can be exported

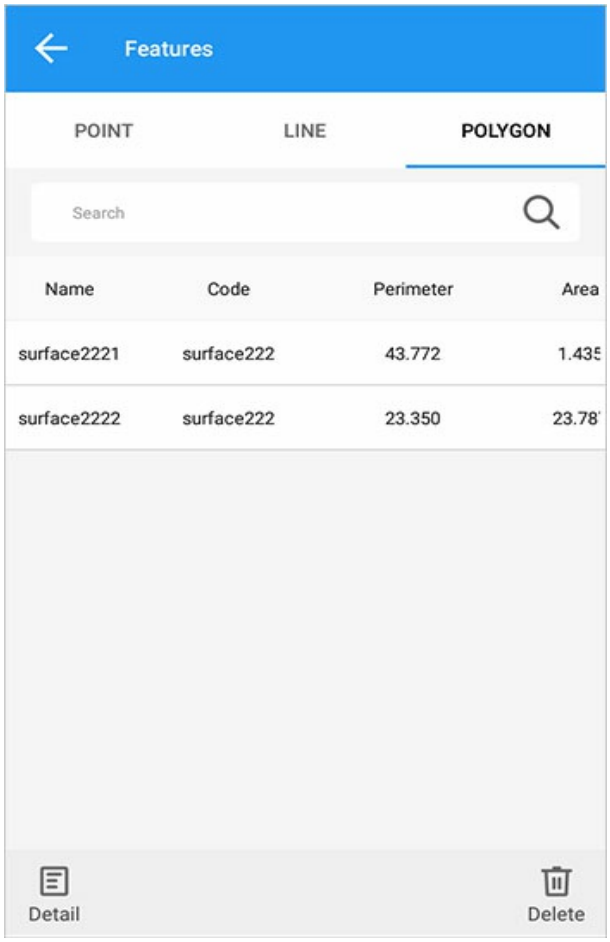
Layer: Properties included in the exported Shapefile

Feature Management

Home -> [Project] -> [Features].

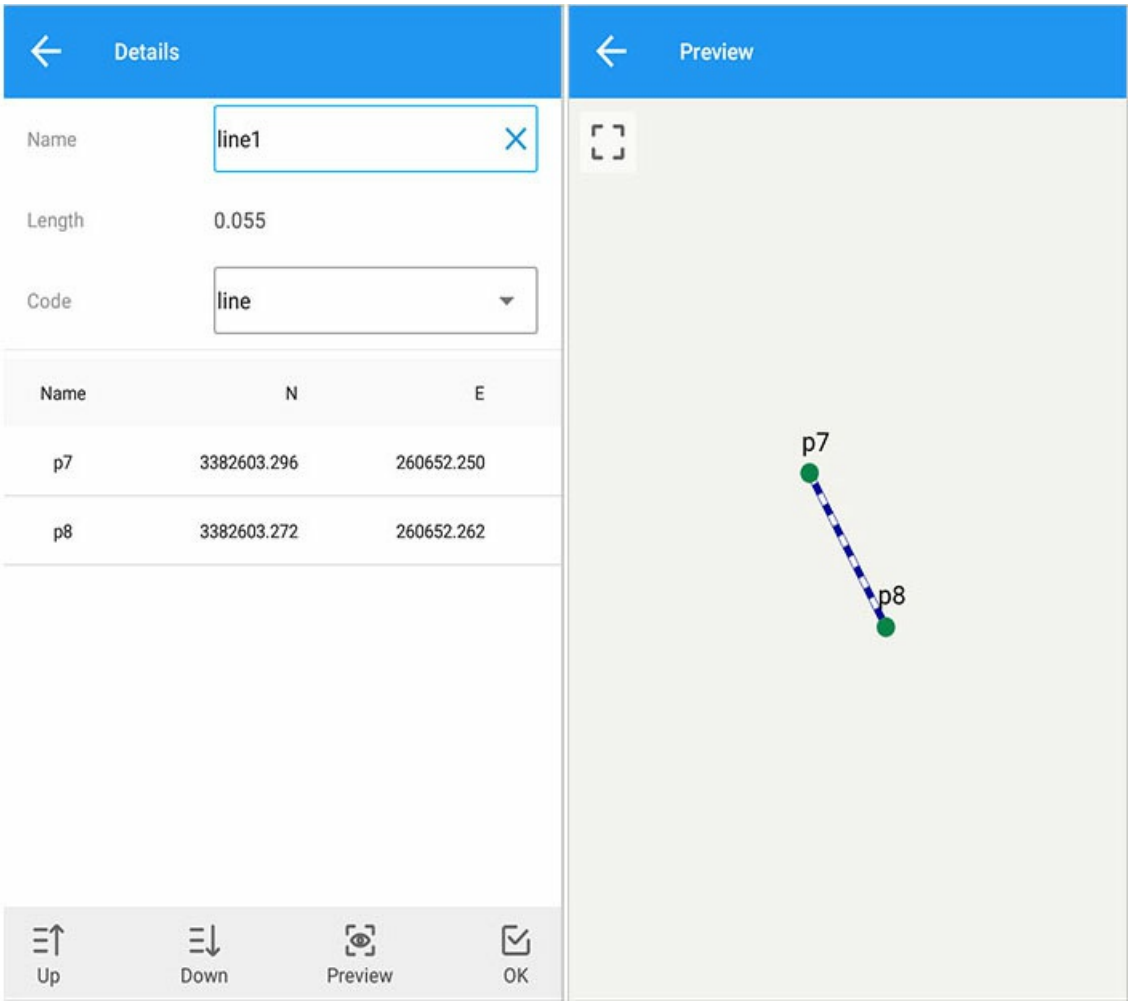
Points, lines, and surfaces are displayed in columns; the name and code are displayed under the point column; the name, code, and length are displayed under the line column; the name, code, perimeter, and area are displayed under the surface column.





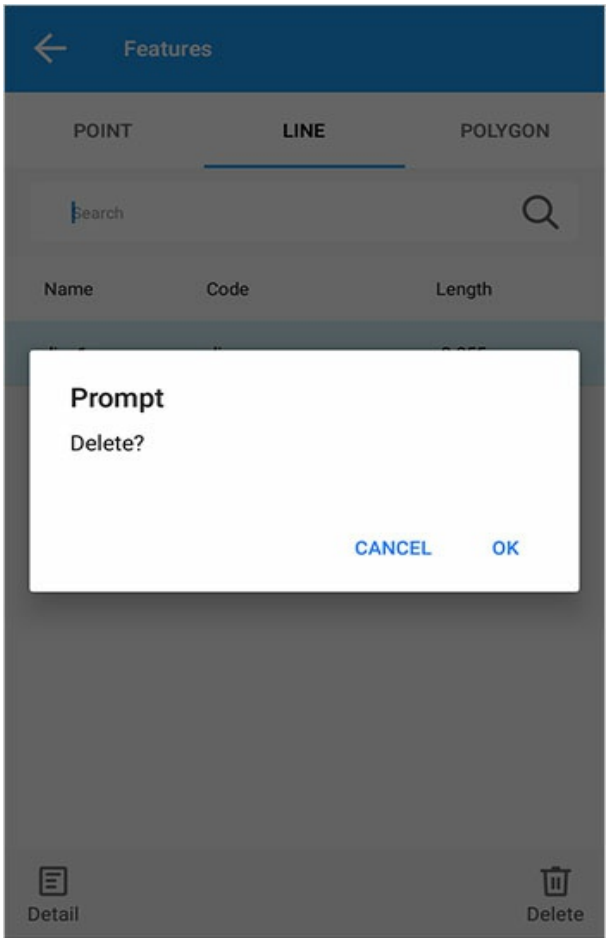
1. Detail

Click [Details] to view the details of the features; you can move the data up and down, preview the features and change the code. As shown below:



2. Delete

Feature deletion: After selecting the feature data, click Delete to execute the delete operation.


Features
POINT
LINE
POLYGON
Search
Name
Code
Length
Prompt
Delete?
CANCEL
OK
Detail
Delete

Device

Device includes below modules:

Connection

Rover

Base

Device Info

Position Info

Register

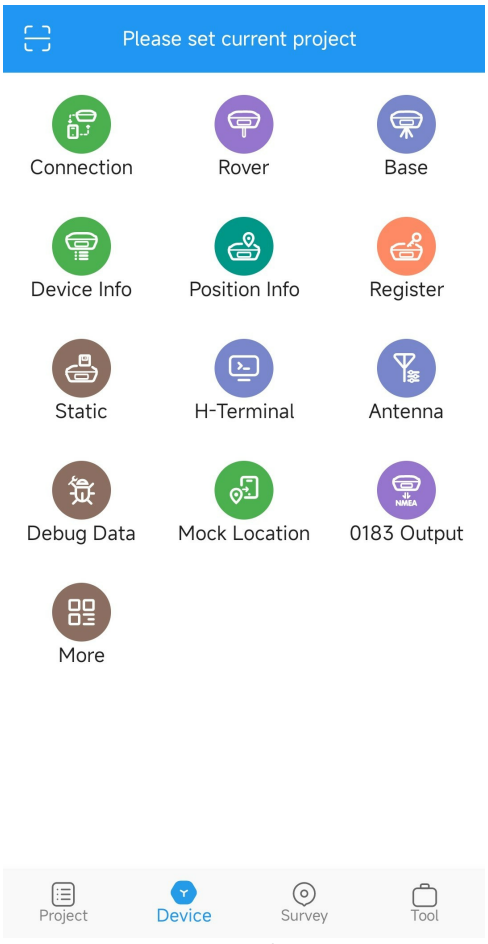
Static

HTerminal

Antenna

0183Output

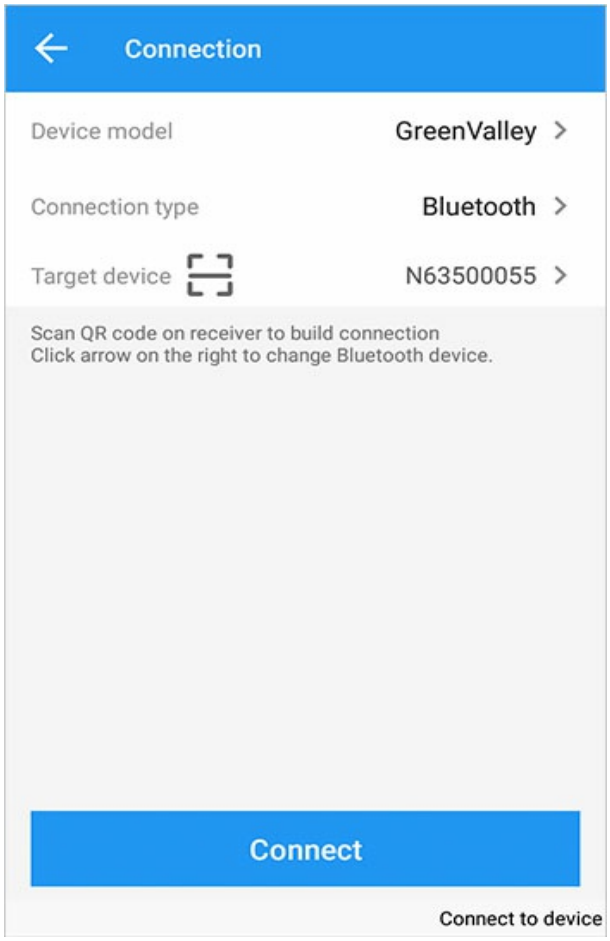
DebugData



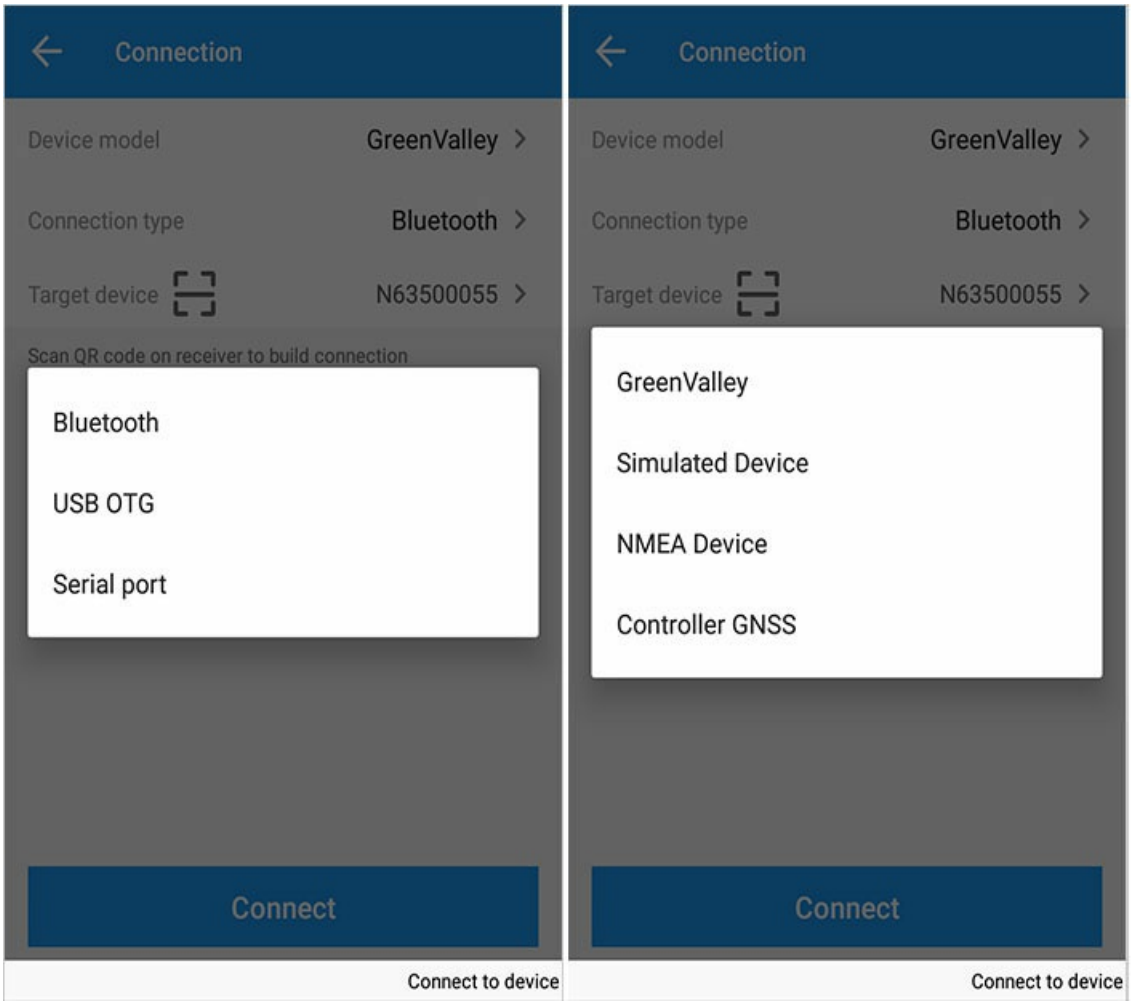
Main Interface

Device Connection

Main interface->【Device】->【Connection】.



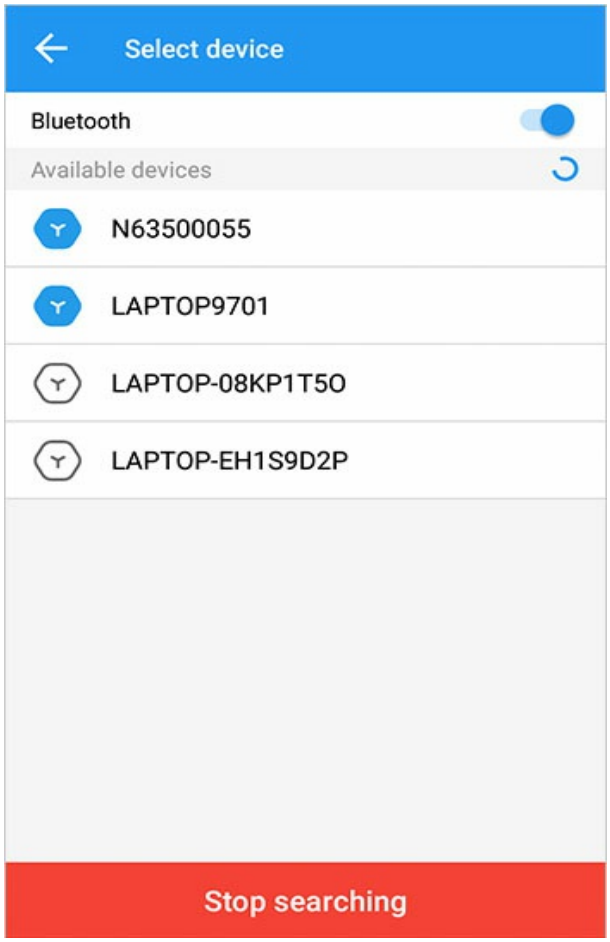
1. Connection setting



Device type: GreenValley、Simulated device、NMEA Device、Controller GNSS.

There are three typrs of ways to connect LiBase: 1) Bluetooth: Binding connection via Bluetooth; 2) USB OTG: Connect via USB serial port; 3)Serial port：Connect via serial port.

2. Connection

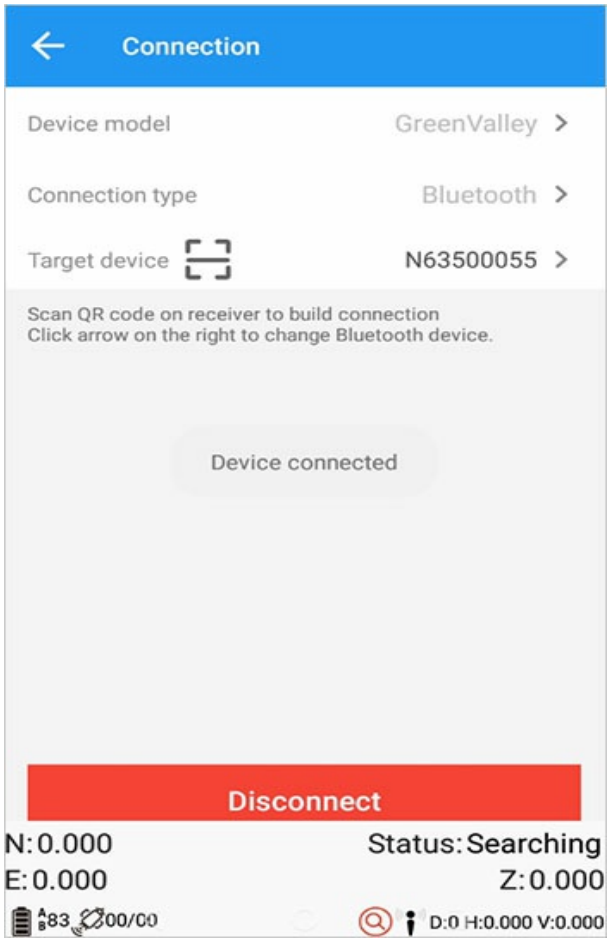


Note：

Blue device: paired bluetooth;
Gray device: scanned device;

Long press to cancel binding. You can also click stop search in the search process to interrupt the Bluetooth search, and the button will change to start search.
Directly perform bluetooth search (note the refresh icon in the upper right corner). When a device is available, select the SN of the device to be connected, complete the binding and start the connection, and the connection will turn green (the connection result will be available within 15 seconds).

Click [Connect], the software will automatically connect to the device with the bound SN number. The "Connect" button will change to the "Disconnect" button if it has been connected. If there is already a bound connected device, exit the software and restart it will prompt: automatic connection.



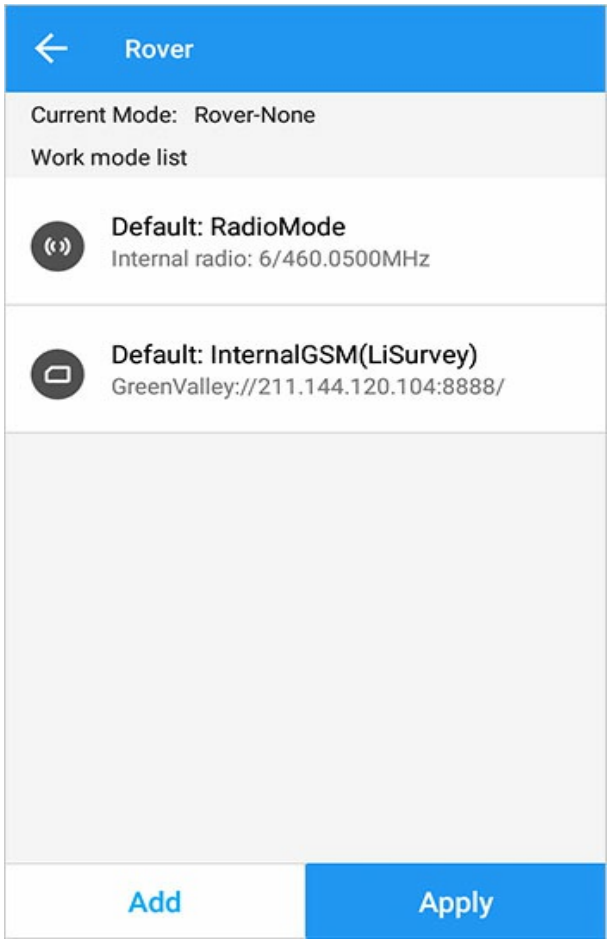
1) The interface displays the connected receiver information and satellite information after sucessful connection.

Rover Station

Icon Meaning

Icon	Meaning
	Radio
	Host Network
	Handbook Network

Main Interface->【Device】->【Rover Station】.



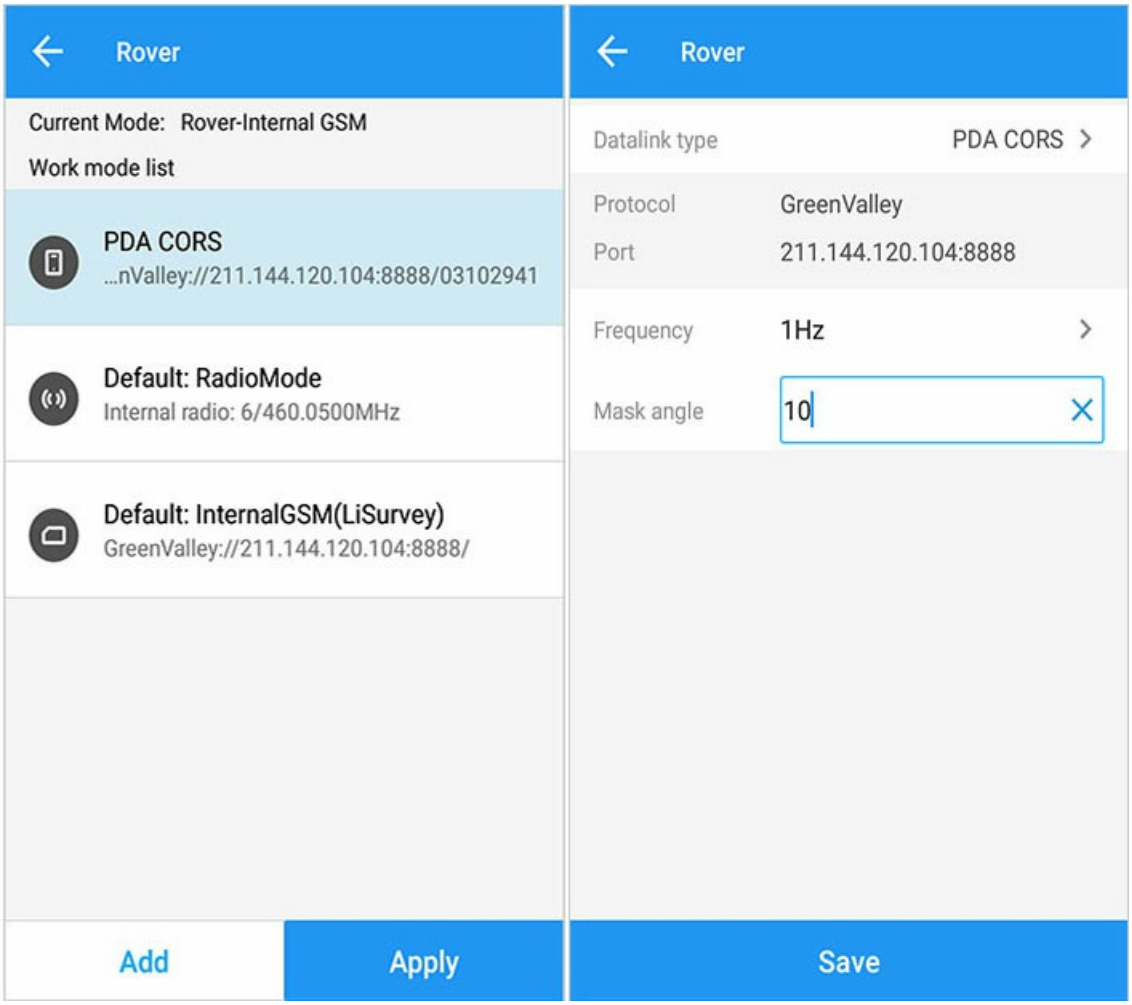
Tips: Check the current mode, if you need to change it, add it yourself or use the default startup mode; and the startup list displays the mode used and the corresponding configuration information.
Default startup: The default startup item cannot be edited and deleted.

Rover Station:
1、 Internal Radio Mode:
a. Internal radio：transparent transport protocol
b. Channel frequency: 6-460.0500
2、 Internal SIM card：
a. Service: IP 211.144.120.104
b. Port: 8888.

1. Startup parameters

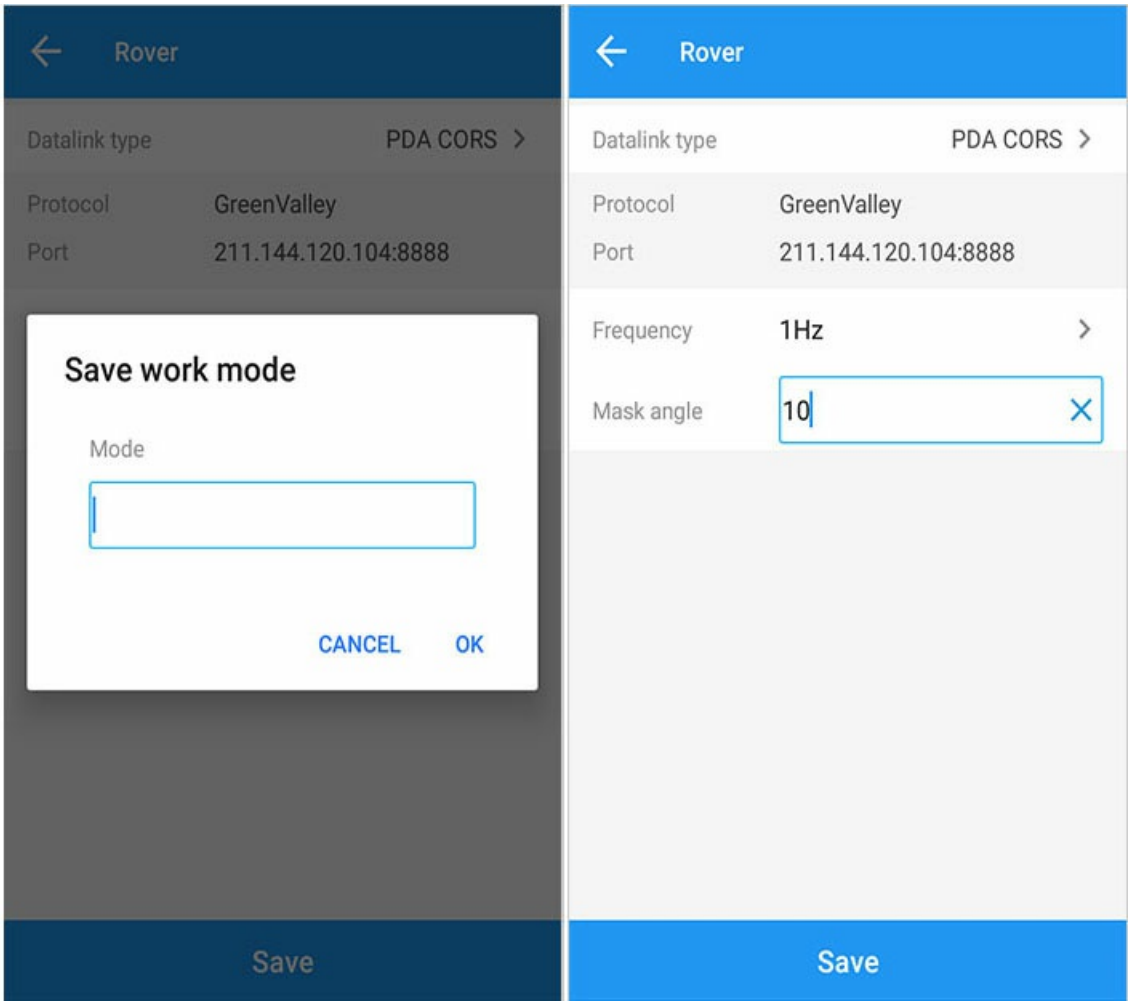
Long press the list data to enter editing mode.

1.1.Startup item view



View: Select a startup to view the current startup configuration

1.2. Copy and edit

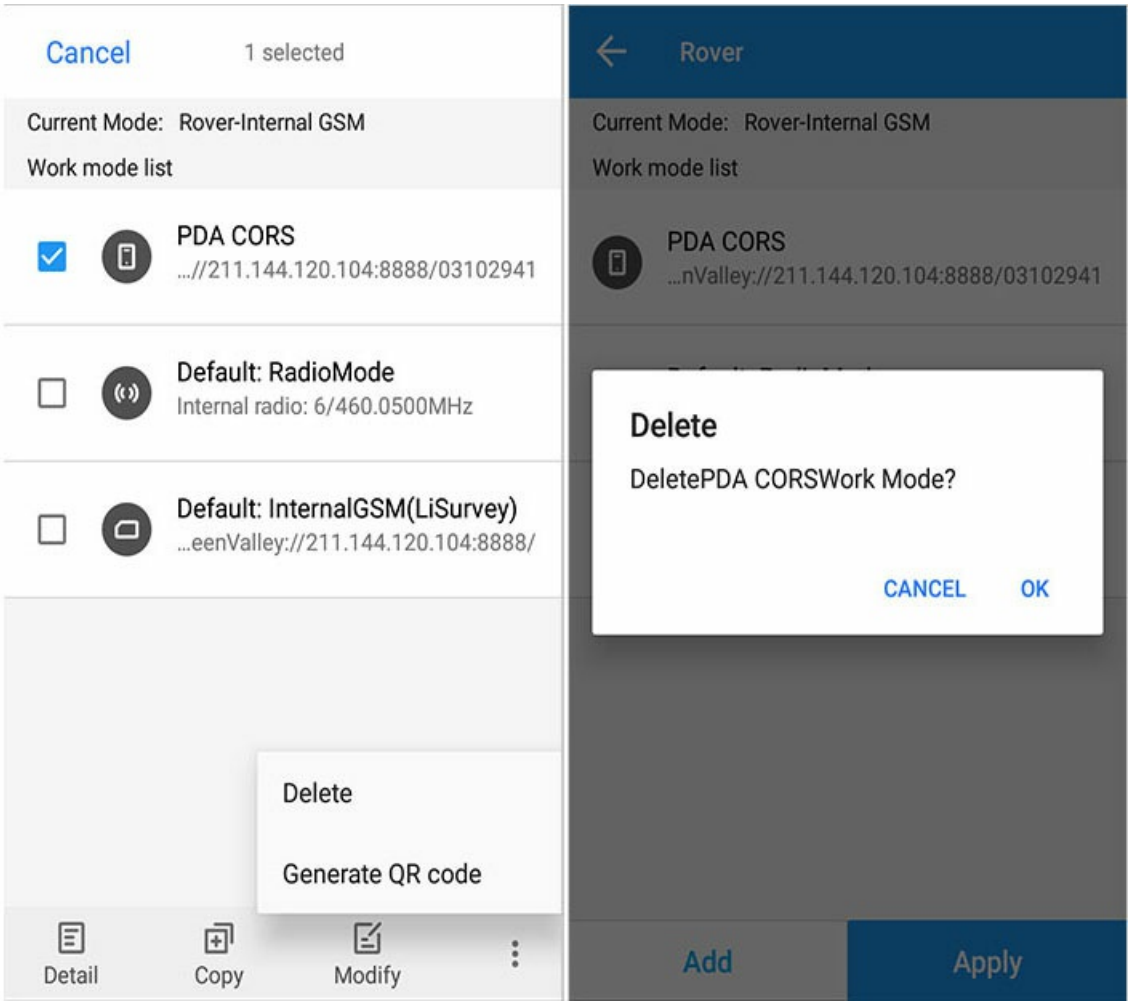


Copy: Select a startup to copy the current startup configuration.

Edit: Select a startup to edit the current startup configuration.

Note: The default startup items cannot be edited.

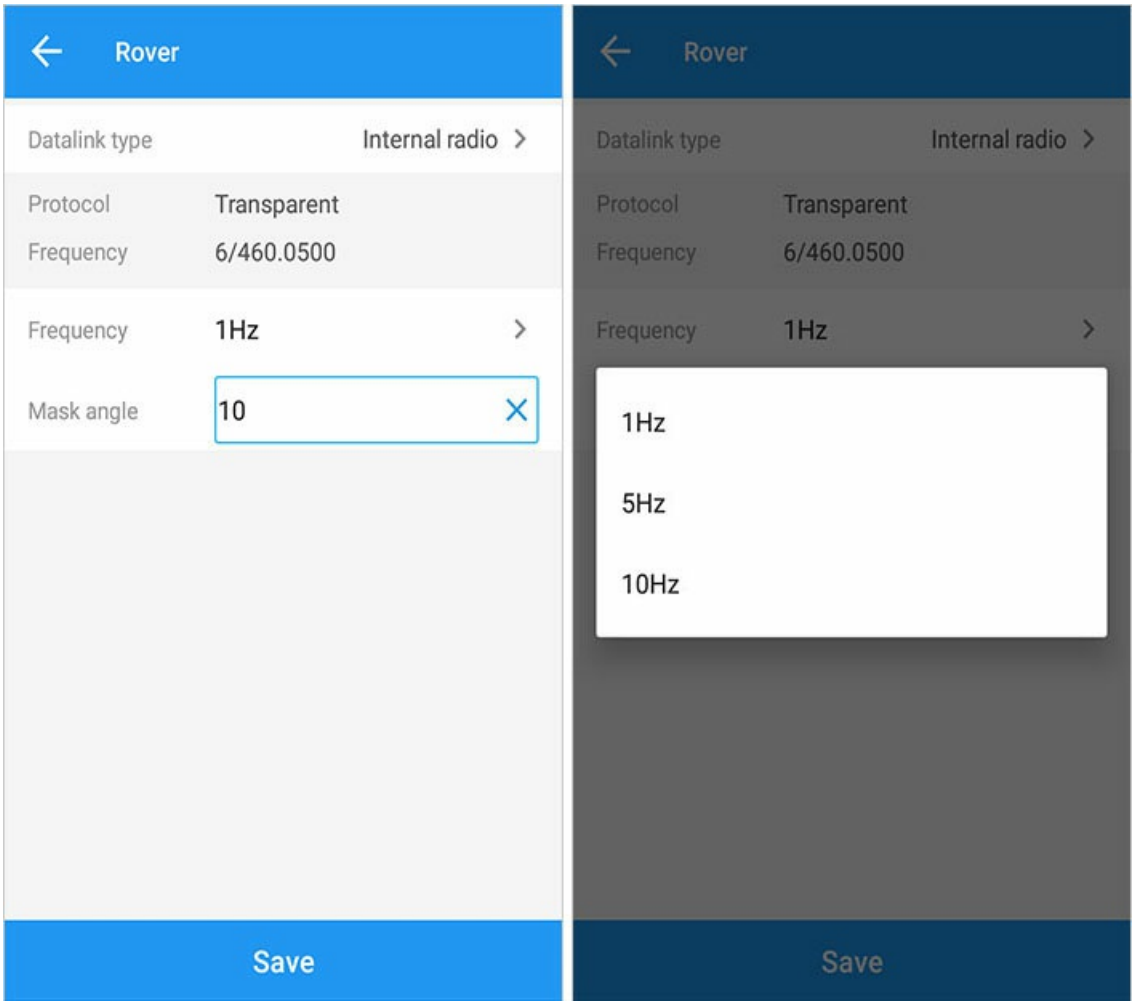
1.3. Startup deletion



Delete: Select a startup to delete the current startup configuration(the default startup item cannot be deleted).

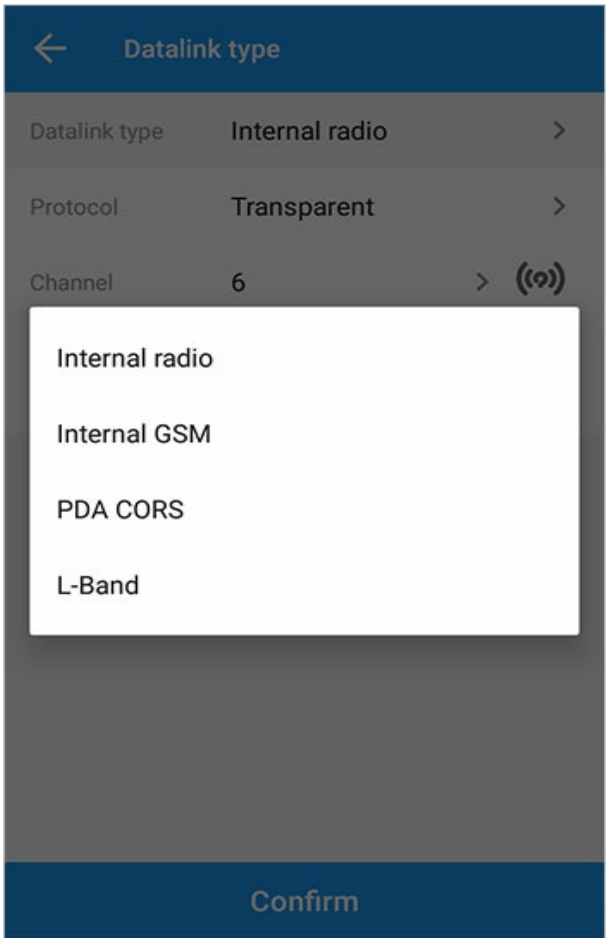
2. New startup item

Click 【Add】 and perform the following operations



Communication mode: internal radio/host network/handbook network /QXZC optional, internal radio by default.

2.1. Internal radio



1) Protocal: options from the drop-down list include: TT450S、Transparent、MAC、South；

2) Channel: Please refer to the following table for the corresponding frequency value of the channel;

3) Frequency: Users can manually input the operation of radio frequency power,or set the frequency through the [+/-] symbol,frequency [+/ -] step is 0.0125, reference video Frequency:high frequency:450-470MHZ，medium frequency: 430-450 MHZ, low frequency: 410-430 MHZ;

Frequency table of radio channel

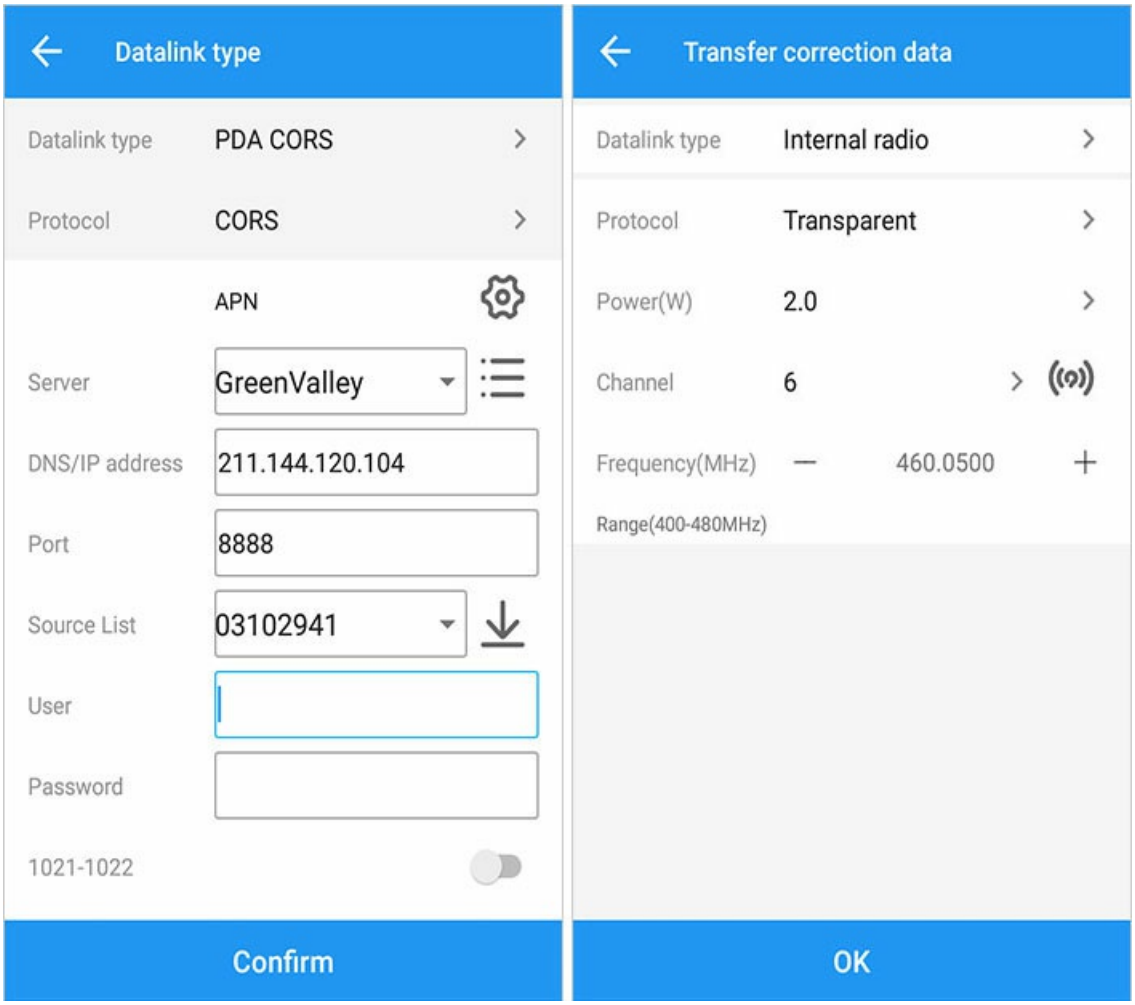
Channel	Frequency
Customize	Customize
1	455.0500
2	456.0500
3	457.0500
4	458.0500
5	459.0500
6	460.0500
7	461.0500
8	462.0500
9	463.0500

2.2. Network boot

Network: Host network and handbook network, their Settings are exactly the same.

Protocol: CORS，GreenValley，TCP。

2.2.1.CORS protocol



1)APN: The information about the dial-up Internet access supported by the SIM card needs to be set separately for the Intranet or dedicated card. For details, see the following.

2)Server: The current name of the server can be quickly selected from the drop-down list or entered or changed on the current page.

3)DNS/IP address: The IP address or web address of the server center (for example, rtk.ntrip.qxwz.com); it can also be directly input or changed in the current interface.

4)Port: The port of the server center can also be input or changed in the current interface;

5)Source List: select by quickly droping down, or enter or change in the current interface.

6)User/Password： The user name and password for logging in to the CORS center can also be entered or changed on the current screen.

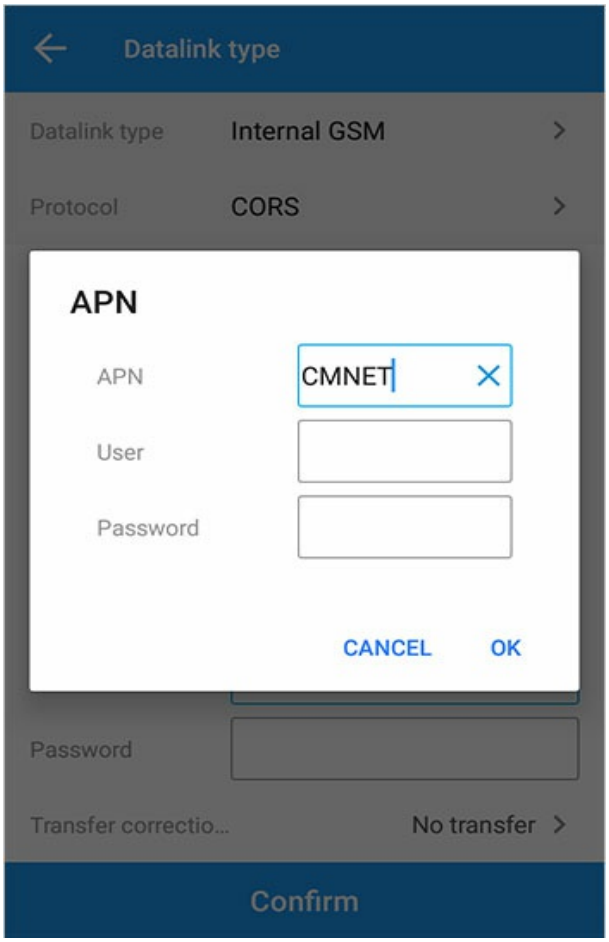
7)1021-1022、1023-1024、1025-1027: Coordinate conversion parameters broadcast by CORS station;

8)Data forwarding: forward the network differential data through the internal radio. It is turned off by default and can be manually turned on to set the relevant internal radio parameters.

9) VRS using: VRS is a virtual reference station, which can be used or not used.

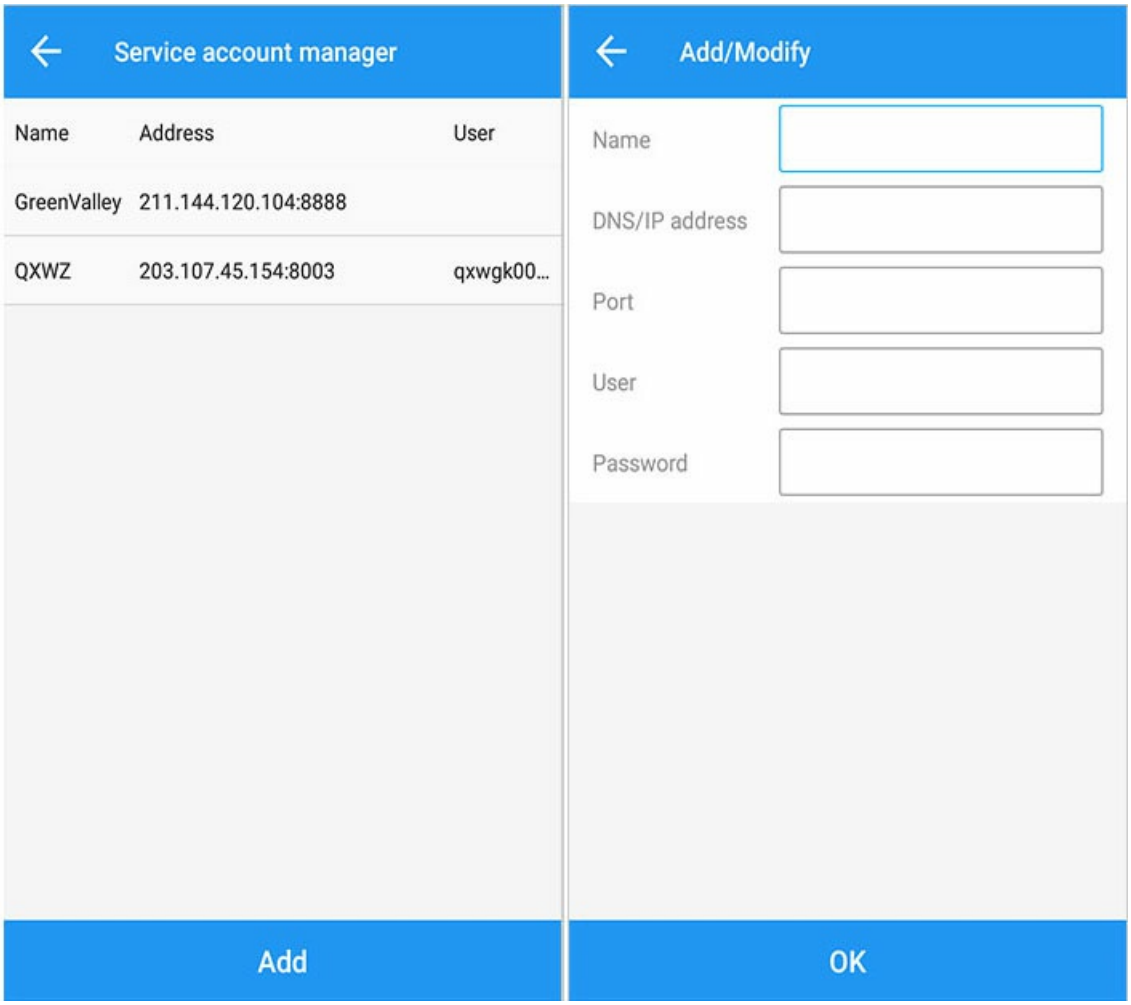
Note： Mode supports handbook network and host network CORS.

APN setting



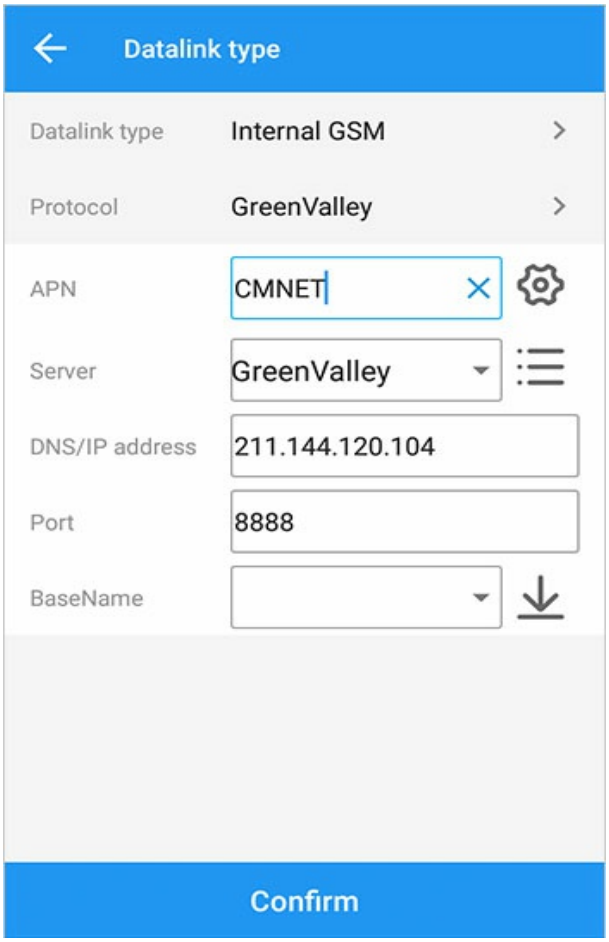
The APN name, user name and password are configured based on the SIM card support or the dedicated card network.

Add service:



The server can directly select the server name that has been stored in the server management, and it can be applied directly. You should add the following information: Name、DNS/IP address、Port、User name、Password.

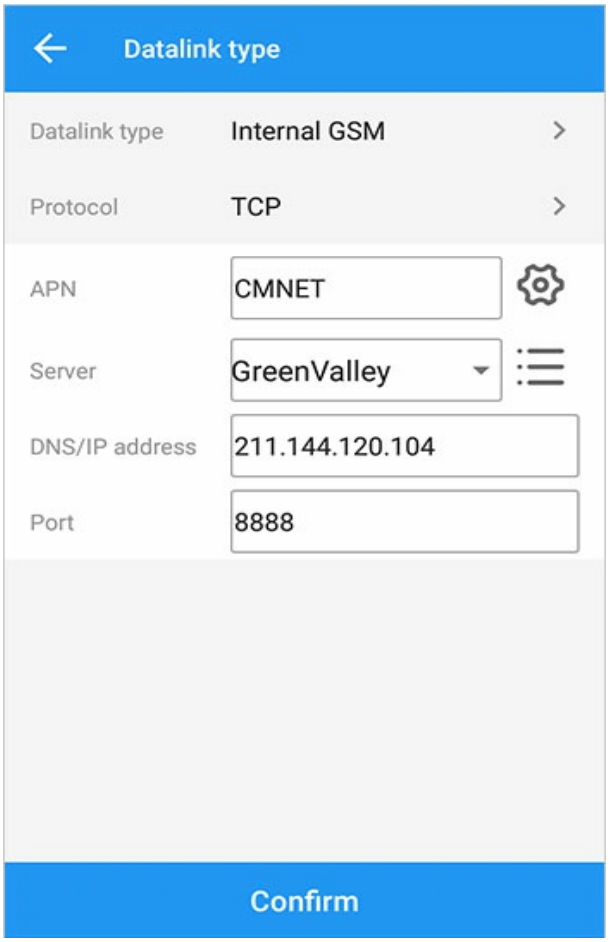
2.2.2.GreenValley protocol



1) APN:The information about the dial-up Internet access supported by the SIM card needs to be set separately for the Intranet or dedicated card. For details, please refer to the CORS protocol.
2) Server: The current name of the server can be quickly selected from the drop-down list or entered or changed on the current page.
3) DNS/IP address: The IP address or web address of the server center (for example, rtk.ntrip.qxwz.com); it can also be directly input or changed in the current interface.
4) Port: The port of the server center can also be input or changed in the current interface;
5) Name of base station: Obtain the source list corresponding to the current server center IP address and port (storing historical calls), or you can also customize the input;

Note： Base station name: the name of the base station set in the current protocol. After the rover station obtains the name, it needs to be selected to access differential data normally (because CDC+ server software uses NTRIP protocol).

2.2.3.TCP protocol

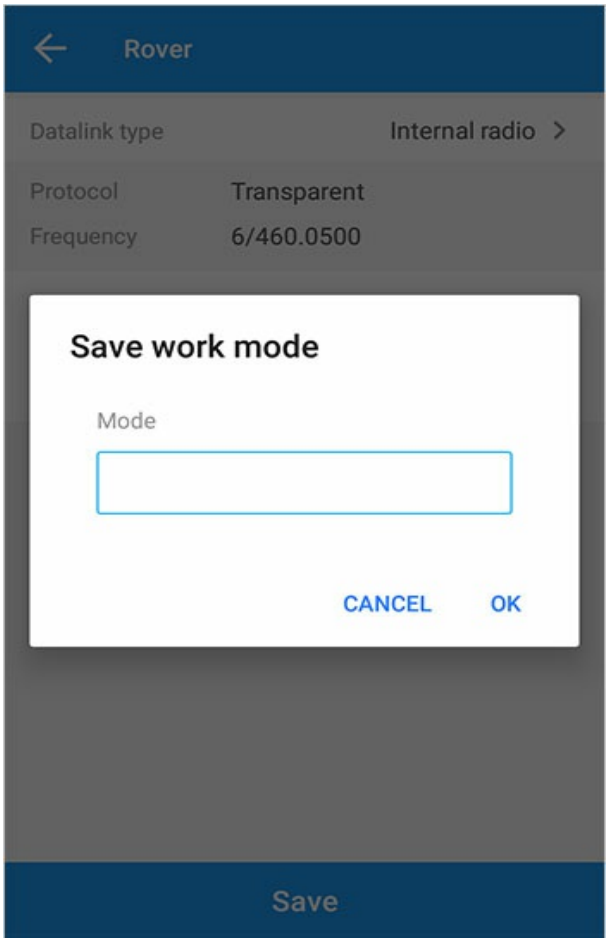


1) APN: The information about the dial-up Internet access supported by the SIM card needs to be set separately for the Intranet or dedicated card. For details, please refer to the CORS protocol;
2) Server: The current name of the server can be quickly selected from the drop-down list or entered or changed on the current page;
3) DNS/IP address: The IP address or web address of the server center (for example, rtk.ntrip.qxwz.com); it can also be directly input or changed in the current interface;
4) Port: The port of the server center can also be input or changed in the current interface;

Note：

1. TCP communication does not require any authentication user name and password, and is generally used on the area network. If the TCP service is used on the Internet, security cannot be guaranteed.
2. There are no restrictions on TCP logins.

2.3. Start saving



The name must be entered. Click "OK" to complete the saving, and click "Cancel" to cancel the saving item.

Note：

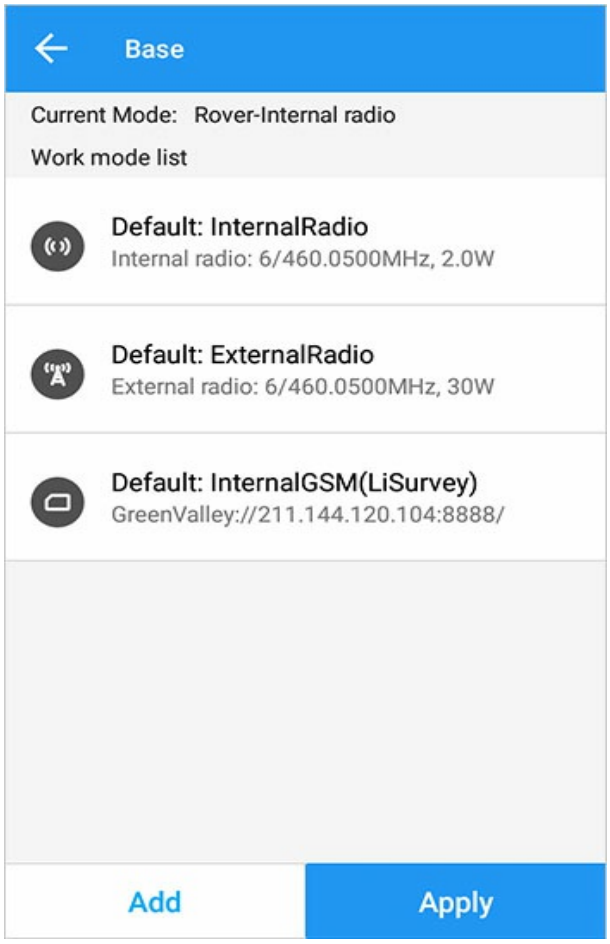
1. A prompt will pop up to give instructions when saving with the same name.
2. It cannot be modified in the startup items once the name is saved. (Please save the name according to your own homework needs).

Base Station

Icon meaning

Icon	Meaning
	Internal radio
	Receiver network
	External radio

Main interface->【Device】>【Base】。



Tips: Check the current mode, and if you need to change it, add it or use the default startup mode. The startup list displays the used mode and configuration information. Default startup: The default startup item cannot be edited and deleted.

Base station：

1、 Start the base station with internal radio:

a. Internal radio：transparent transport protocol

b. Transmitted power: 2W

c. Channel frequency: 6-460.0500

d. Start mode: automatic coordinates

e. Differential mode: RTCM（3.2）

f. Mask angle: 10°

2、 Start the base station with external radio:

a. External radio baudrate: 38400

b. Start mode: automatic coordinates

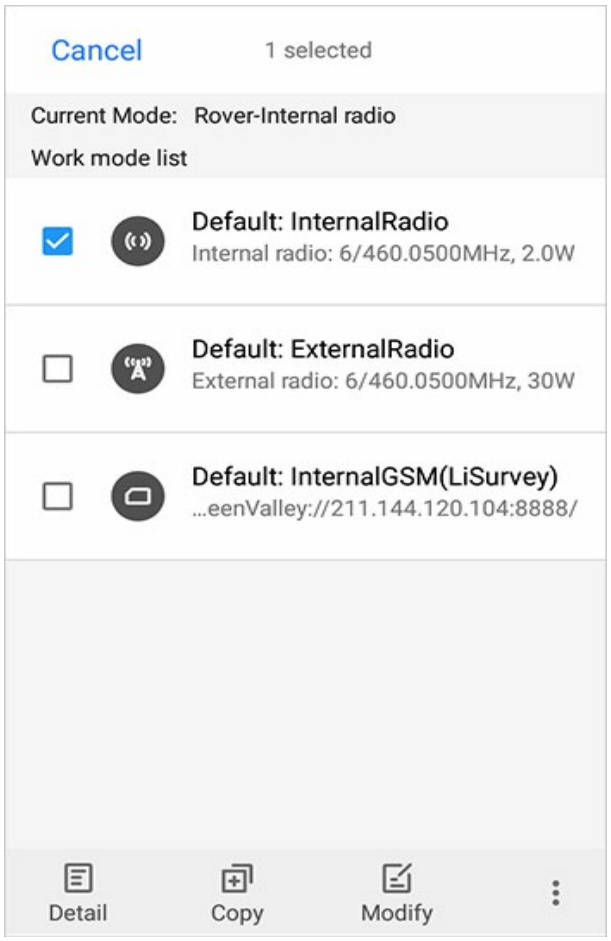
c. Differential mode: RTCM（3.2）
d. Mask angle: 10°

3、 Internal GSM transmission
a. Protocol: GreenValley
b. Address: 211.144.120.104
c. Port: 8888
d. Start mode: automatic coordinates
e. Differential mode: RTCM（3.2）
f. Mask angle: 10°
Note: The default base station startup items are all automatic base station mode, and the base station automatically obtains coordinates after startup.

1.Startup parameters

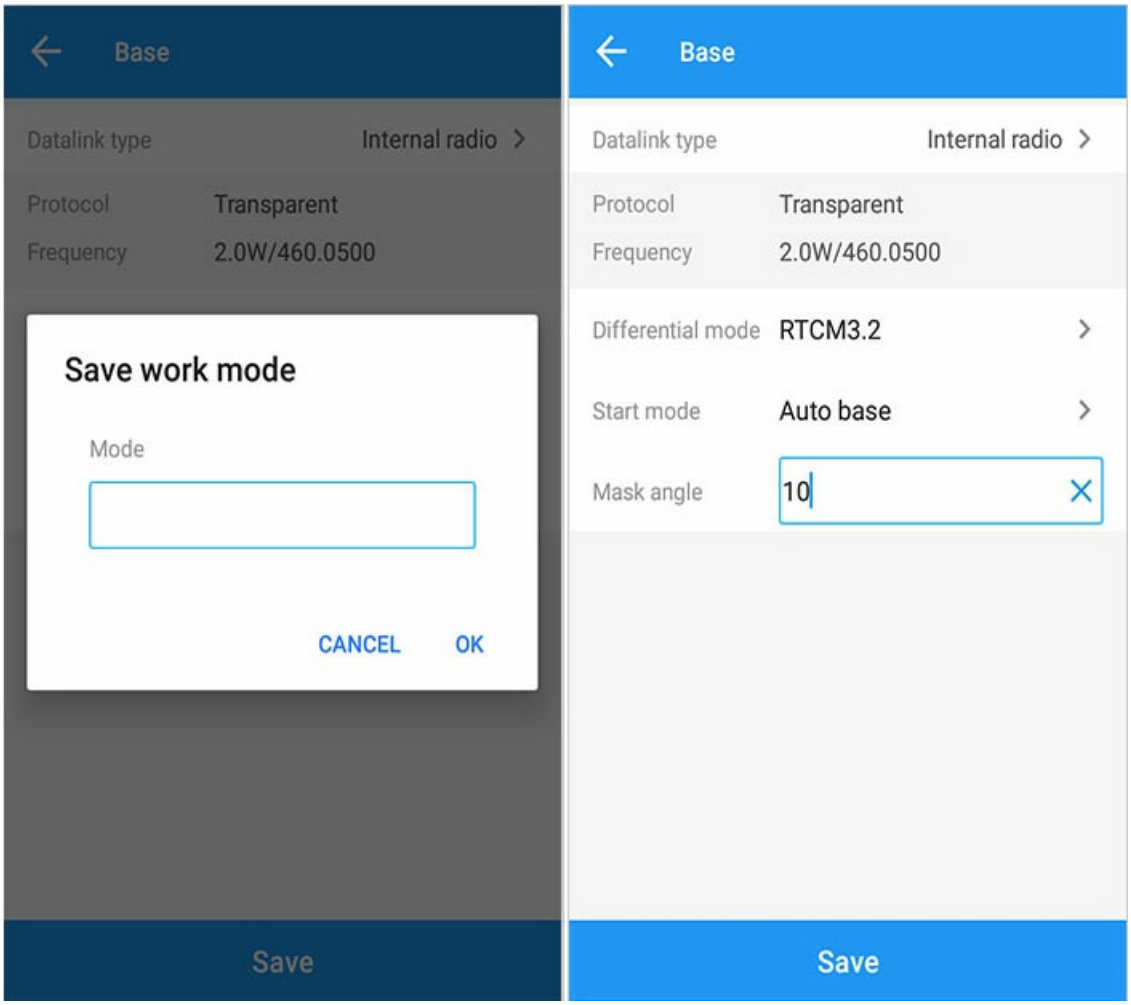
Long press the list data to enter editing mode.

1.1.Startup item view



View: Select a startup to view the current startup configuration

1.2.Startup copy and edit

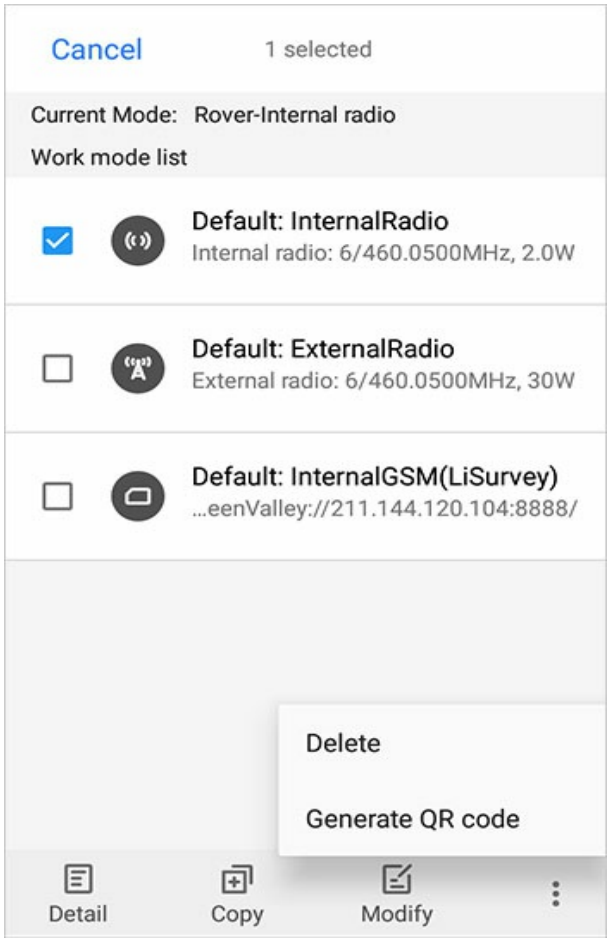


Copy: Select a startup to copy the current startup configuration.

Edit: Select a startup to edit the current startup configuration.

Note: The default startup items cannot be edited.

1.3.Startup deletion



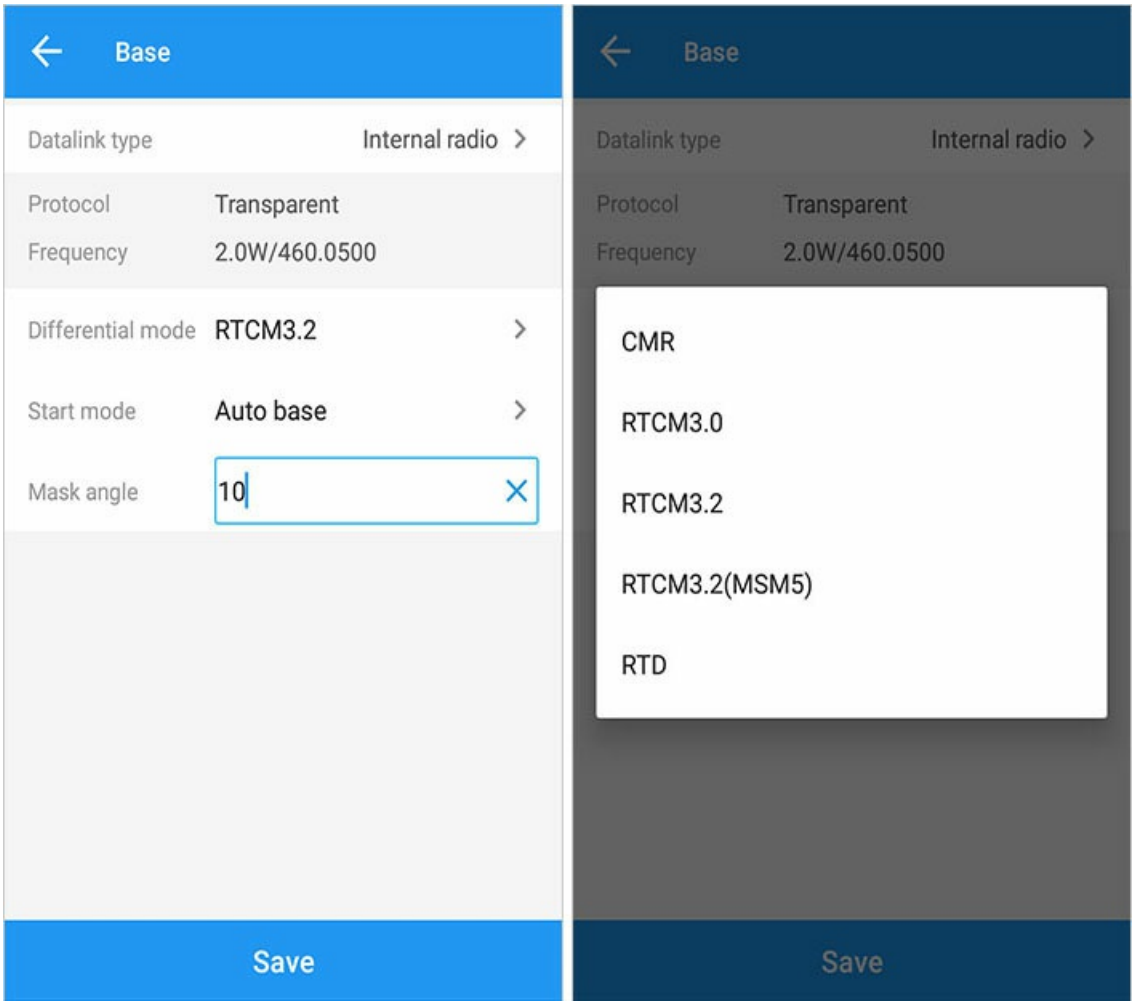
Delete: Select a startup to delete the current startup configuration(the default startup item cannot be deleted).

Generate QR code: Select an item to activate, and the QR code can be generated.

Note: The default startup items cannot be deleted.

2.New startup item

Click 【Add】 and perform the following operations



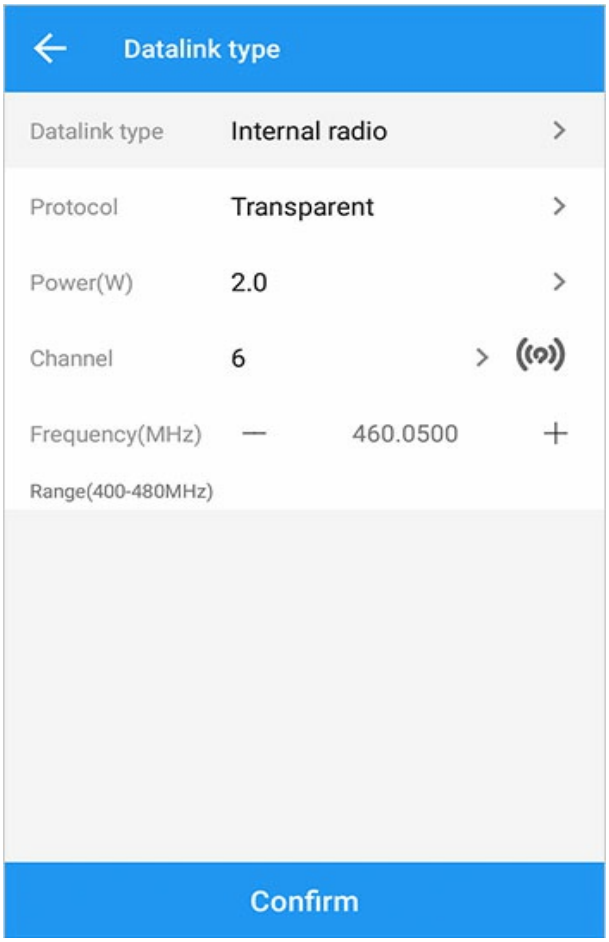
Communication mode of base station: Internal radio/Internal GSM/External radio can be selected, internal radio is default.

Differential mode: five differential are opional, the default is RTCM3.2.

Start mode can be auto base or fix position.

Mask angle: the maximum Angle of the receiving satellite signal, input range between 0 and 90 degrees (excluding 90 degrees).

2.1.Internal radio

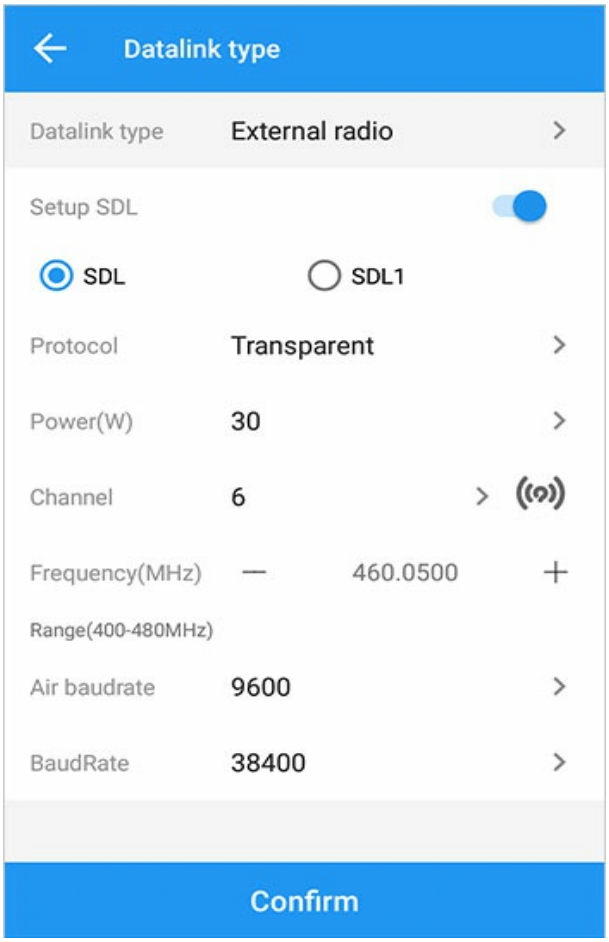


1) Protocal: options from the drop-down list include: TT450S、Transparent、MAC、South；
2) Power: default is 2W, 1W/0.5W can be selected;
3) Channel: Please refer to the following table for the corresponding frequency value of the channel;
4) Frequency: Users can manually input the operation of radio frequency power,or set the frequency through the [+/-] symbol,frequency [+/ -] step is 0.0125, reference video Frequency:high frequency:450-470MHZ， medium frequency: 430-450 MHZ, low frequency: 410-430 MHZ;
Note: The base station has more power options than the rover: in the drop-down list: 0.5, 1, 2.

Frequency table of radio channel

Channel	Frequency
Customize	Customize
1	455.0500
2	456.0500
3	457.0500
4	458.0500
5	459.0500
6	460.0500
7	461.0500
8	462.0500
9	463.0500

2.2.External radio

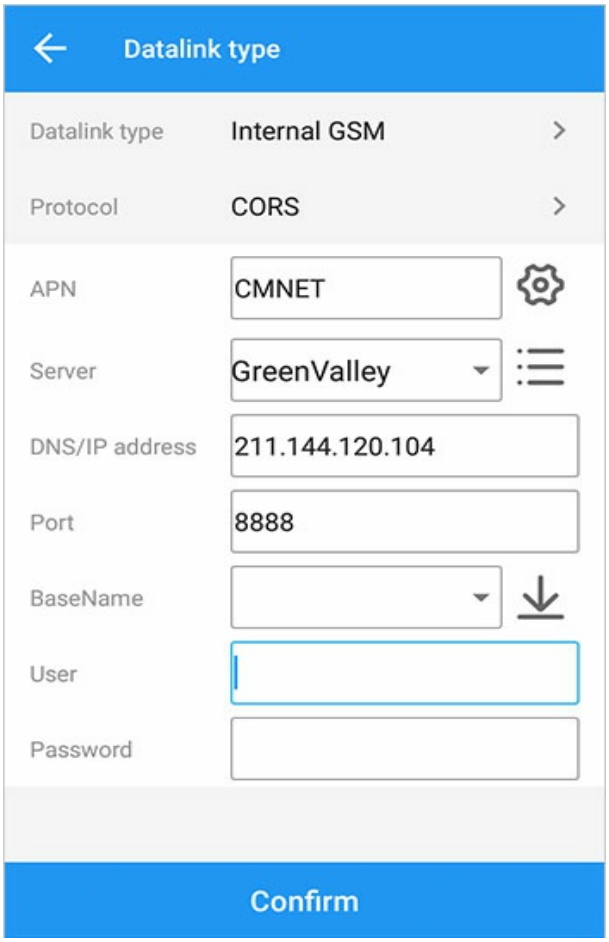


1) Protocal: options from the drop-down list include: TT450S、Transparent、MAC、South；
2) Power: default is 30W, 2W、5W、10W、15W、20W、30W can be selected;
3) Channel: Please refer to the internal radio;
4) BaudRate: the default is 38400, 4800、9600、19200、38400、57600、115200 are avaliable;
5) Air baudrate: default is 9600, 9600、19200 are avaliable.

2.3.Internal GSM

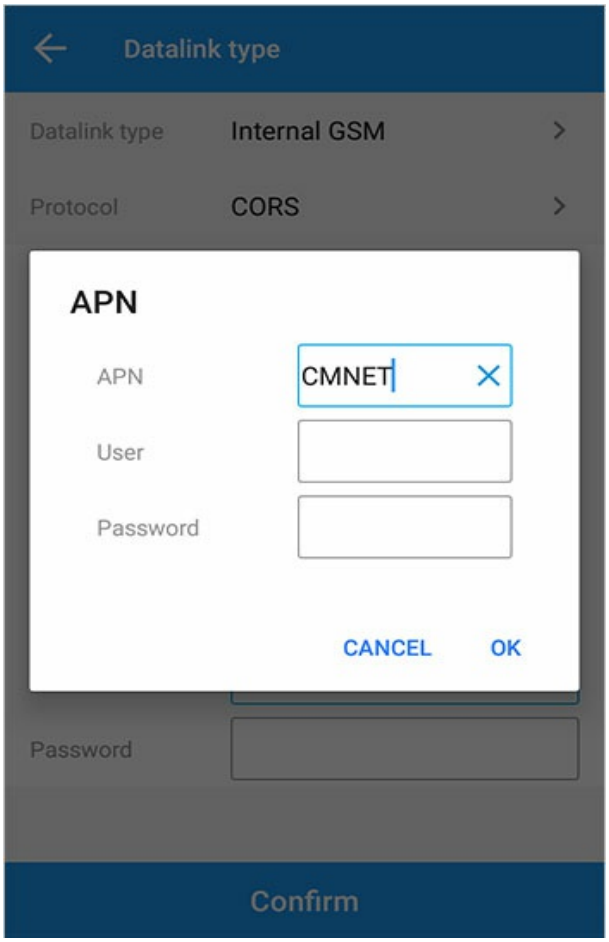
Protocol: CORS，GreenValley.

2.3.1.CORS protocol

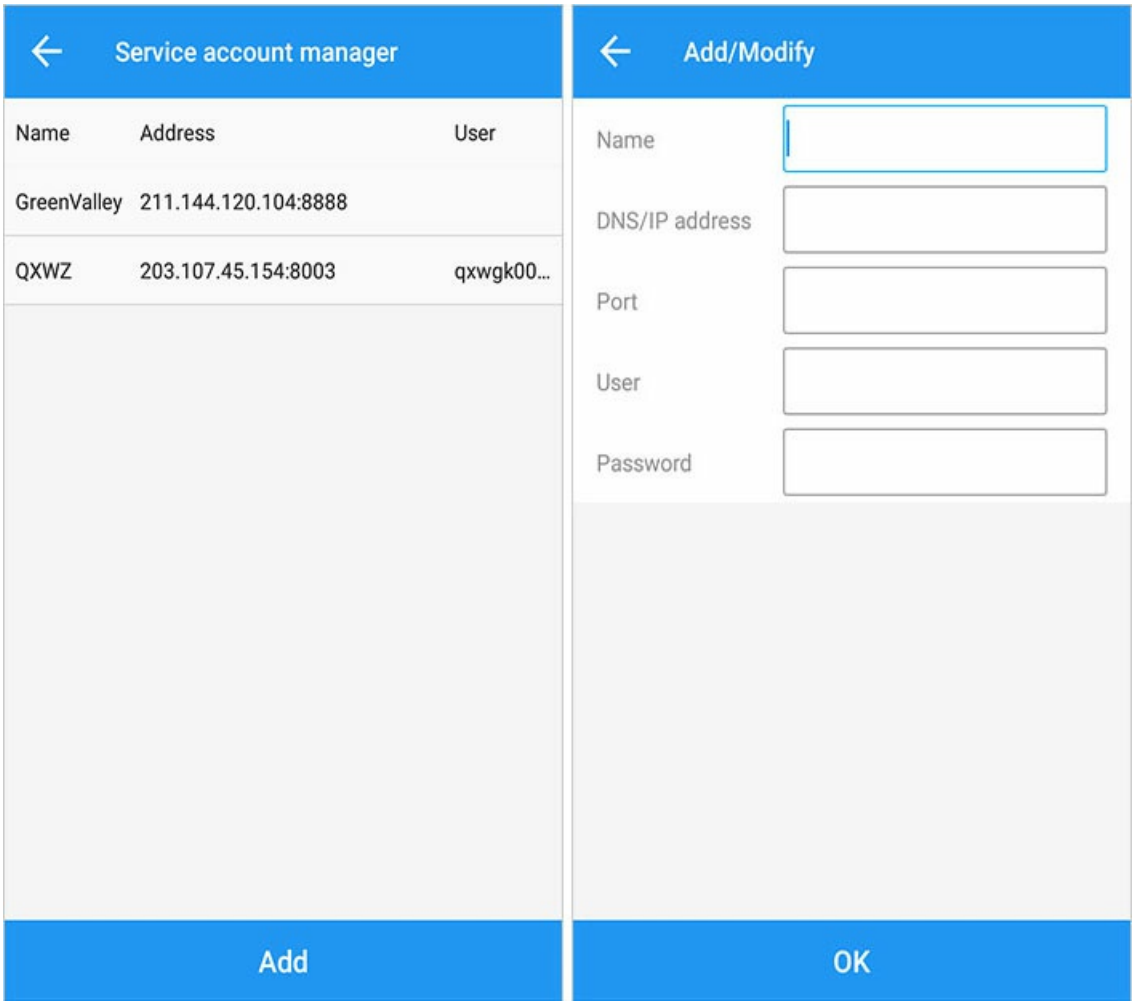


1)APN: The information about the dial-up Internet access supported by the SIM card needs to be set separately for the Intranet or dedicated card. For details, see the following;
2)Server: The current name of the server can be quickly selected from the drop-down list or entered or changed on the current page;
3)DNS/IP address: The IP address or web address of the server center (for example, rtk.ntrip.qxwz.com); it can also be directly input or changed in the current interface;
4)Port: The port of the server center can also be input or changed in the current interface;
5)Source List: select by quickly droping down, or enter or change in the current interface;
6)User/Password： The user name and password for logging in to the CORS center can also be entered or changed on the current screen.

APN setting

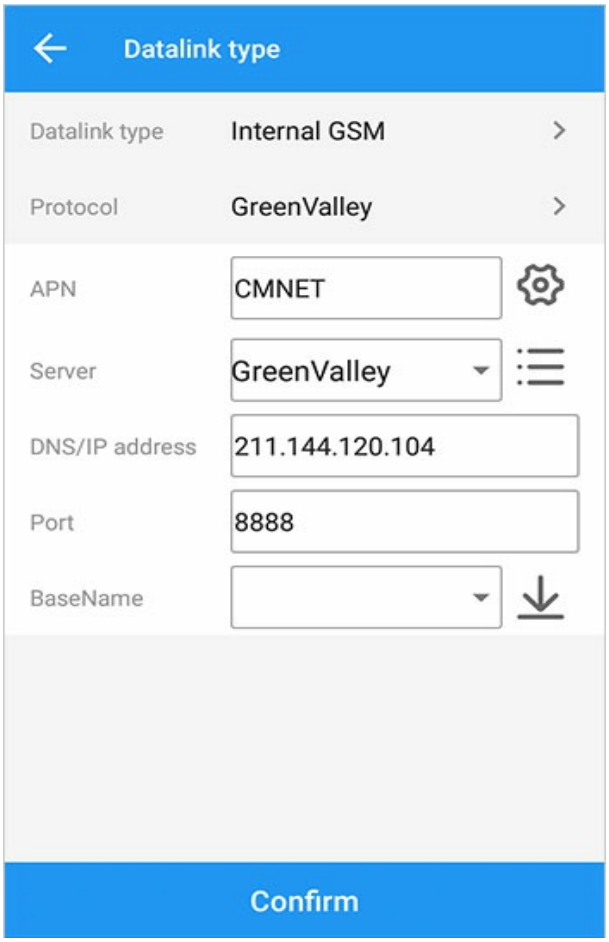


The APN name, user name and password are configured based on the SIM card support or the dedicated card network.
Add service:



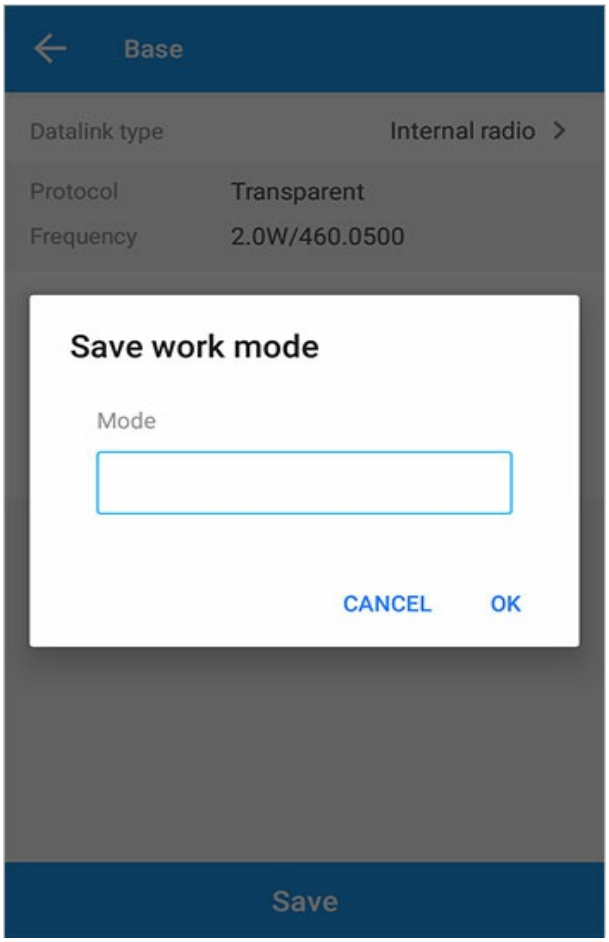
The server can directly select the server name that has been stored in the server management, and it can be applied directly. You should add the following information: Name、DNS/IP address、Port、User name、Password.

2.3.2.GreenValley protocol



1) APN: The information about the dial-up Internet access supported by the SIM card needs to be set separately for the Intranet or dedicated card. For details, please refer to the CORS protocol.
2) Server: The current name of the server can be quickly selected from the drop-down list or entered or changed on the current page.
3) DNS/IP address: The IP address or web address of the server center (for example, rtk.ntrip.qxwz.com); it can also be directly input or changed in the current interface.
4) Port: The port of the server center can also be input or changed in the current interface;
5) Name of base station: Obtain the source list corresponding to the current server center IP address and port (storing historical calls), or you can also customize the input;

2.4.Start saving



The name must be entered. Click "OK" to complete the saving, and click "Cancel" to cancel the saving item.

Note：

1. A prompt will pop up to give instructions when saving with the same name.
2. It cannot be modified in the startup items once the name is saved. (Please save the name according to your own homework needs).

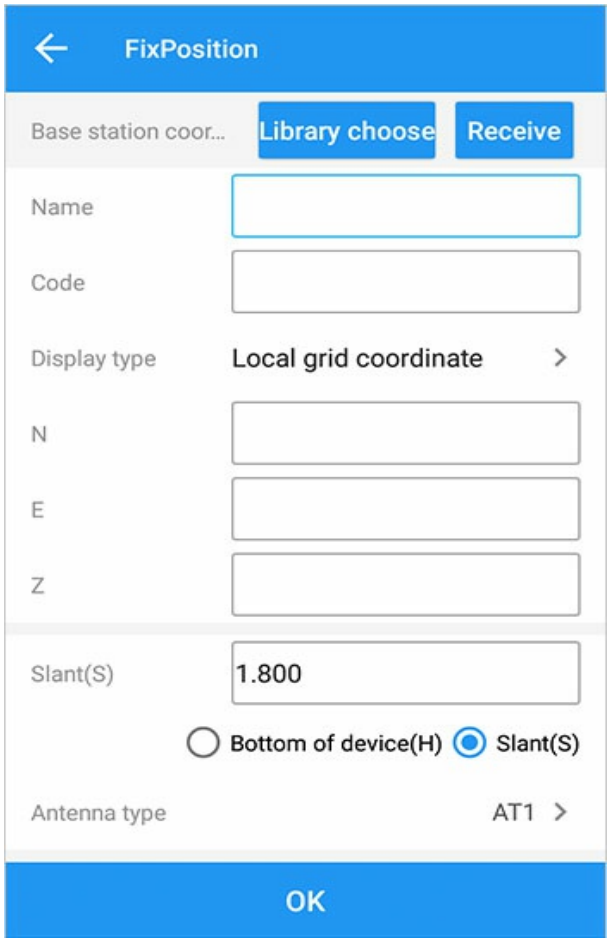
3.Start startup item

The receiver will automatically get current coordinates when the startup item is auto base.

You need enter known coordinate when the startup item is fix position.

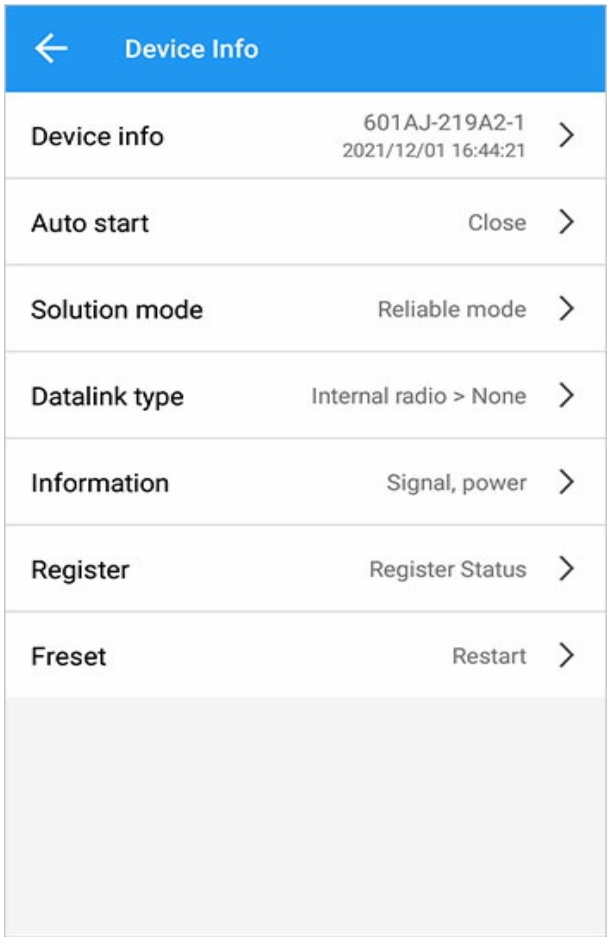
1)Library choose: Select a known point from library.

2)Get: Get a point with GNSS.


FixPosition
Base station coor...
Library choose
Receive
Name
Code
Display type
Local grid coordinate
N
E
Z
Slant(S)
1.800
Bottom of device(H)
Slant(S)
Antenna type
AT1
OK

Device Info

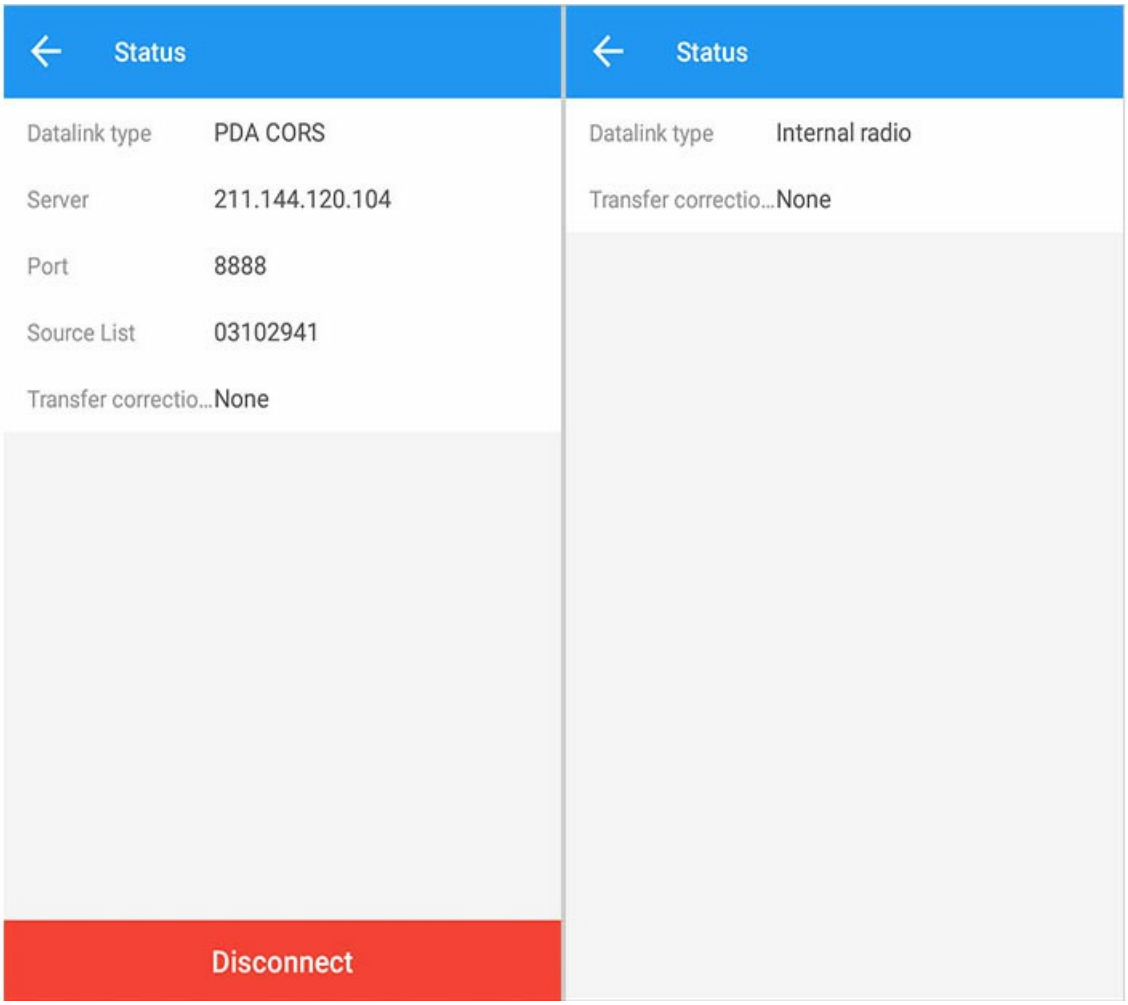
Main Interface->【Device】->【Device Info】.



1) Restart: restart the connected receiver;

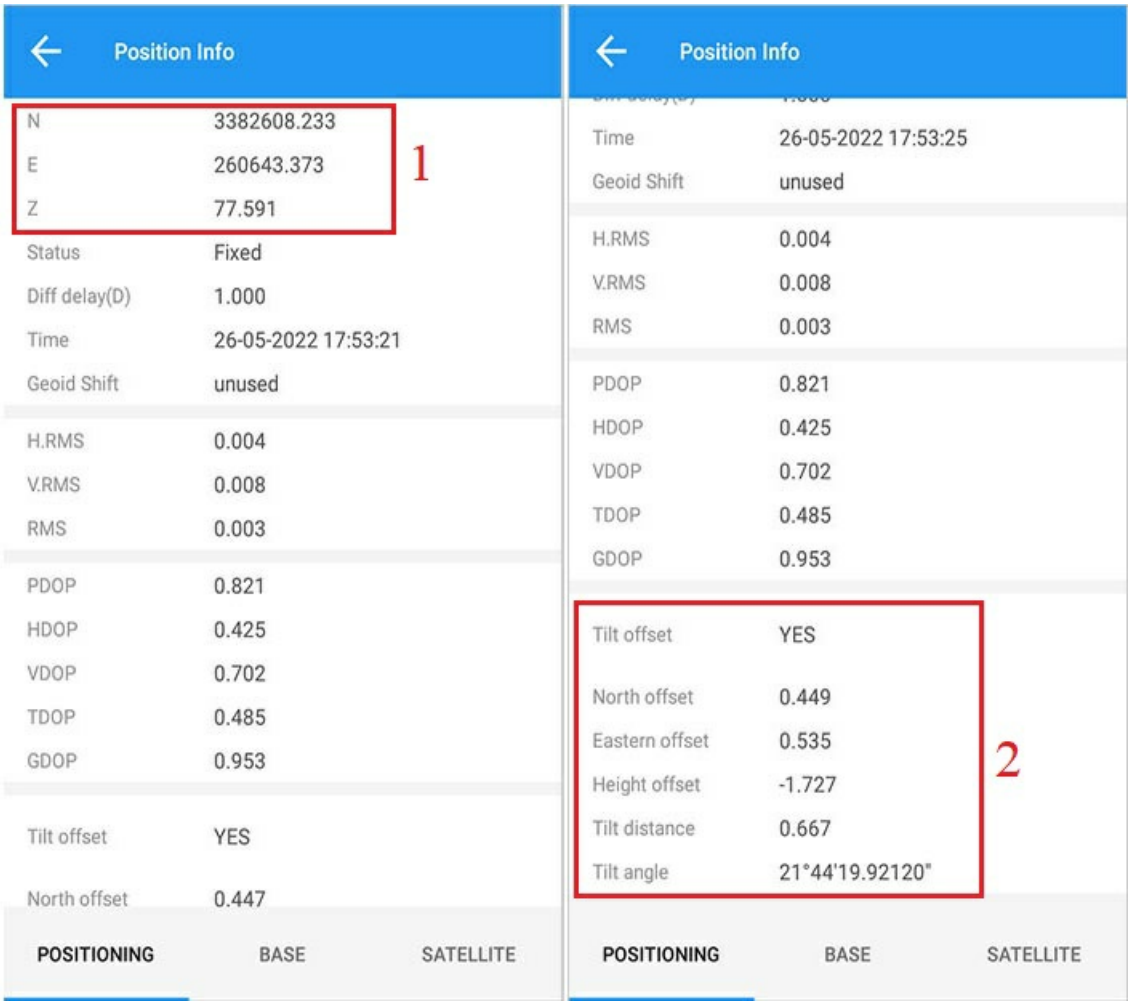
2) Factory reset: restore the connected receiver to factory settings;

3) Data link: the current working parameter information of the receiver. In the case of a manual network, the connection and disconnection of data links are provided.


Status
Datalink type
PDA CORS
Server
211.144.120.104
Port
8888
Source List
03102941
Transfer correctio...
None
Disconnect
Status
Datalink type
Internal radio
Transfer correctio...
None

Location Information

Main interface->【Device】->【Location Information】->【Location】.



1) Coordinate information: default N/E/Z, click to switch to B/L/H, such as 1 mark;

2) Differential status: It is displayed according to the current receiver mode and positioning, such as: the base station is displayed as the base station; the mobile station is: single point, differential, floating, fixed;

3) Accuracy index: HRMS, VRMS, RMS value;

4) Satellite accuracy factors: PDOP, HDOP, VDOP, TDOP, GDOP;

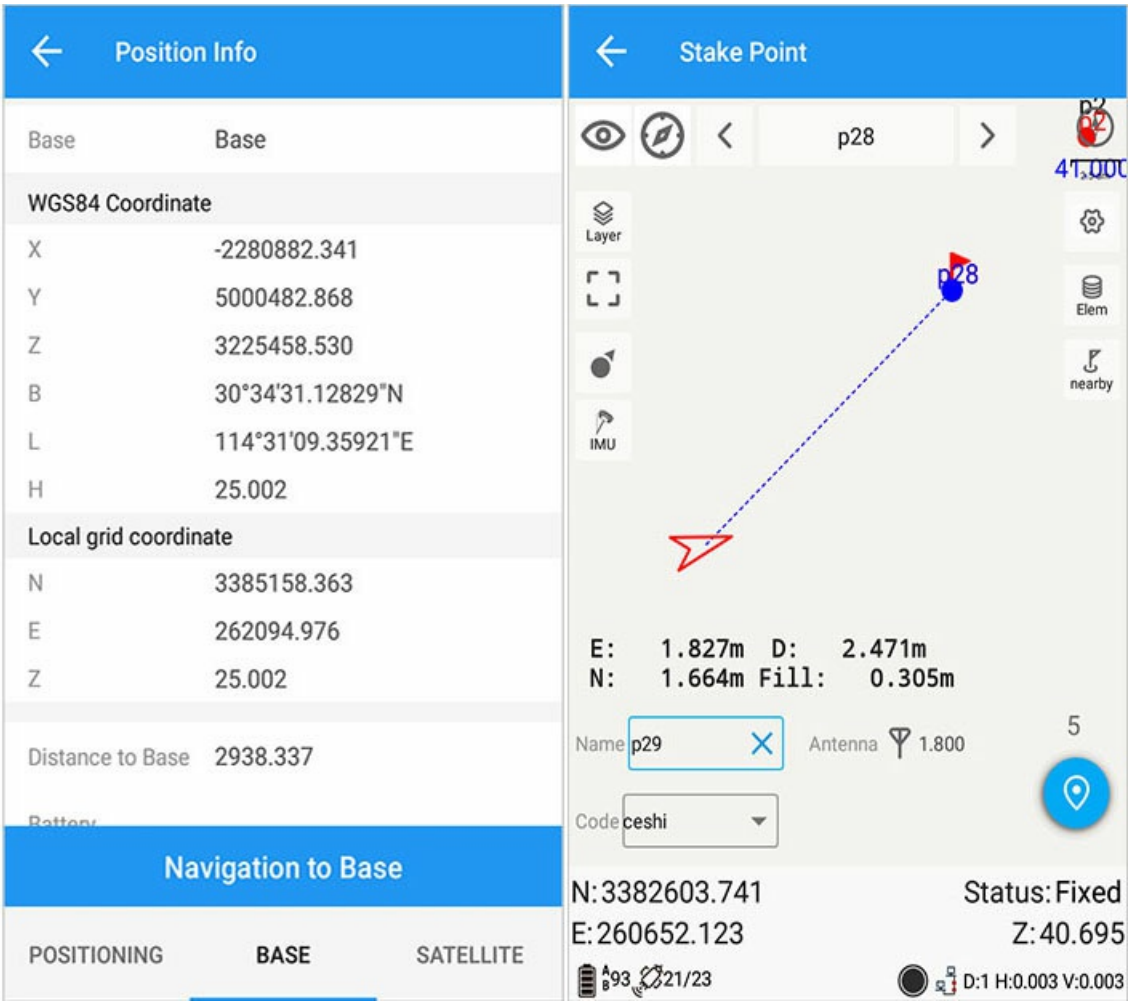
5) Differential delay (D): The time of data delay, which will be displayed in the current status bar;

6) Time: the time information output by the current GNSS;

7) Tilt compensation: None by default. If there is, it will display the current compensation value such as 2 mark.

Navigation base station

Main interface->【Device】->【Location Information】->【Base station】, View coordinate information of rover station, etc.



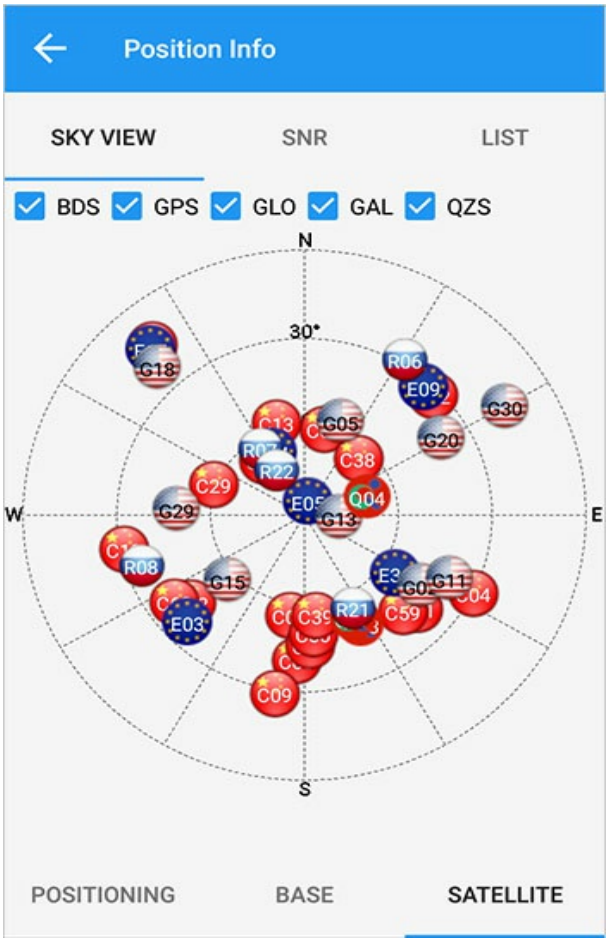
Note: The base station navigation information must be available in the differential state.

Satellites Information

Main interface-> 【Device】-> 【Location Information】-> 【Satellite】.

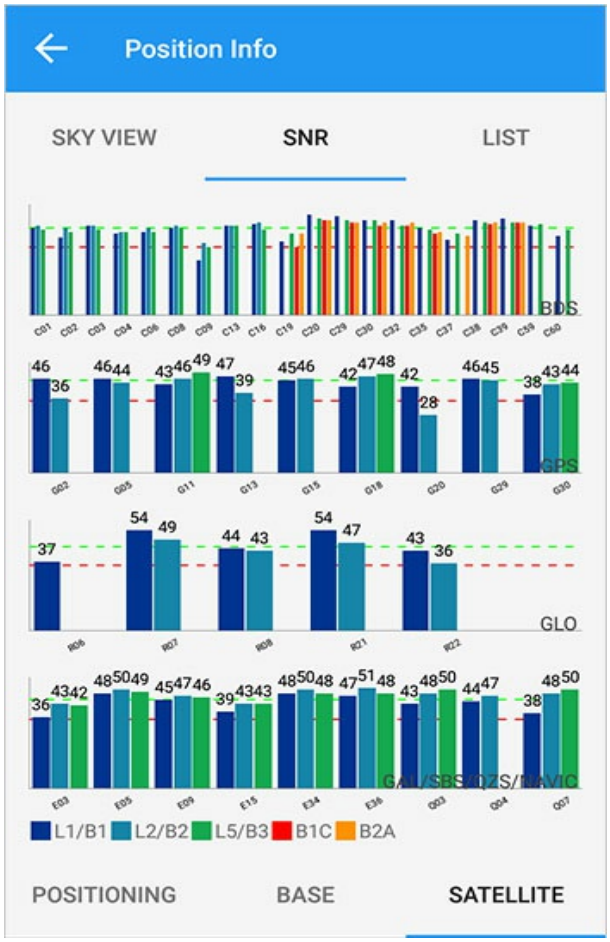
1.Satellite Map

By default, GPS, BDS, GLONASS, and GALILEO are ticked by default, and a certain type of satellite is blocked, so the differential calculation does not use such satellite calculation applications. As shown below:



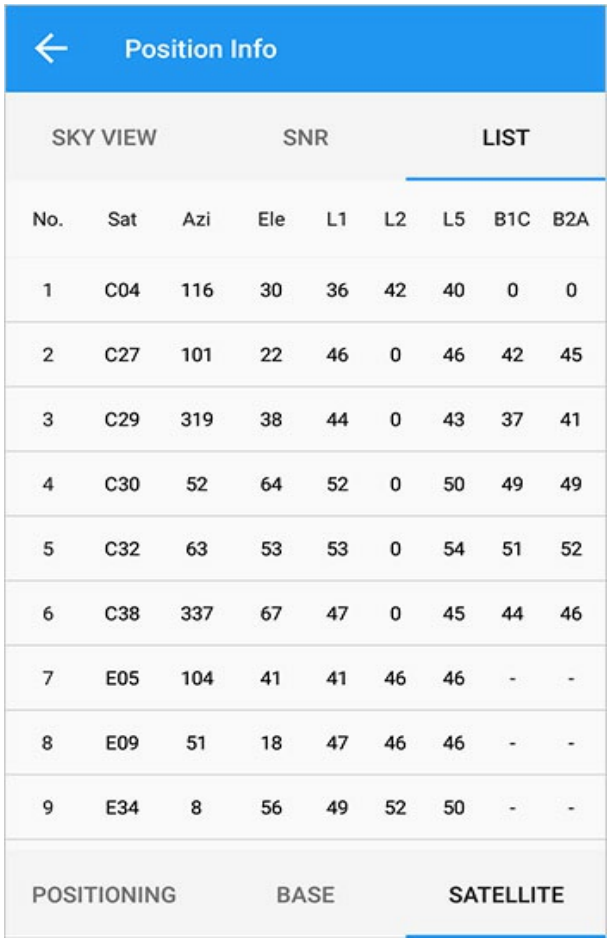
2.Signal to noise ratio

The current Signal-to-noise ratio diagram is displayed, with the green line representing the best L1 value and the red line representing the best L2 value:



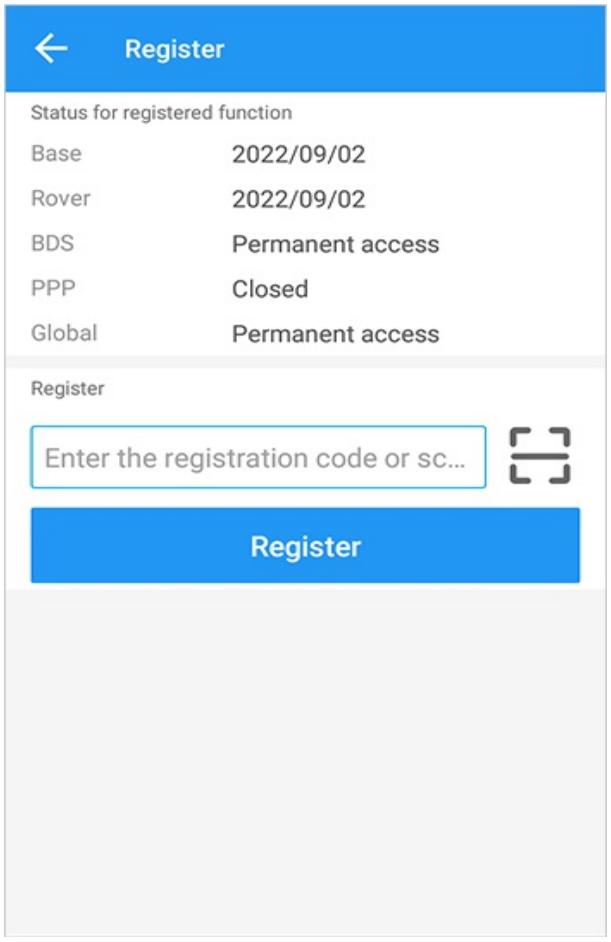
3.Satellite List

The contents displayed in sequence include serial number, satellite, azimuth, altitude Angle, L1/B1, L2/B2, L5/B3; In the figure, black represents the satellites participating in the calculation, and gray represents the satellites not participating in the calculation.


Position Info
SKY VIEW
SNR
LIST
No. Sat Azi Ele L1 L2 L5 B1C B2A
1 C04 116 30 36 42 40 0 0
2 C27 101 22 46 0 46 42 45
3 C29 319 38 44 0 43 37 41
4 C30 52 64 52 0 50 49 49
5 C32 63 53 53 0 54 51 52
6 C38 337 67 47 0 45 44 46
7 E05 104 41 41 46 46 - -
8 E09 51 18 47 46 46 - -
9 E34 8 56 49 52 50 - -
POSITIONING
BASE
SATELLITE

Register

Main Interface->【Device】->【Register】.



1) Registered function status: Beidou, globalization, base station, rover station;

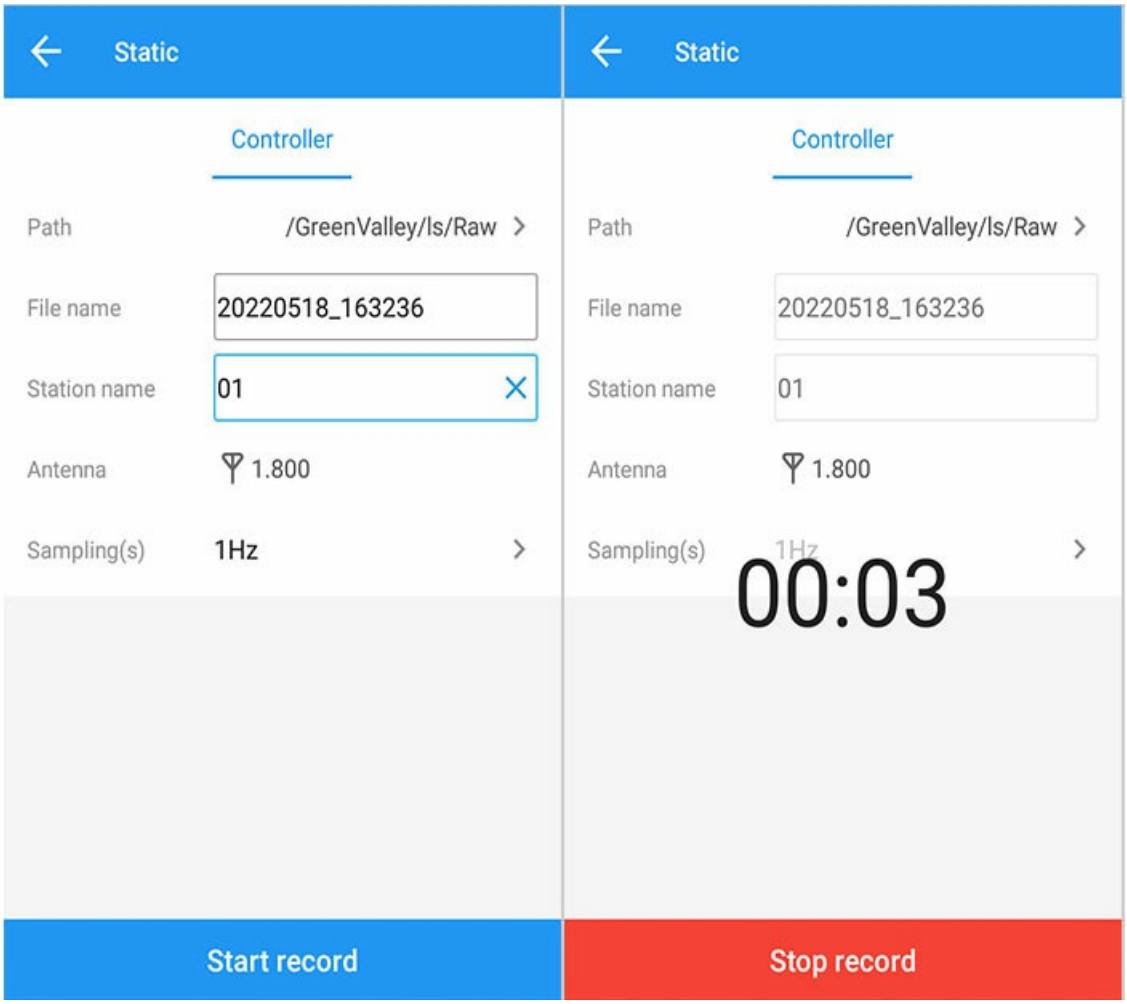
2) Registration code: The registration code input area of the software; you can also quickly scan the QR code to register, click "Register" and verify the correct registration code to complete the registration operation.

Static

Main Interface -> 【Device】-> 【Static】.

1. Local storage

【Local storage】-> 【Start recording】 The status is as follows:



1) Recording mode: local storage by default;

2) Path: default GreenValley/ls/raw, modifiable;

3) File name: By default, the file name is the creation time of the current task. Users can also customize the file name;

4) Station: blank by default, user-defined;

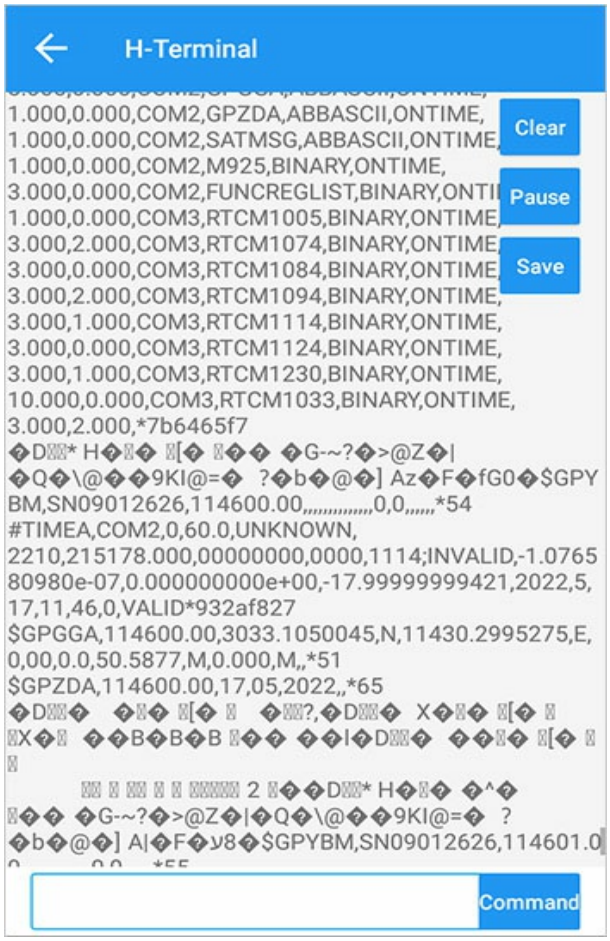
5) Antenna: 2 meters by default, user-defined;

6) Sampling interval: 1s by default, user-defined.

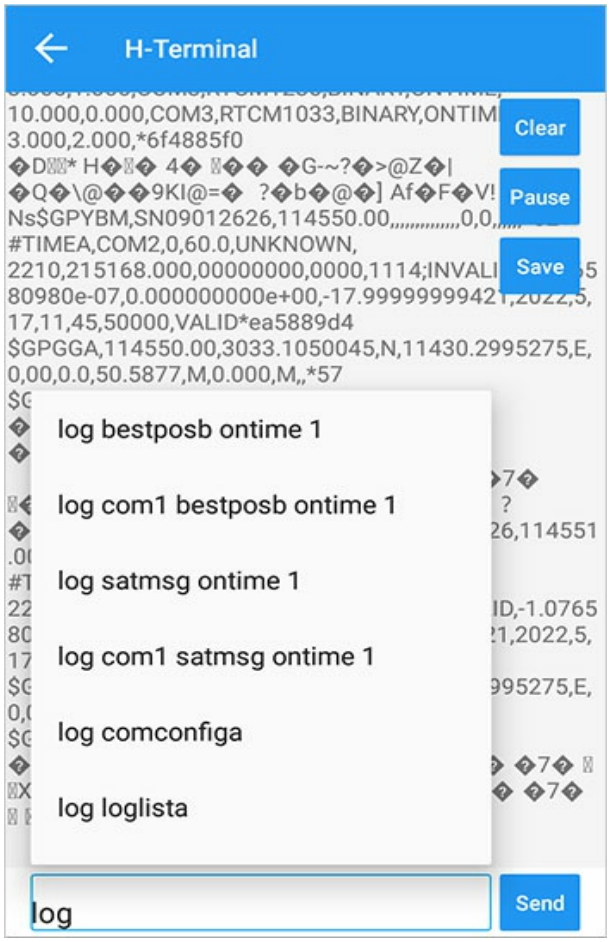
Note: if the user exits, it will prompt whether to keep the record, if so, continue to record, select "Cancel" to stop recording and close the interface.
When the record is completed, you can directly click the path to view the file in the format of XXX.cnb.

H-Terminal

Main interface->【Device】->【H-Terminal】, send commands to the board through the terminal to operate the receiver.



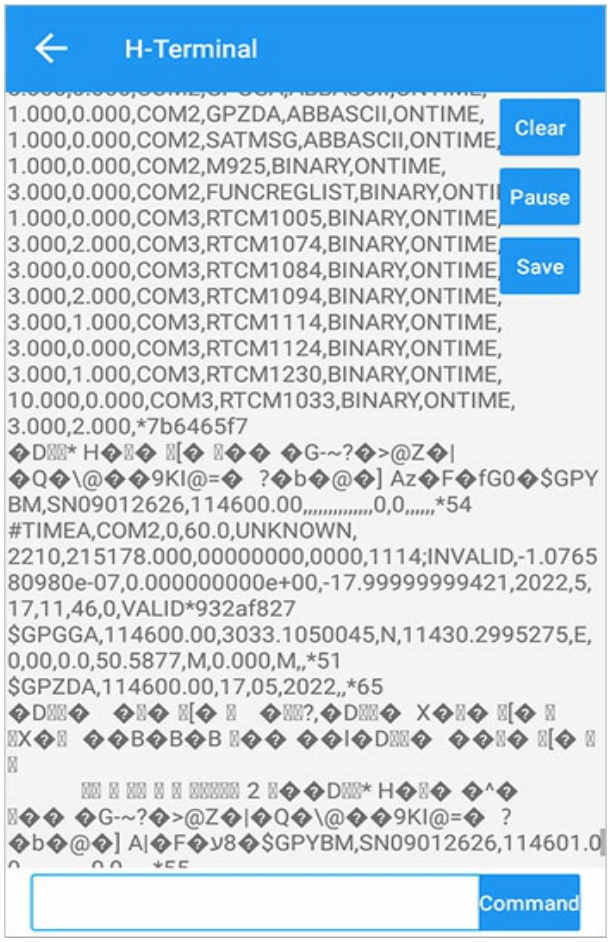
1.Send



Send by input related commands, command input has the function of automatic completion. (Whether the instruction is valid depends on whether the currently connected hardware supports it.)

The receiver can be set or debugged by instructions, and the conventional application commands are embedded inside. After input, the required commands will pop up.

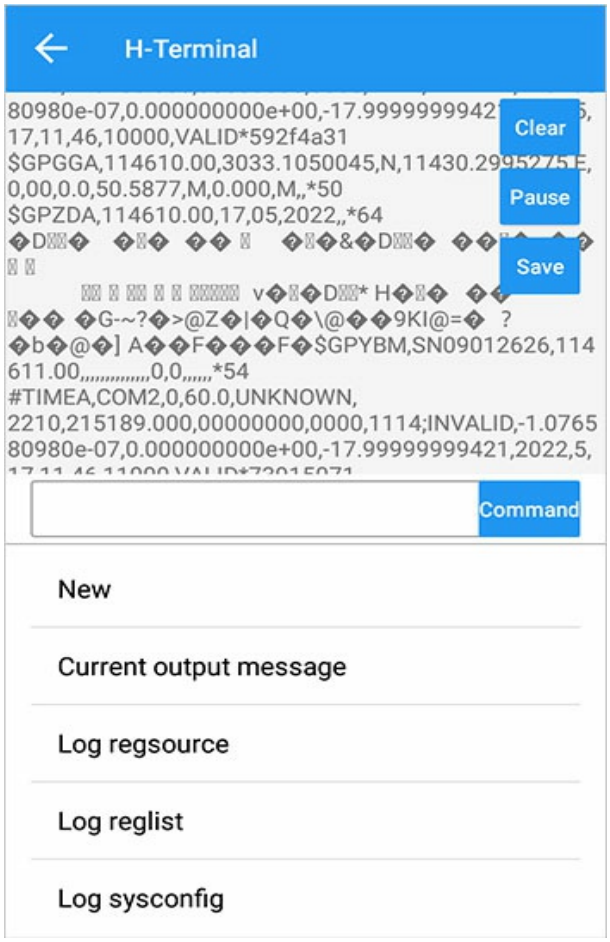
2.Clear and pause



Click the clear button to clear the current interface, and click the pause button to stop scrolling the current interface.

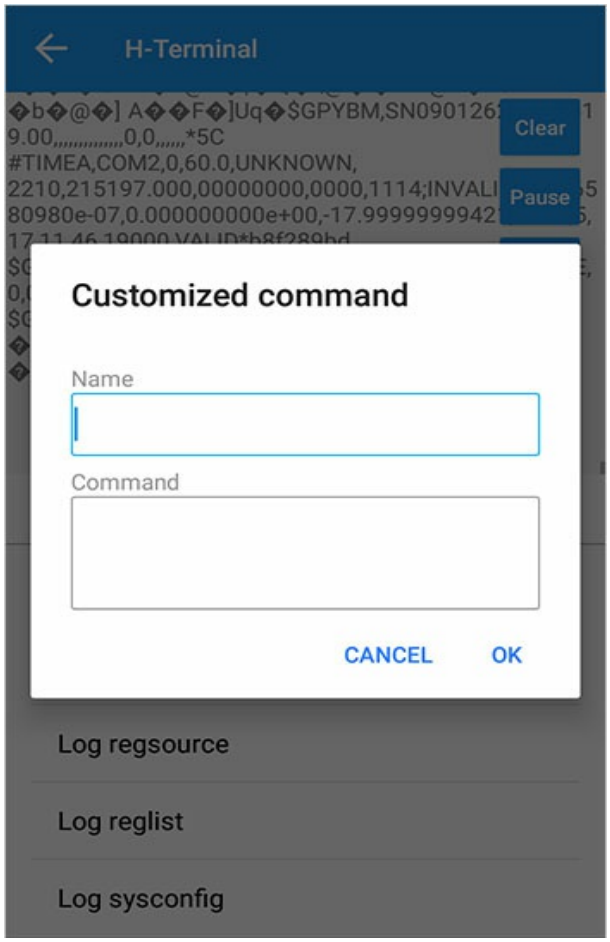
3. Instruction set

Click the instruction, and the instruction set pops up. The first line is the new instruction set, and the rest is the defined instruction set.



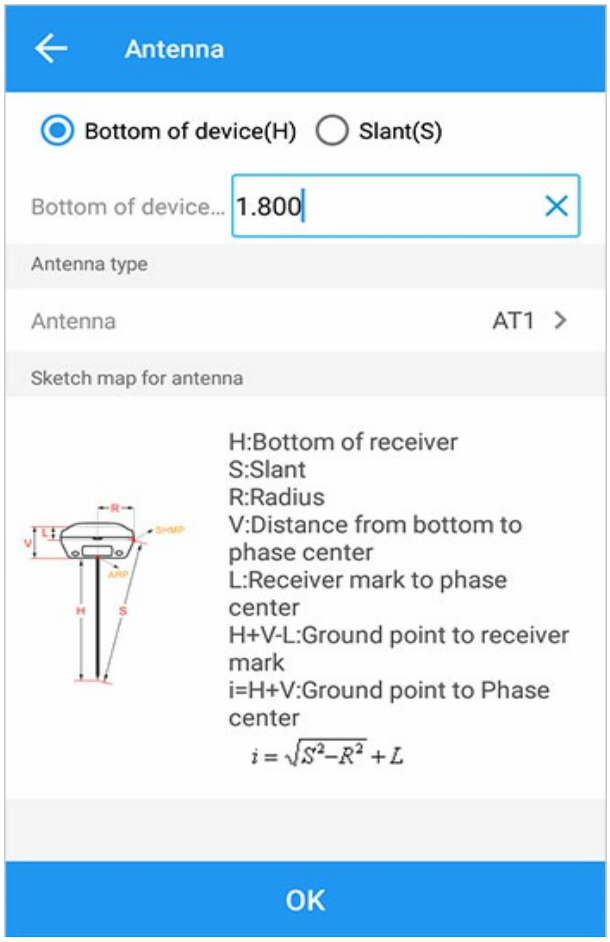
3.1 Instruction set creation

Click New Instruction Set to create a new instruction set.


H-Terminal
Clear
Pause
#TIMEA,COM2,0,60.0,UNKNOWN,
2210,215197.000,00000000,0000,1114;INVALI
80980e-07,0.000000000e+00,-17.9999999942
Customized command
Name
Command
CANCEL
OK
Log regsource
Log reglist
Log sysconfig

Antenna Settings

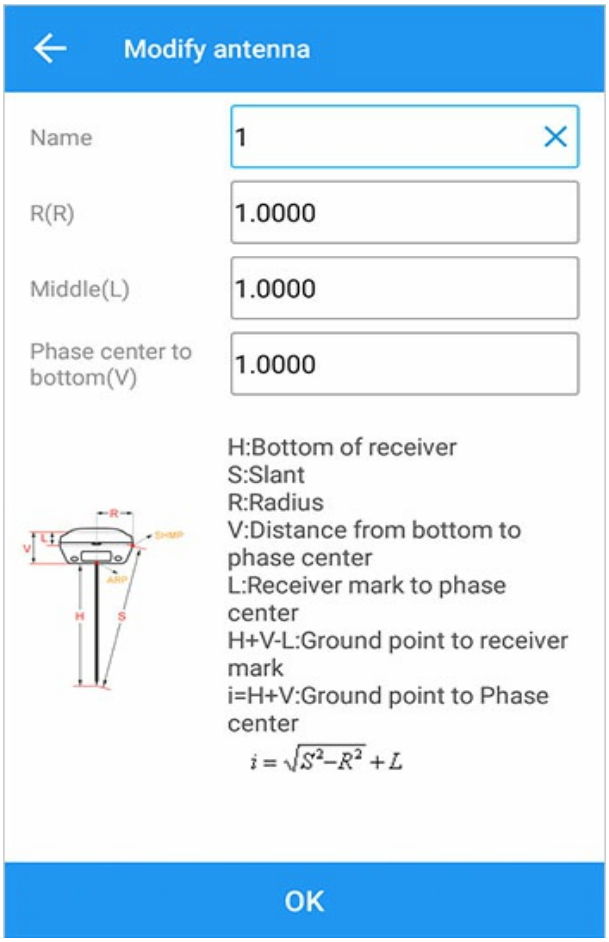
Main interface -> [Device] > [Antenna Settings].



1.Vertical height

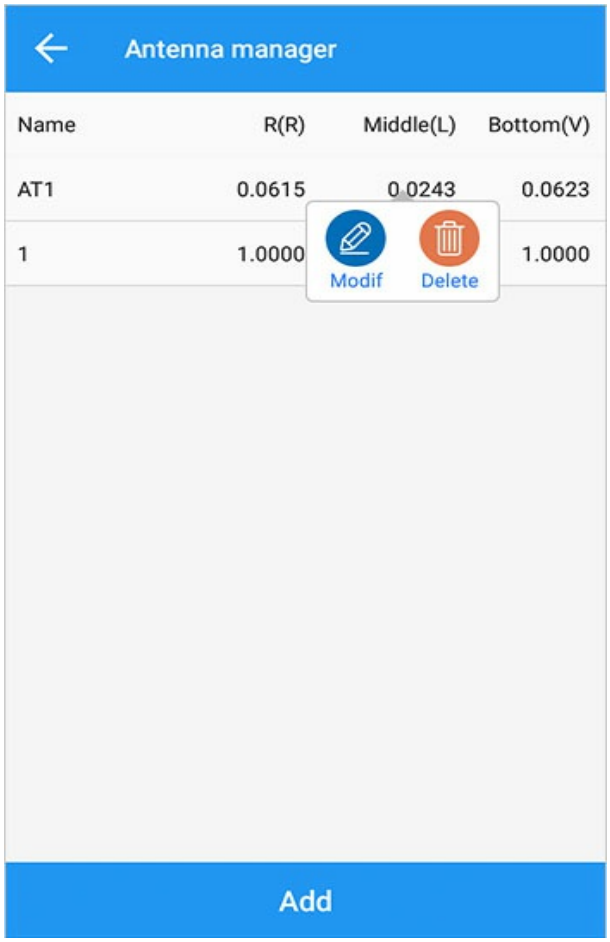
Height: Enter according to the actual measurement value.

1.1. Add antenna

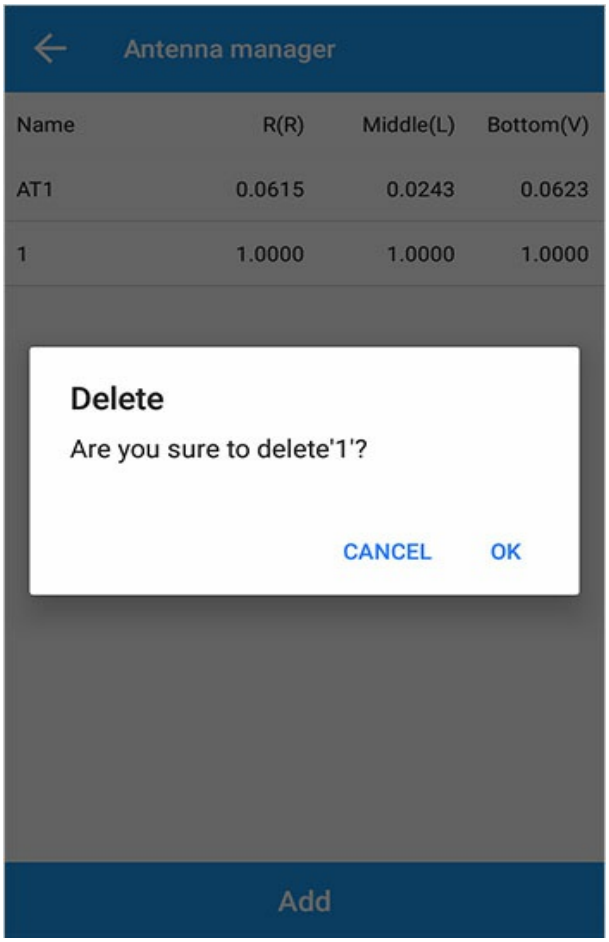


1.2.Edit antenna

You can long press to edit and delete the antenna type, the default type cannot be deleted.



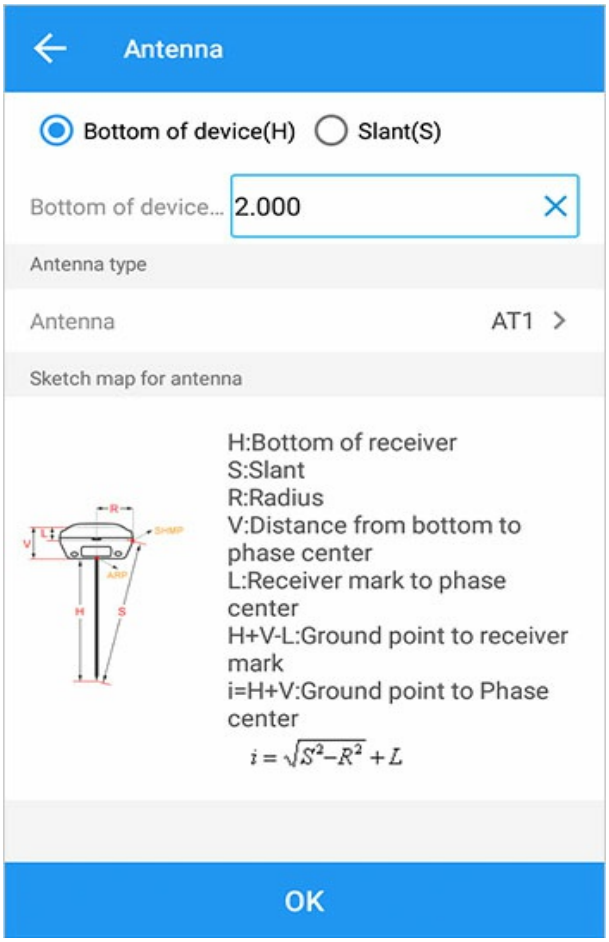
Select an antenna and delete it.



Note：Click [OK] in the upper right corner and the software prompts "Antenna setting is successful" after the antenna setting is completed.

2.Pole Height

The default pole height is 1.80, and the slant height can also be selected. Height: input according to the actual measurement value.

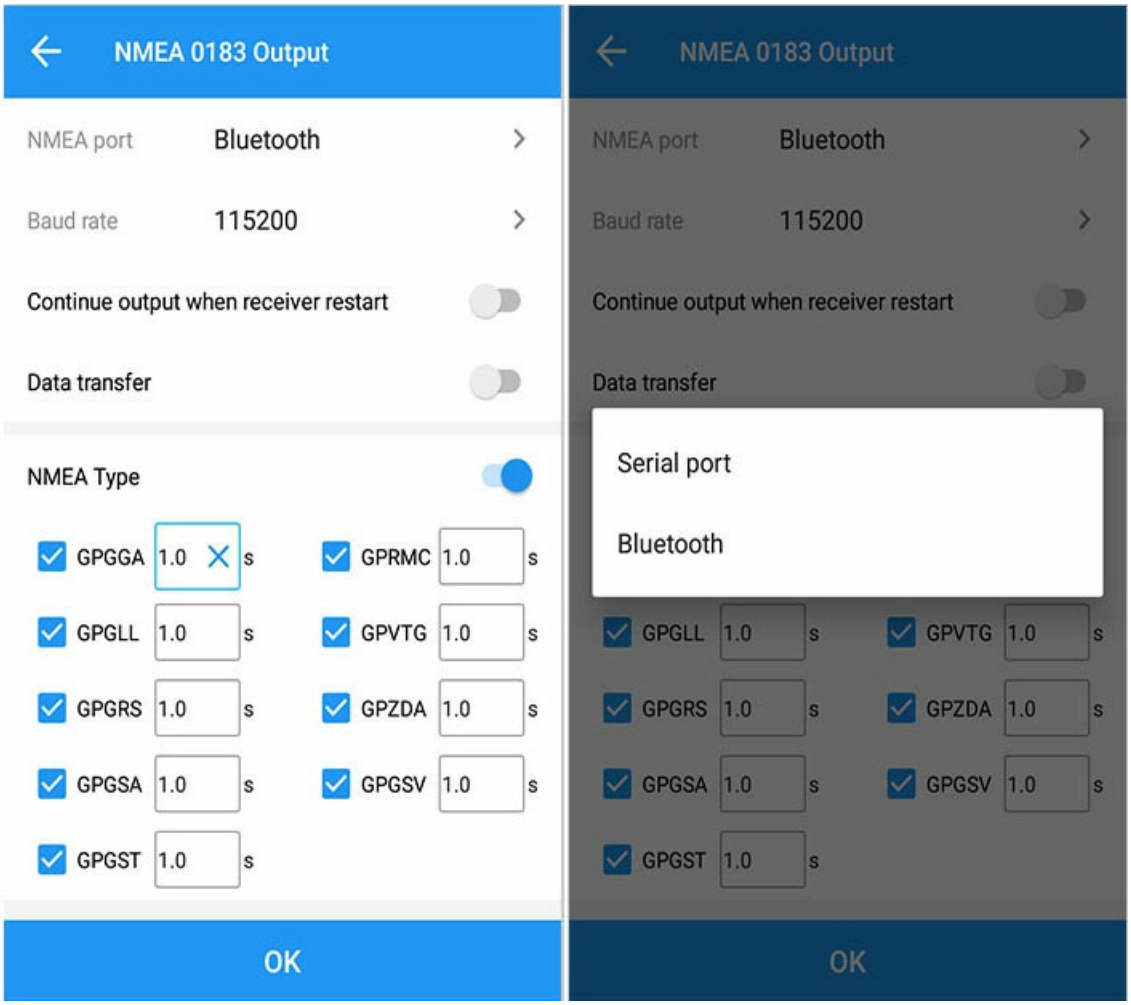


Other settings are the same as above.

Note：Custom antennas are stored in the task by default.

0183 Output

Main interface -> [Device] -> [0183 Output].



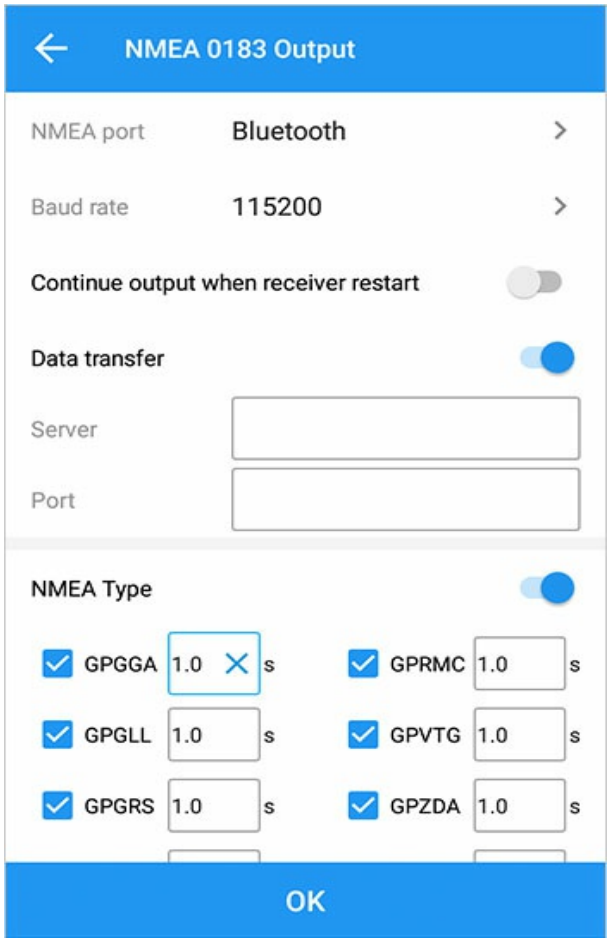
1) Output port: default com1, you can choose Bluetooth.

2) Baud rate: default 115200, selectable from: 4800-115200.

3) Restart the receiver to output normally: It means that the output settings are saved, and the message is still output after restarting the receiver.

4) Output message: Select all to default to all messages, or select GPGGA, GPGSV, GPRMC, GPGSA, GPGRS... as shown in the figure, click "OK" to complete.

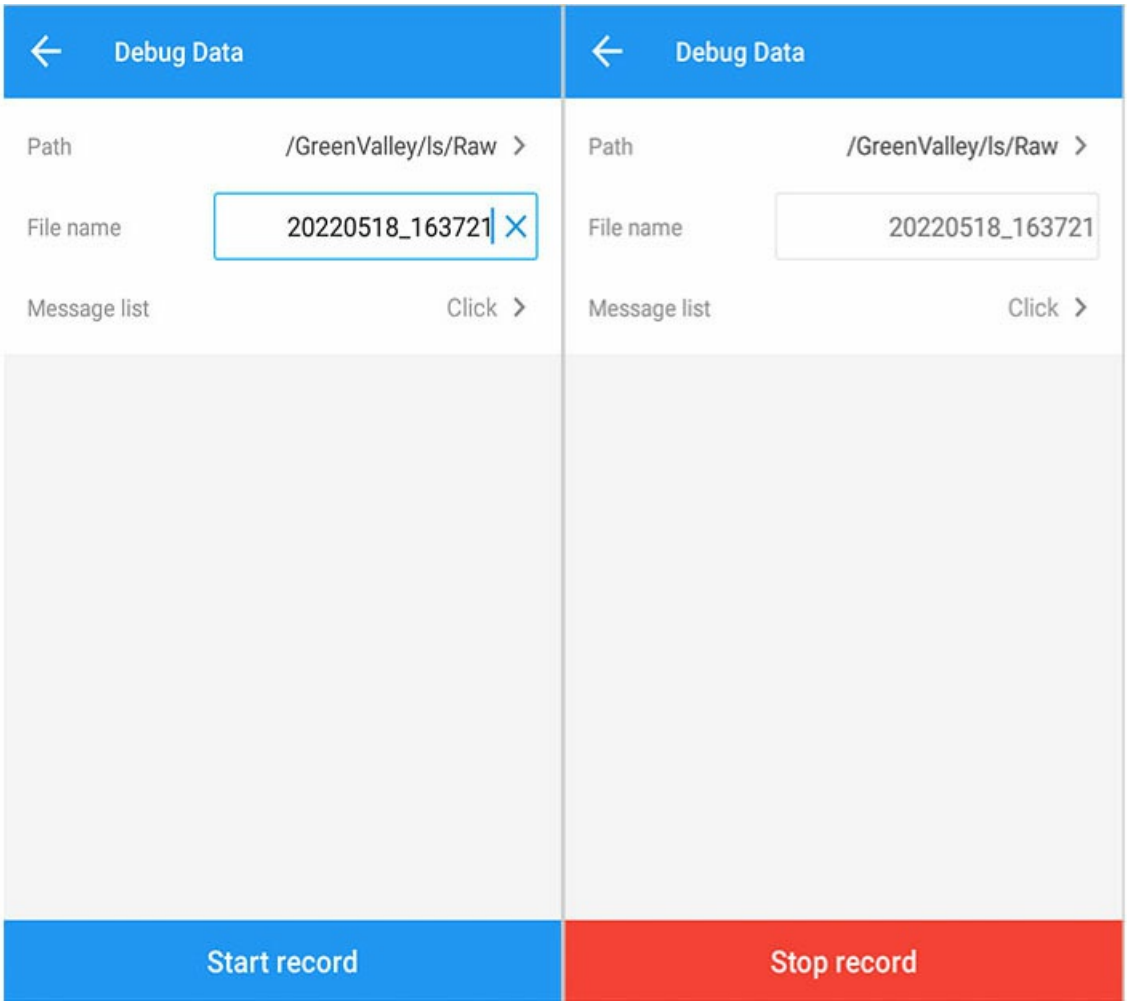
5) Data forwarding: Turn on data forwarding, enter the server and port, and the current receiver message will be forwarded to the server.


NMEA 0183 Output
NMEA port
Bluetooth
Baud rate
115200
Continue output when receiver restart
Data transfer
Server
Port
NMEA Type
GPGGA 1.0 s
GPRMC 1.0 s
GPGLL 1.0 s
GPVTG 1.0 s
GPGRS 1.0 s
GPZDA 1.0 s
OK

Debug Data

Main interface->【Device】->【Debug Data】。

1.Debug Data



The measurement results can be viewed in `GreenValley/ls/Raw` , opened by notepad.

Survey

Survey includes below modules:

TopoSurvey

- Option

MappControl Survey

Detail Survey

AutoSurvey

Stake Point

Stake Line

Stake Arc

Stake CAD

Area Survey

Road Design

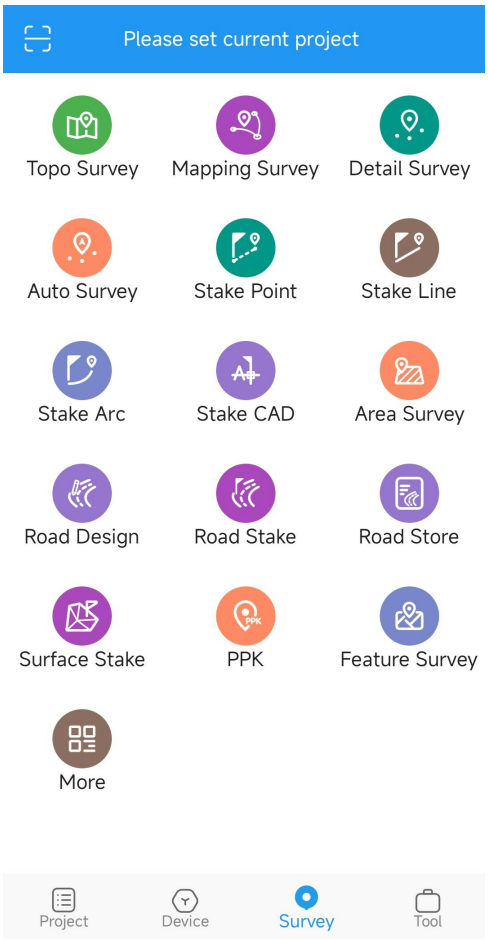
Road Stake

Road Store

Surface Stake

PPK

Feature Survey



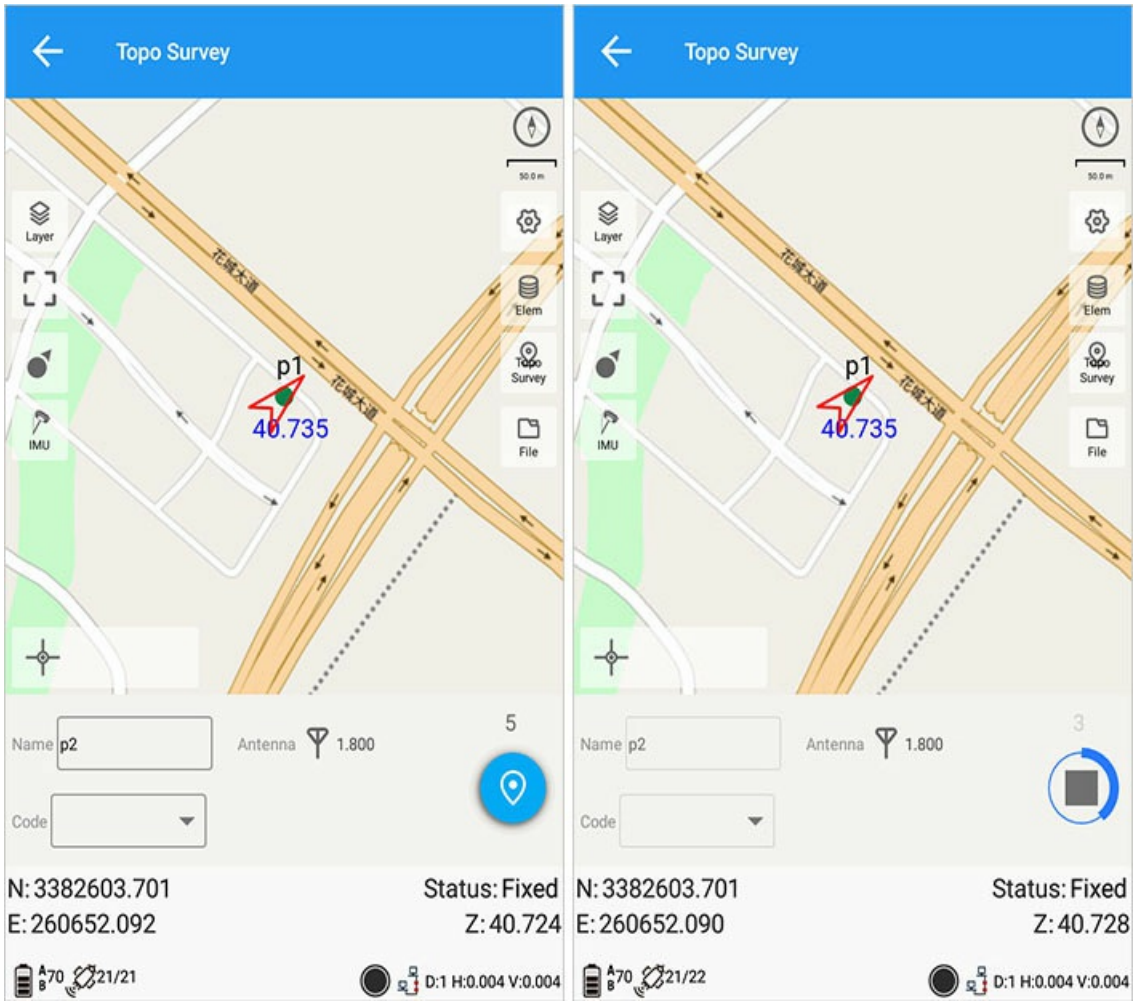
Main Interface

Topo Survey

Interface icon meaning

Icon	Meaning	Icon	Meaning
	Layer Options		Settings
	Full screen center		Point Library
	Single Perspective		File
	Multi-view		Solution reset

Main interface ->【Measurement】->【Point Measurement】.



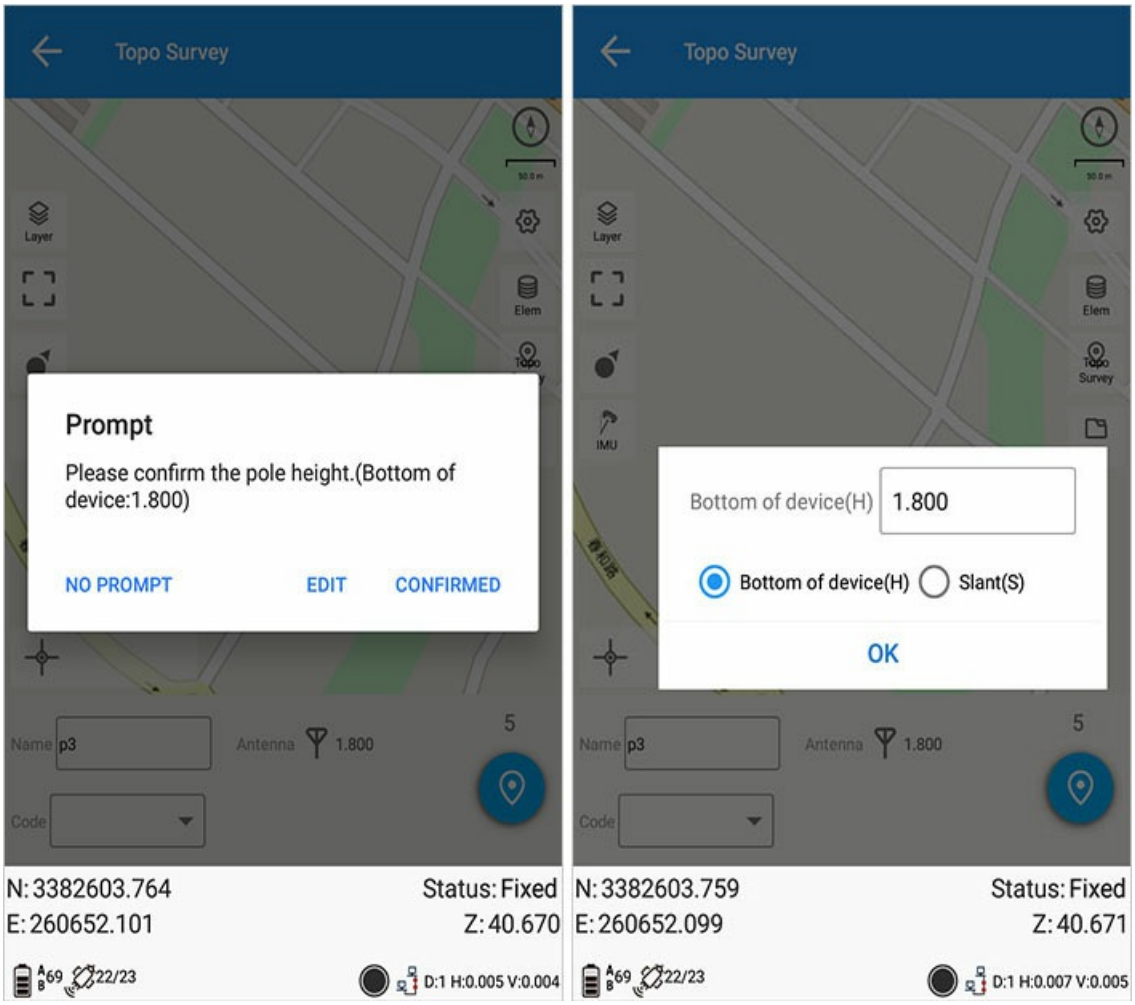
Inertial Navigation Inclination Measurement

Connect the GreenValley LiBase receiver and use the inertial navigation tilt measurement function. Inertial Navigation Inclination Measurement IMU (English Inertial measurement unit, IMU for short).

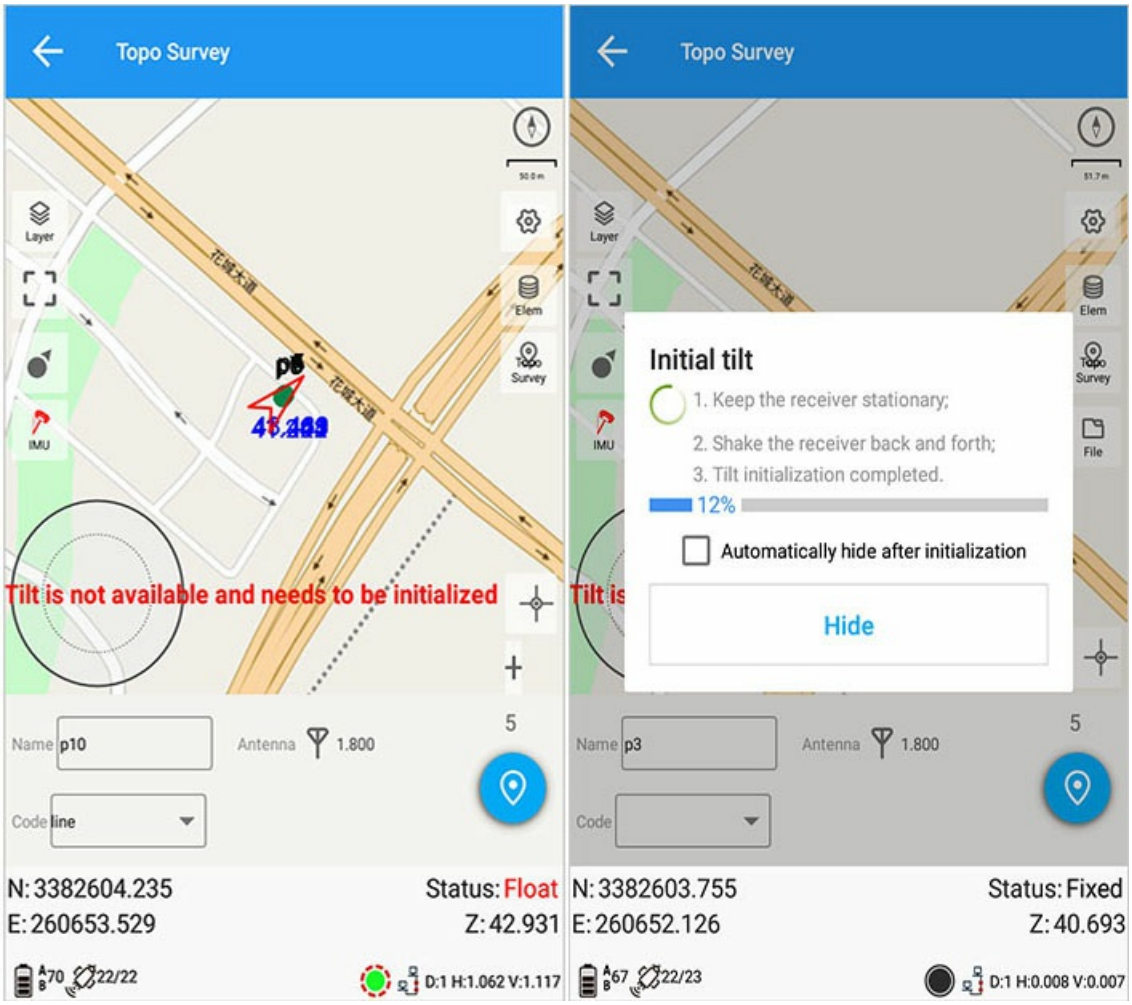
Click the [Tilt] button on the left to turn on the tilt measurement function, and a text prompt is displayed in the figure: Tilt is unavailable and needs to be initialized; Before initialization, set the pole height: set the antenna position and set the pole height;

Initialization steps:

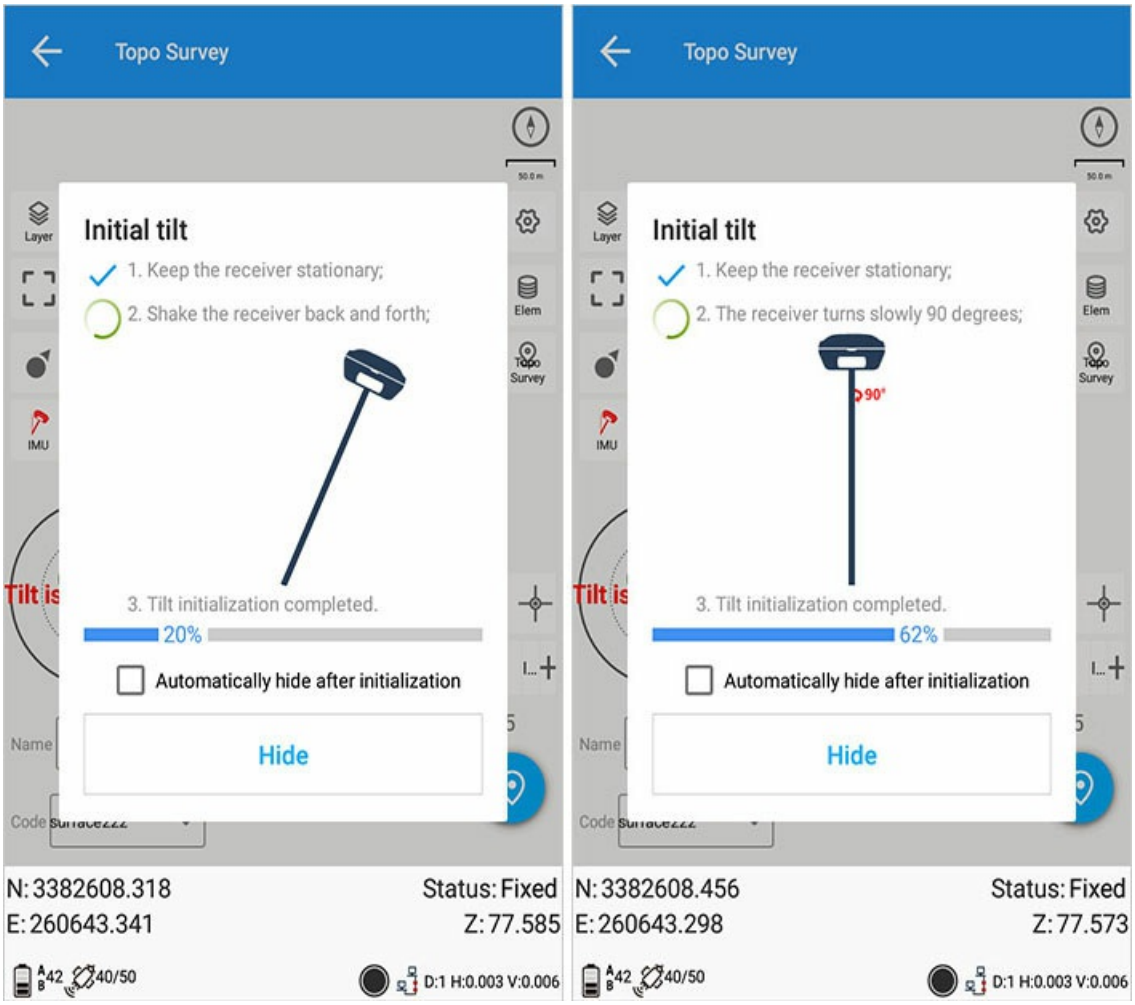
1. Click the tilt icon on the right: prompt to confirm the height of the rod, click Modify to jump to the modification interface;



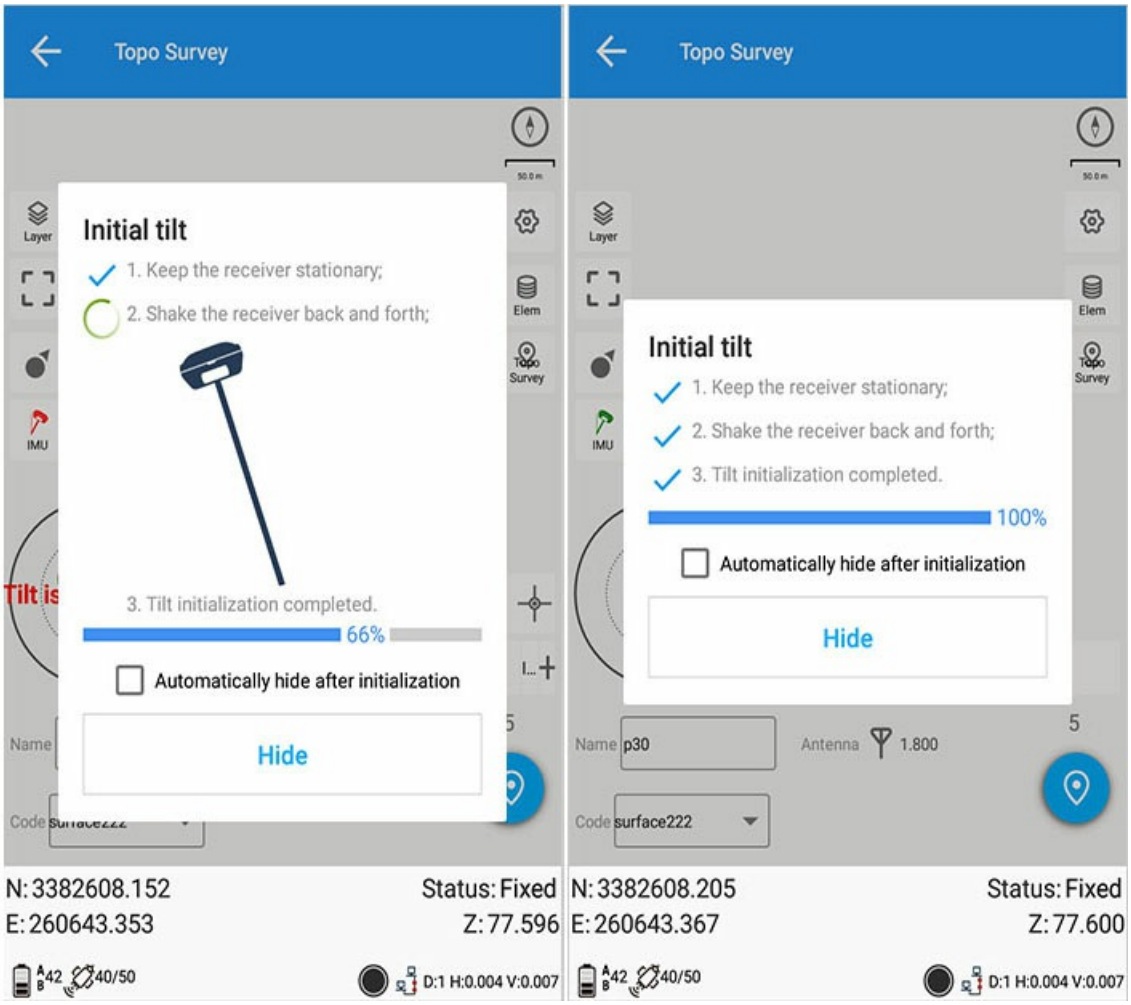
1. Stand the receiver horizontally for about five seconds: the icon and voice prompts keep the receiver still;



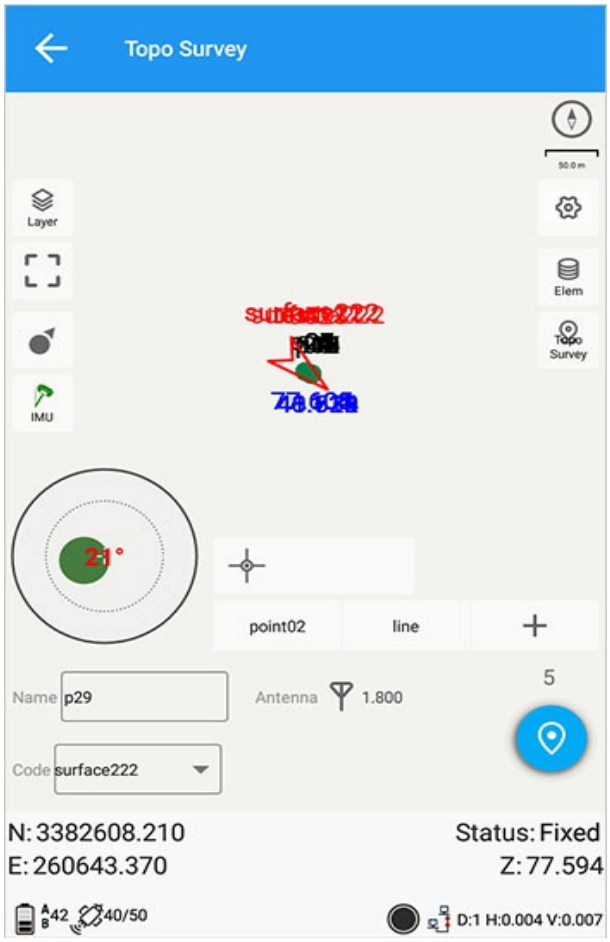
1. Slowly shake the receiver back and forth with the panel toward you (large amplitude, low frequency shaking);
2. The receiver slowly rotates 90 degrees;



1. Slowly shake the receiver back and forth (large amplitude, low frequency shaking);

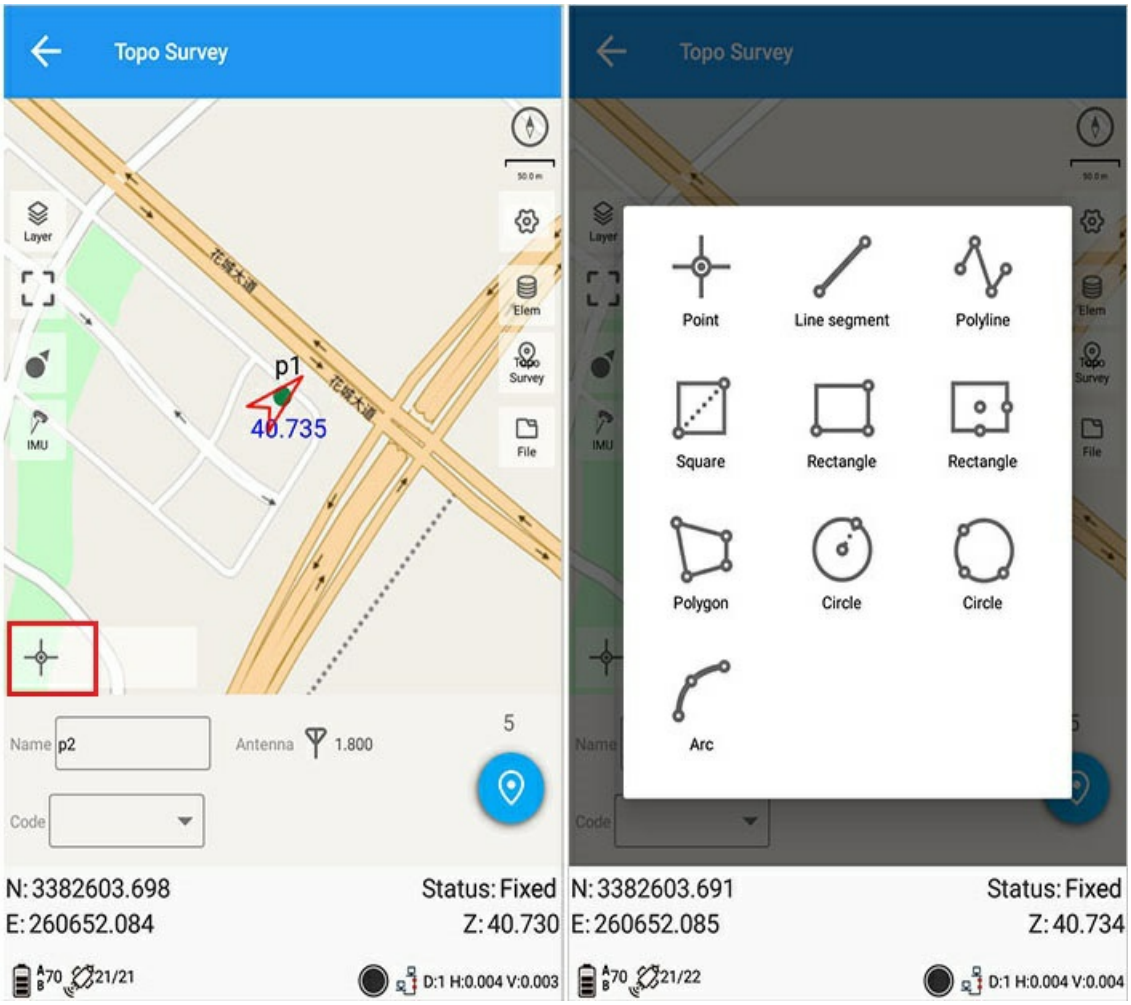


1. The initialization is complete: Click the [Hide] button in the prompt box to hide the prompt information; you can check the [Auto hide after initialization] to automatically hide the prompt information after the initialization is completed. After the initialization is completed, the measurement interface displays a bubble box;



Graphical measurement

Graphical measurement can specify measurement points, line segments, polylines, squares, rectangles, polygons, circles, arcs, and curves; when measuring, select the graphic icon to be measured, click the measurement button, measure the first point, and then follow the prompts on the interface, one by one. The measurement point completes the measurement of the graph.



Graphic measurement steps:

a) Point: Click to select "Point", click the measurement button to complete the measurement;

b) Line segment: Click to select "Line segment", measure the first point and the second point to complete the measurement of the line segment, after measuring the first point, click [Cancel] to cancel the first point;

c) Polyline: Click to select "Polyline", measure the first point, the next point and other points to complete the measurement of the polyline. After measuring the first point, click [Cancel] to cancel the previous measurement point;

d) Square: Click to select "Square", measure the diagonal point 1 and the diagonal point 2 to complete the measurement. After measuring the first point, click [Cancel] to cancel the previous measurement point;

e) Rectangle: There are two ways to measure the rectangle. 1: Origin + width limit point + height limit point, automatically form a rectangle after measuring three points; 2: Center point + width limit point + height limit point, automatically form a rectangle after measuring three points; click [Cancel] to cancel the previous measurement point;

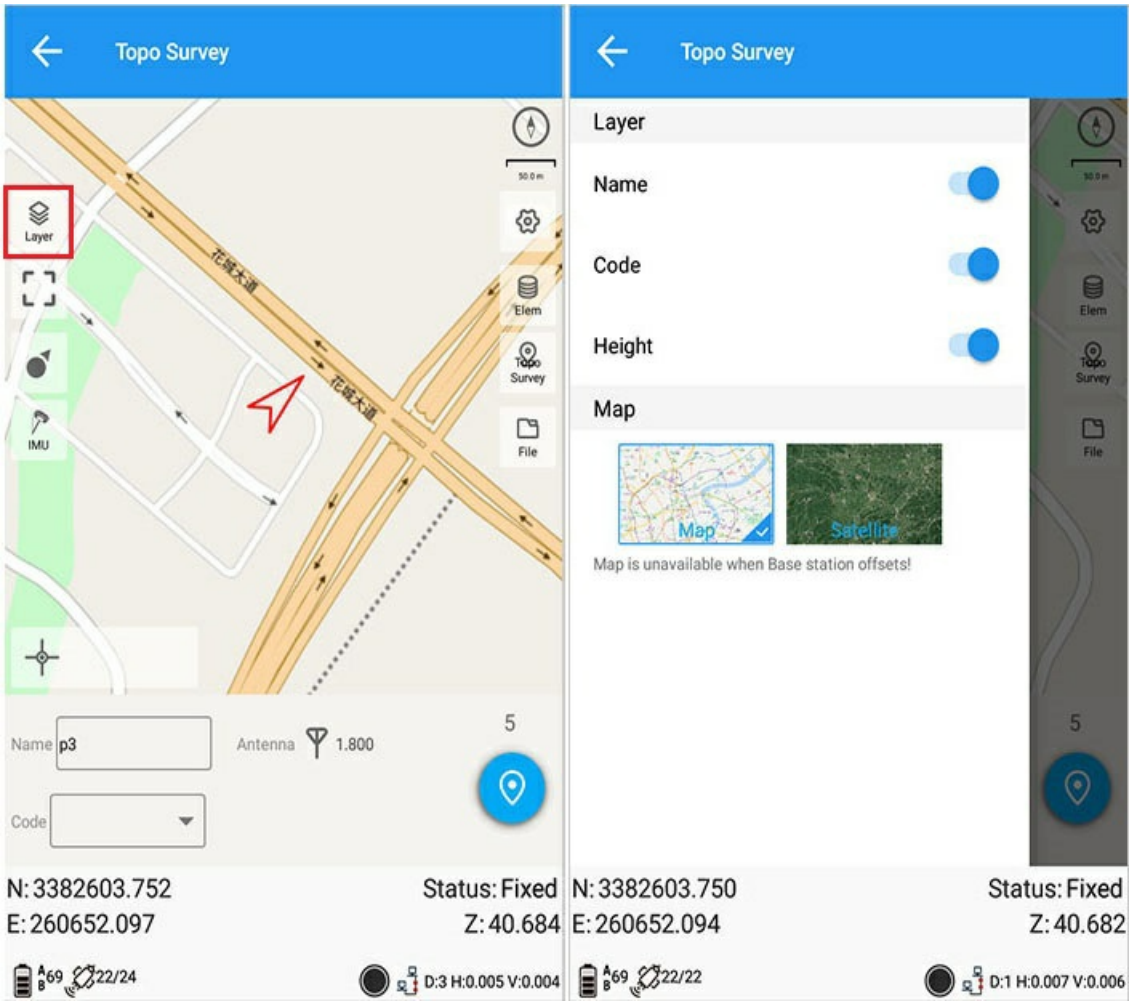
f) Polygon: measure at least three points to form a polygon. After measuring three points, click the [Finish] button to form a polygon; click [Cancel] to cancel the previous measurement point;

g) Circle: There are two ways to measure a circle. 1: The center of the circle + a point on the circle, the measurement is completed to automatically form a circle; 2: The three points measured are three points on the circle, and the measurement is completed to form a circle, click [Cancel] to cancel the previous measurement point;

h) Arc: measure three points to form an arc, click [Cancel] to cancel the previous measurement point;

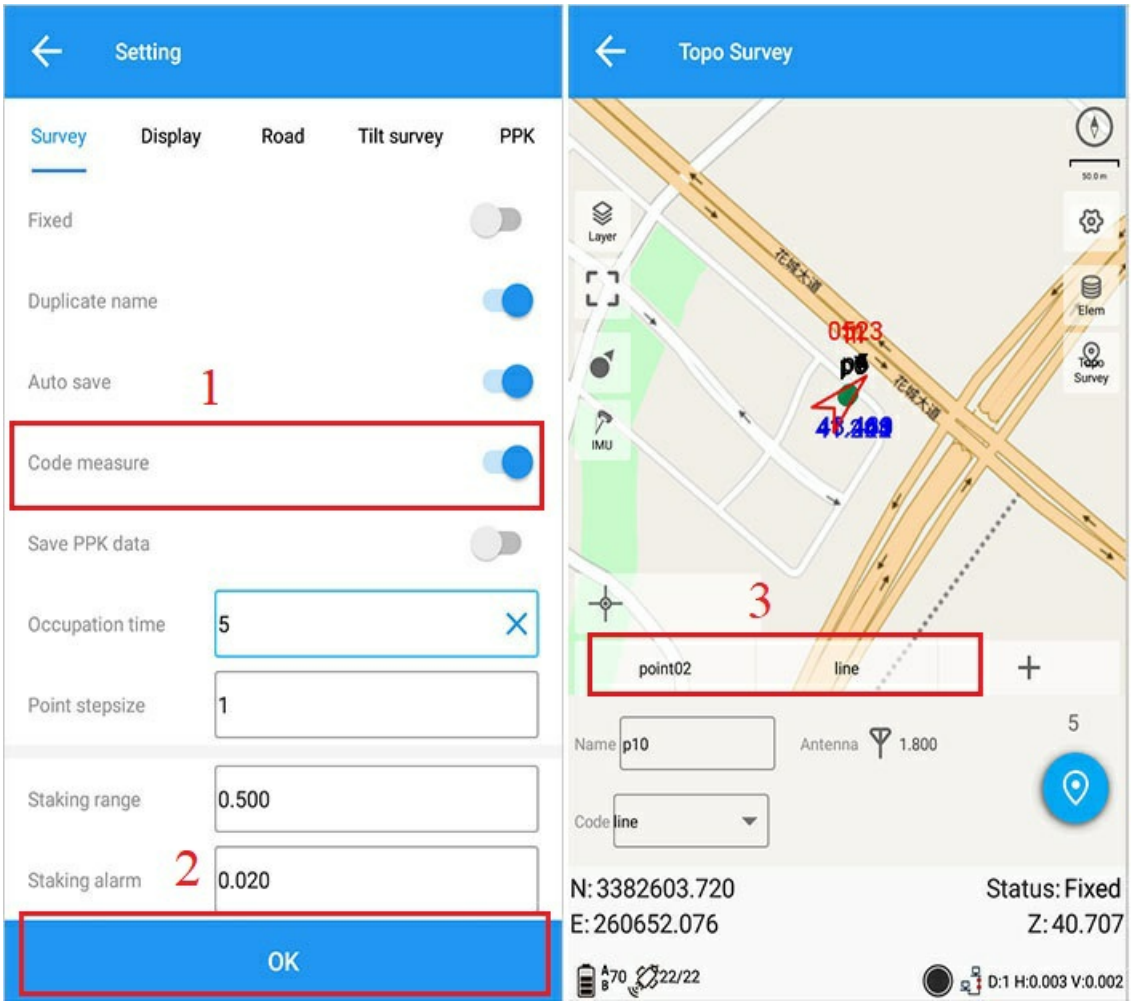
Curve: Measure at least three points to form an arc, click [Finish] to form an arc; click [Cancel] to cancel the previous measurement point;

1. Layer



Layer: You can choose to open point name, code, elevation, map, and apply it according to user needs.

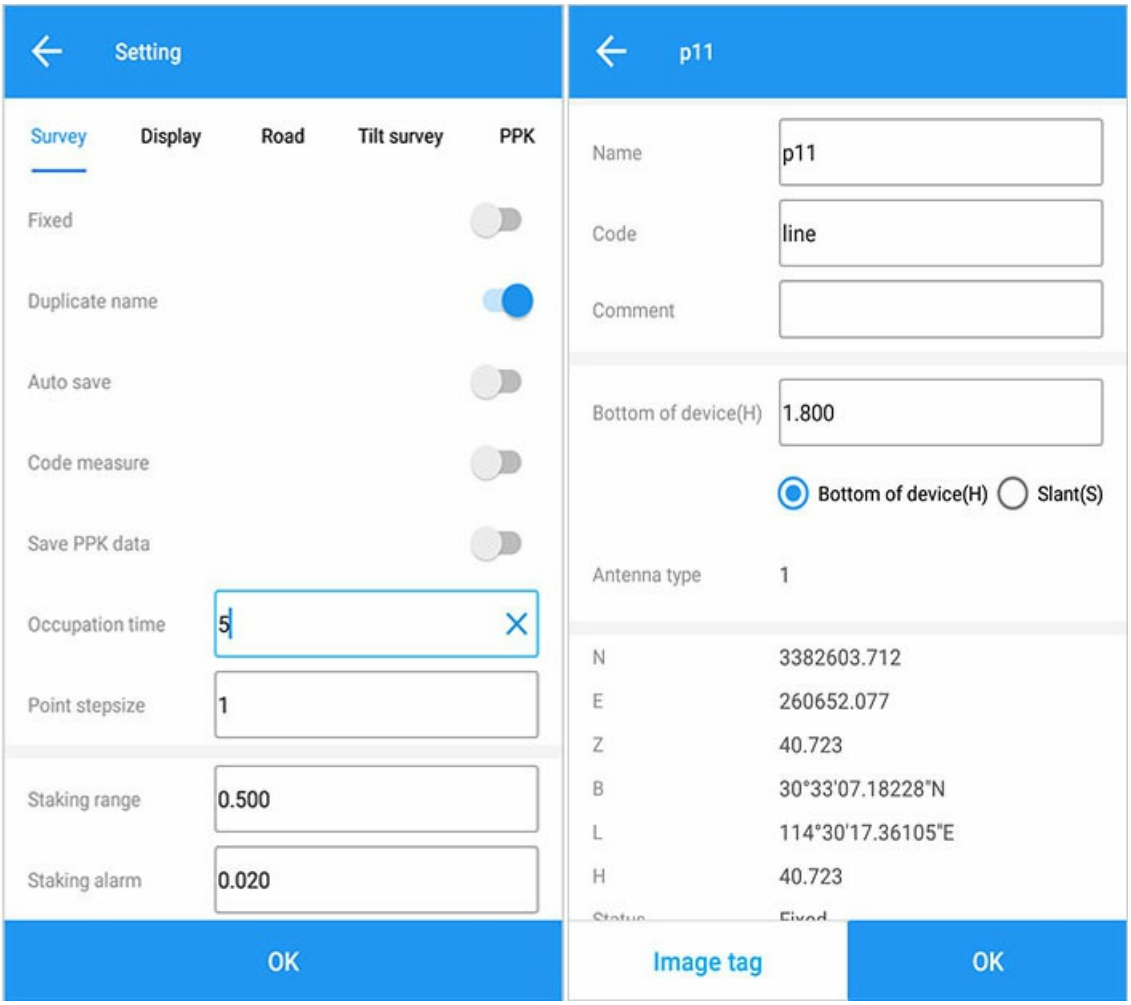
2. Code



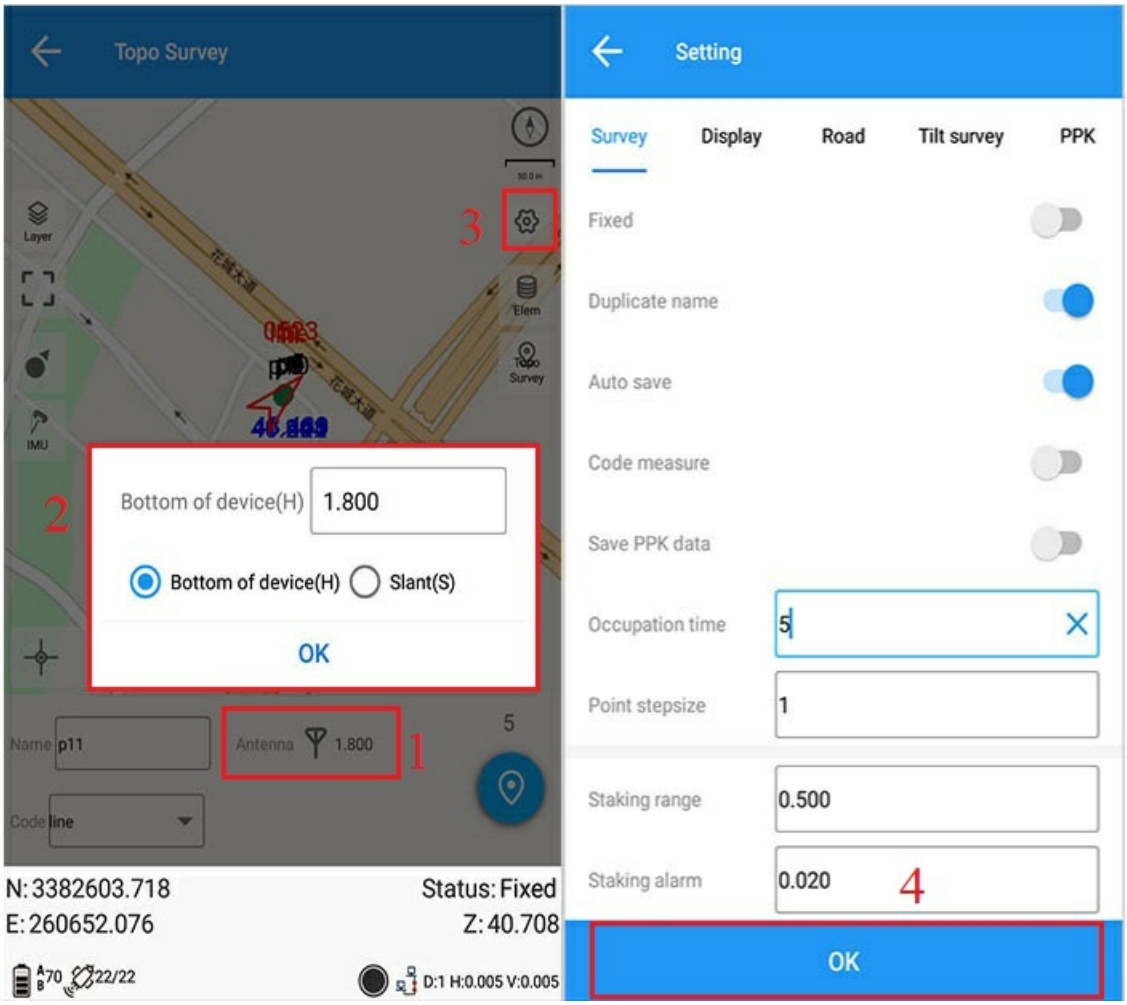
Enter the option settings, click the icon 1 to enable quick measurement using common codes, click the icon 2 to save the settings, return to the measurement interface, as shown in 3, click the plus sign to add a common code, and then click any desired code as shown in the icon, Measurement operations can be performed quickly and directly.

3. Auto save point

Enter the option setting, close the automatic save point, return to the measurement interface to perform the measurement operation, and the save point interface will pop up.


Setting
Survey
Display
Road
Tilt survey
PPK
Fixed
Duplicate name
Auto save
Code measure
Save PPK data
Occupation time
5
Point stepsize
1
Staking range
0.500
Staking alarm
0.020
OK
p11
Name
p11
Code
line
Comment
Bottom of device(H)
1.800
Bottom of device(H)
Slant(S)
Antenna type
1
N
3382603.712
E
260652.077
Z
40.723
B
30°33'07.18228"N
L
114°30'17.36105"E
H
40.723
Image tag
OK

4.Options



1) Pole height setting: Click to enter 2 as shown in 1 to enter the pole height quick setting.

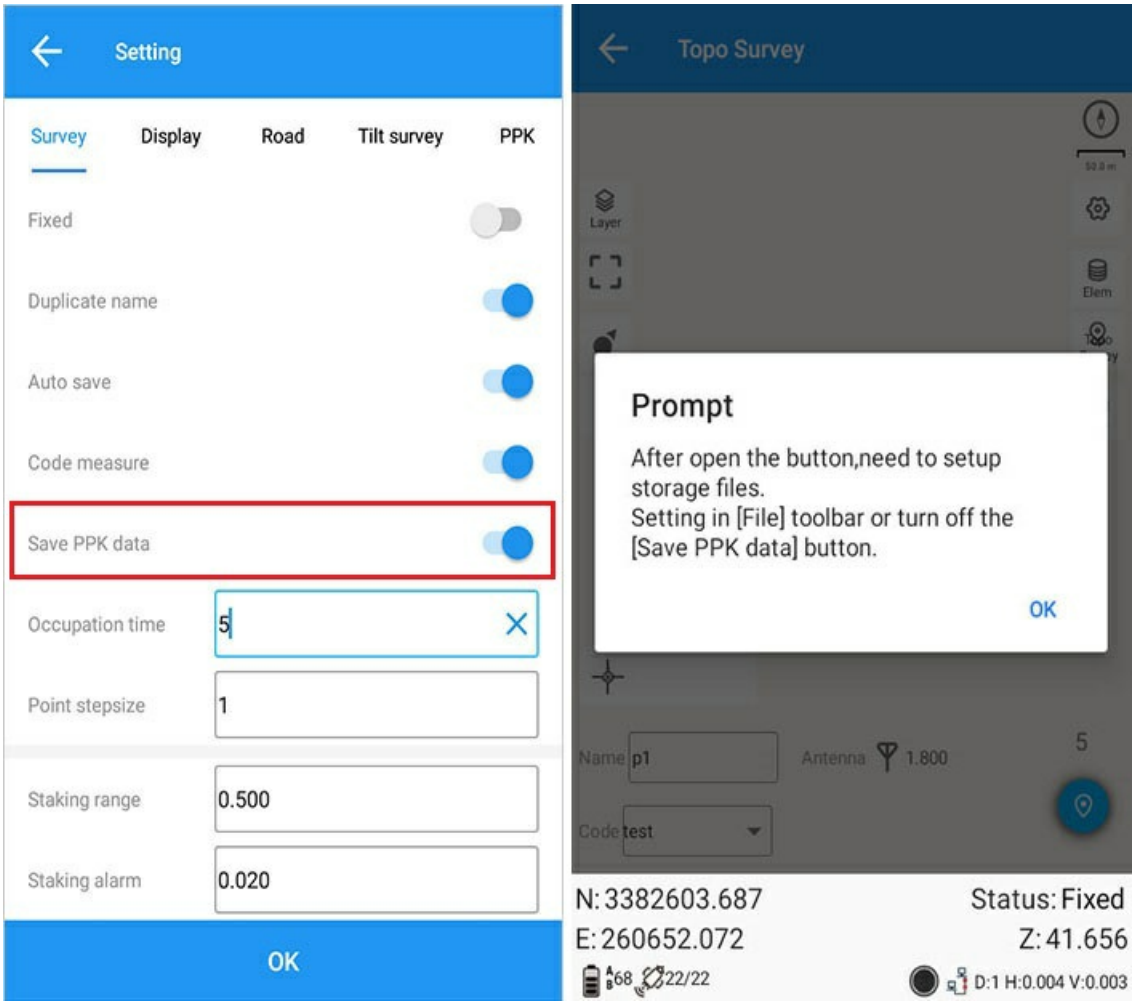
2) Option setting: Click to enter as shown in 3 and then click 4 to complete the setting (please refer to the option setting operation for the specific option setting content).

3) Point library: Click on the right column "point library" to execute, enter the point library operation.

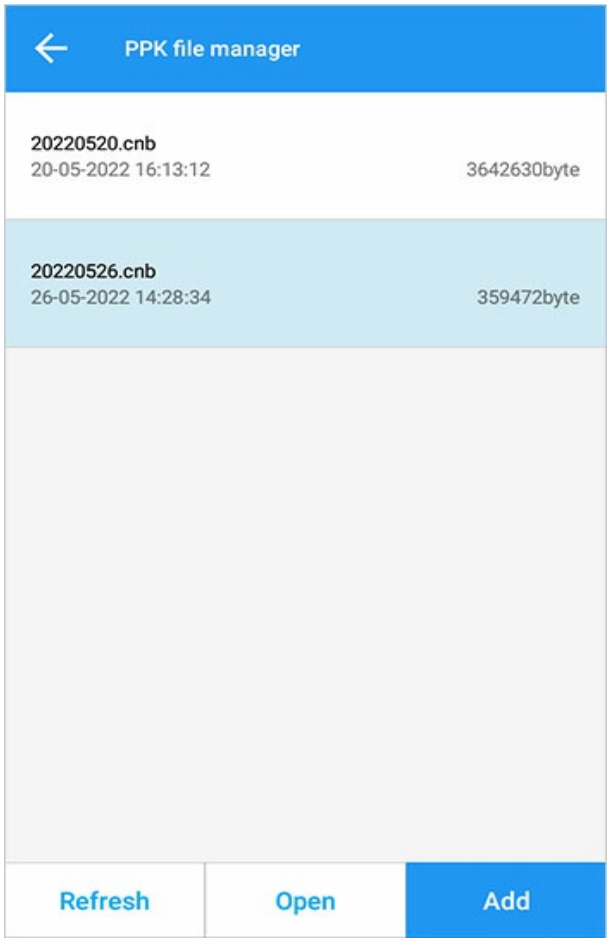
Note: Please refer to Measurement Options for details.

5. Save PPK data

1) Open and save PPK data: a pop-up prompt to set the PPK file will pop up.



2) Click the file icon on the right to jump to the PPK file management interface. For details, see PPK Survey.

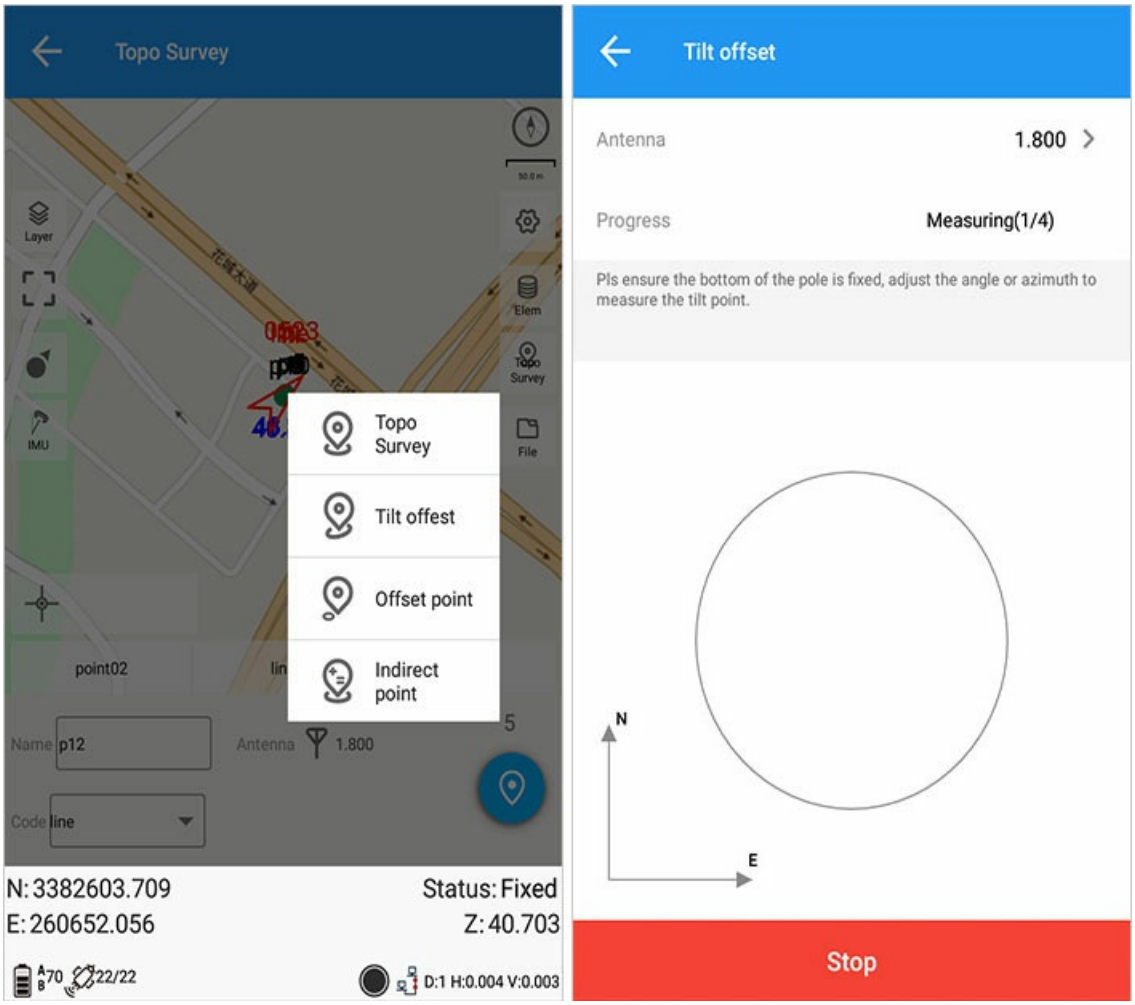


6. Inclination point measurement

1) Click the normal point icon on the right, and a selection box will pop up to select the inclined point.

2) Click on the measurement to enter the tilt point measurement, and the antenna can be set.

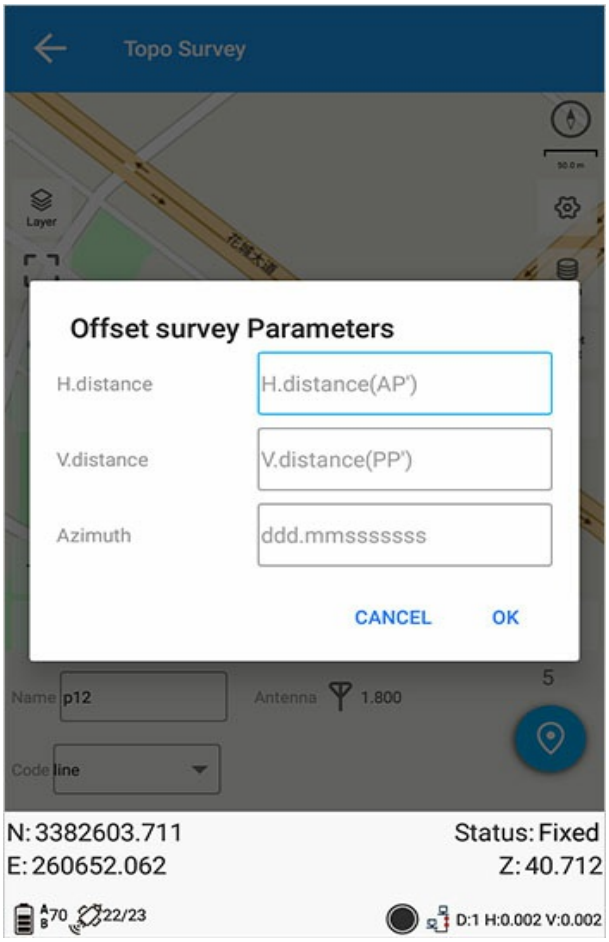
Note: Inclination point measurement means collecting four tilt points at the same position to obtain more accurate measurement points.



7. Eccentric point measurement

1) Click the normal point icon on the right, and a selection box will pop up to select the eccentric point.

2) Click the measurement icon to pop up the eccentric measurement parameter setting box, set the parameters, and click OK to complete the measurement.



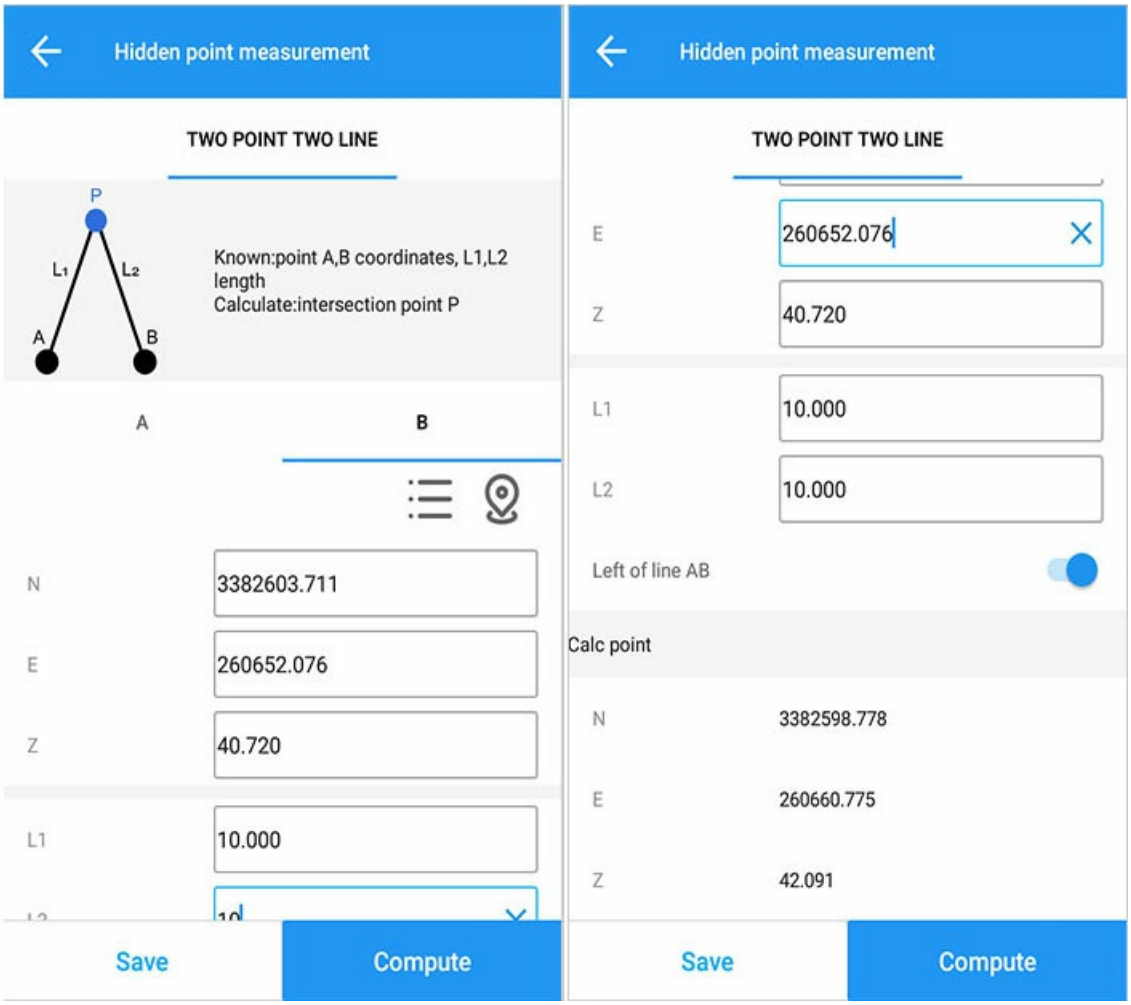
8. Indirect measurement

1) Click the normal point icon on the right, and a selection box will pop up to select indirect measurement.

2) There are three selection methods for A and B: custom input; point library selection; direct measurement;

3) L1, L2: Custom input.

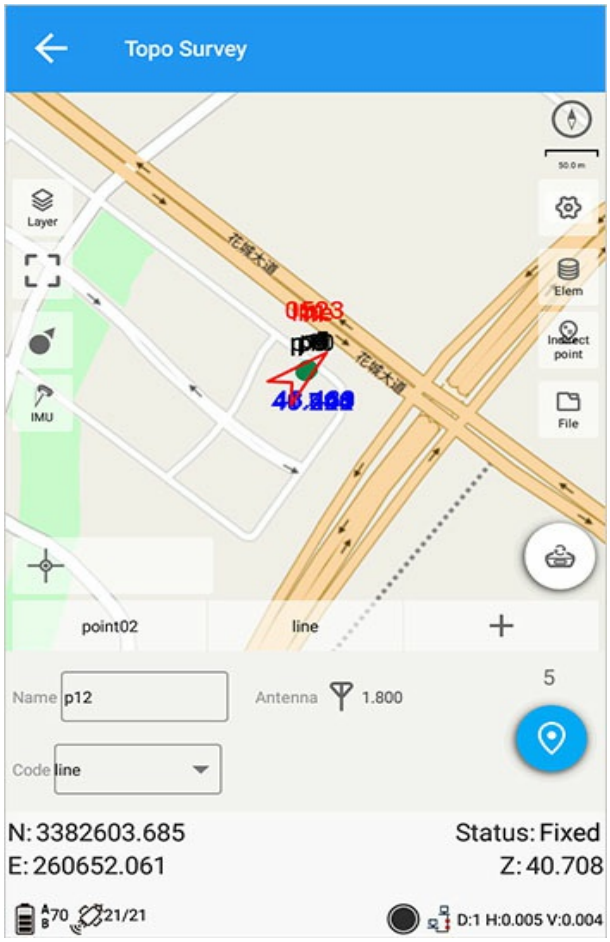
Note: The L1 and L2 inputs conform to the triangular relationship rule, that is, "L1+L2 is greater than the distance between points A and B".



9. Solve reset

Click [Settings] -> [Display] -> [Safe Mode] to open, and the solution reset function will appear on the point measurement interface.

【Solution reset】: Re-acquire the differential signal to prevent flying spots.

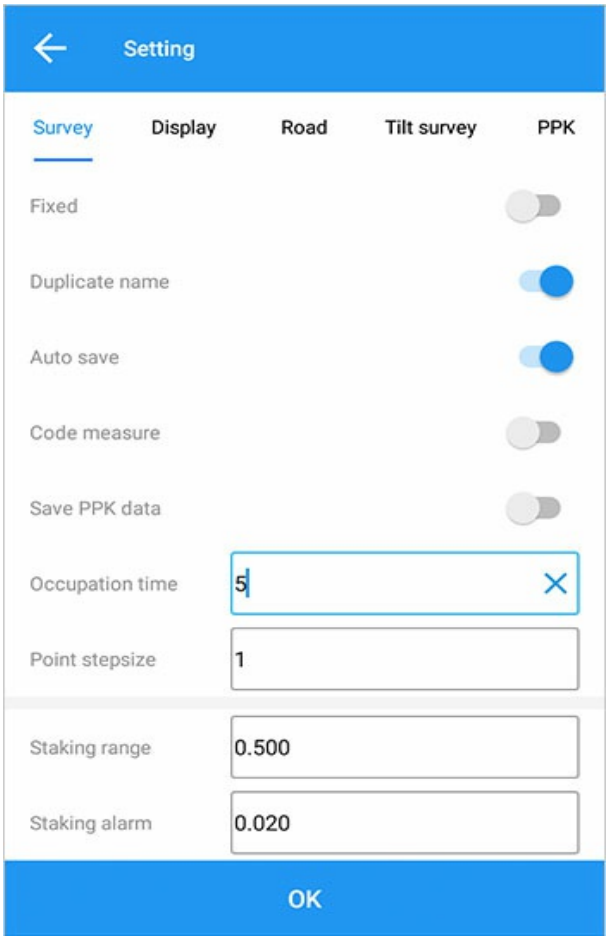

Topo Survey
Layer
IMU
Elem
Intersect point
File
point02
line
Name p12
Antenna 1.800
5
Code line
N: 3382603.685
E: 260652.061
Status: Fixed
Z: 40.708
70
21/21
D:1 H:0.005 V:0.004

Options

Main interface ->[Measure]->[Measure]/[Stakeout]->Options.

Measurement Stakeout

Click the option icon on the right interface to enter.



Description of measurement stakeout:

1) Fixed solution: It is checked by default. After canceling it, the stakeout point can be measured without limiting any accuracy;

2) Allow same-name points: the roll call can be repeated when it is opened, and a prompt will pop up when the roll call is repeated when it is closed;

3) Automatically save points: when the measurement point is completed, a confirmation interface will pop up;

4) Use common codes for quick measurement: open the selection box to use common codes, and close the selection box without common codes;

5) Save PPK data: when opening, click OK to pop up a prompt to select a PPK file;

6) Measurement times: 5 times by default, users can customize the settings;

7) Rolling step: default 1, user can customize the setting;

8) Stakeout range: the default is 0.500 meters, the user can customize the setting (large circle);

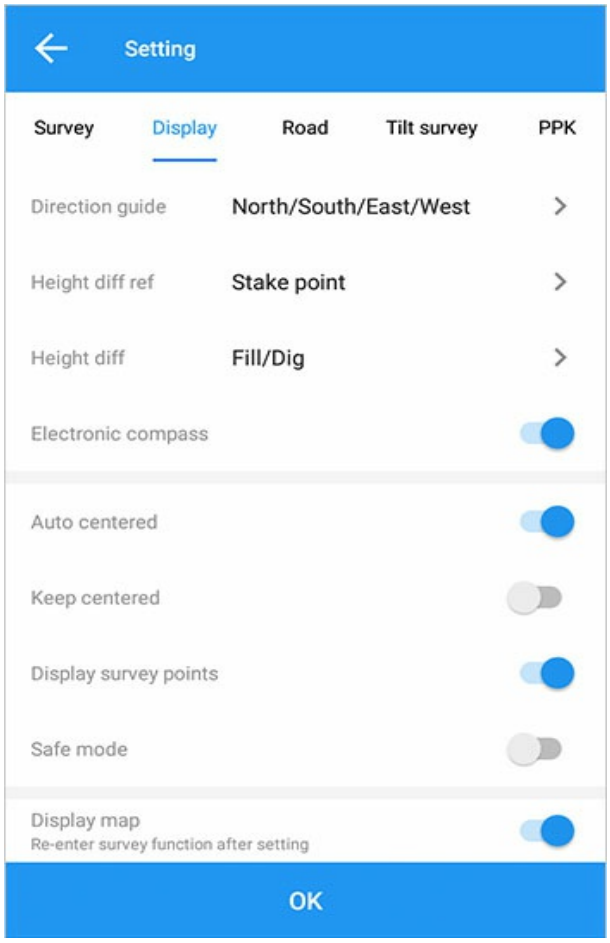
9) Alarm difference: the default is 0.02 meters, the user can customize the setting (small circle), which is mainly different from the stakeout range. When the mobile station is 0.02m away from the stakeout point, an automatic alarm sound prompts, while the stakeout range is only in the circle without any alarm;

10) Output frequency: the default is 1Hz, the user can customize the settings according to the options;

11) Stake-out point name: The name of the measuring point is used by default. You can choose to use the prefix and use the current stake number. If the prefix is used by default FY_, the user can customize and modify the content of the prefix.

Display

Click to toggle - show



Display description:

1) Direction display: southeast, northwest, front and rear, left and right, azimuth distance;

2) Height difference datum: start point, end point, stakeout point;

3) Height difference display: default positive/negative, optional filling/digging, positive and negative are displayed according to the difference between the stakeout point and the current mobile station position, high is positive, low is negative, filling is low, and digging is high;

4) The electronic compass of the handbook determines the forward direction: it is turned on by default, which means that the electronic compass on the PDA is used as an auxiliary pointing;

5) Automatic centering: enter the starting interface of point measurement, and the measurement arrow is centered;

6) Keep centered: no matter what operation is performed, the measurement arrow is automatically centered;

7) Display historical measurement points: off by default, can be turned on;

8) Safe Mode: The solution reset function can be turned on;

9) Display map: display two map types, map or satellite;

10) Display basemap: multiple display basemaps can be selected;

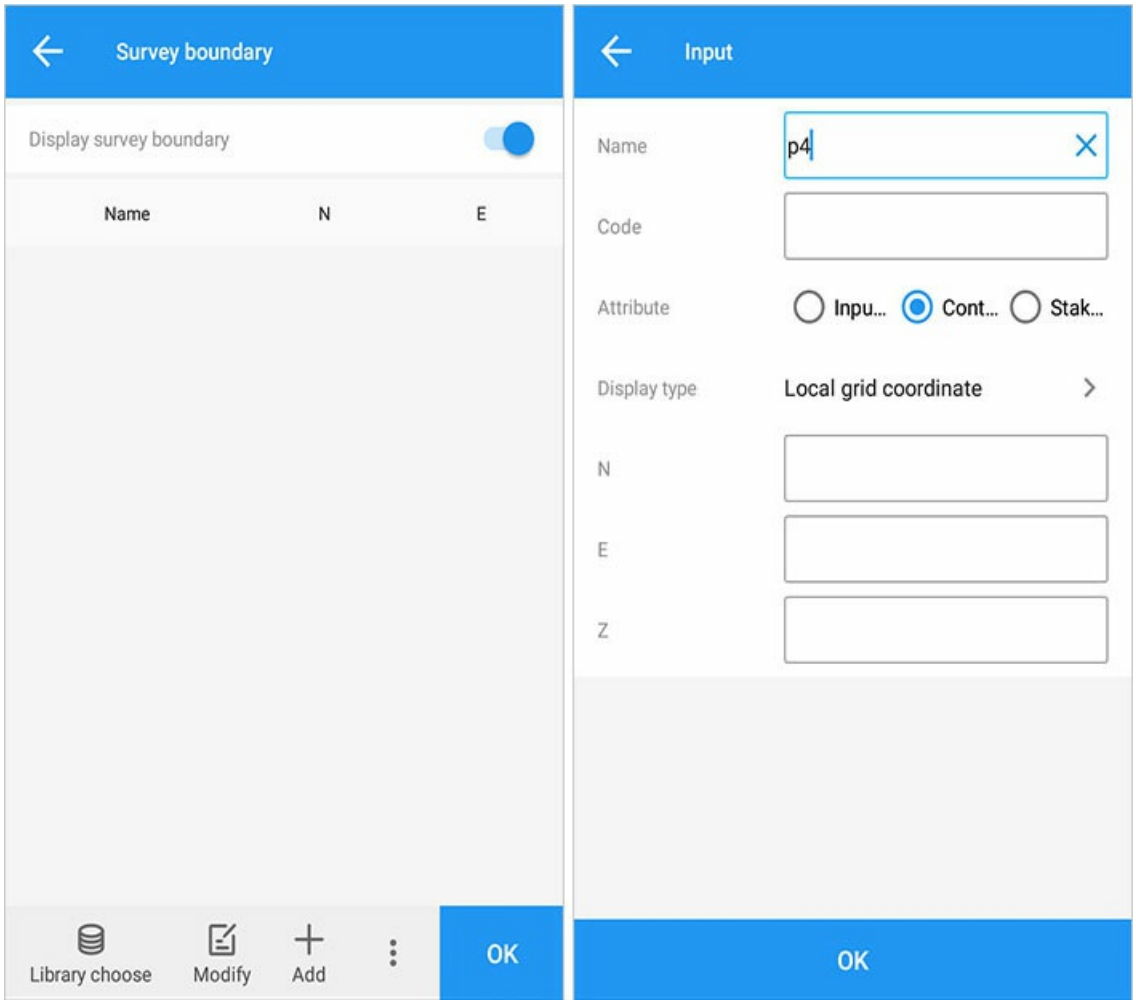
11) Measurement Boundary: Boundary lines can be added by definition, and measurement points or known points can be used to display in the measurement stakeout graph in real time according to the current defined value.

Note: The settings of the basemap must be re-entered to take effect normally.

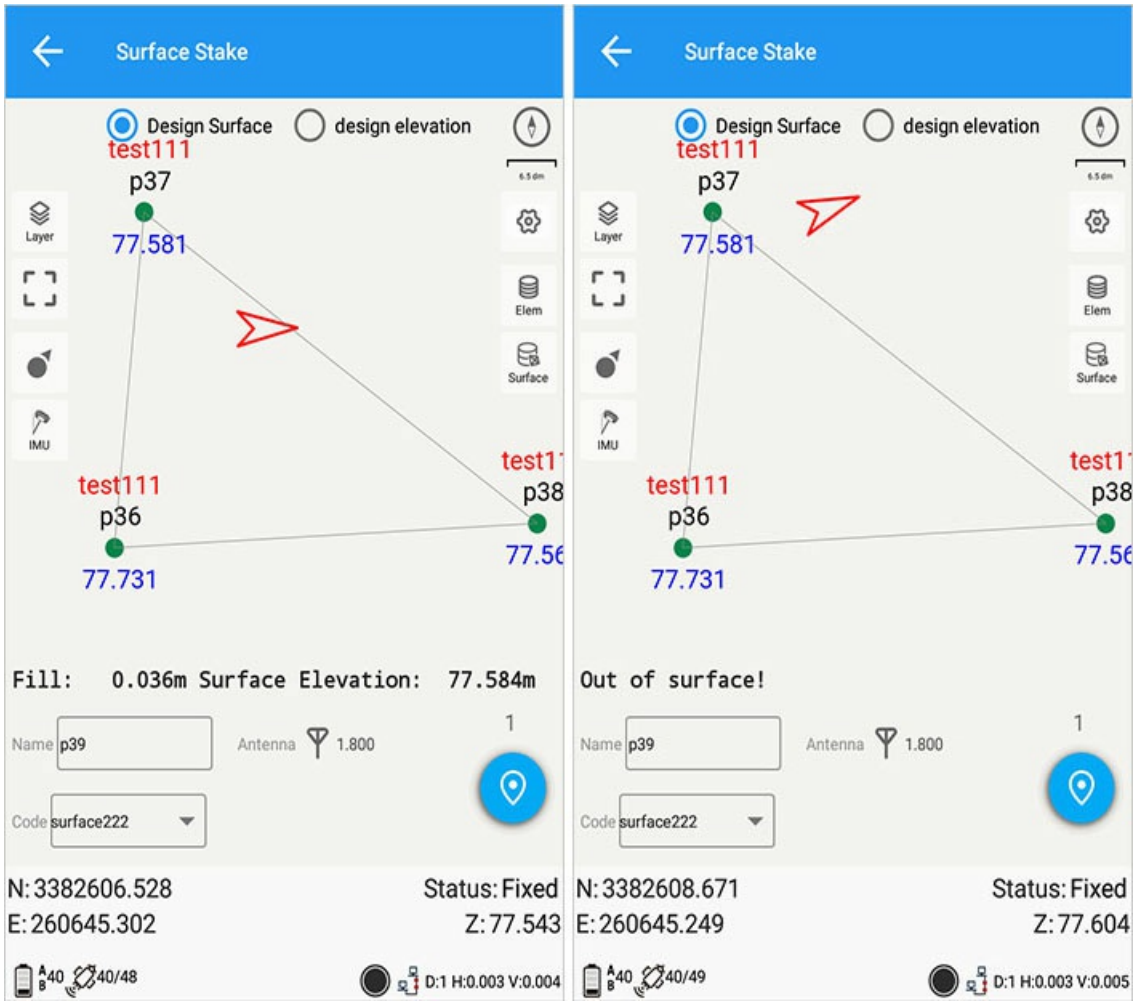
measurement boundaries

1) Add border

Click [Add] to enter the add interface, and then enter the new boundary parameter value.

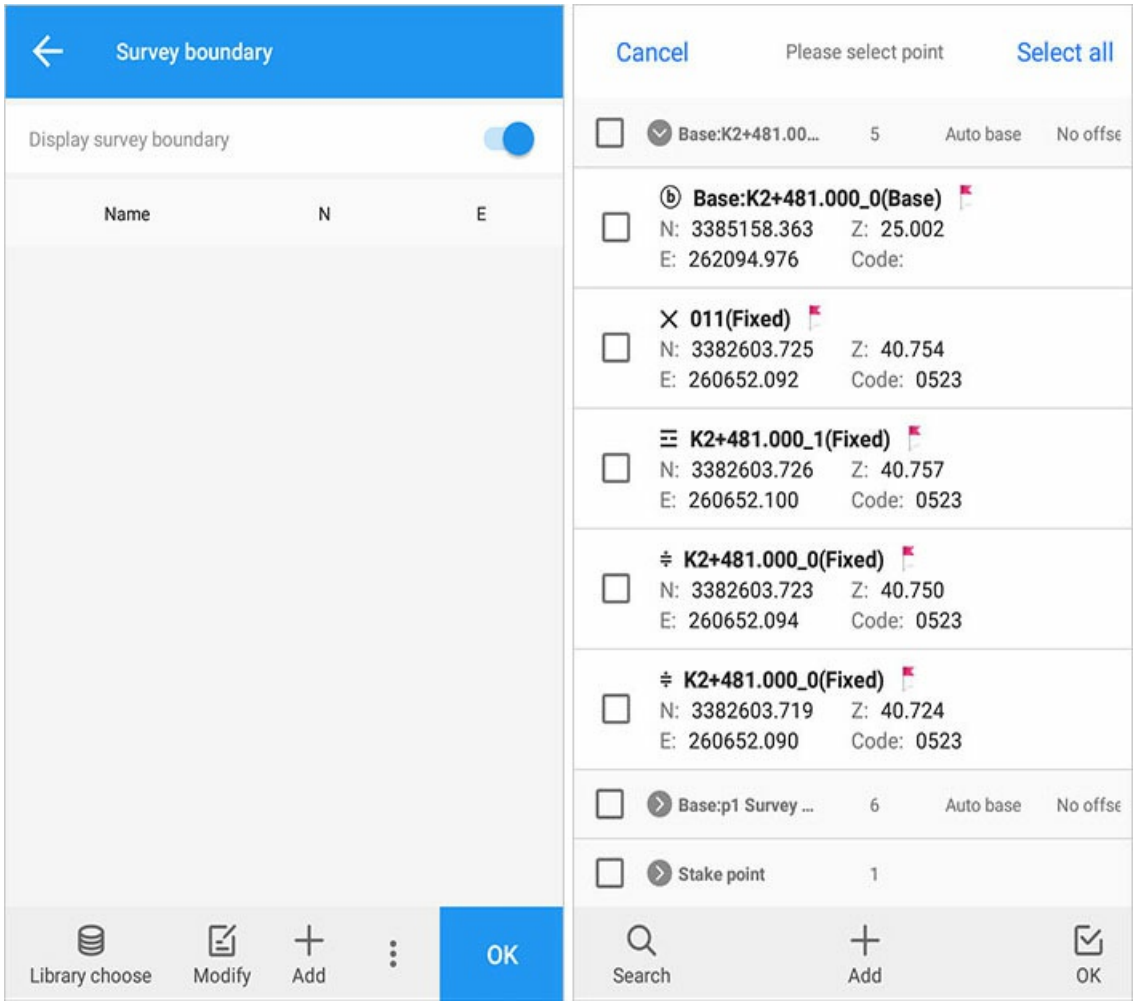


Return to the measurement interface and display the measurement boundary. If it is not within the boundary, a red prompt will be given.



2) Library selection boundary

Click [Library Selection] to enter the selection point interface.



3) Clear the border

Click [Clear] or three dots [Clear] the border.

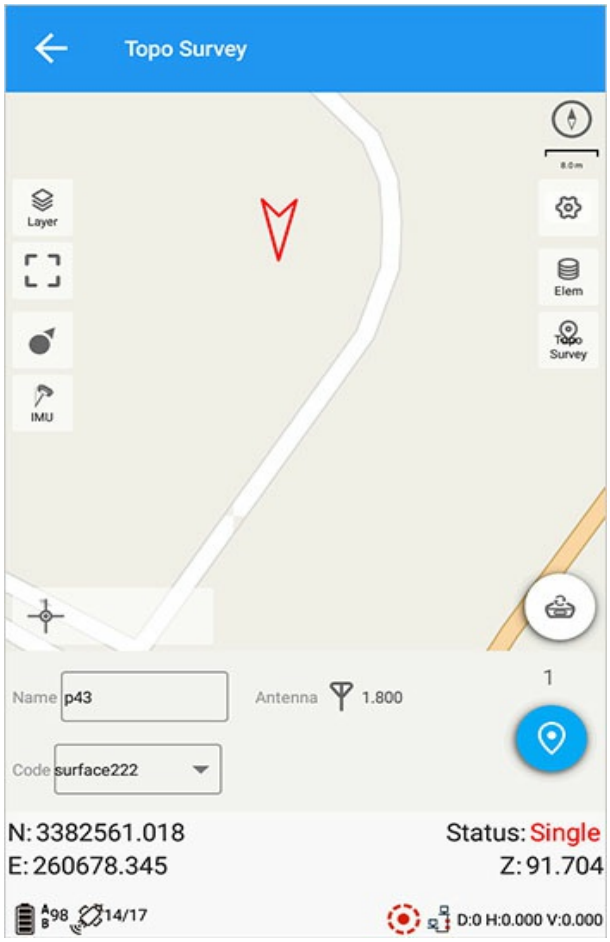
4) Enable borders

Click OK to apply the measurement boundary.

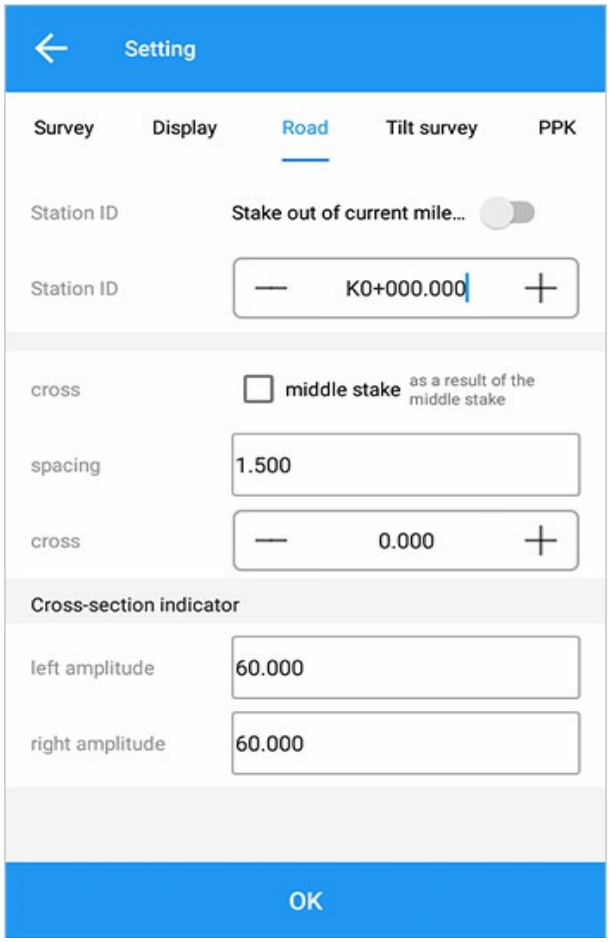
Safe mode

The safety mode is disabled by default. When the safety mode is turned on, the solution reset function button will appear on the measurement interface.

Click to reset the solution, and the device will obtain the differential signal again.


Topo Survey
Layer
IMU
Elem
Survey
Name p43
Antenna 1.800
1
Code surface222
N: 3382561.018
E: 260678.345
Status: Single
Z: 91.704
14/17
D:0 H:0.000 V:0.000

Road



Road Description:

1) Stake out method: stake out according to stake number, you can select stake stake of current mileage;

2) Stake number: the target stake number of stakeout, the user can define the input, the default starts from the starting stake, which can be added or subtracted quickly;

3) Lateral deviation: the lateral deviation distance on the pile in the road (the lateral deviation on the tangent line), the default distance can choose the offset, the distance is negative on the left and positive on the right, and the offset is offset by the coordinate change of △x and △y . If the check box is checked: [Stakes] (as the results of the middle piles), it will be regarded as the results of the middle piles;

4) Spacing: the spacing distance in the lateral direction, the default is 1.5 meters, the user can customize and modify;

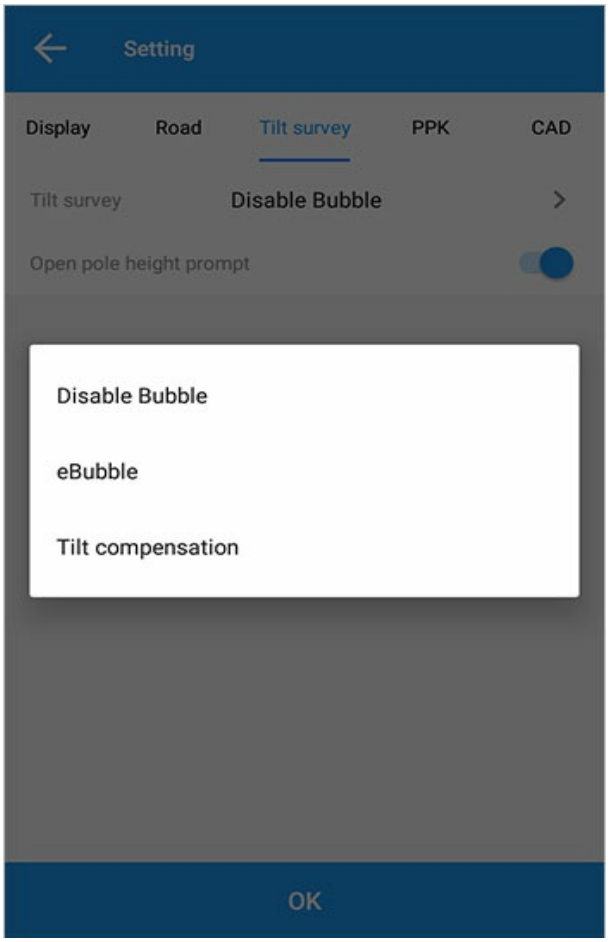
5) Horizontal offset: the default distance can choose the offset; the distance is negative on the left and positive on the right; the default value is 0, which can be added or subtracted quickly;

6) Cross-cutting indicator line: Define the length value of the displayed cross-cutting red line. The default width of the left and right widths is 60m, and the user can customize the settings.

Tilt measurement

Connect the receiver with the bubble or inertial navigation tilt measurement function, and click the tilt measurement in [Options] to enable or disable the bar height prompt.

The tilt measurement options are displayed in the options:



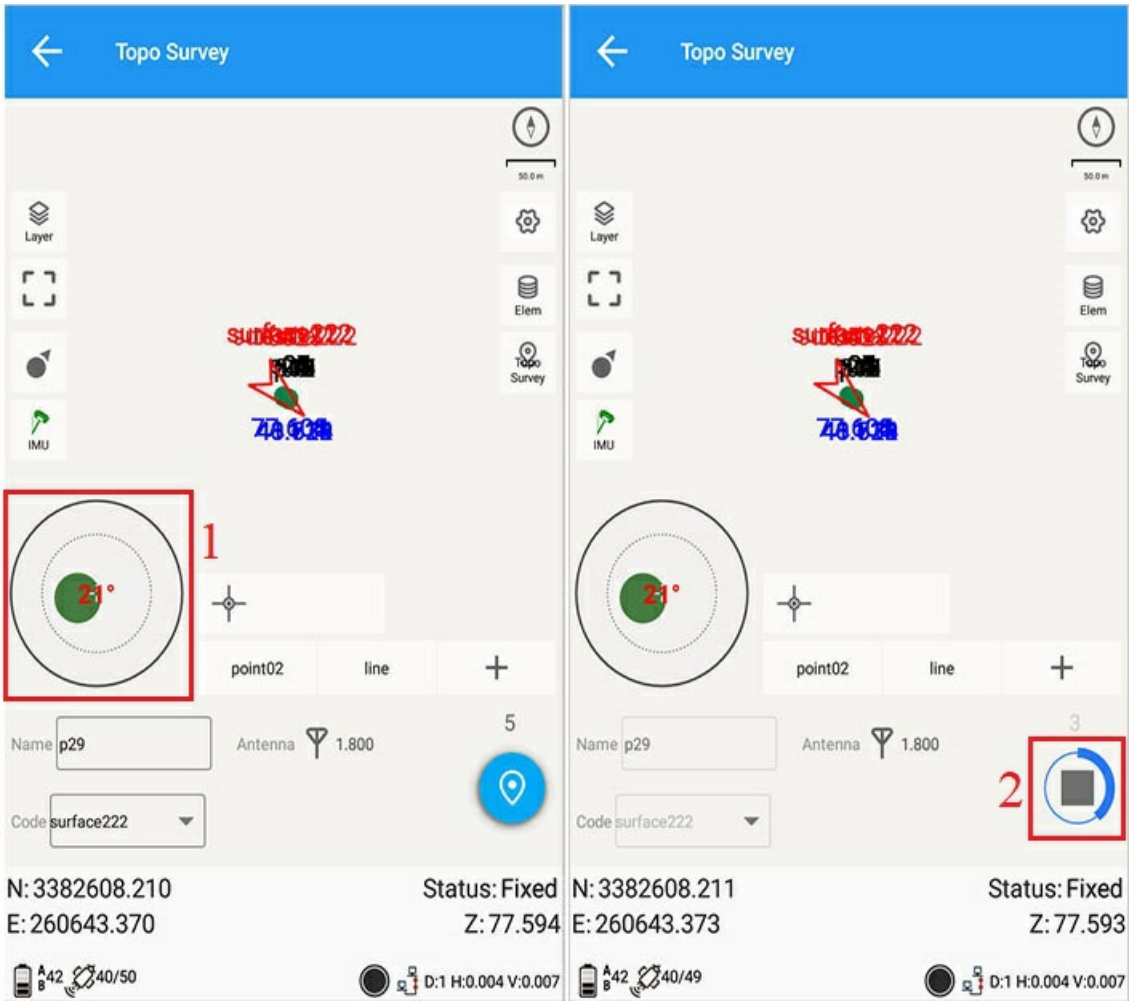
Tilt measurement: Disable tilt, electronic bubble, tilt correction.

disable tilt

No bubbles are used.

Electronic bubble

Use electronic bubbles to assist measurement, enter the measurement interface, and bubbles will be displayed.



Tilt correction

Inertial Navigation Inclination Measurement

Description of bubbles:

1) Tilt tolerance: The default is 1 meter, which is determined by the current antenna parameters. When the antenna height is higher, the tilt tolerance will be larger. Generally, the antenna height is 2 meters, and the tilt tolerance is the best value of 1 meter (default bubble tilt angle). 30 degrees);

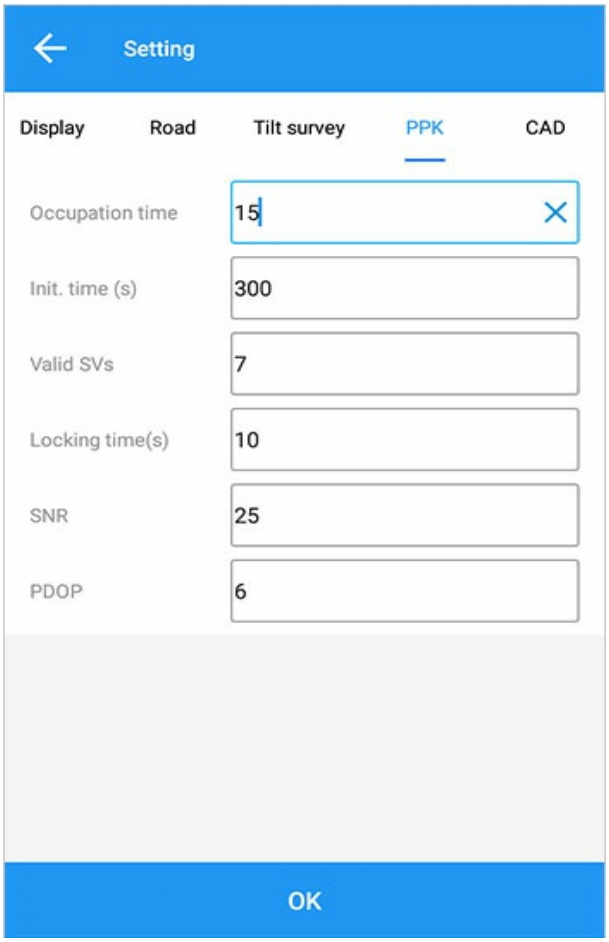
2) Magnetic field strength: The default is 70, which can be adjusted according to the local magnetic field. You can also click "Device" - "Location Information" to view the current magnetic field strength;

3) Calibration period: 20 days by default, 60 days, 180 days and 360 days can be selected;

4) Magnetometer: read the current receiver magnetometer status and status (calibrated, uncalibrated, calibration expired), you can click "calibration" to calibrate according to the operation diagram;

5) Accelerometer: Read the current receiver accelerometer status and status (calibrated, uncalibrated, calibration expired), click "Calibration" to calibrate according to the operation diagram.

PPK



PPK description:

1) Measurement times: 5S by default, can be customized;

2) Initialization time (seconds): default 300s, can be customized;

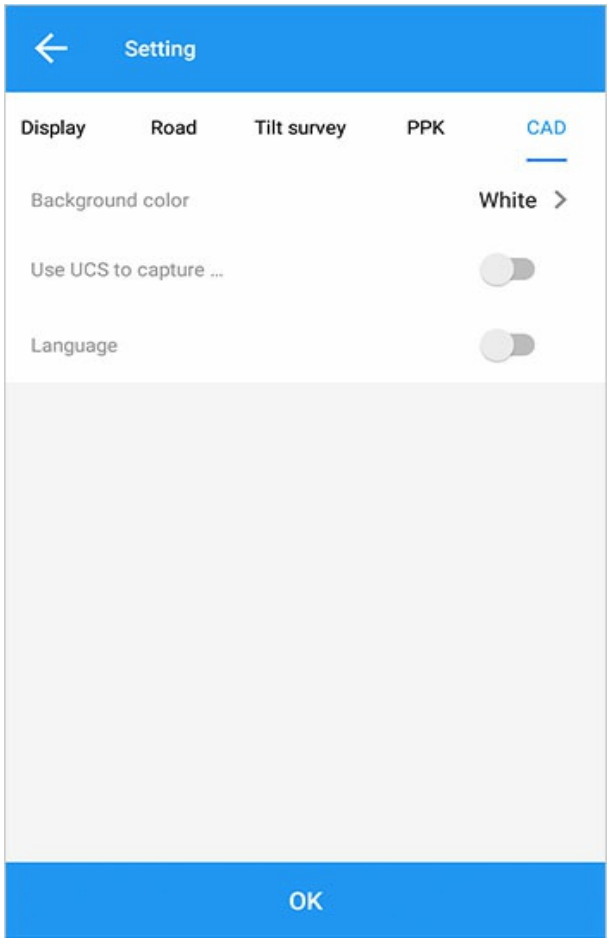
3) The number of valid satellites: the default is at least 7 satellites, which can be customized;

4) Locking time (seconds): default 10s, can be customized;

5) Signal-to-noise ratio value: the default is 25, which should be customized according to L1, L2, and L3;

6) PDOP value: default 6, can be customized.

CAD



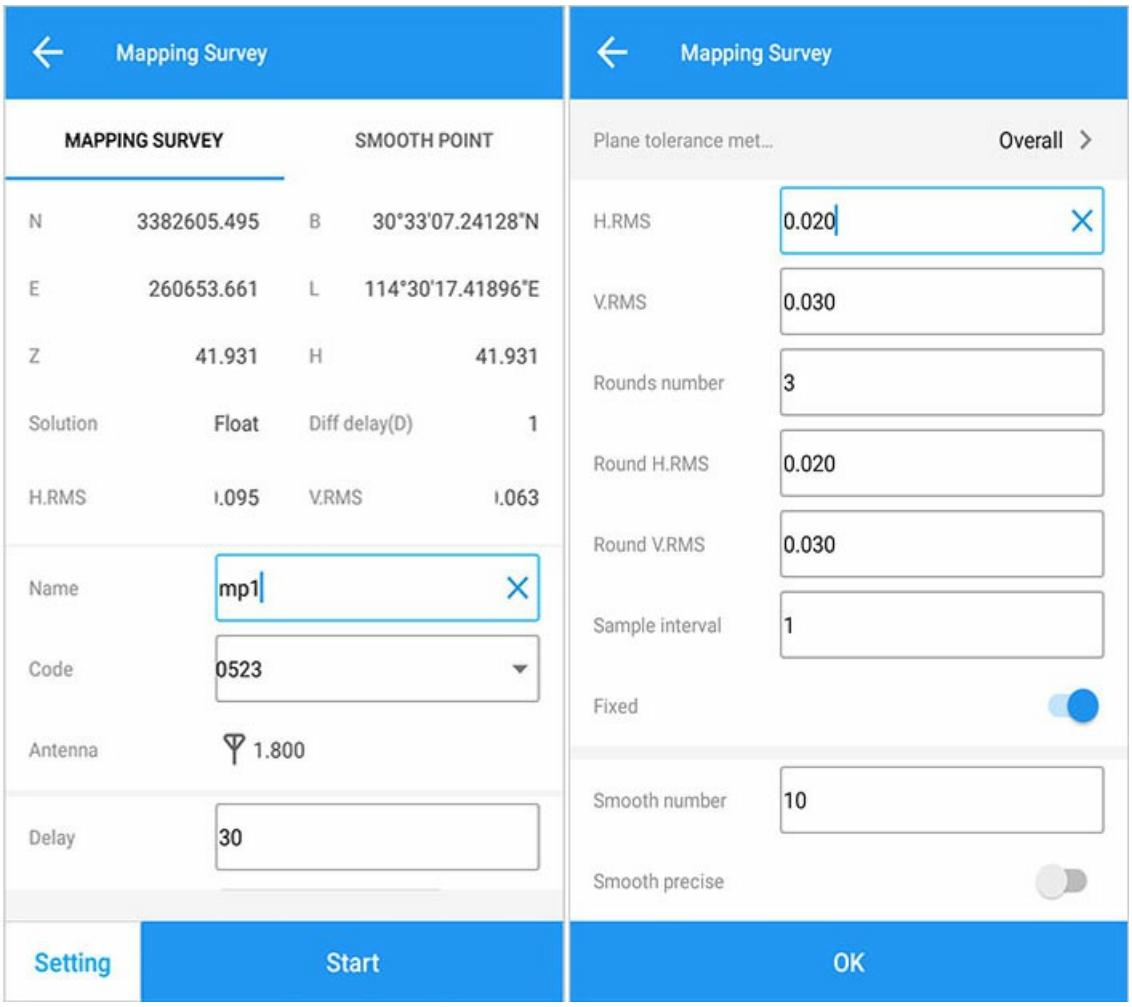
Background color of CAD basemap: black, gray, white

Use UCS to Snap Points: When this feature is turned on, the user coordinate system is used.

Mapping Survey

1. Mapping Survey

Click [Survey] -> [Mapping Survey]:



[Point Name]: The default point name is mp1, and the point name of the root point can be customized.

[Code]: Select the code, please refer to Code Set for details.

[Antenna]: The default is 1.8, and the input can be customized.

[Delay]: The default delay is 30, and the input delay can be customized, that is, the reset delay seconds.

【Start】: Measure the root of the graph. After the smoothing, mapping and reset are completed, the root of the graph is measured.

set up:

【Plane tolerance mode】: There are two ways to choose the overall and each component (dN, dE), that is, the overall tolerance setting or the tolerance setting for each component.

[Graph root plane tolerance]: Set the smooth point plane tolerance, the default is 0.020, which can be defined by yourself.

[Plot root elevation tolerance]: Set the elevation tolerance of the smooth point, the default is 0.030, which can be defined by yourself.

[Number of test rounds]: Select the number of test rounds, the default is 3, which can be defined by yourself.

[Measurement round plane tolerance]: the average tolerance of smooth points between the measurement rounds, the default is 0.020, which can be defined by yourself.

[Elevation tolerance of measurement rounds]: Similarly, the average tolerance of smooth points between measurement rounds, the default is 0.030.

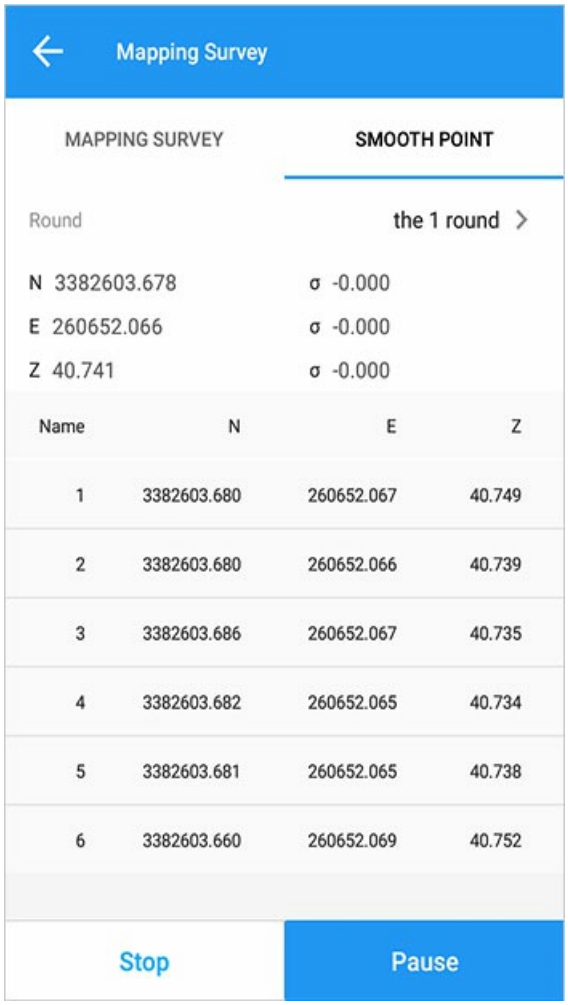
【Sampling interval】: The sampling time interval between smoothing points, the default is 1s, which can be set.

[Smoothing times]: The number of smoothing point measurements in one round, the default is 10, and the minimum cannot exceed 3.

【Smoothing Accuracy】: This part can limit the point coordinates more precisely, all defaults to 0.020.

2.Smoothing Point Data

Displays all measured smooth point data.



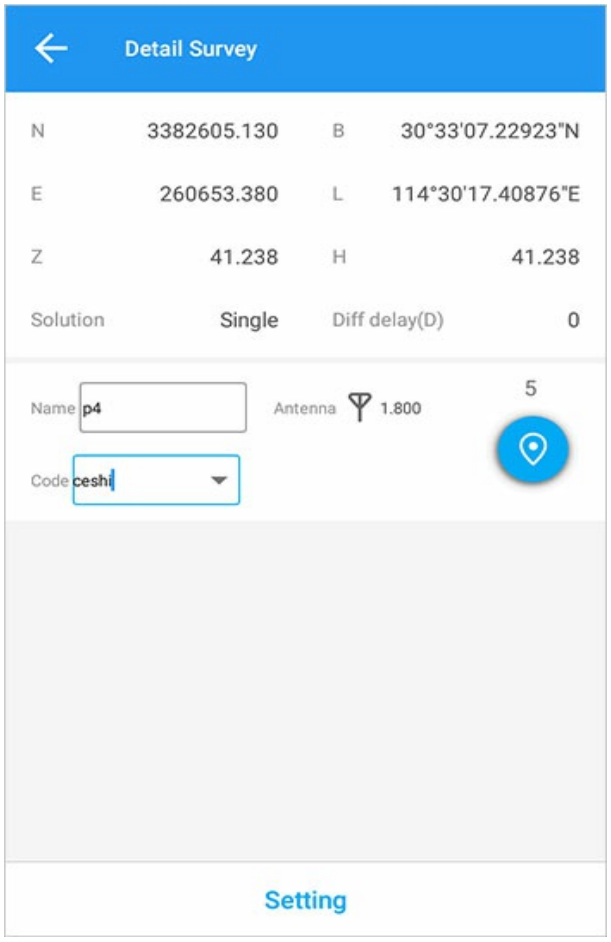
σ：Represents the error value within a measurement round.

【Measurement rounds】: Display the smoothed point data in each measurement round in this measurement process.

Graph root point export: If you have finished measuring the graph root point, please click [Tasks]->[Data Export]->[More Formats]->[Graph Root Point Results Export] to export. For export details, please refer toExport Data。

Detail Survey

Main interface ->【Survey】->【Detail Survey】.



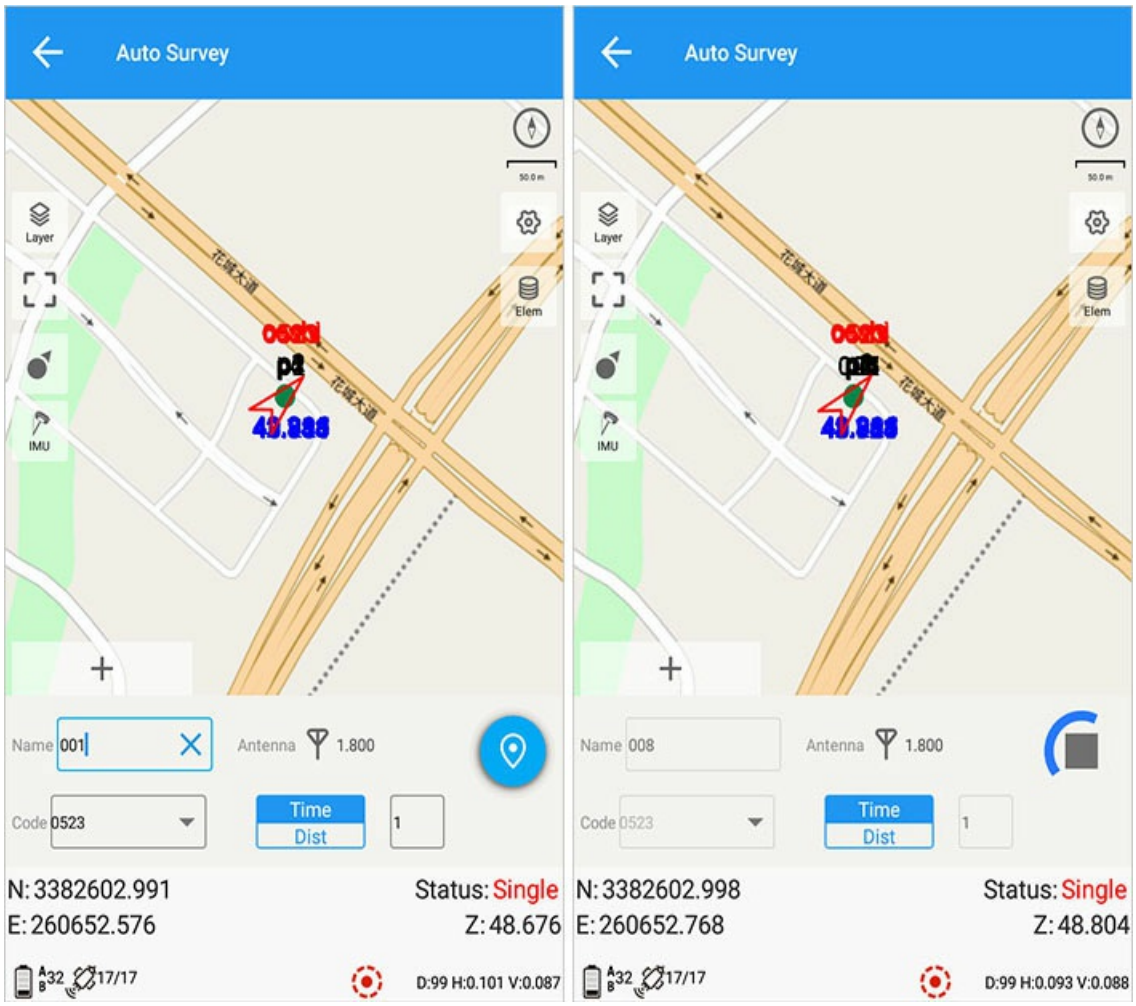
The detail survey and point survey tools have the same functions, but the map-related functions are missing.

Automatic Survey

Interface icon meaning

Icon	Meaning	Icon	Meaning
	Layer options		Settings
	Full screen		Point library
	Single POV		Calculate
	Multi POV		Mapped point
	Reset		

Main interface -> [Survey] -> [Automatic Survey].



Auto survey: an uninterrupted measurement method.

When measuring, it must be ensured that the input point name and the differential requirements are met, and the following content must be input:

1) Point name: set the survey point name;

2) Code: Set the survey code, which can be used directly by inputting the code (the input code can be reused by clicking the code box. For details, please refer to Code Collection);

3) Survey method: time/distance, the default time is 1s, which can be modified as needed, meaning that the interval is 1s measurement, and the distance is also the same as the time method (unit is m), which cannot be parallel to the time;

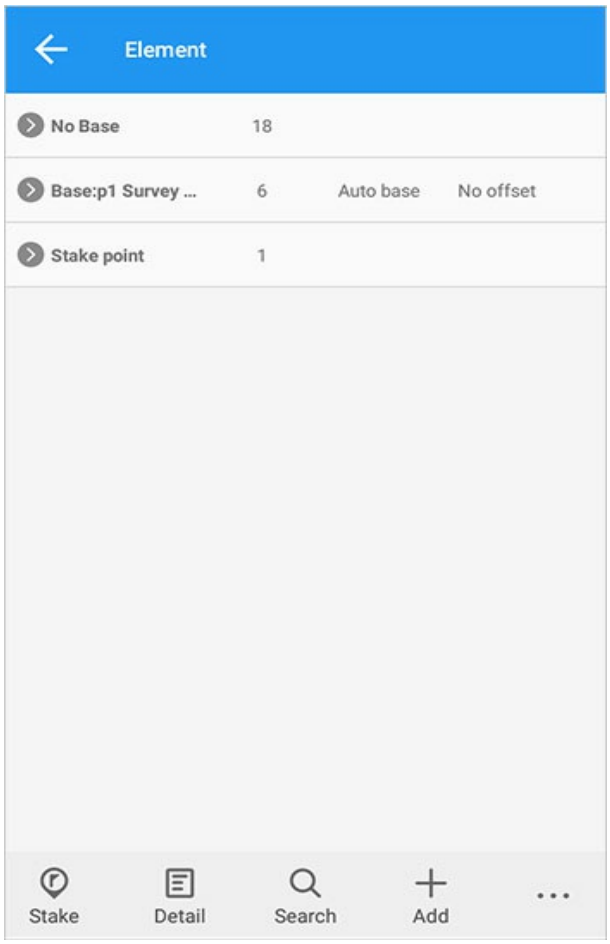
4) Other operations are the same as ordinary survey modes.

When clicking to survey, the point information can be measured only when the accuracy of the current epoch information meets the accuracy in the measurement parameters set by the user. Otherwise, if the user does not stop the measurement, the measurement time will be suspended until the accuracy of the epoch information meets the setting.

Note: The measured distance is a straight line distance.

1.Point Library

Click the point library icon on the right interface to enter.



For detailed operations, please refer to Point Library.

2.Options

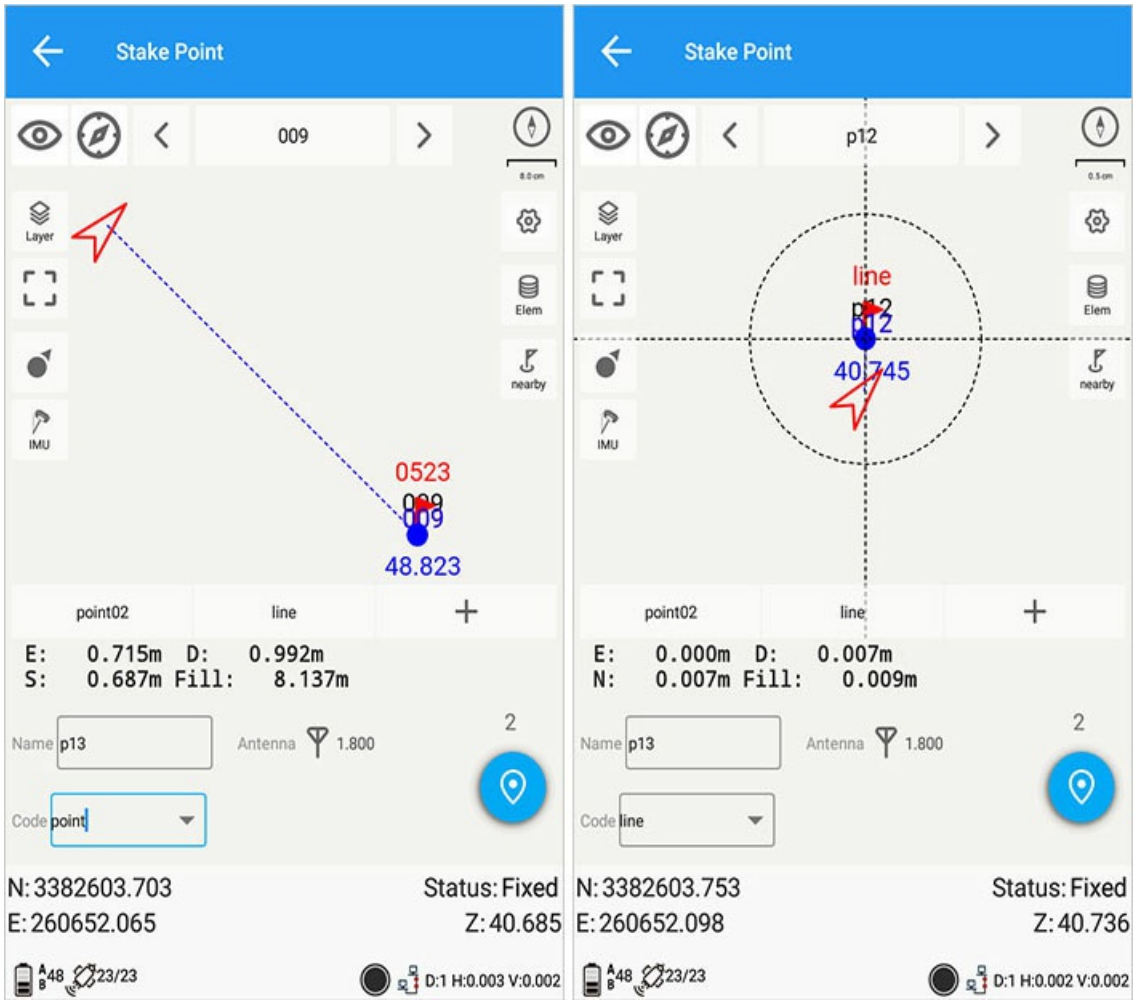
See Survey Options.

Point Stake

interface icon meanings

Icon	Meaning	Icon	Meaning
	Enable big font display orientation indication		Disable large font display orientation indication
	Show compass		Show map
	Previous stakeout point		Next stakeout point
	Layer options		Settings
	Full screen center		Point library
	Single POV		Solution reset
	Multi POV		Nearest point

Main interface->[Measurement]->[Point Stake].



When two circles appear in the graph and the viewing angle arrow and the red flag are in the small circle at the same time, it means that the physical point of the stakeout point is found. A large circle means entering the target range circle by default 0.5m, and a small circle means entering the alarm range circle by default 0.02m (for details, see: Stakeout Options).

Graphical indication of stakeout points:

1) The guide bearing scale is displayed in the graph.

2) Stake out point name, click the stake out point name on the picture, you can enter the editing design elevation interface, and modify the elevation.

3) The red arrow represents the location of the rover.

4) The small red flag represents the stakeout point.

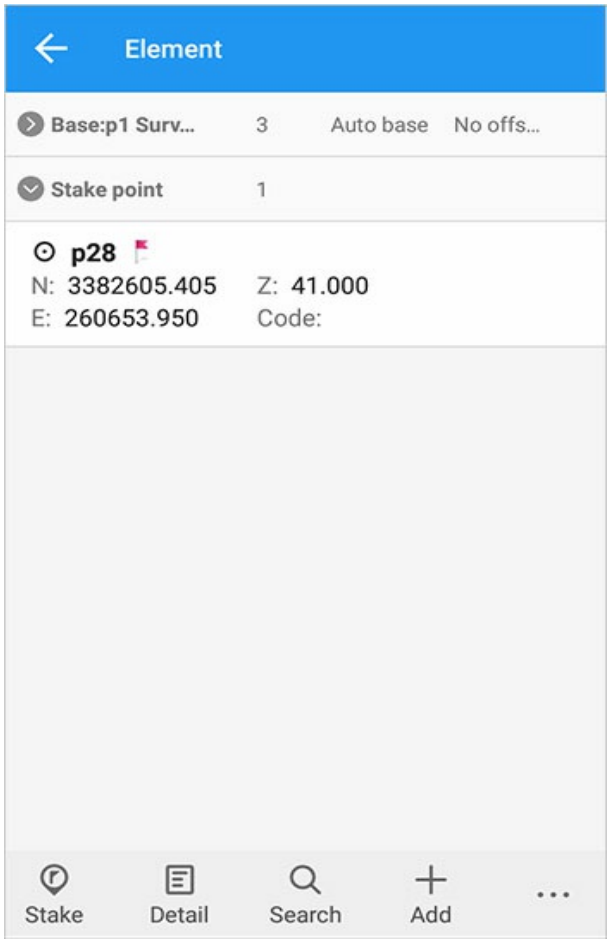
5) Direction indication: The default is southeast, northwest, or you can select front, back, left, right, and azimuth in the options.

6) Current status: It is displayed as the fixed status of the current mobile station. If it is a base station, it is displayed as a base station.

7) The rotation direction of the pointer in the figure is the current direction.

1. Point library

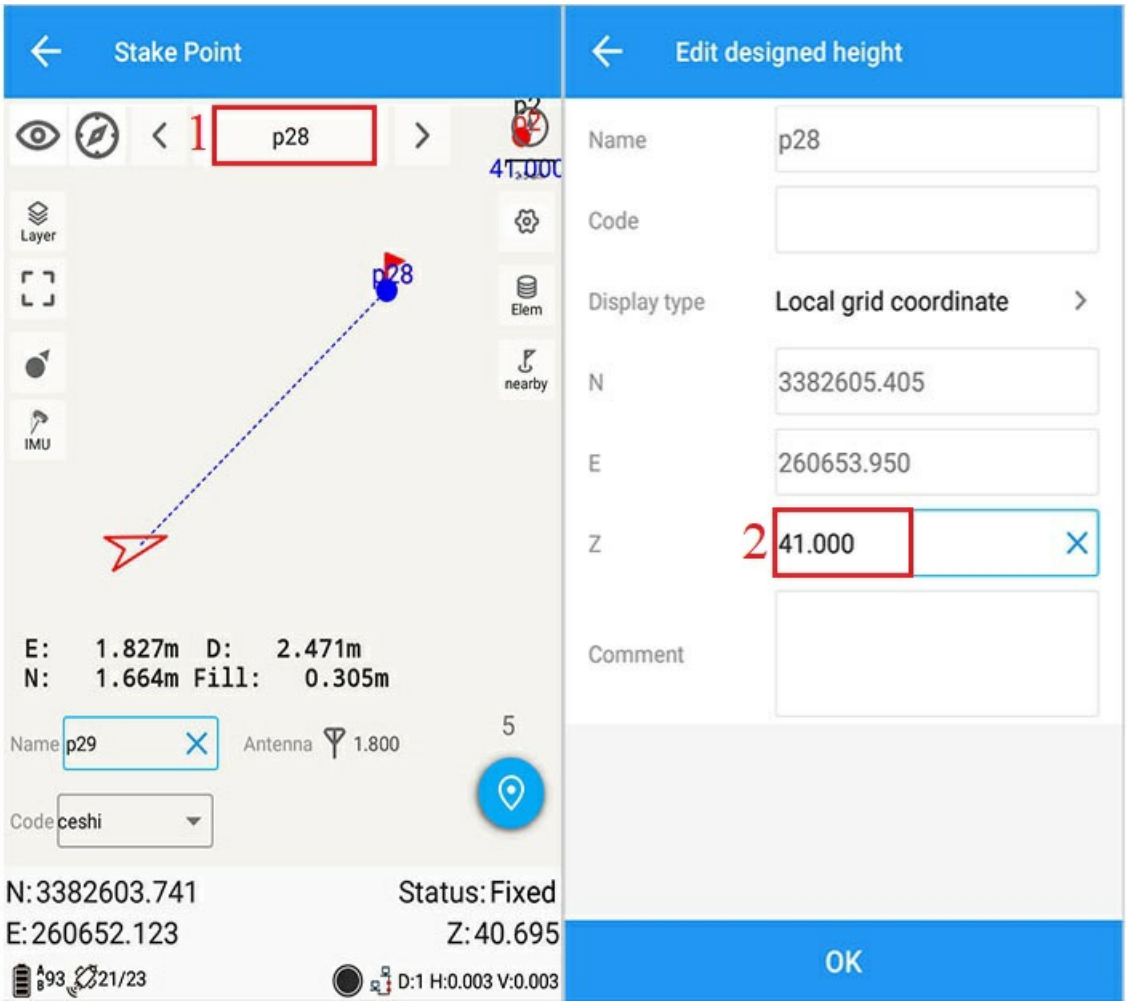
If there is no stakeout point in the current task, first enter the coordinate point library. If there is a stakeout point, click the point library icon on the right interface to enter the coordinate point library.



Point library operation:

1) Stakeout: quick stakeout for point stakeout. 2) For the detailed operation of the coordinate point library, see: Coordinate Point Library.

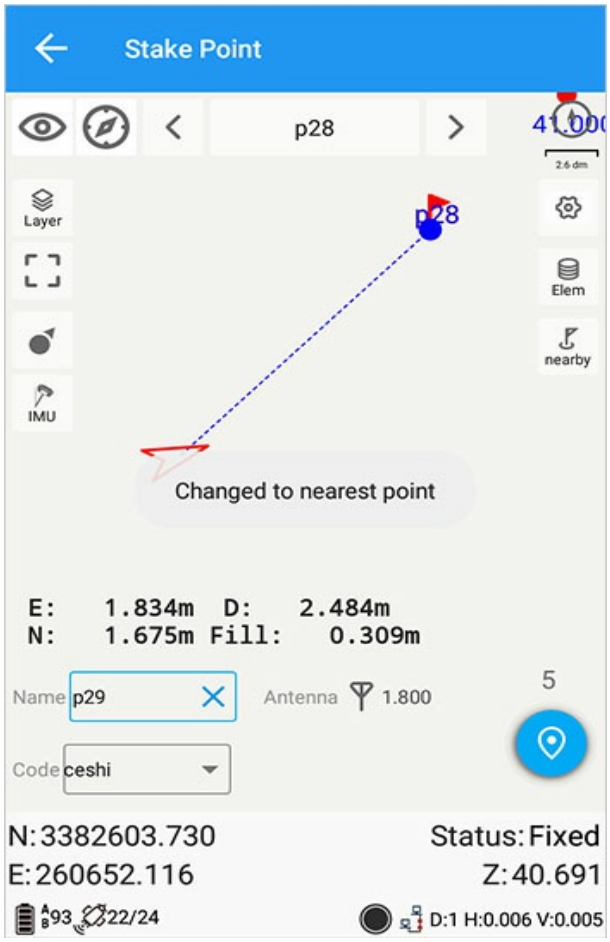
2. Point Design Elevation



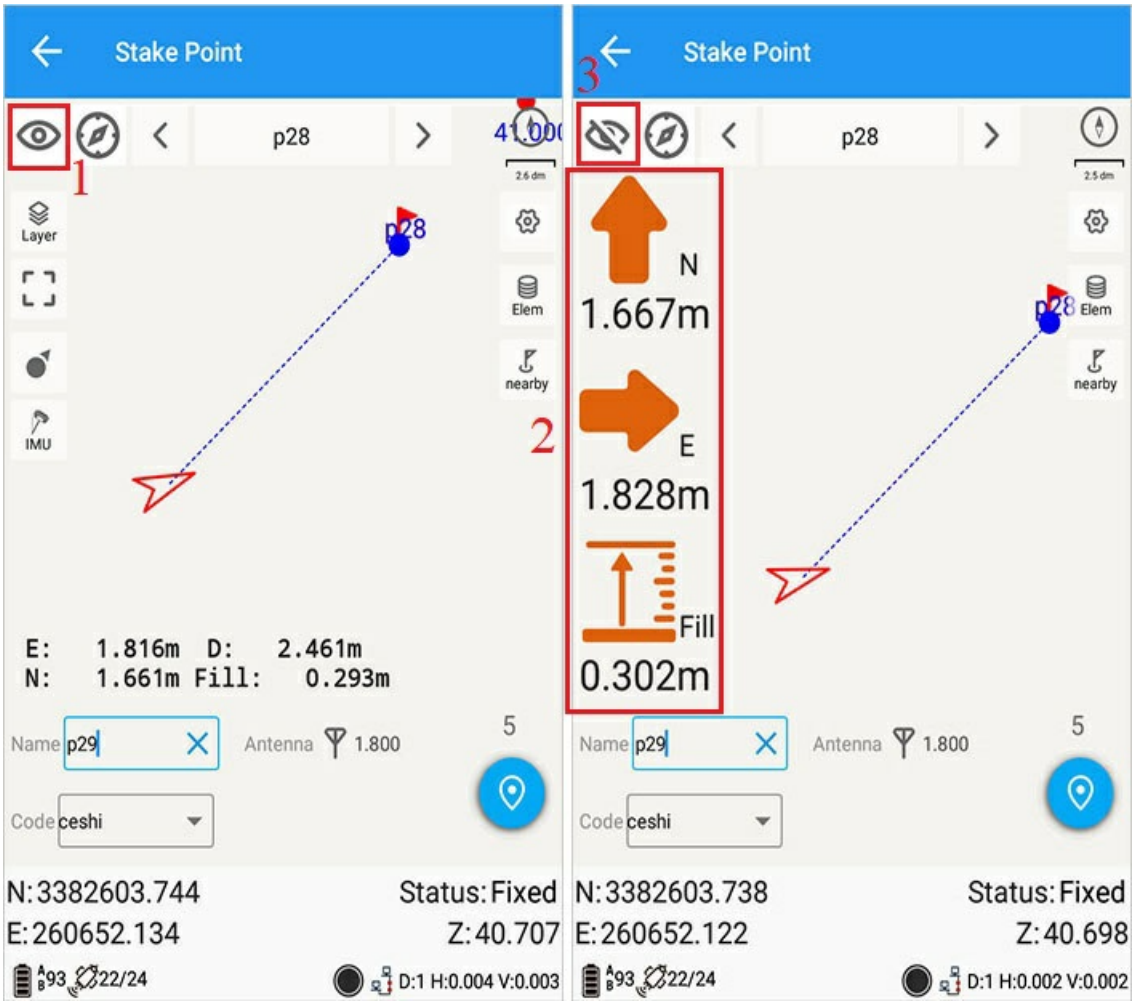
Click the icon 1 in the upper left picture, you can jump to edit the design elevation interface, you can modify the height of the stakeout point (such as the icon 2), and other information can be viewed but not edited.

3. Stake out nearby points

Click near the mark to switch the nearby point stakeout.

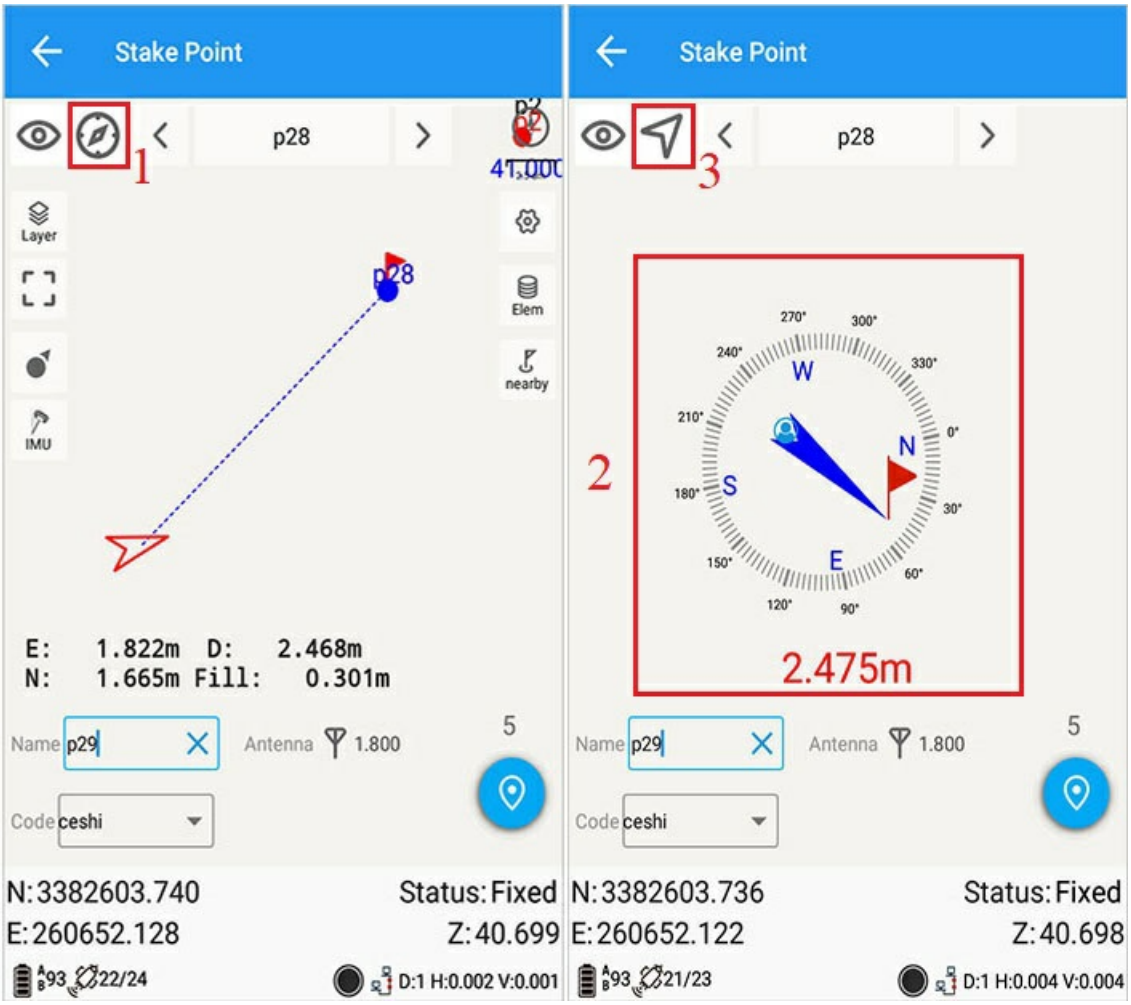


4. Turn on the large font display direction indicator



Click the ① icon in the upper left picture to display the large font (mark ②), and click ③ to close the display.

5. Show compass



Click the 1 icon in the upper left picture to display the compass (mark 2), and click 3 to switch back to the map.

6. Options

For details, see Measurement Options.

7. Solve reset

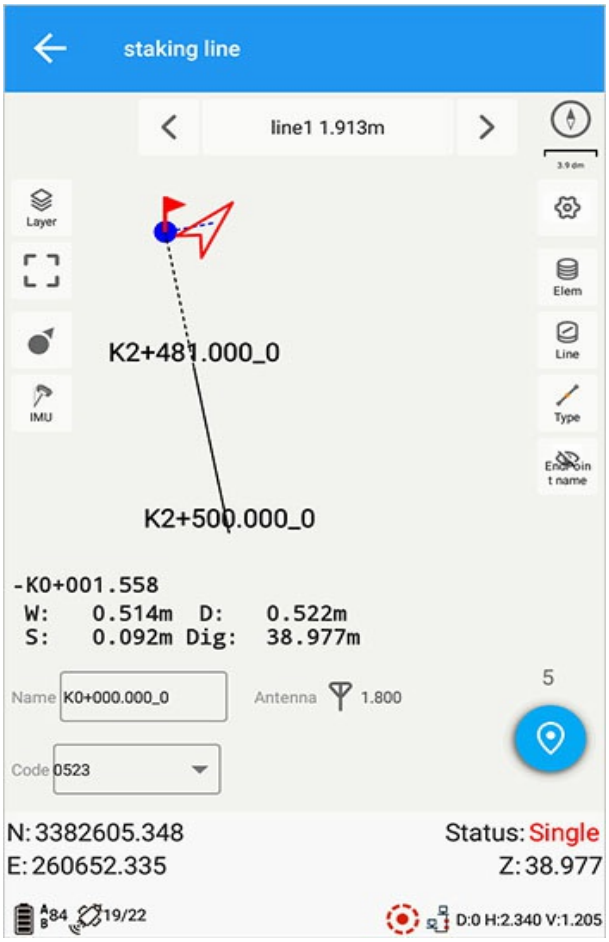
The same point measurement is consistent, and the differential signal function is re-acquired.

Line Stake

Interface icon meaning<

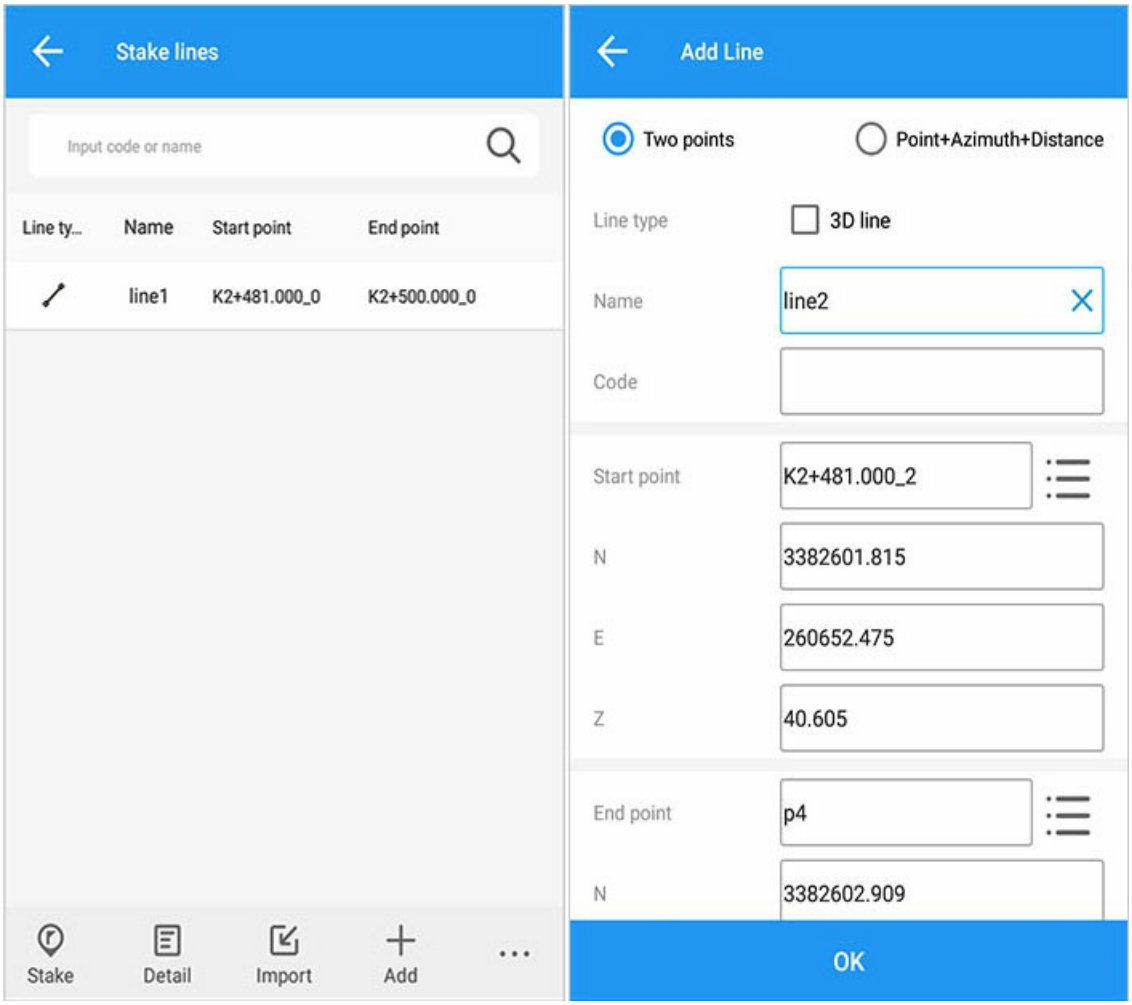
Icon	Meaning	Icon	Meaning
<	Previous line		Settings
>	Next line		Point library
	Layer Options		Line Library
	Full Screen		Method
	Single POV		Reset
	Multi POV		Endpoint name control

Main interface ->【Survey】->【Line Stake】.



1.Line Library

Click [Line Stake] if there is no stakeout line in the current task, first enter the line stakeout library. If there are stakeout lines, click the line library icon on the right interface to enter the line library.



1.1. Add Line

Lines can be added by two points, starting point + azimuth + distance, and the input information is as follows:

【Three-dimensional line】 If selected, it is a three-dimensional line, otherwise it is a two-dimensional line without elevation;

> 3D Line: The pile points are calculated in space when staking out, and the pile points are calculated horizontally when not selected.

[Name] is the name of the line. By default, the first line of the task is line1 and the second line is line2, and so on. You can also customize the input. 【Code】Line code, you can customize the input, see Code Set for details. [Starting point] is the starting point of the line, you can customize the input, or click the icon. 【N】Input coordinate numerical value, must be input. 【E】Input coordinate numerical value, must be input. 【Z】Input coordinate numerical value, must be input. **Input when constructing a line with two points** [End point]: It is the end point of the line, which can be customized and input, or click the icon. 【N】: Input coordinate numerical value, must be input. 【E】: Input coordinate numerical value, must be input. 【Z】: Input coordinate numerical value, must be input.

When starting point + azimuth + distance, enter 【Azimuth】from the true north as 0 degrees 【Slope】plus or minus 90 degrees 【distance】horizontal distance

【Starting point number】 The starting point number when the line is staked

1.2. Stakeout

Click Select Line > to stake out.

1.3. Edit, Import

【Details】 Click to select line > 【Details】to view or edit lines; 【Import】 Select the line file to be imported > 【Confirm】

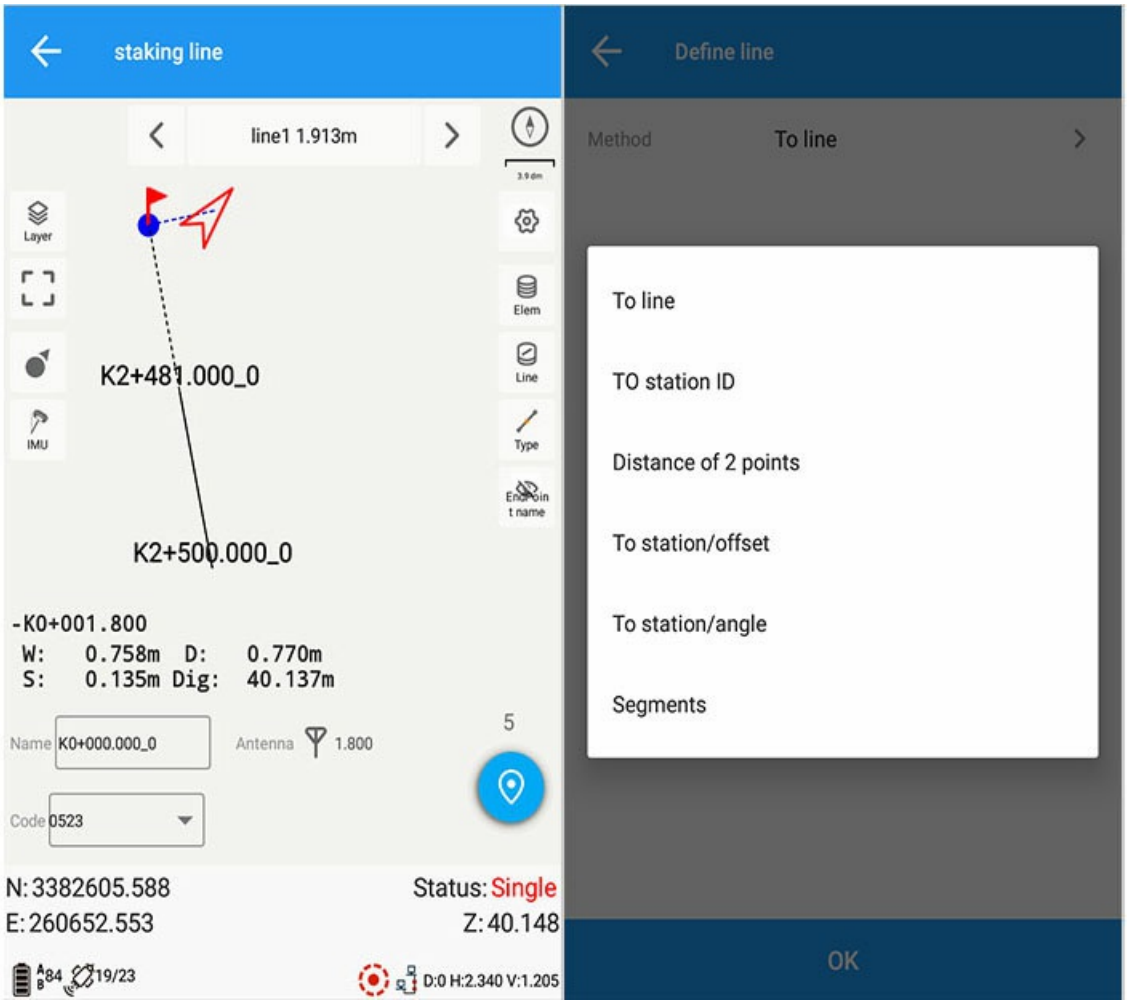
1.4. Delete, Clear

【Delete】 Click the selected line > 【Delete】to delete the selected line;

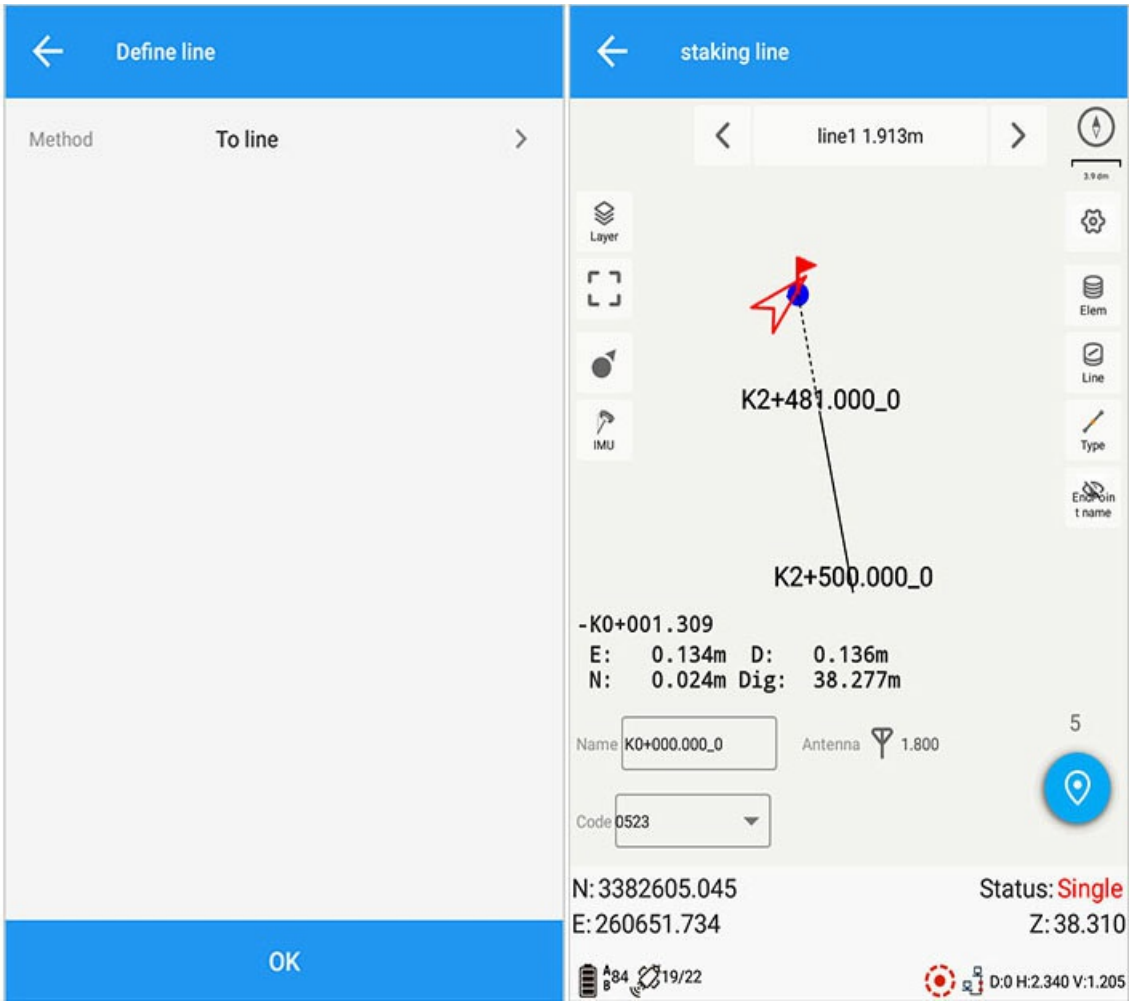
[Clear] [...] > [Clear] Delete all lines in the line library;

2.Method

Main interface -> 【Line Stake】-> 【Method】.



2.1. On Line



On the straight line, find the position of the straight line according to the staking direction indication on the interface:

1) Display the length of the line name and the current stake number: the line name is the current stakeout line and the total length, and the stake number shows the stake number where the current mobile station is located;

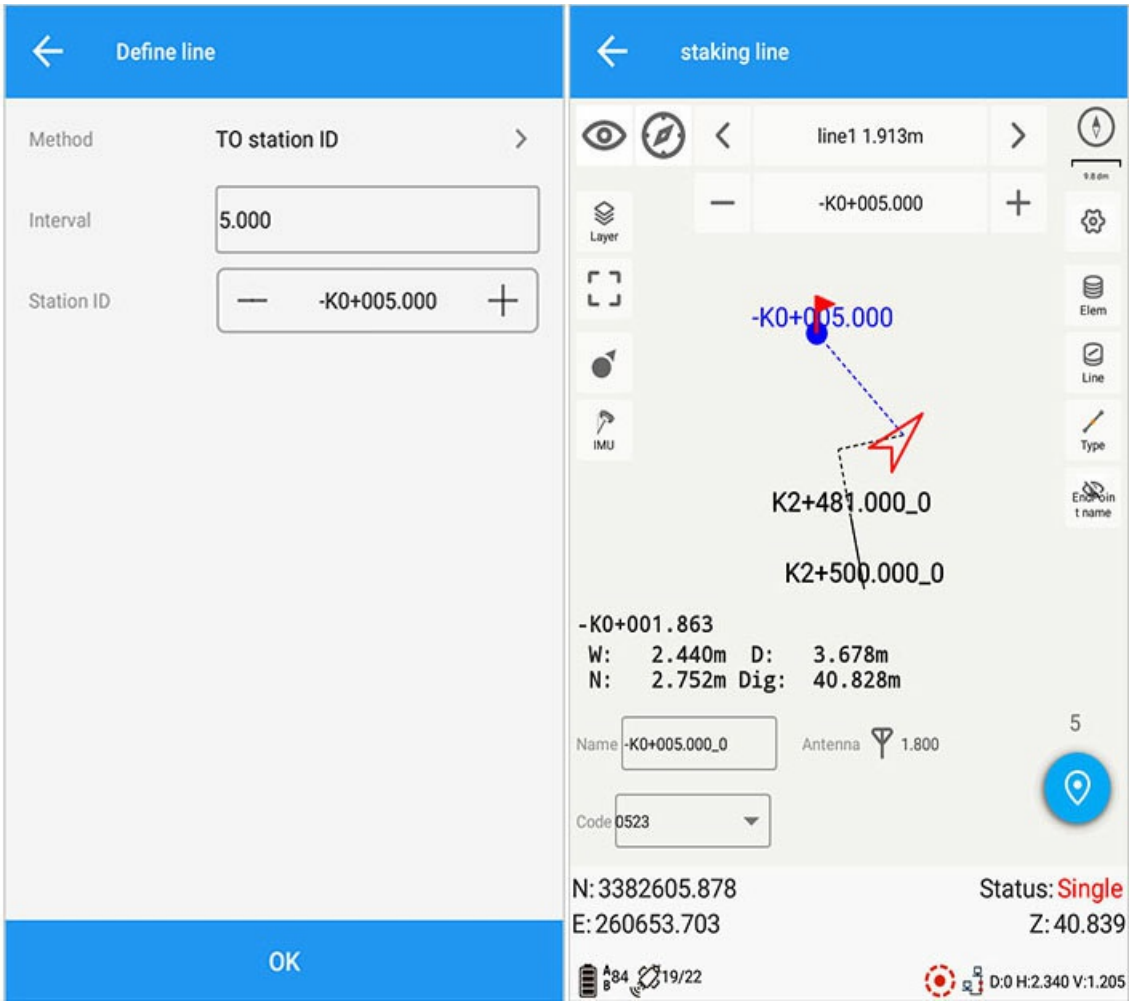
2) Display line and start and end point: display the name of the current stakeout line and start and end point;

3) Display the traction line of the distance line of the current mobile station: display the traction line of the distance line of the current position of the receiver, and display the dotted line when it is an extension line;

4) Display the connection between the current position of the receiver and the starting point and the ending point;

5) Display the vertical distance between the receiver pole ground point and the line (dotted line).

2.2. Straight Line Stakes

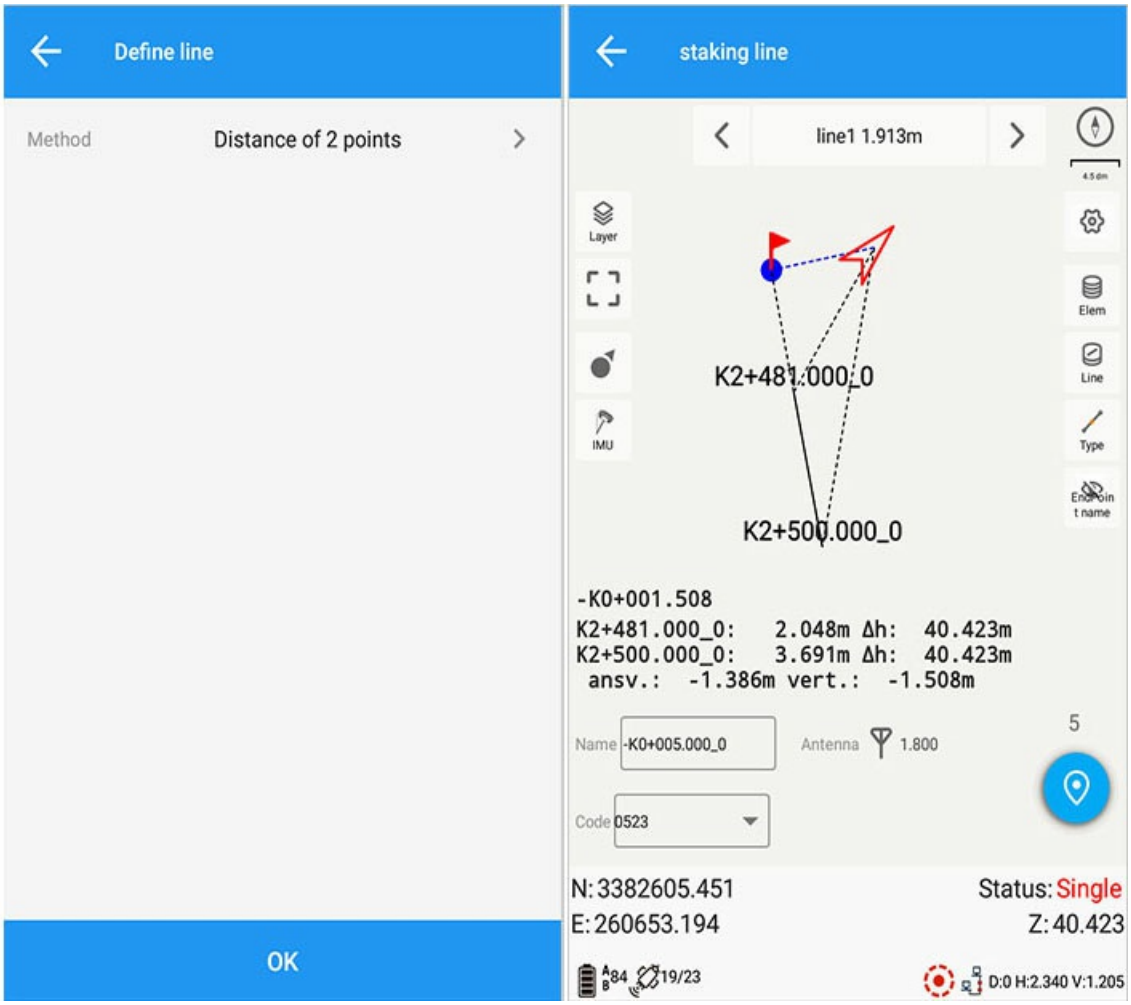


1) Stake distance: the current stake interval distance can be input by the user;

2) Stake number: the current stake number, the stake number refers to the current straight-line distance calculated from the starting mileage of the starting point to the current position (it can be added or subtracted, step by step according to the distance between the stakes, and can also be input by yourself)

Adding stakes and subtracting stakes: The addition or subtraction is performed with the currently set stake distance, and the current stake distance value is displayed when the distance is 20m (simultaneously displayed according to the settings in the method, or can be set directly in this graphical interface).

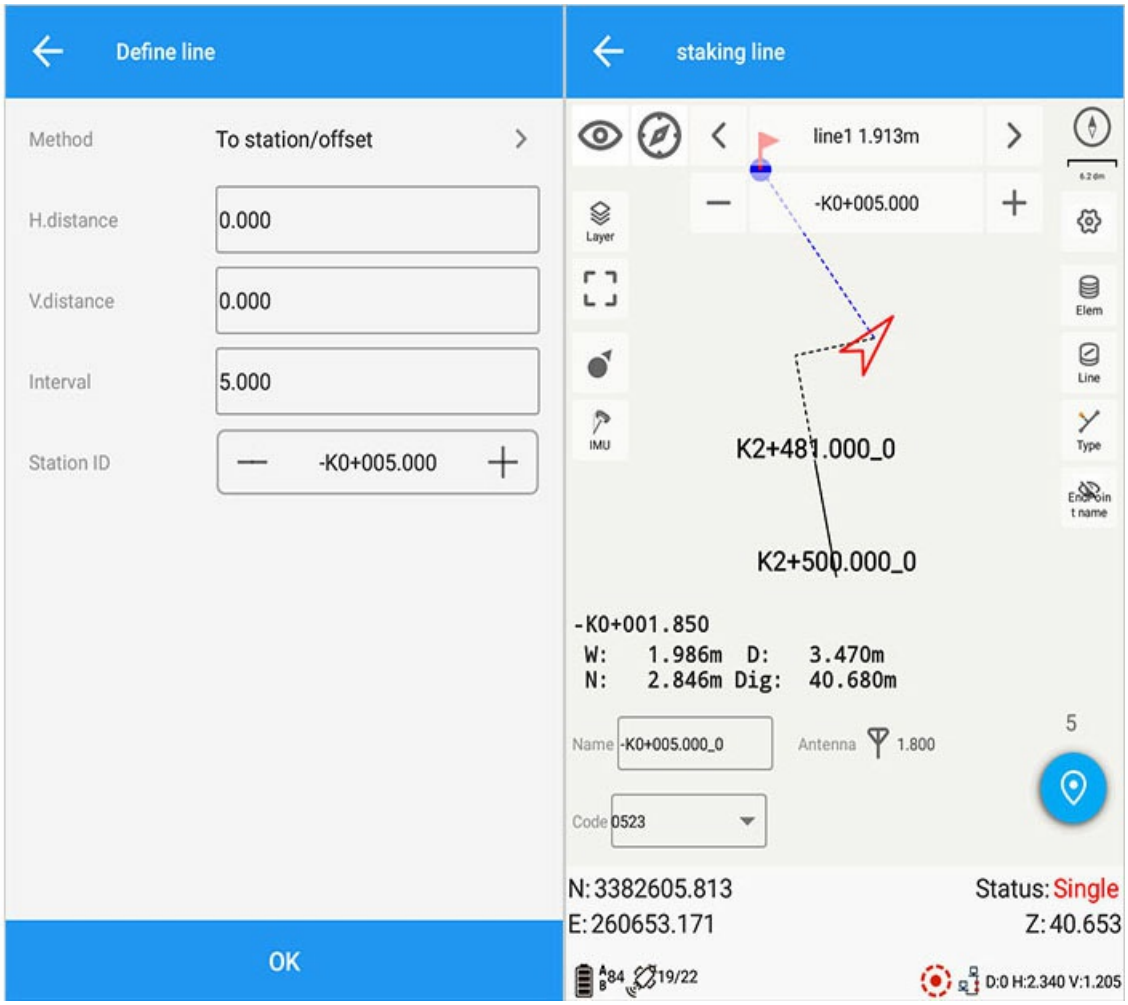
2.3. Distance Between Points



1) Two-point distance: The currently displayed bearing indication uses the two-point distance height difference, which corresponds to the distance height difference from the start point and the end point, as well as the corresponding horizontal offset and vertical offset.

The graphic display is roughly the same as the graphic on a straight line, and the azimuth indicator shows the distance from two points.

2.4. Stake Offset From Line



1) Horizontal distance: plane distance (left negative, right positive);

2) Vertical distance: vertical distance (upper positive, lower negative);

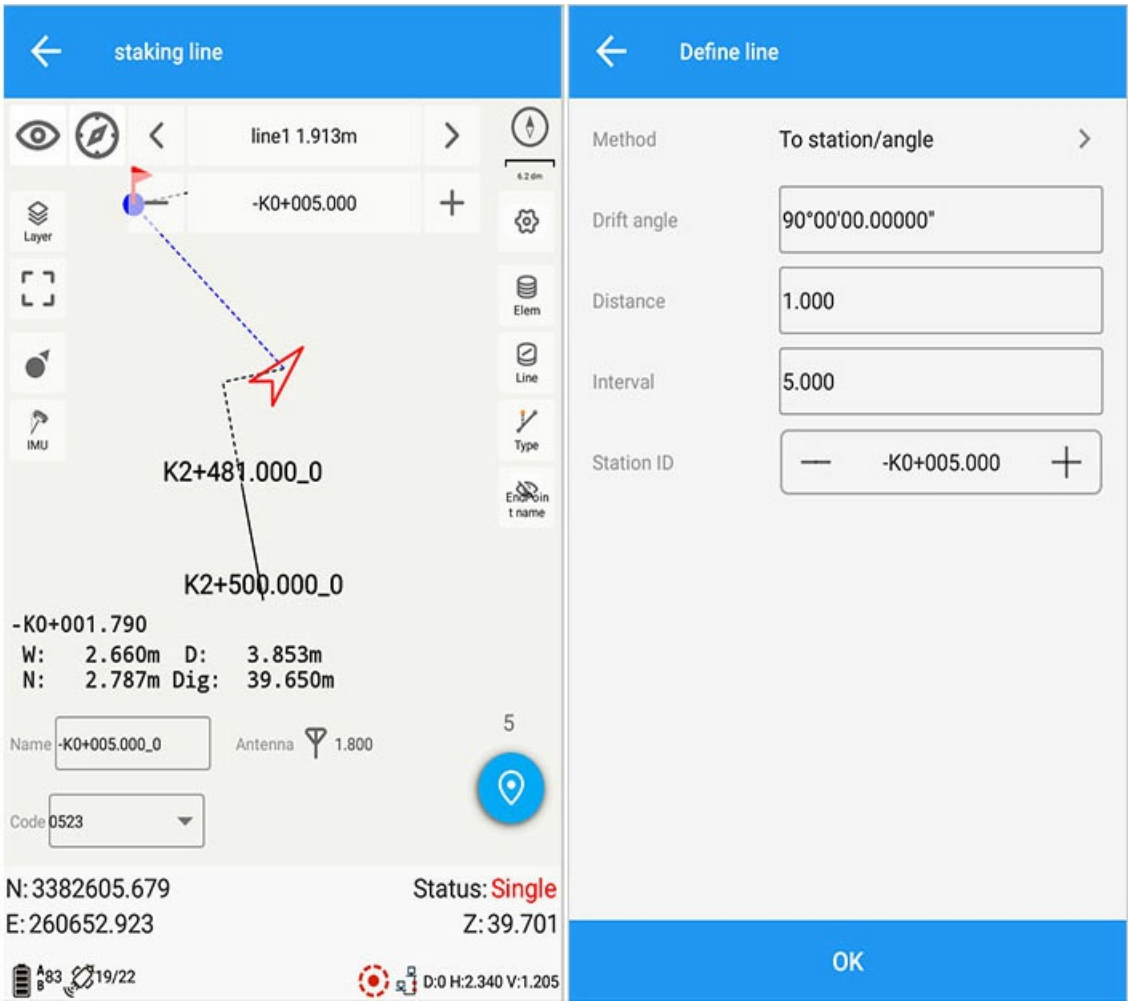
3) Stake distance: the distance between the current stakes (users can customize the input);

4) Stake number: the stake number to be staked out (additional or subtractive, step by step according to the stake distance, or can be input by definition).

Adding stakes and subtracting stakes: the addition or subtraction is performed with the currently set stake distance, and the current stake distance value is displayed at 20m (simultaneously displayed according to the settings in the method, or can be set directly in this graphical interface).

The graphical interface displays the distance between the current moving site and the current stake and the offset pulling line (when the stake is 0, it is the starting point, and a dotted line is displayed on the extension line), and the distance to the current point plane that needs to be offset is the pulling line.

2.5. Station declination from a straight line



1) Declination: Rotation of stake on the straight line or on the chain of the straight line (positive to the right, negative to the left);

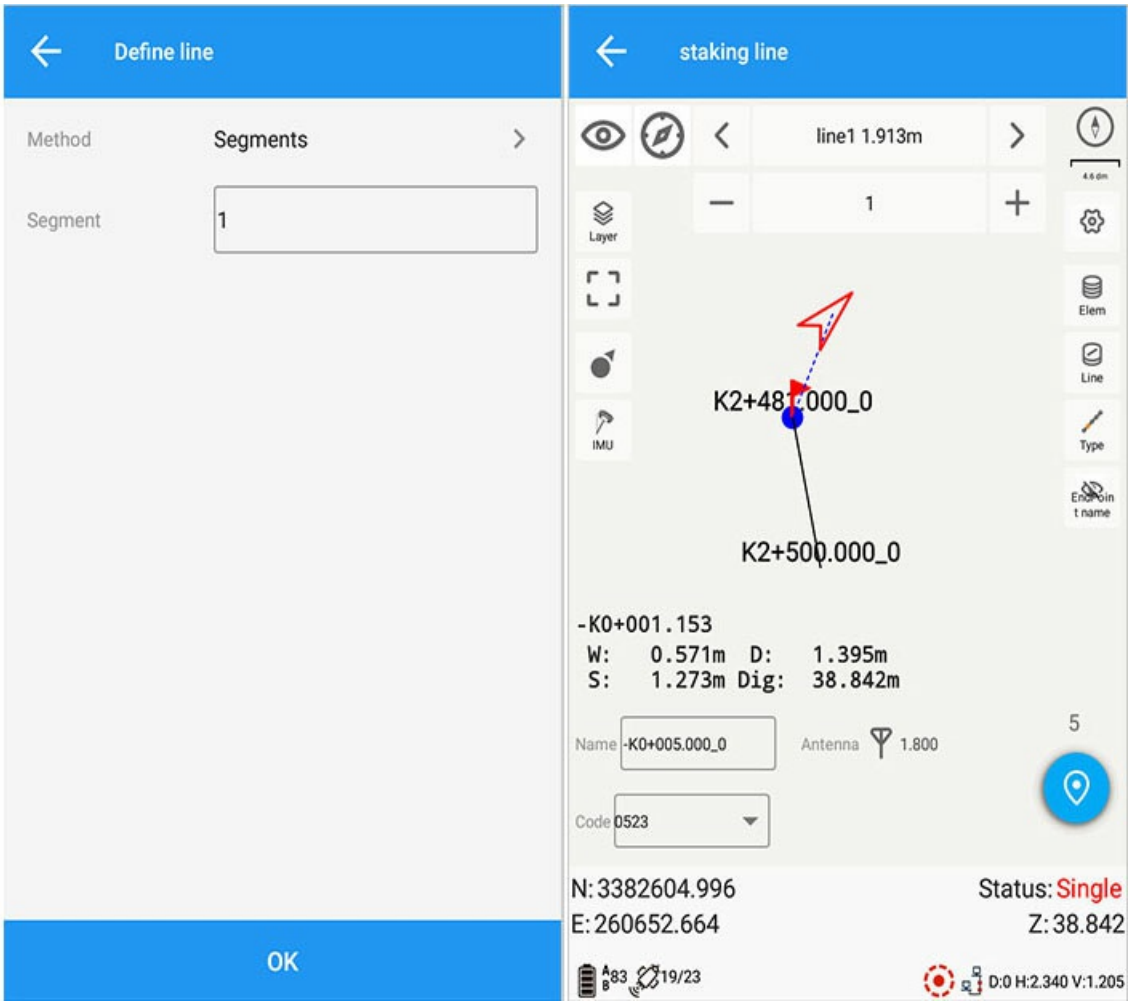
2) Distance: the position of the declination angle of the current required stakeout line. ;

3) Stake distance: the distance between the current stakes (users can customize the input);

4) Stake number: the stake number to be staked out (additional or subtractive, step by step according to the stake distance, or can be input by definition).

The graph displays the currently set rotation angle (if the whole decimal angle is too long to be displayed in the graph, an integer is displayed).

2.6. Segmentation



1) Segmentation: that is, the dividing line;

2) Number of segments: the number of segments currently required to be set (default 1, minimum 1, only integers are supported, addition and subtraction can be customized input);

3) Add segment: add to the next segment;

4) Subtract segment: reduce to the previous segment.

The current segment number is displayed in the graph, and each segment is marked with the current segment and the segment end on the line.

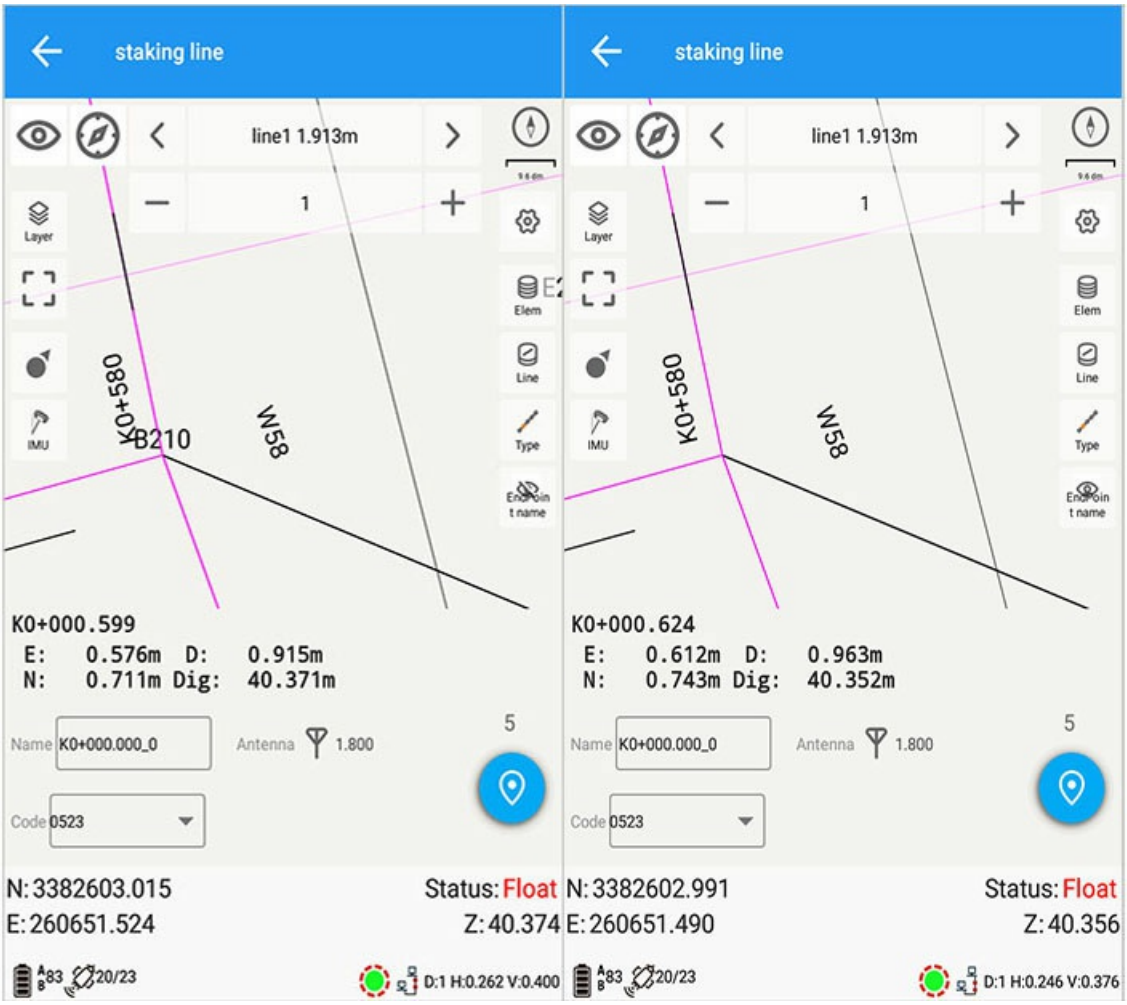
3. Options

For details, see Survey Options.

4. Reset

Reacquire the differential signal to avoid inaccurate spots.

5. Endpoint Name Switch



The Endpoint name switch is mainly used for [Tasks]->[Import Basemap]->[Save Line to Line Library], this function is also applicable if [Save Line End Point to Point Library] is checked.

The default endpoint name is displayed, when the endpoint name switch button is clicked, the endpoint name is hidden.

Note: This function is not available when [Save Line End Point to Point Library] is only checked.

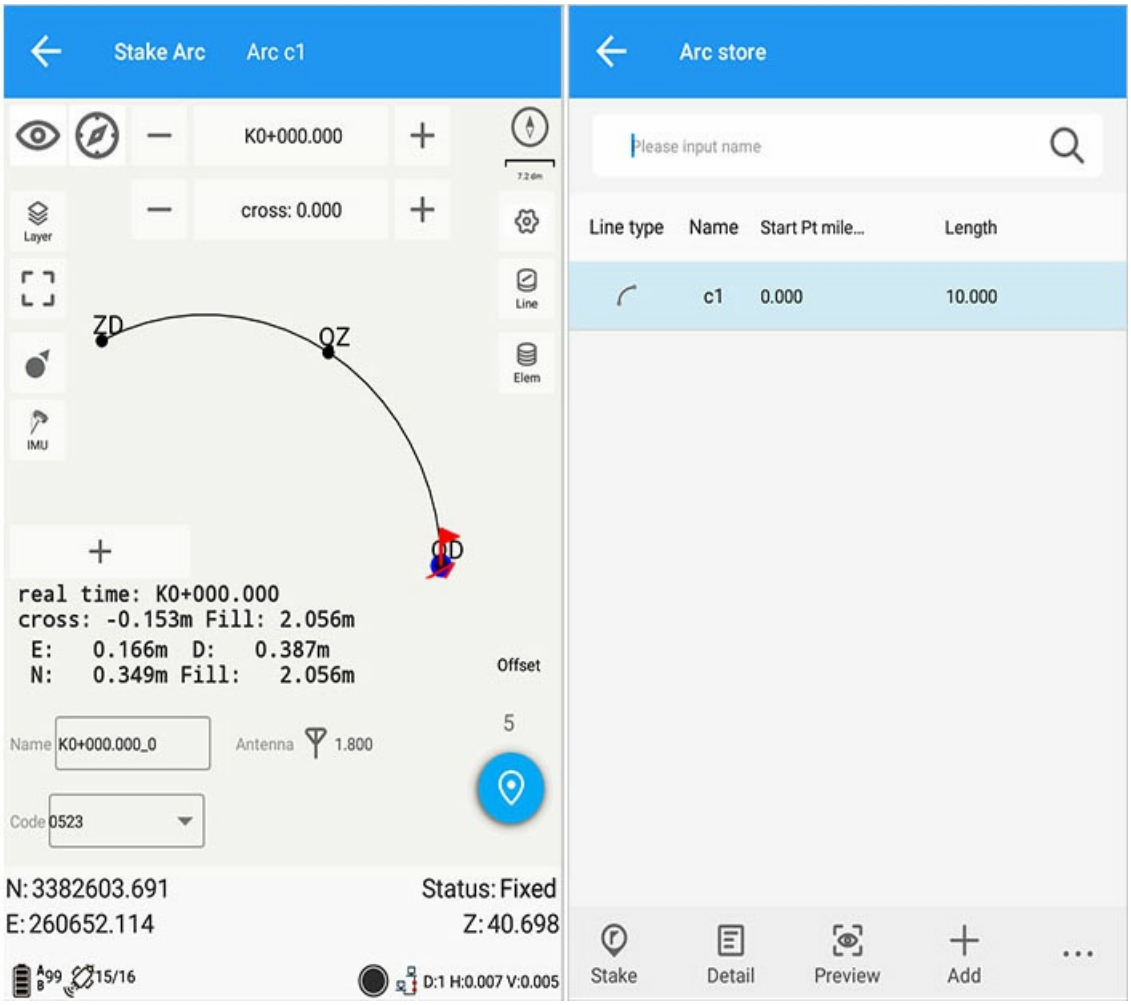
ArcStake

Interface icon meaning

Icon	Meaning	Icon	Meaning
	Layer Options		Settings
	Full screen		Point Library
	Single POV		Line Library
	Multi POV		Direction
	Reset		

Main interface->[Survey]->[CurveStake].

When there is a stakeout arc, enter the stakeout interface; when there is no stakeout arc, enter the arc library.



Staking Graphical Indications:

1) The guide bearing scale is displayed in the graph;

2) The name of the stakeout arc, click the left and right arrows to switch the stakeout previous or next arc;

3) The current stake number is displayed below the stakeout arc name, click the plus or minus sign to add or subtract stakes;

4) The red arrow represents the location of the mobile station;

5) The small red flag represents the stakeout point;

6) Direction indication: the default is southeast, northwest, or you can choose front, back, left, right, and azimuth in the options;

7) Current status: It is displayed as the fixed status of the current mobile station, if it is a base station, it is displayed as a base station;

8) The rotation direction of the pointer in the figure is the current direction.

Stakeout function descriptions:

1) Setting: Please refer to Survey Options for details.

2) Reset: Re-acquire the differential signal.

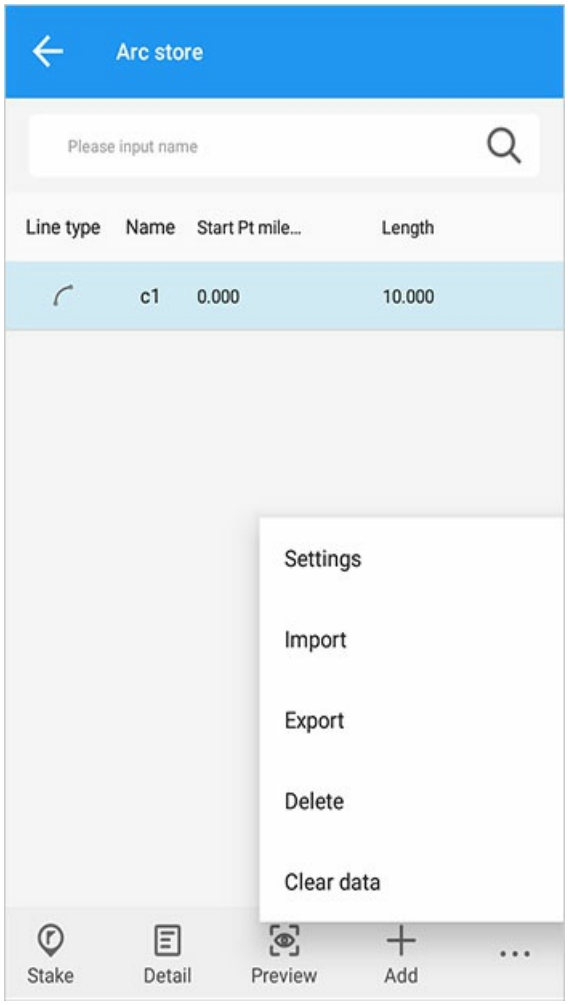
3) Line library: jump to the curve staking library.

4) Point library: Jump to the coordinate point library, please refer to Coordinate Point Library for details.

5) Layer: Please refer to Point Survey for details.

Curve Library

Click the curve library icon on the right interface to enter the staking curve library.



Curve library operations：

1) Stake out: select the line to stake out;

2) Details: After selecting the point, you can access the detailed information;

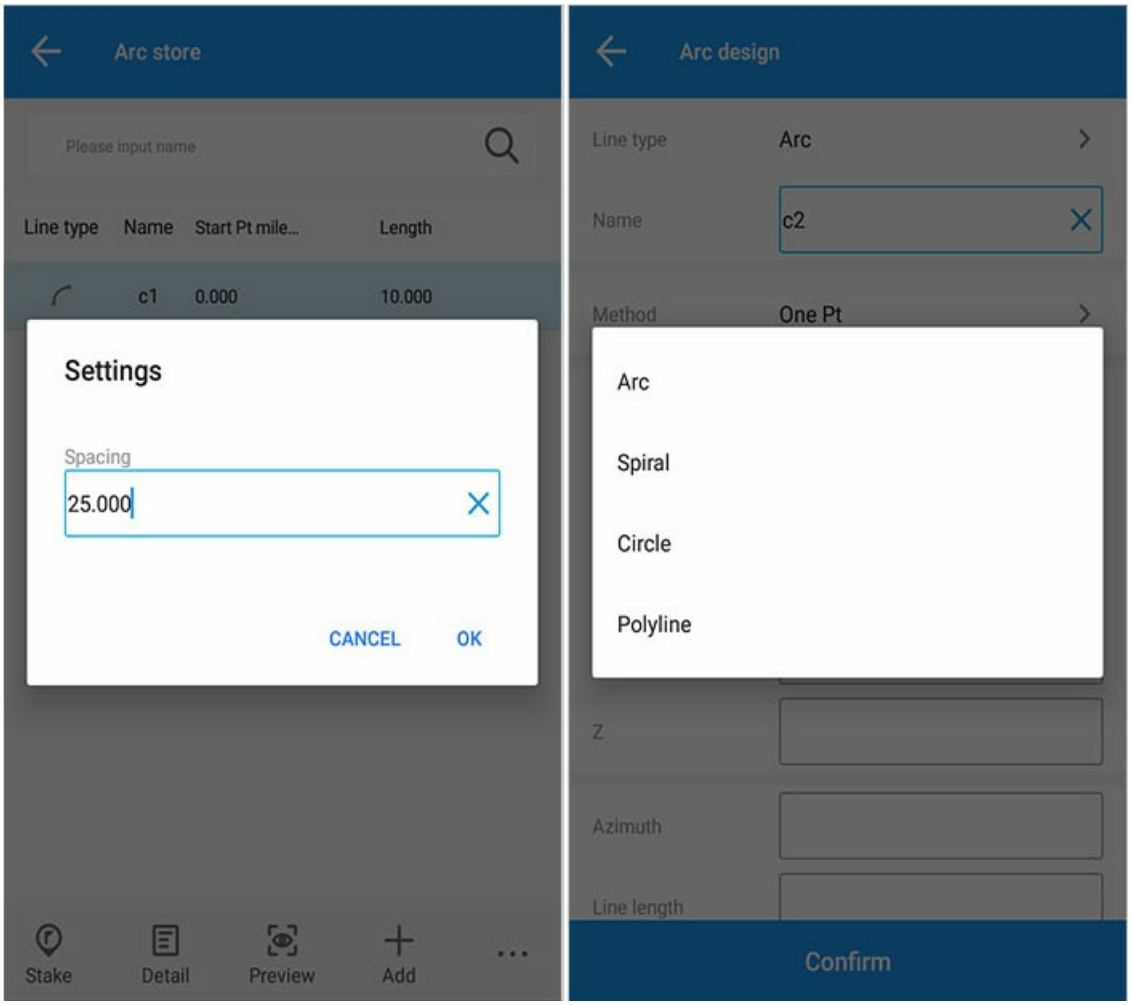
3) Preview: Select the curve, click to preview the graph and pile-by-pillar table;

4) Setting: Set the stake spacing;

5) Three small points: import (quick import staking curve), export (export existing staking curve), delete (delete staking curve), clear (clear staking curve).

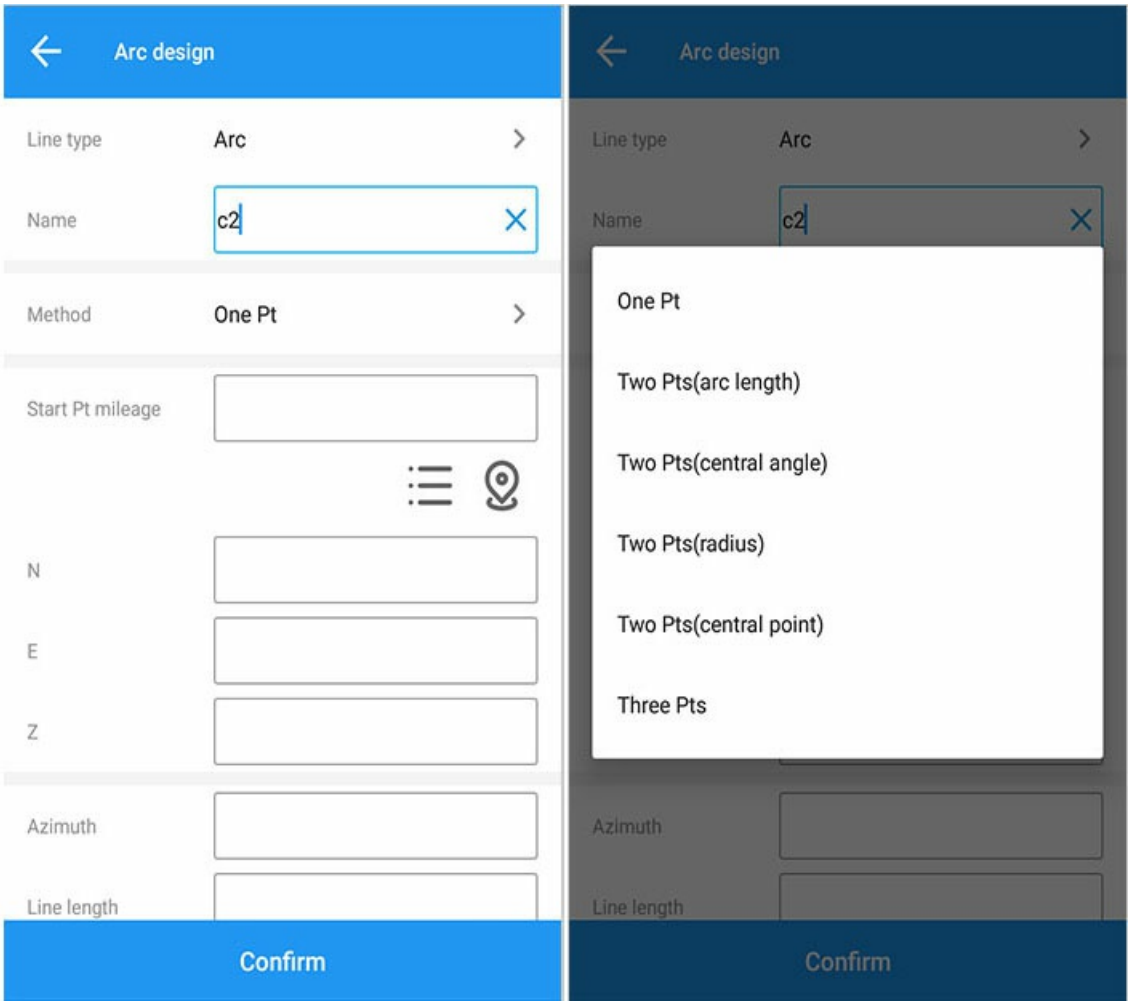
Add Curve

Click the Add button to enter the curve design interface, where you can add circular curves, transition curves, circles and polylines.



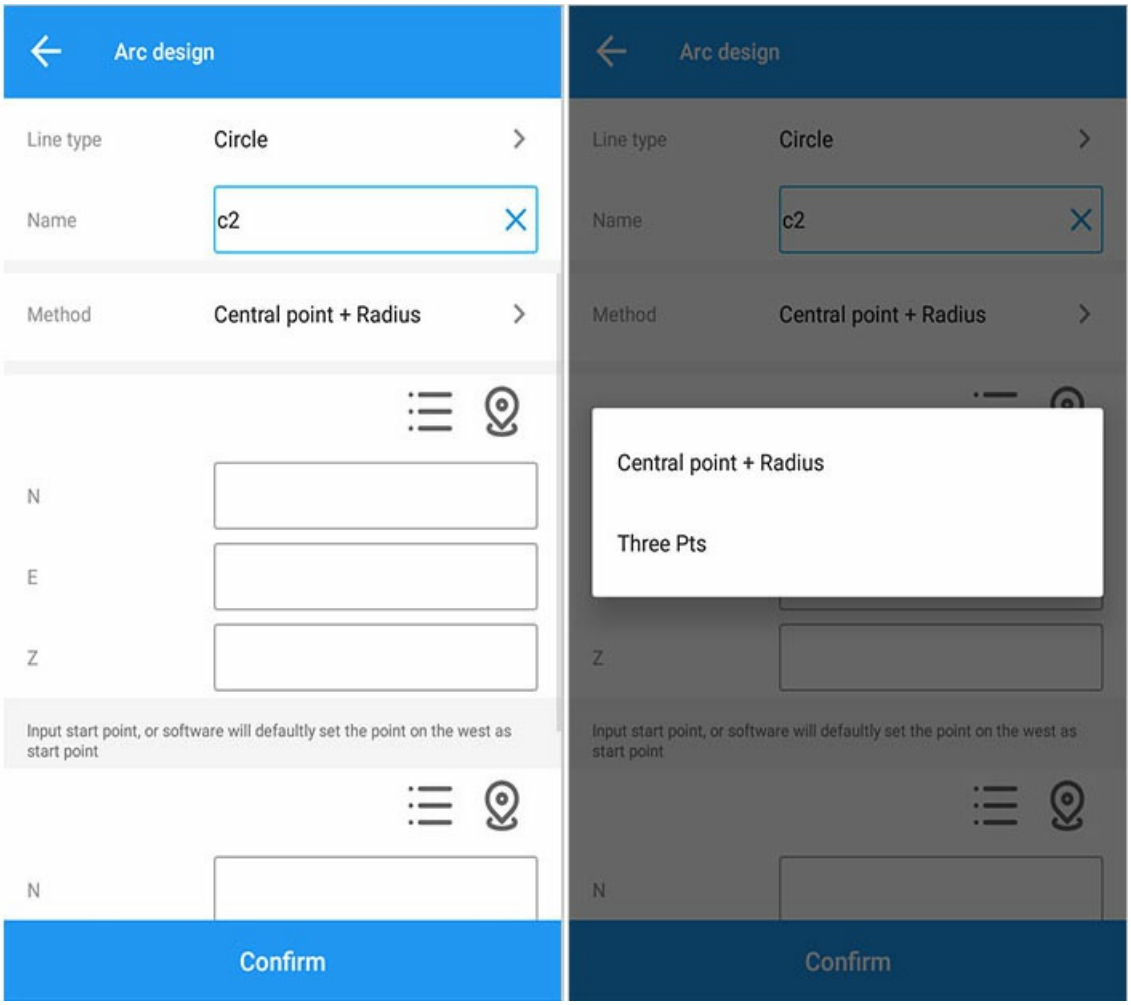
Circular Curves

Methods of adding circular curves: one-point method, two-point method (knowing the arc length), two-point method (knowing the center angle), two-point method (knowing the radius), two-point method (knowing the center of the circle), three-point method; Know the data and choose different ways to add the circular curve.



Circles

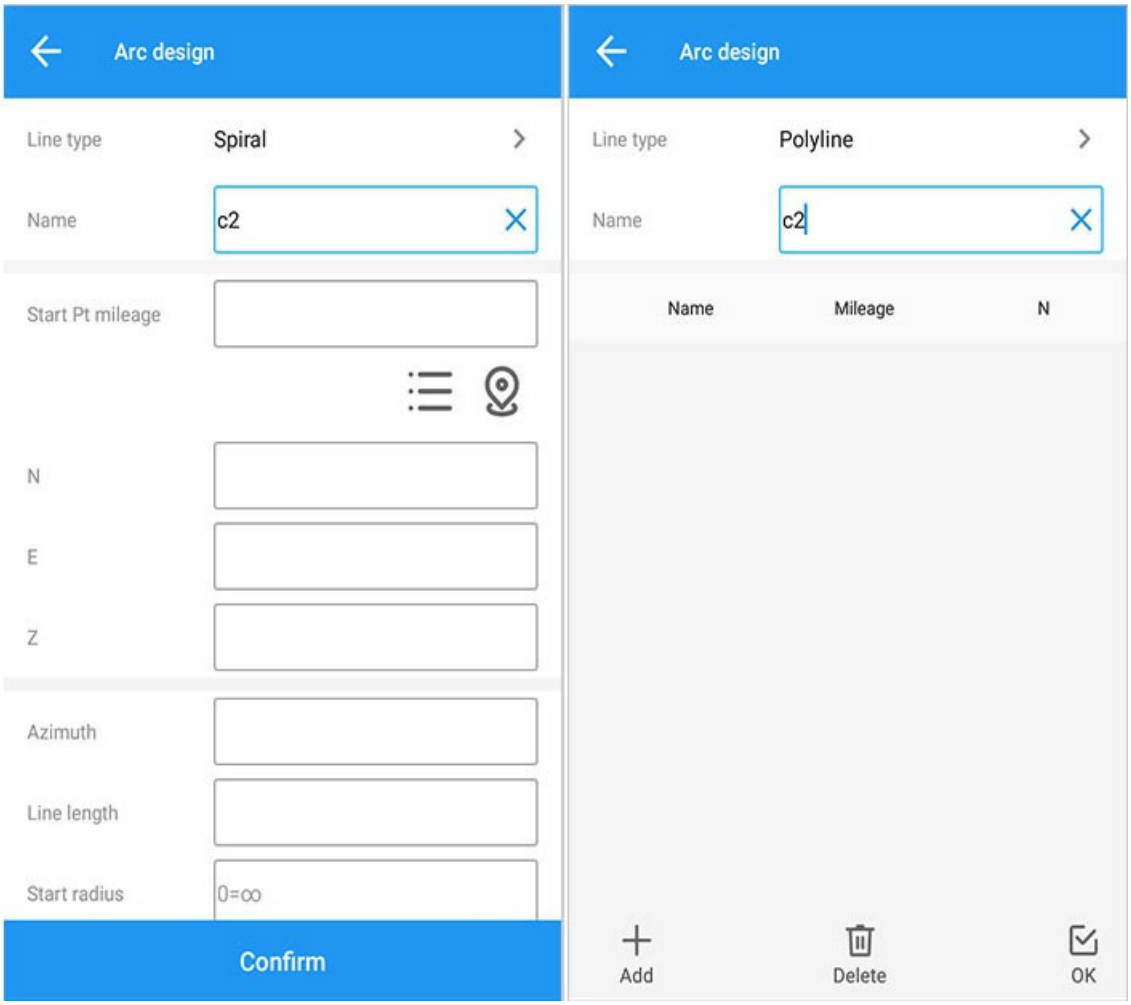
The method of adding a circle: center + radius, three-point method; you can choose different ways to add according to the known data.



Spirals and Polylines

For the parameters of spirals, follow the prompts to enter the parameter information;

Add a polyline: Click the [Add] button to enter the point library, select the point to be added and add it to the polyline point, and click [OK] to form a polyline with the selected points in the selected order.



Options

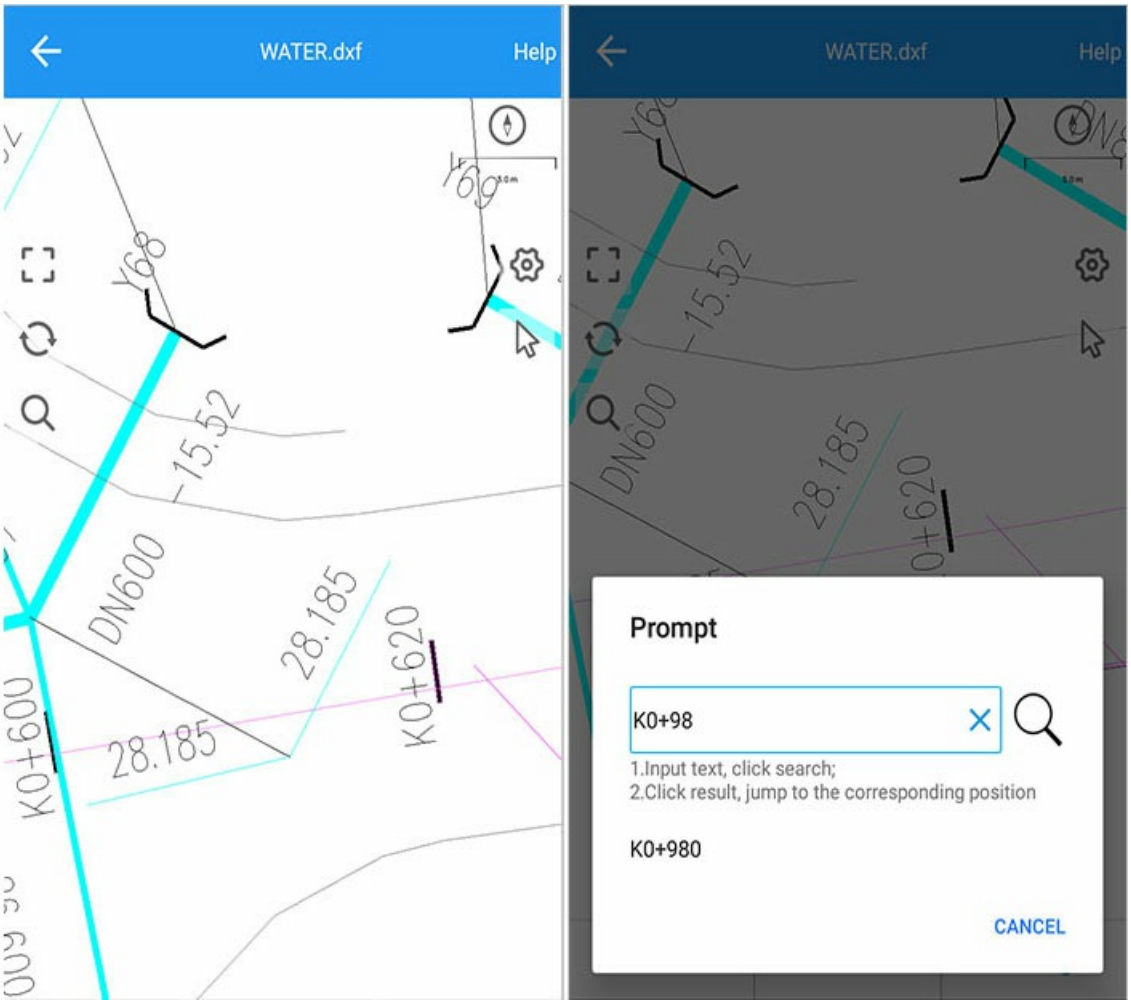
For details, see Survey Options.

CADStake

Interface icon meaning

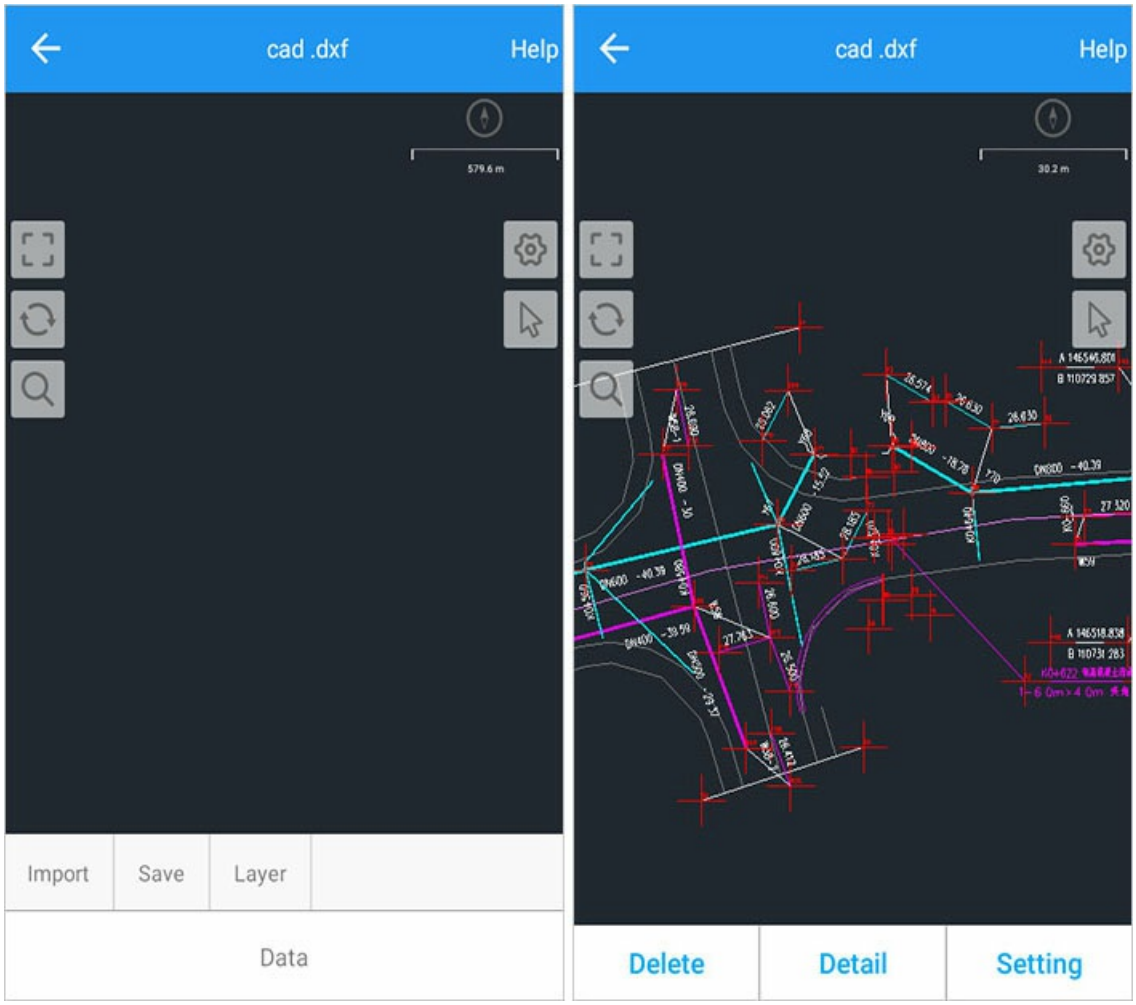
Icon	Meaning	Icon	Meaning
	Turn on enlarged direction display direction indicator		Turn off enlarged direction display direction indicator
	Display compass		Display map
	Last stake		Next stake
	Layer options		Settings
	Full screen		Point library
	Single POV		Nearby Points
	Multi POV		Search

Main interface -> [Survey] -> [CADStake] Click the data to import background, realistic background layer or save background.



【Search】: Enter the point name in the project to search.

【Settings】: Please refer to Survey Options for details.

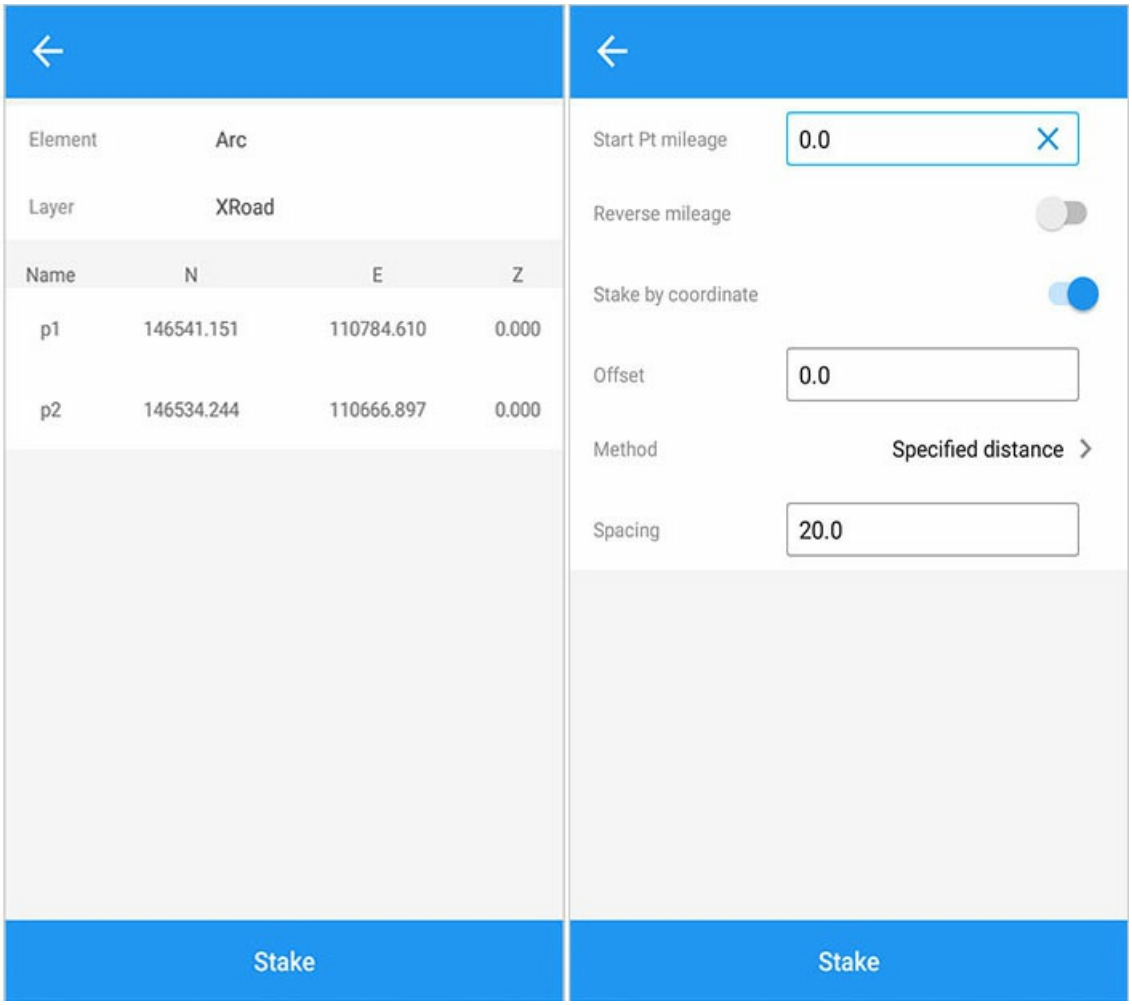


After importing the background, select a line on the basemap, and the feature information and stakeout settings of the line will be displayed:

【Delete】: The line can be deleted. After deletion, click on the blank interface to save the background image.

【Element information】: Including the elements, layers, and key points of the line, select the element points and click the stakeout button to stake out;

【Stakeout Settings】: Set the starting point mileage, stake-by-pile coordinate stakeout, offset distance, and calculation method (specified distance, line segment equalization, key nodes);

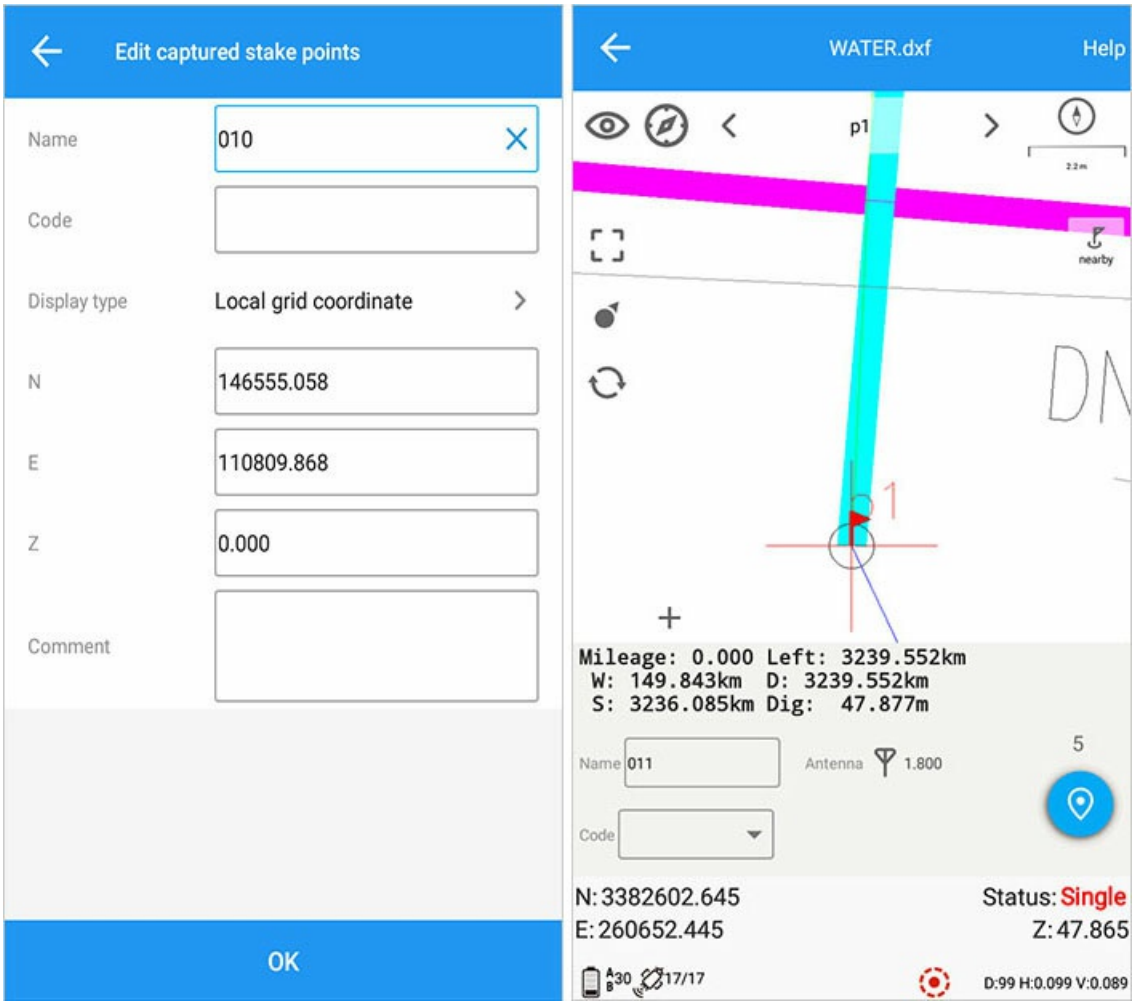


When selecting [Stakeout Method], the calculation method is as follows:

[Specified distance]: the interval distance of the specified line segment;

【Equal division of line segment】: Divide the line segment into the set number of segments equally;

【Key node】: You can click the key point in the line segment, such as "start point", "end point" and so on.



[Point click arrow]: Select the point click arrow, drag the selected coordinate point to set out, and add it to the input point of the point library;

Graphical indication of stakeout interface:

1) The guide bearing scale is displayed in the graph;

2) The red arrow represents the location of the mobile station;

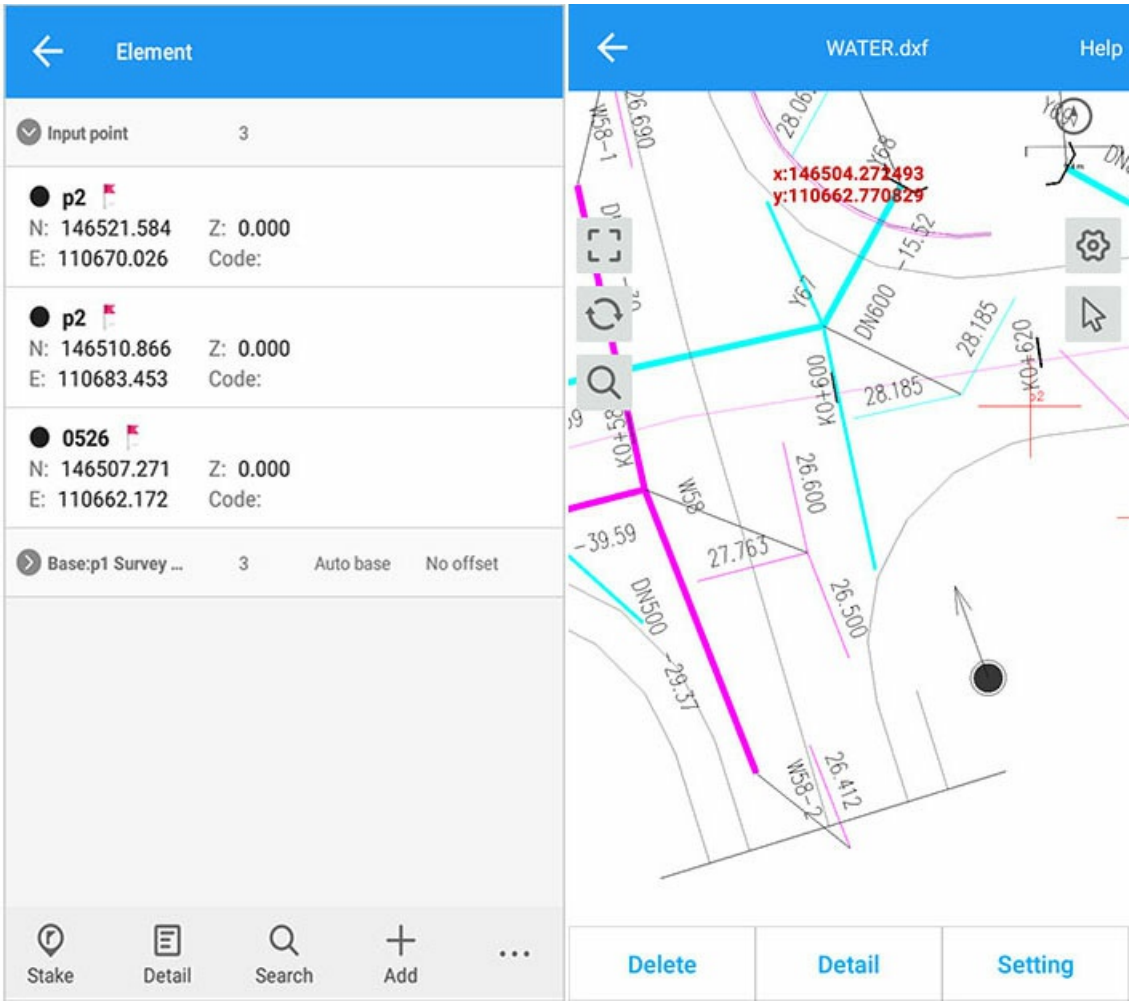
3) The small red flag represents the stakeout point;

4) Direction indication: The default is southeast, northwest, and you can also choose front, back, left, right, and azimuth in the options;

5) Current state: It is displayed as the fixed state of the current mobile station, if it is a base station, it is displayed as a base station;

6) The rotation direction of the pointer in the figure is the current direction.

Stake out point library

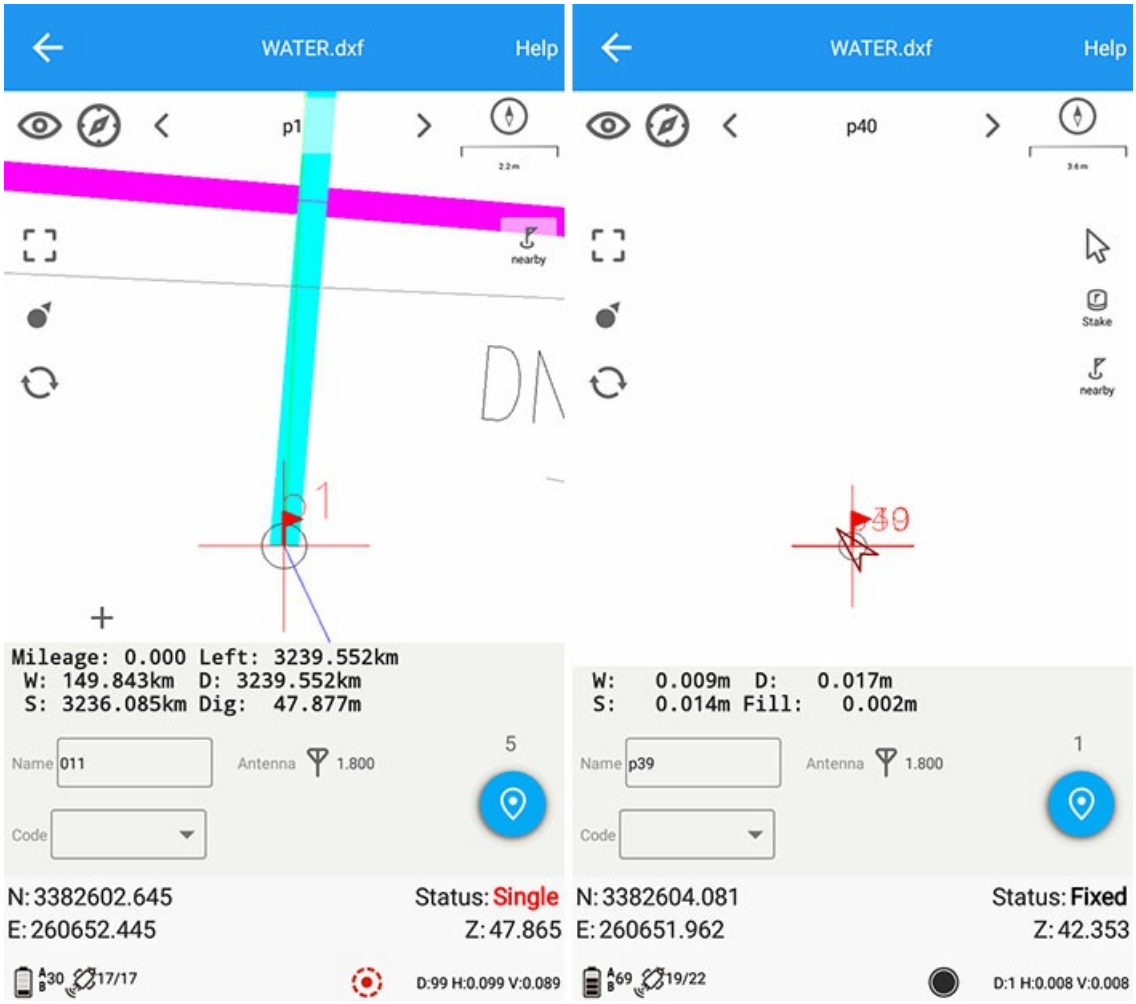


Point library operation

1) Stakeout: select points for quick CAD stakeout; 2) For other detailed operations, see: Stake out point library;

nearby point stake out

Click the attachment button, the stakeout point will be switched to the attachment point at the current position for stakeout.

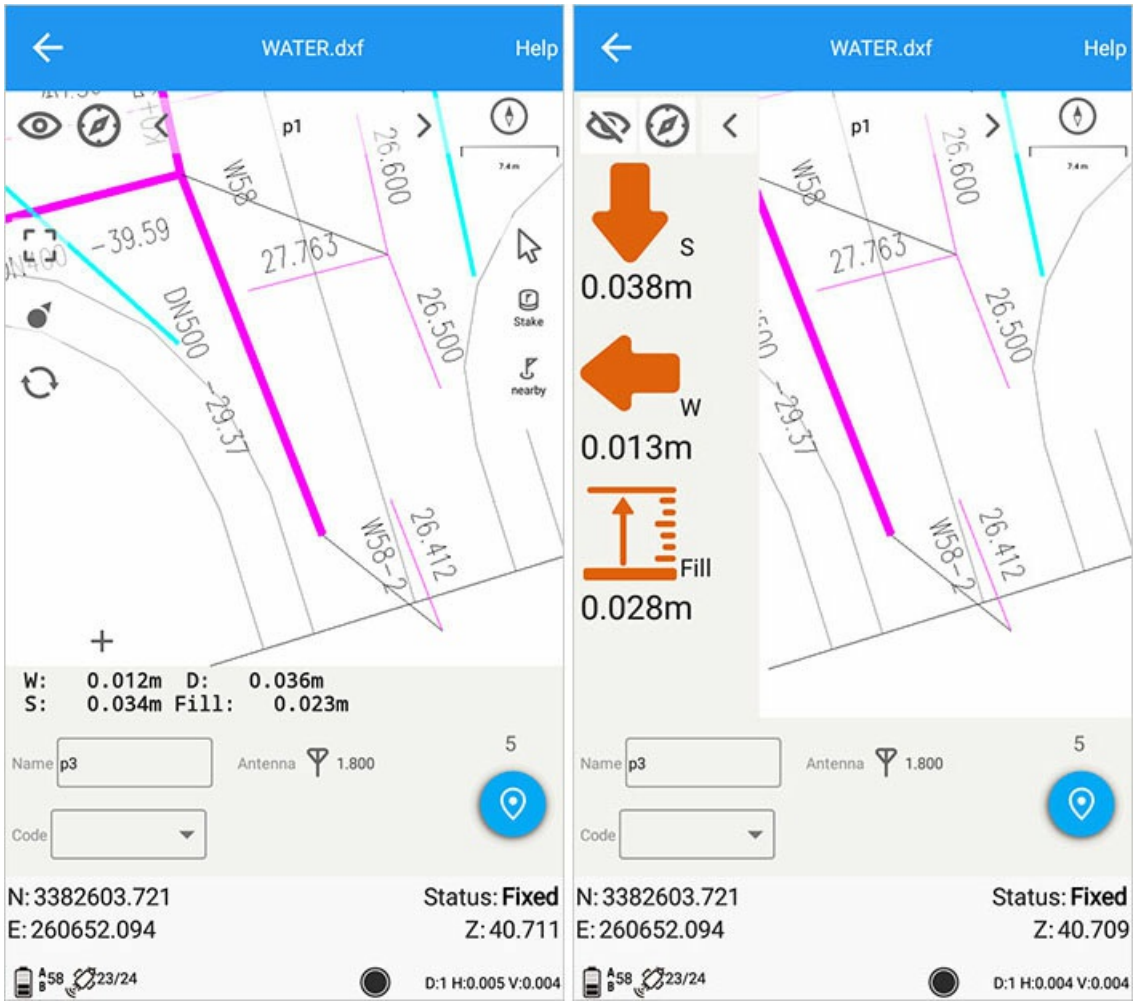


Basemap color

Set the base image color in the measurement survey CAD settings; the base image color is optional: gray, white, black.

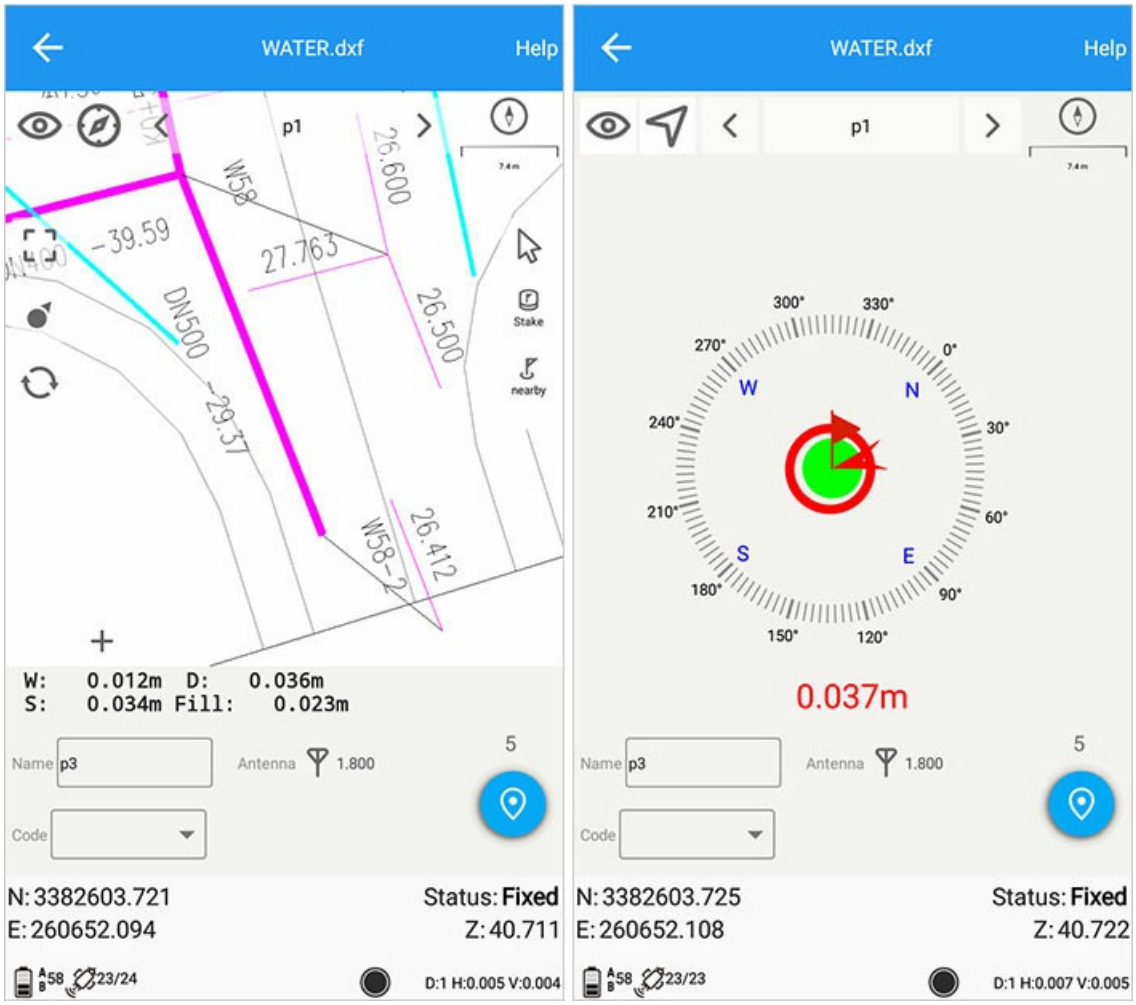
Note: When changing the color of the map, you need to exit the cad stakeout and re-enter for the display to renew.

Turn on enlarged direction display direction indicator



Click the eye icon in the upper left picture to turn on enlarged direction display, click the icon again to turn off.

Display compass



Click the compass icon in the upper left picture to display the compass, and click the icon again to turn off.

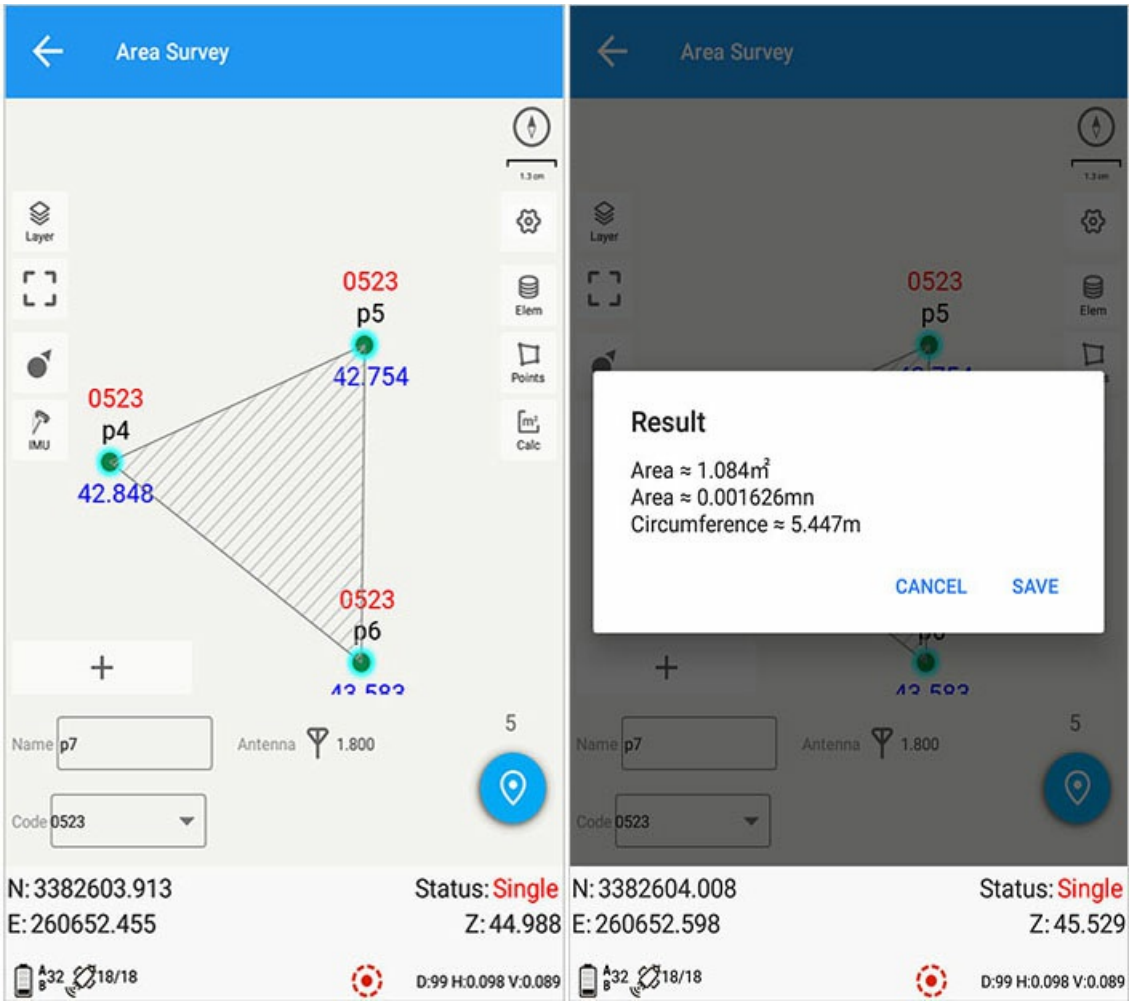
Area Survey

Interface icon meaning

Icon	Meaning	Icon	Meaning
	Layer options		Settings
	Full screen		Point library
	Single POV		Calculate
	Multi POV		Mapped point
	Reset		

Area survey: a quick measurement method to form a map while measuring, and the resulting area can be quickly calculated and stored.

Main interface -> [Measurement] -> [Area Survey].

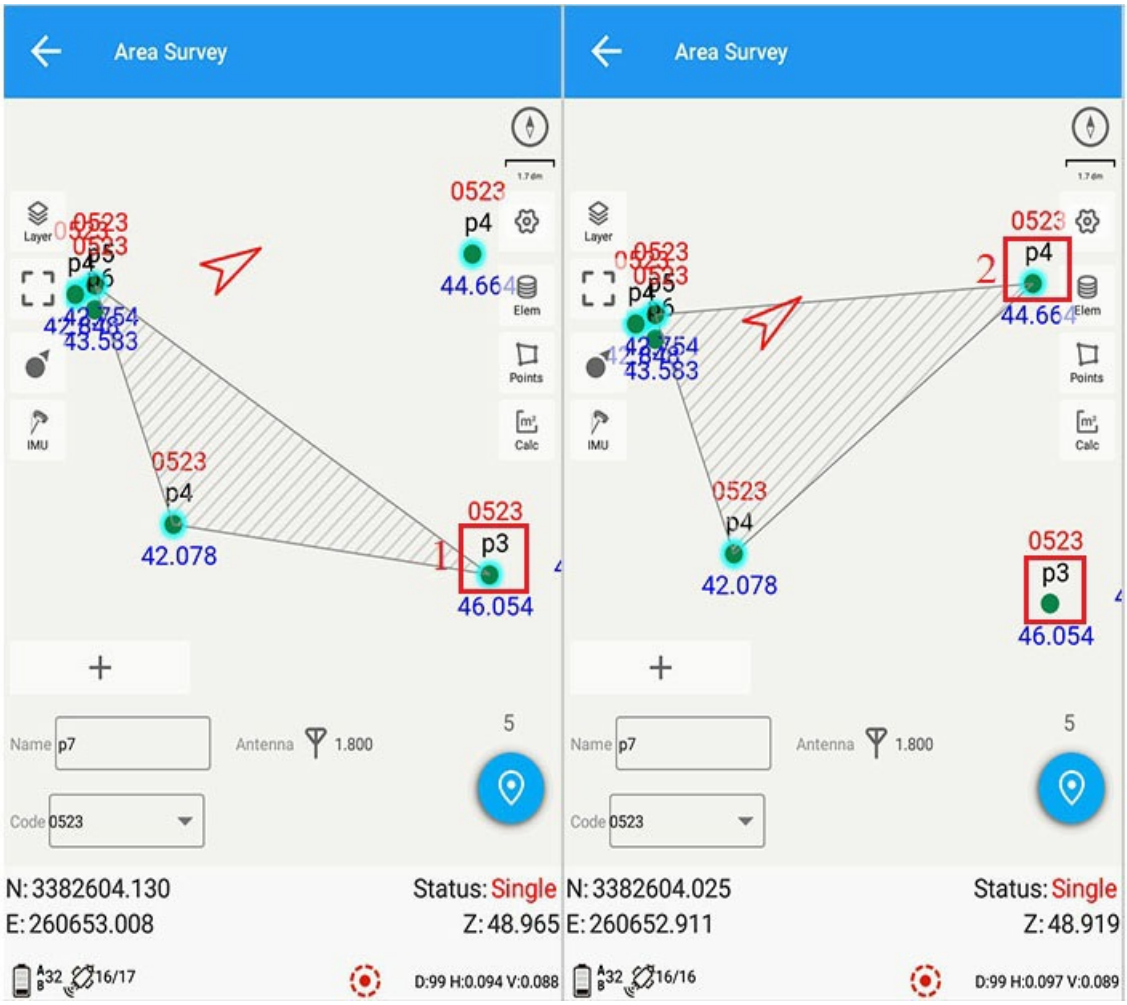


1) Click the surveyed points to automatically close the area according to the order of the points to form a closed area graph (for specific measurements, such as: the common survey settings are the same);

2) Click [Mapped Point] to view the order of the list data, you can long press "Point Name" to adjust the order;

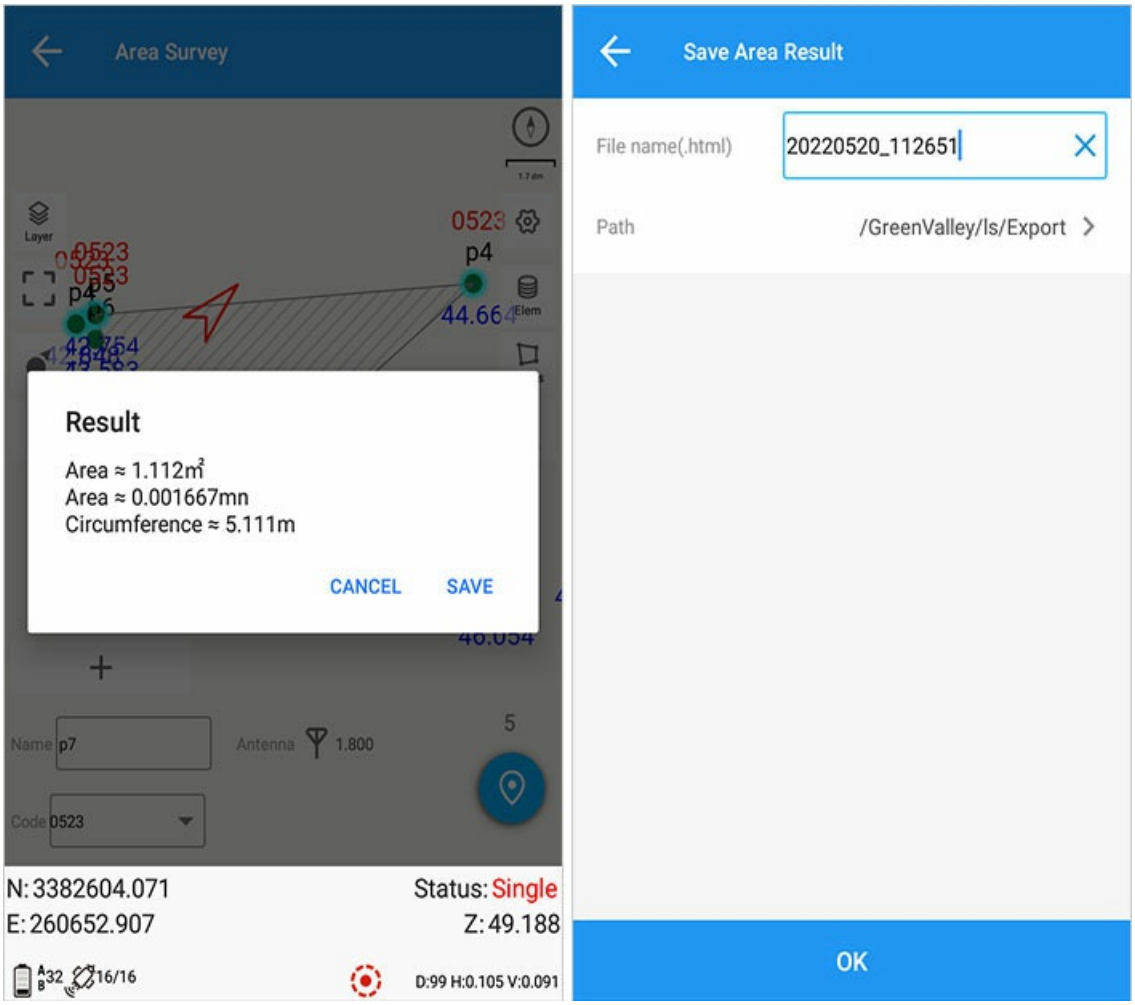
3) Click [Calculate] to calculate the resulting area.

1. Point Editing



Graph editing: Click the point to add and click to delete the area calculation, as indicated by ①② in the above figure.

2.Save Calculation



After clicking save, the current path is defined according to the user output, and the above path is the default path of the software.

Project: 20220520_112651

1. Result

Area:	1.112 m^2
	0.005000 are
Perimeter:	5.111 m
Points:	3

2. Points

Name	Code	N	E	Start time
p5	0523	3382604.040	260652.279	2022/05/23 20:16:54
p4	0523	3382602.909	260652.655	2022/05/23 17:40:11
p4	0523	3382604.143	260654.210	2022/05/23 17:16:26

Open the file in ***.html format, the display result is as shown above.

3.Point List Library

Point library: Click to enter the point library interface, see the coordinate point library for details.

4.Options

See Survey Options.

5.Plot Points

Click [Plot Point] to enter Area Calculation.

6.Point Library

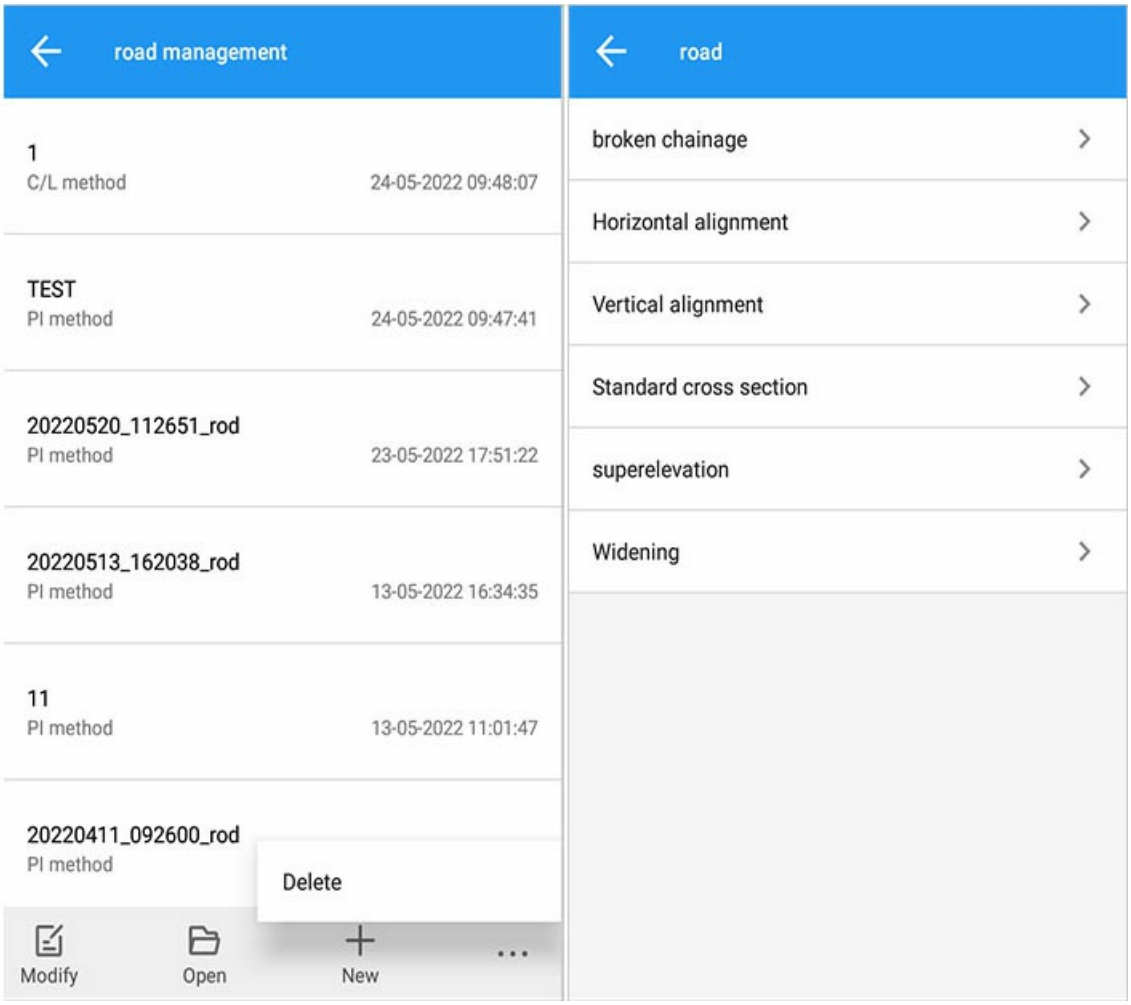
Click [Point Library] to enter [Point Library] (../task/element.html).

7.Reset

Click Reset to reacquire the differential signal.

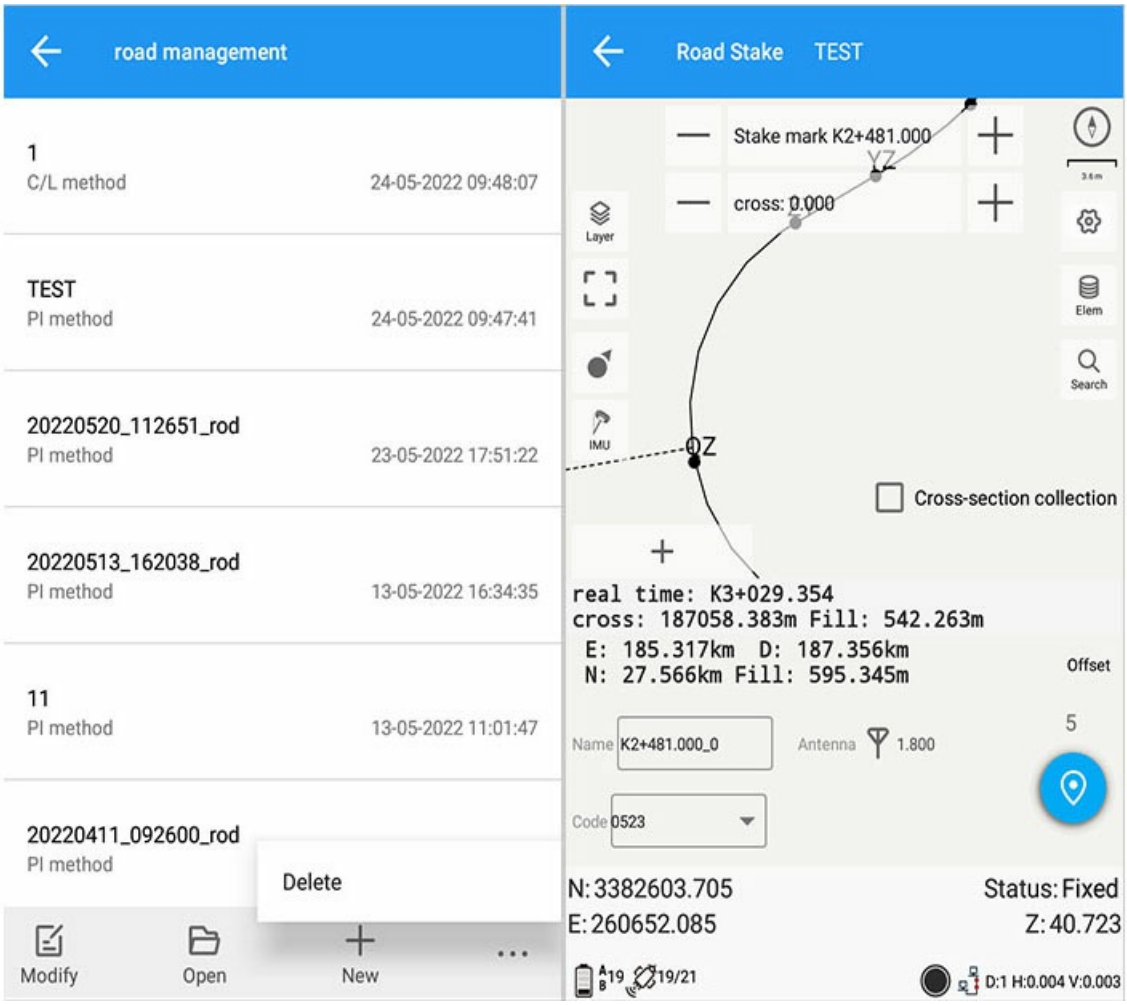
Road Design

Main interface -> [Measurement] -> [Road Design].



1) Edit: Select a road file to edit, and edit the elements of the current road file. 2) Open: Select a road file to open, prompt: road stakeout or traverse survey. Select any one to execute the survey stakeout job. 3) Delete: Select a road file to delete, and prompt: Are you sure to delete it. Confirm to delete, cancel to undo.

Open the road

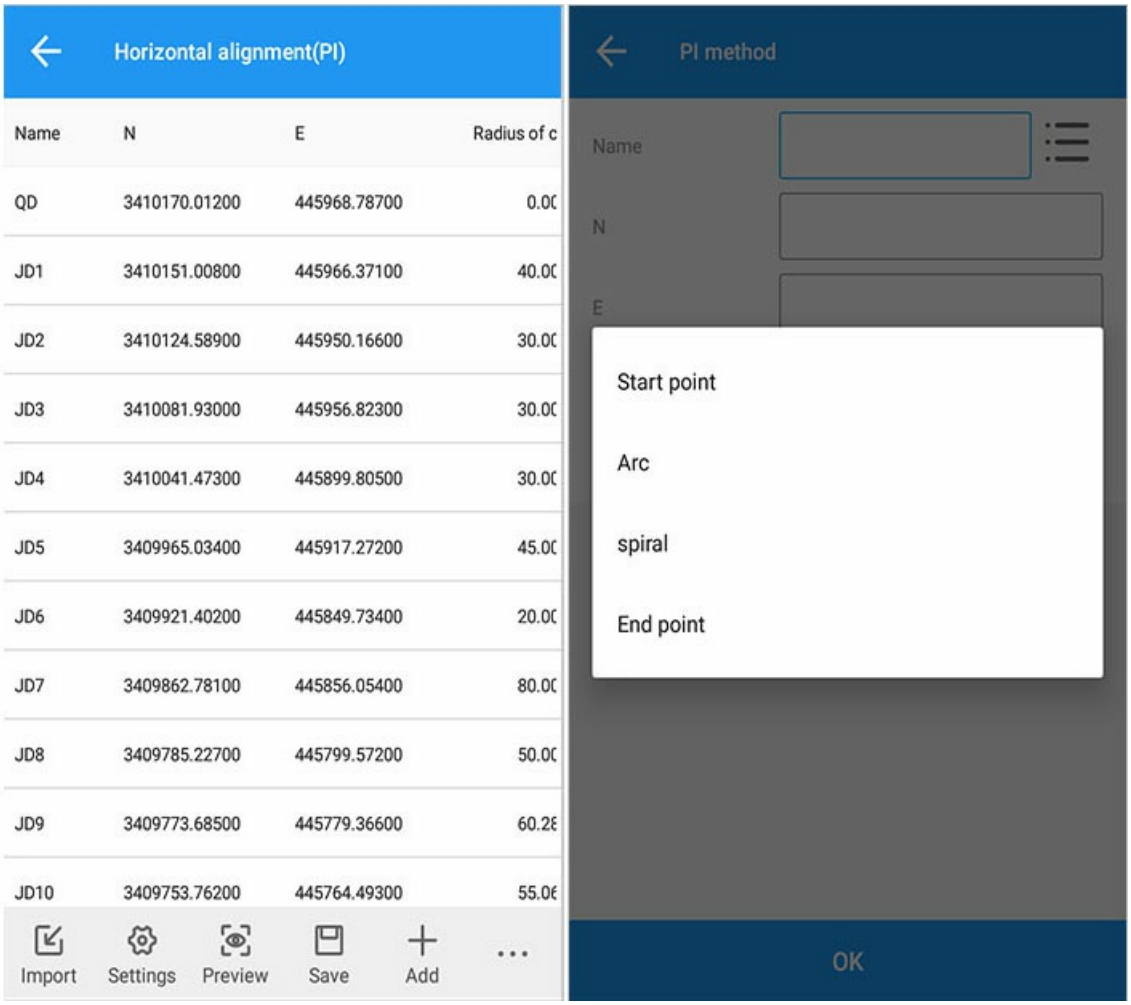


For details on entering stakeout, see [road stakeout].

1. Flat curve

1.1 Intersection method

1.1.1 Add Click [Add] to operate as follows:



New operations for the intersection method:

1) Intersection method - click "Add" to add an intersection element, enter the page to enter the name, N, E, or select the point in the point library as the intersection.

2) Line type: selectable starting point, arc, transition curve and end point.

3) Starting point: The first intersection is generally used as the starting point, and a road flat curve design file has only one starting point.

4) Arc: Enter the arc radius value.

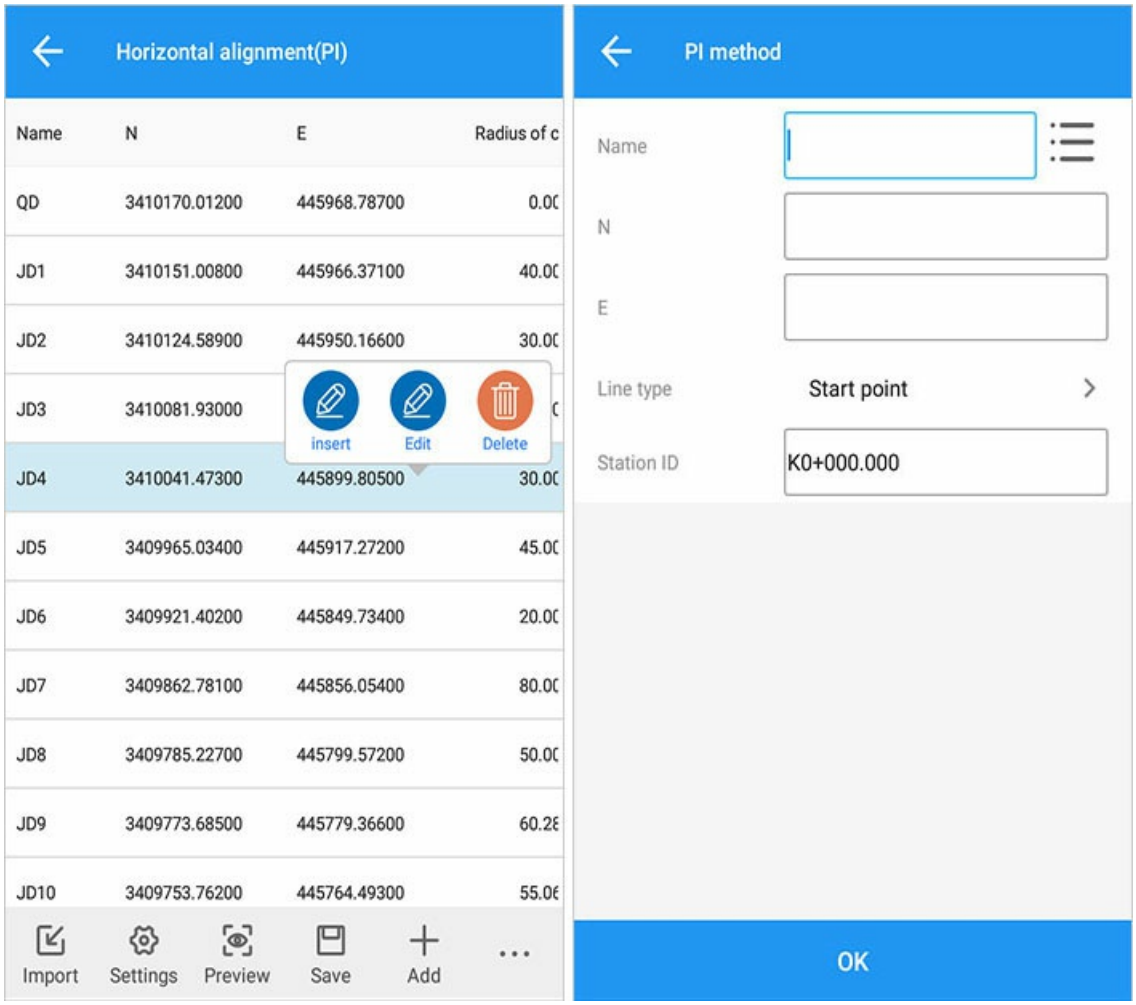
5) Easing curve: input arc radius, ease in (into the helix), ease out (out of the helix).

6) End point: The last intersection is generally used as the end point, and a road flat curve design file has only one end point.

7) After inputting the relevant road elements in the new addition, click "OK" to complete the addition.

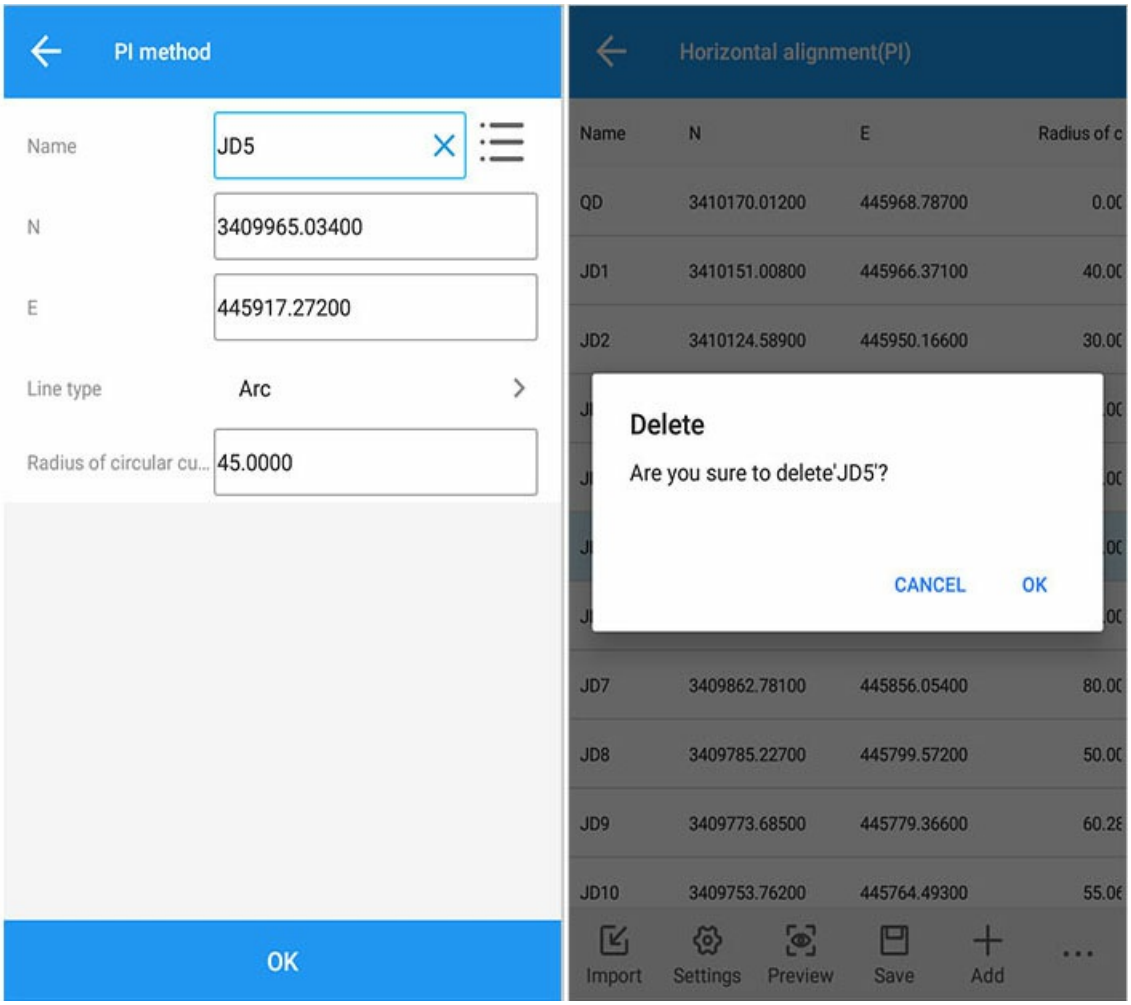
1.1.2 List operation editing

insert



Intersection method list - long press and pop-up function selection: insert, modify, delete, click to enter the editing operation of the element information.

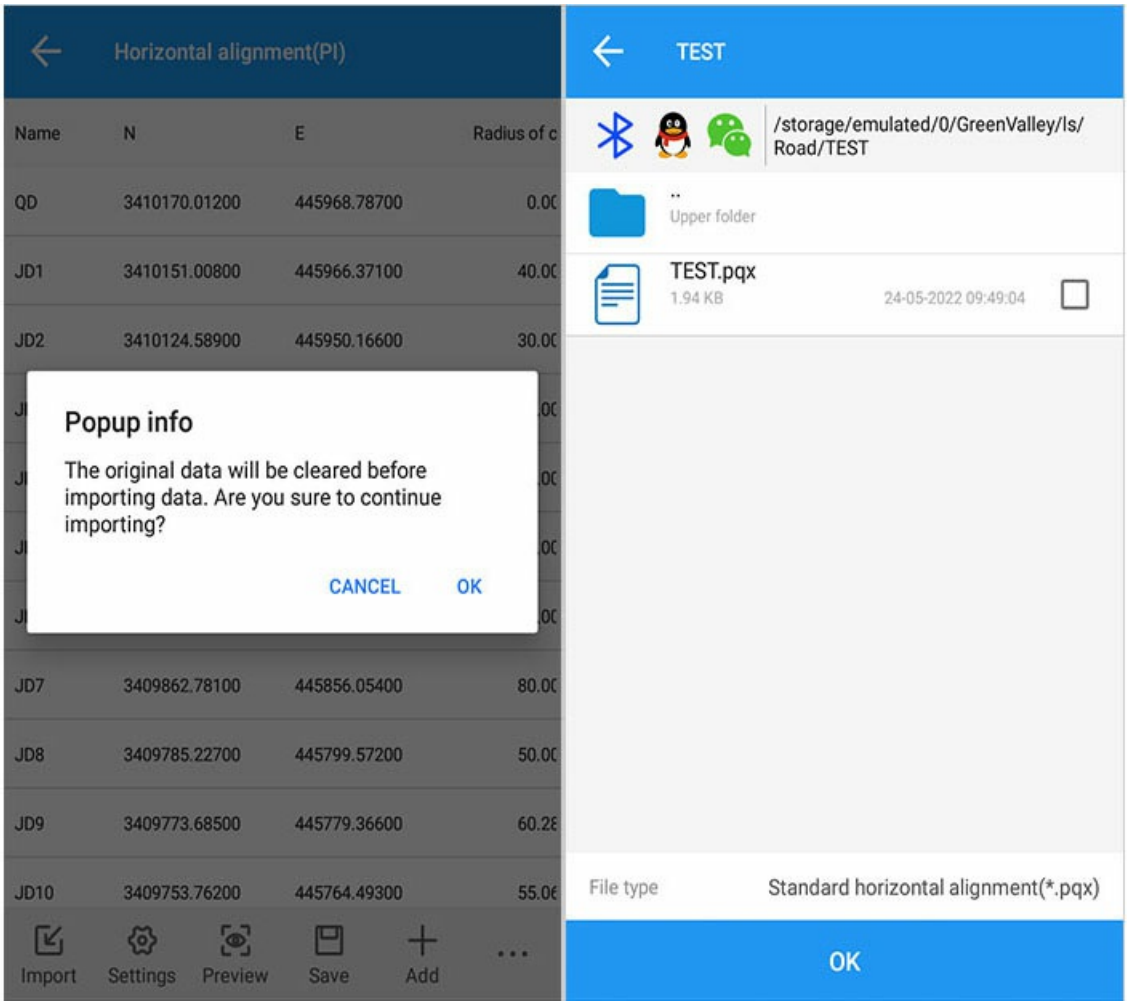
Modification and deletion



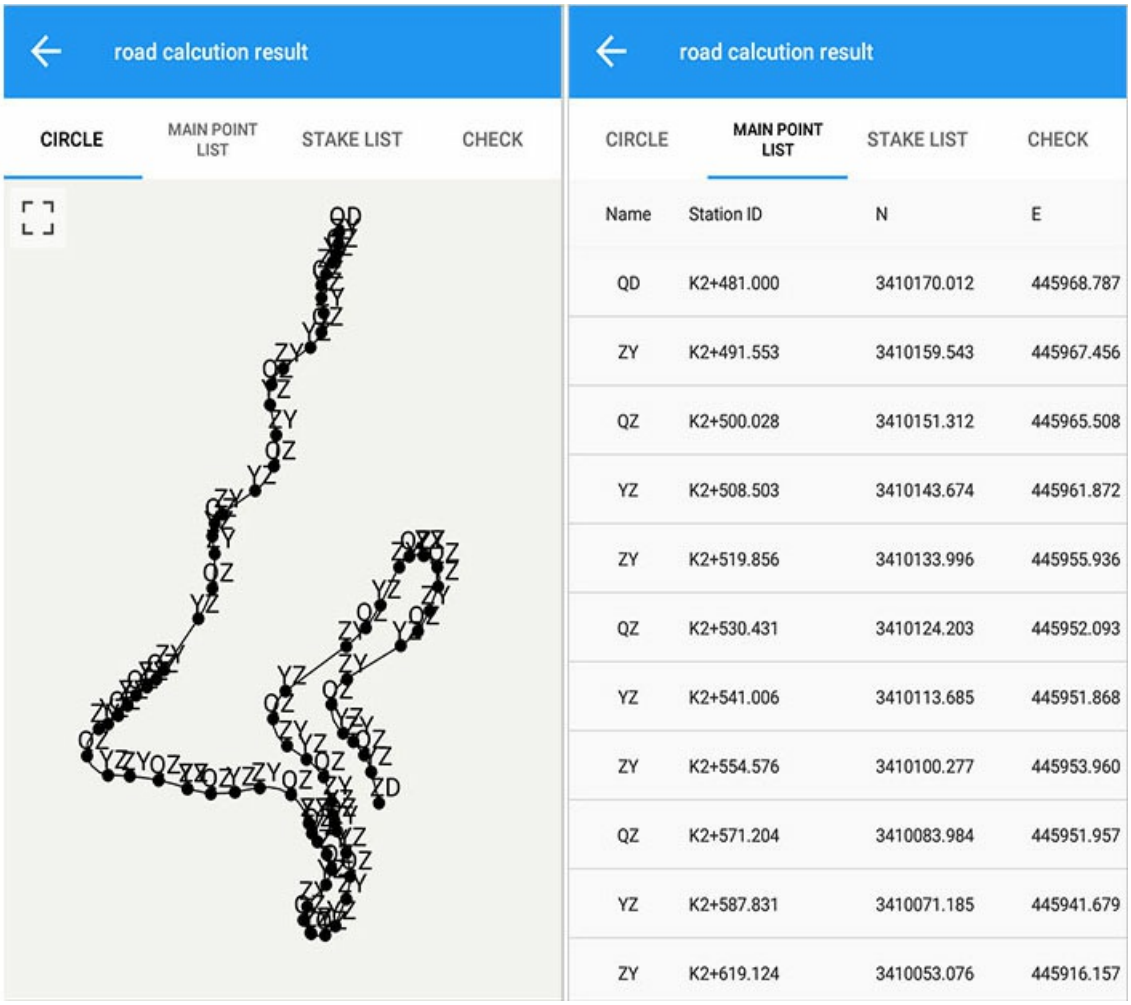
Delete: Select a row of information to delete, and a pop-up prompt "Are you sure you want to delete?" Select "Yes" to delete, select "No" to cancel and return to the list interface.

Modify: Select a row of information to edit, and click "OK" to complete the modification.

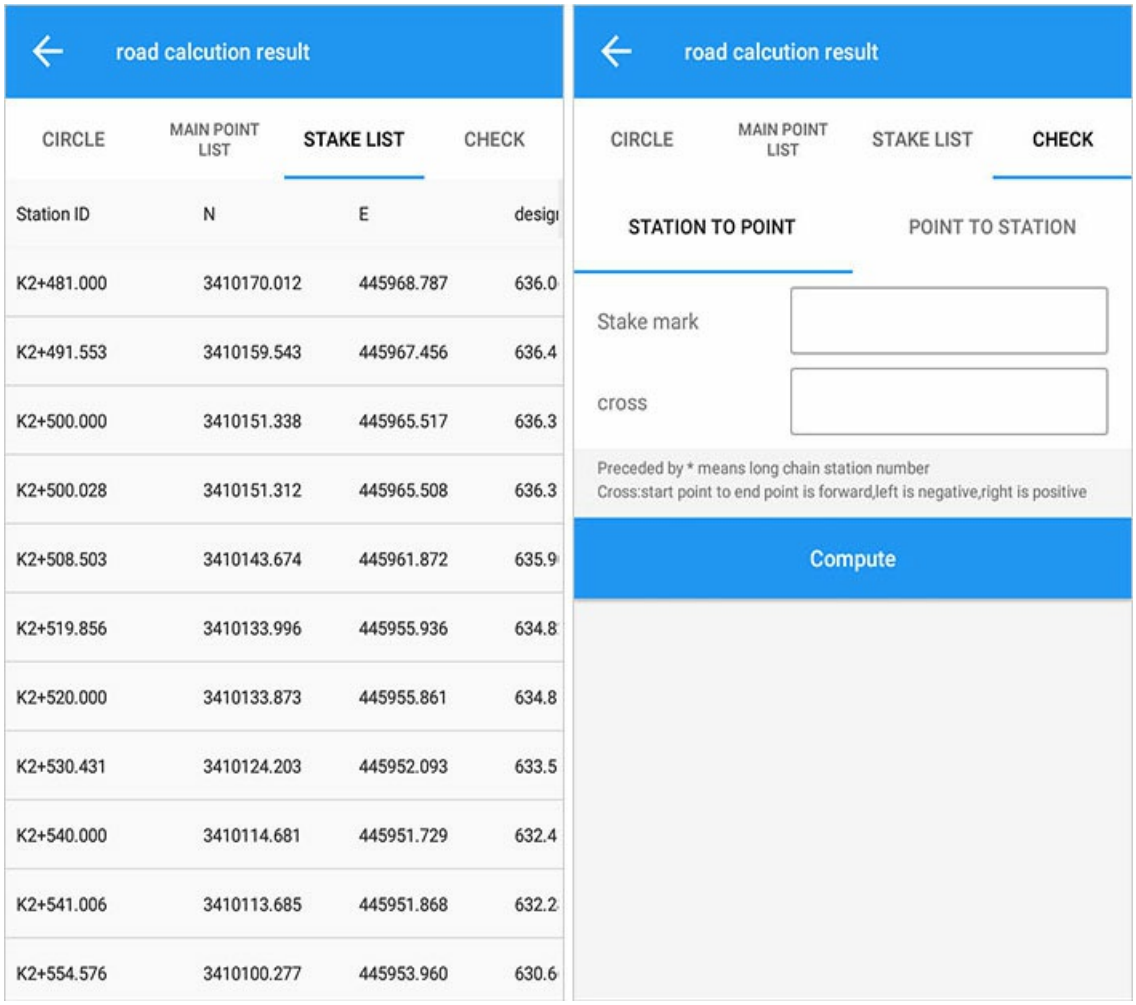
1.1.3 The import preview is detailed in the following figure:


Horizontal alignment(PI)
Name
N
E
Radius of c
QD
3410170.01200
445968.78700
JD1
3410151.00800
445966.37100
JD2
3410124.58900
445950.16600
Popup info
The original data will be cleared before importing data. Are you sure to continue importing?
CANCEL
OK
JD7
3409862.78100
445856.05400
JD8
3409785.22700
445799.57200
JD9
3409773.68500
445779.36600
JD10
3409753.76200
445764.49300
Import
Settings
Preview
Save
Add
TEST
/storage/emulated/0/GreenValley/ls/Road/TEST
..
Upper folder
TEST.pqx
1.94 KB
24-05-2022 09:49:04
File type
Standard horizontal alignment(*.pqx)
OK

1.1.4 Preview



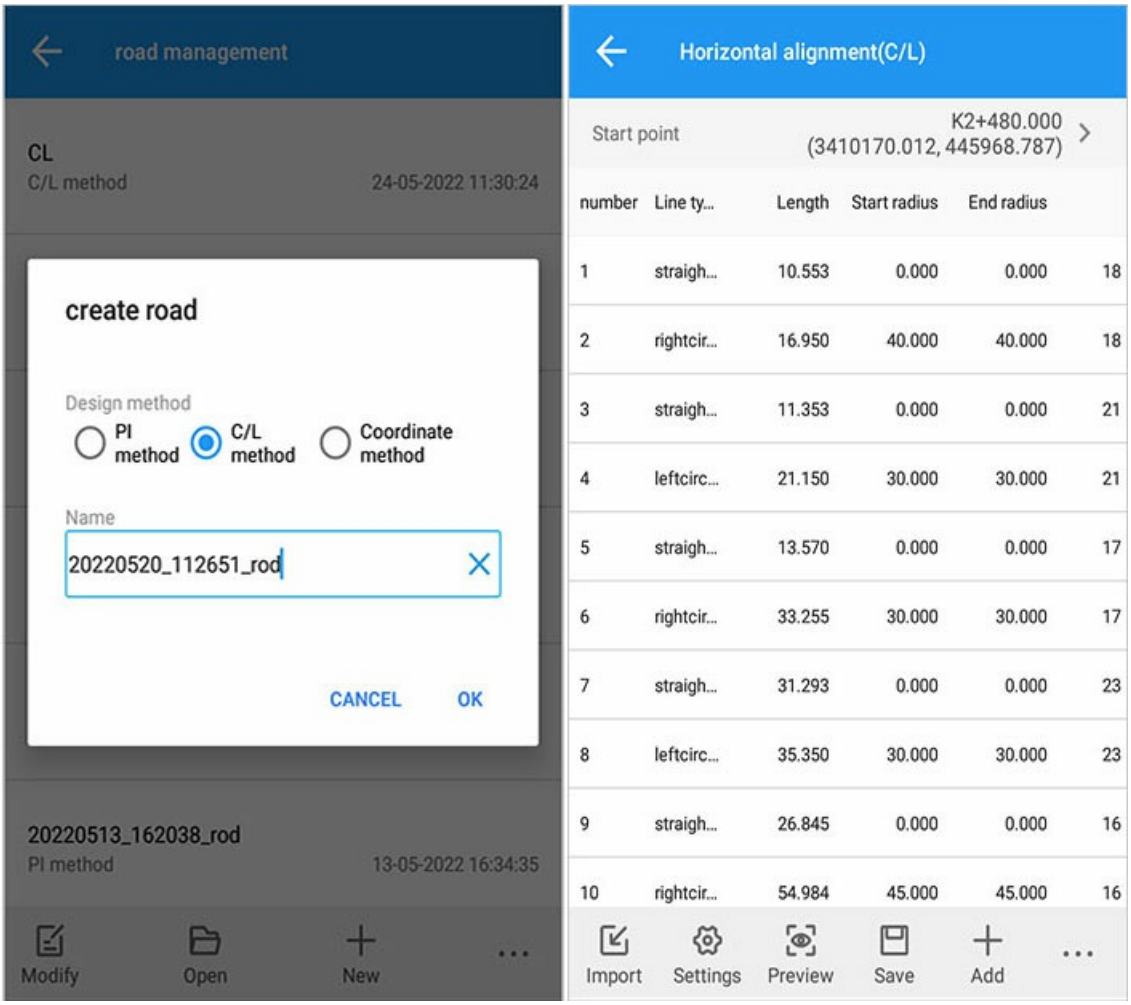
checksum stub-by-segment checksum



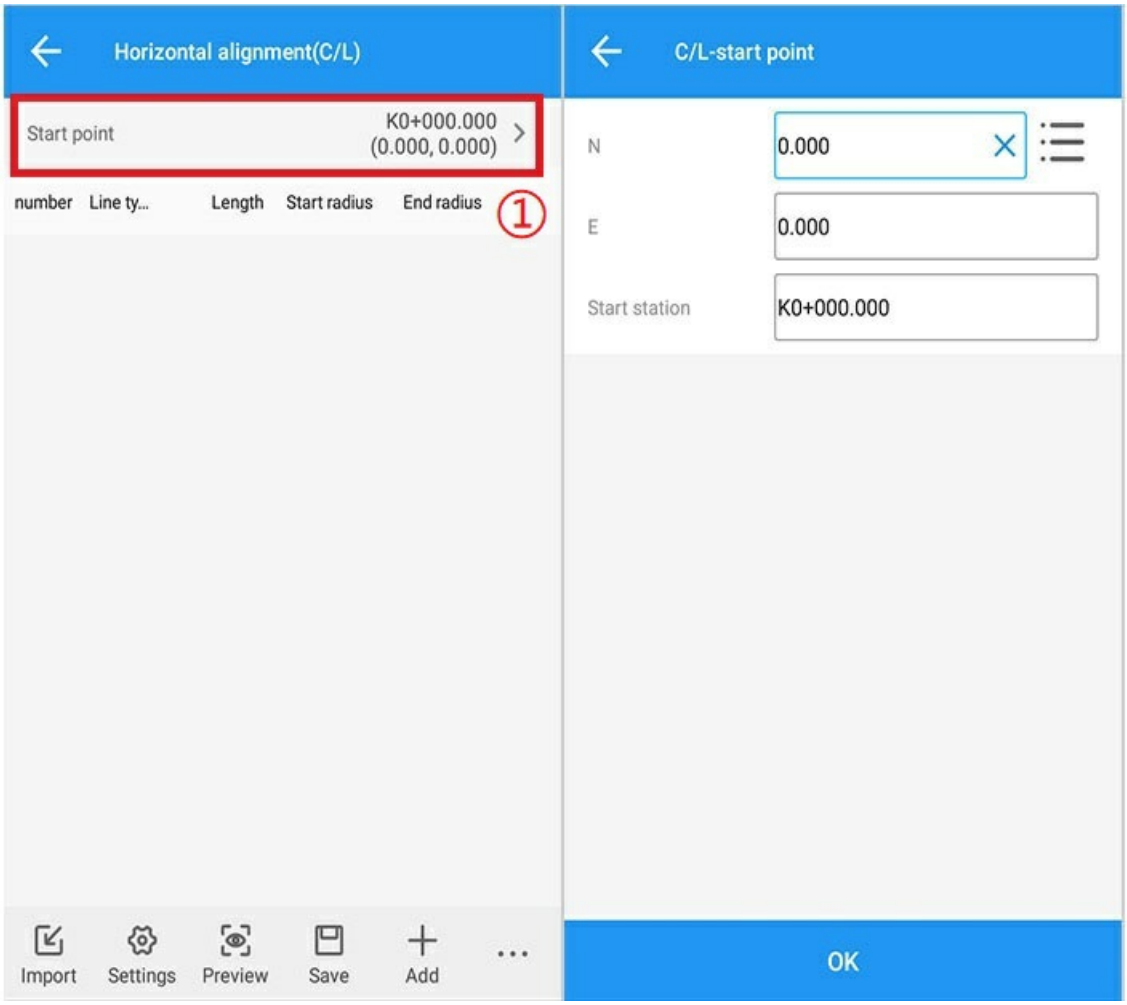
The above operation preview can quickly understand the road editing situation, the process of drawing, main point, pile by pile, and checking the pile number information.

1.2 Line element method

1.2.1 New

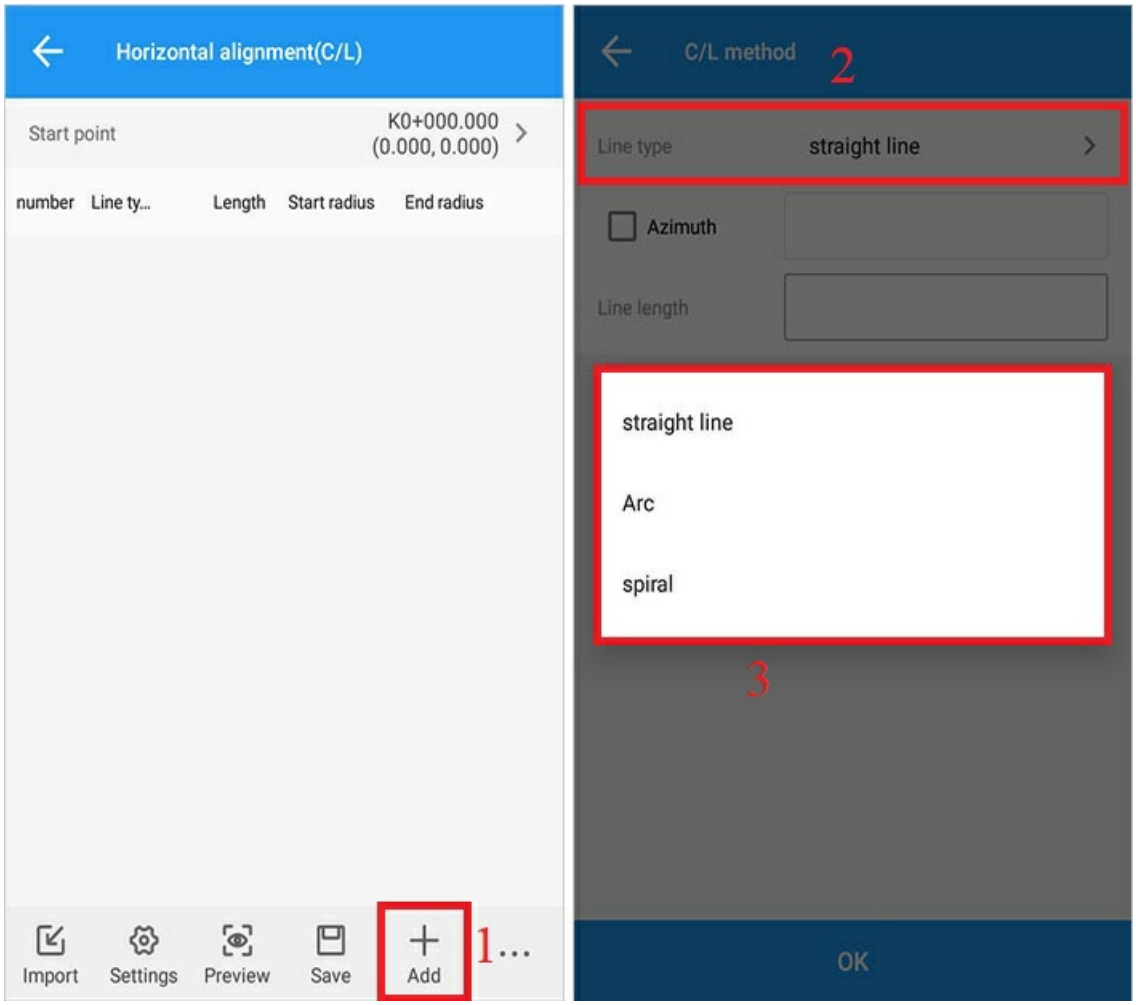


1.2.2 Starting point



Click the mark ① to enter the starting point setting, you can input the starting point or select the starting point element, and click OK to complete after completion.

1.2.3 Add click【Add】



Line element method new operations:

1) Click [Add] to add a new line element to the new interface

2) Line type: straight line, arc, and transition curve are optional.

3) Straight line: Enter the line length of the straight line.

4) Arc: Input the starting point radius, line length and select the direction. (radius: 0=infinity)

5) Easing curve: input start point radius, end point radius, line length and select direction. (radius: 0=infinity)

6) After entering the relevant road elements in the new addition, click "OK" to complete the addition.

1.2.4 Edit

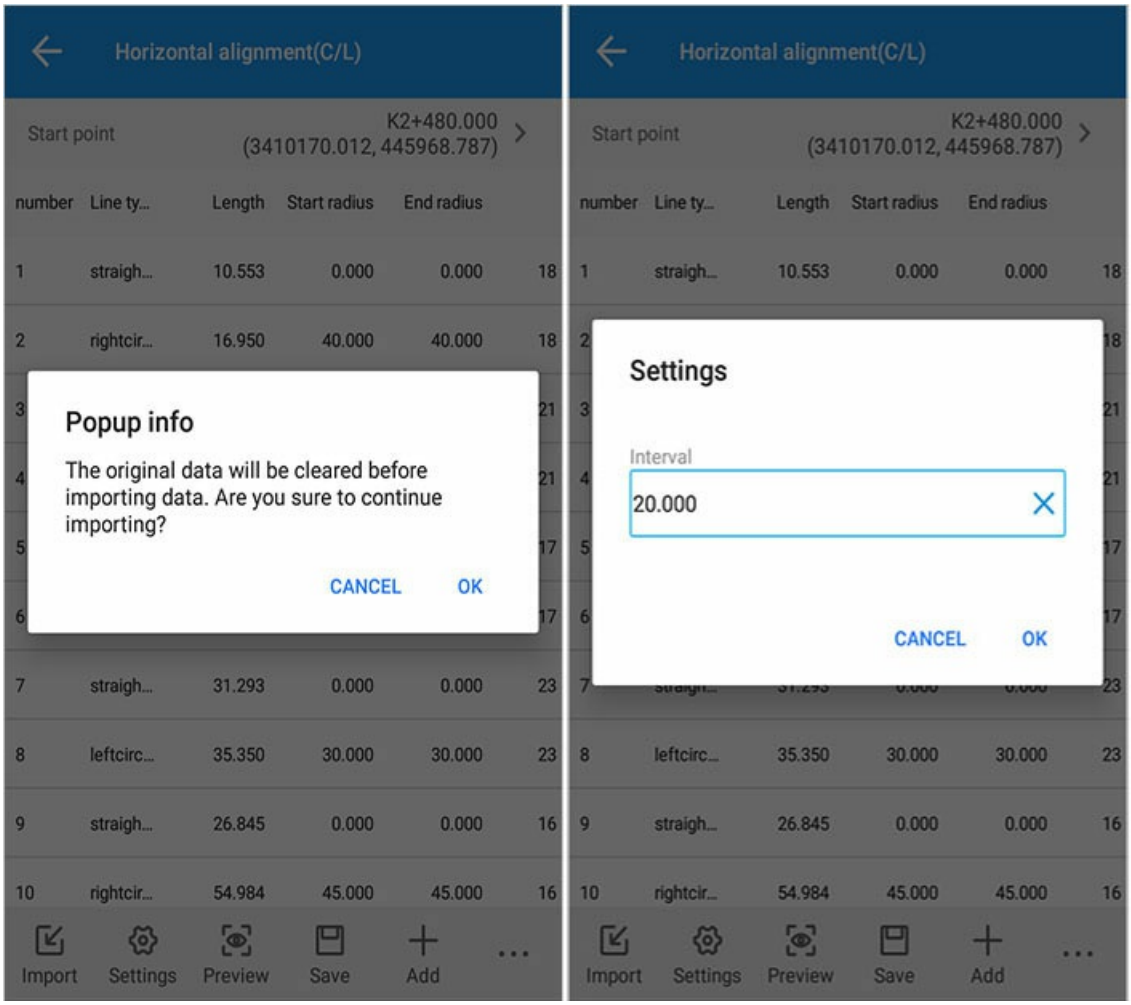
1) Line element method list - long press to pop up function selection: insert, modify, delete.

2) Insert: Select a row of information, insert it in the middle, the inserted content is the same as the new one, and will not be described here.

3) Modify: Select a row of information to edit, and click "OK" to complete the modification.

4) Delete: Select a row of information to delete, a pop-up prompt "Are you sure you want to delete XX? [Select] "Yes" to delete, select "No" to cancel and return to the list interface.

1.2.5 Import settings

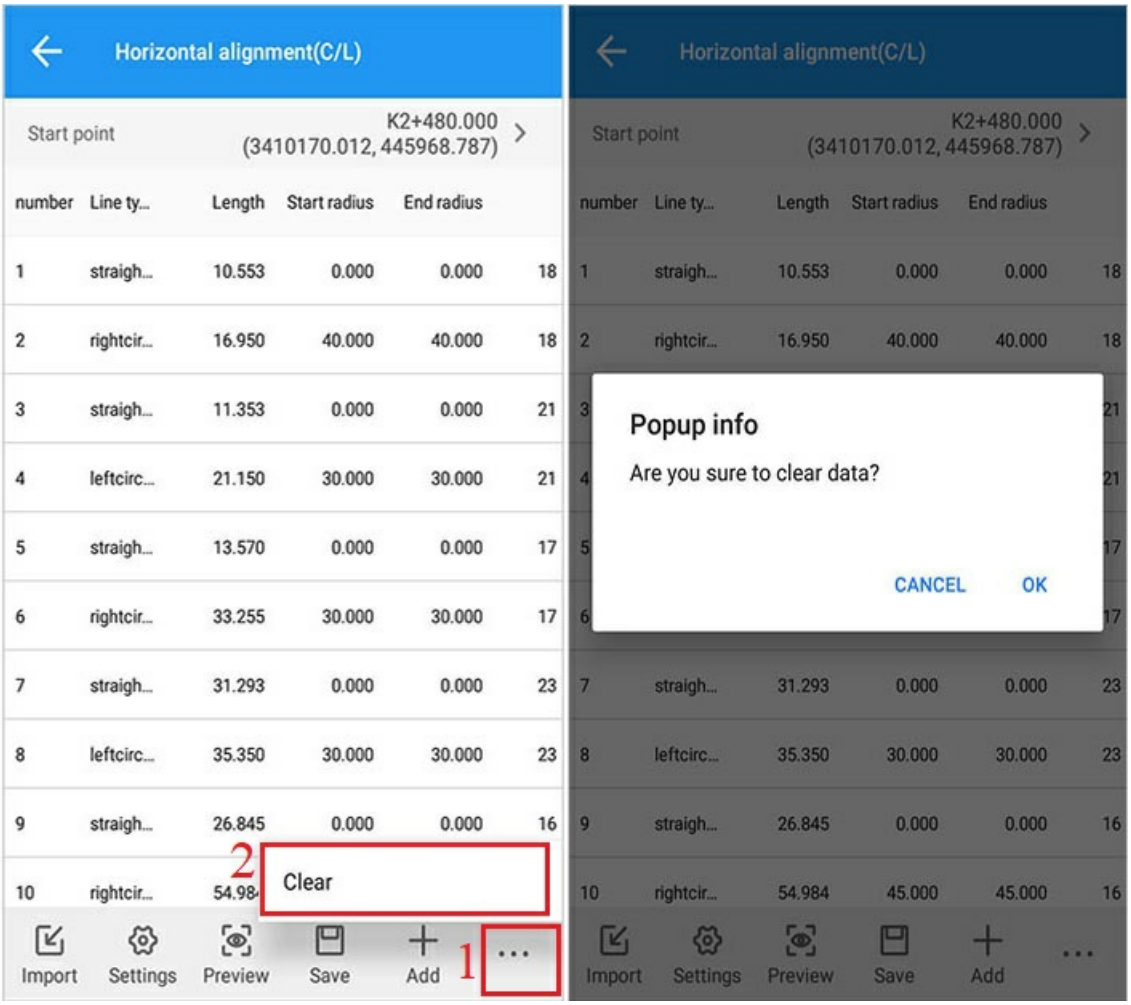


1) Import: You can import flat curve files (*.pqx), and also import roadstar and surveyor data files (if it is a table, you need to ensure that the format is ".xls).

2) Setting: Set the current road pile distance.

3) Preview: Consistent with the intersection method.

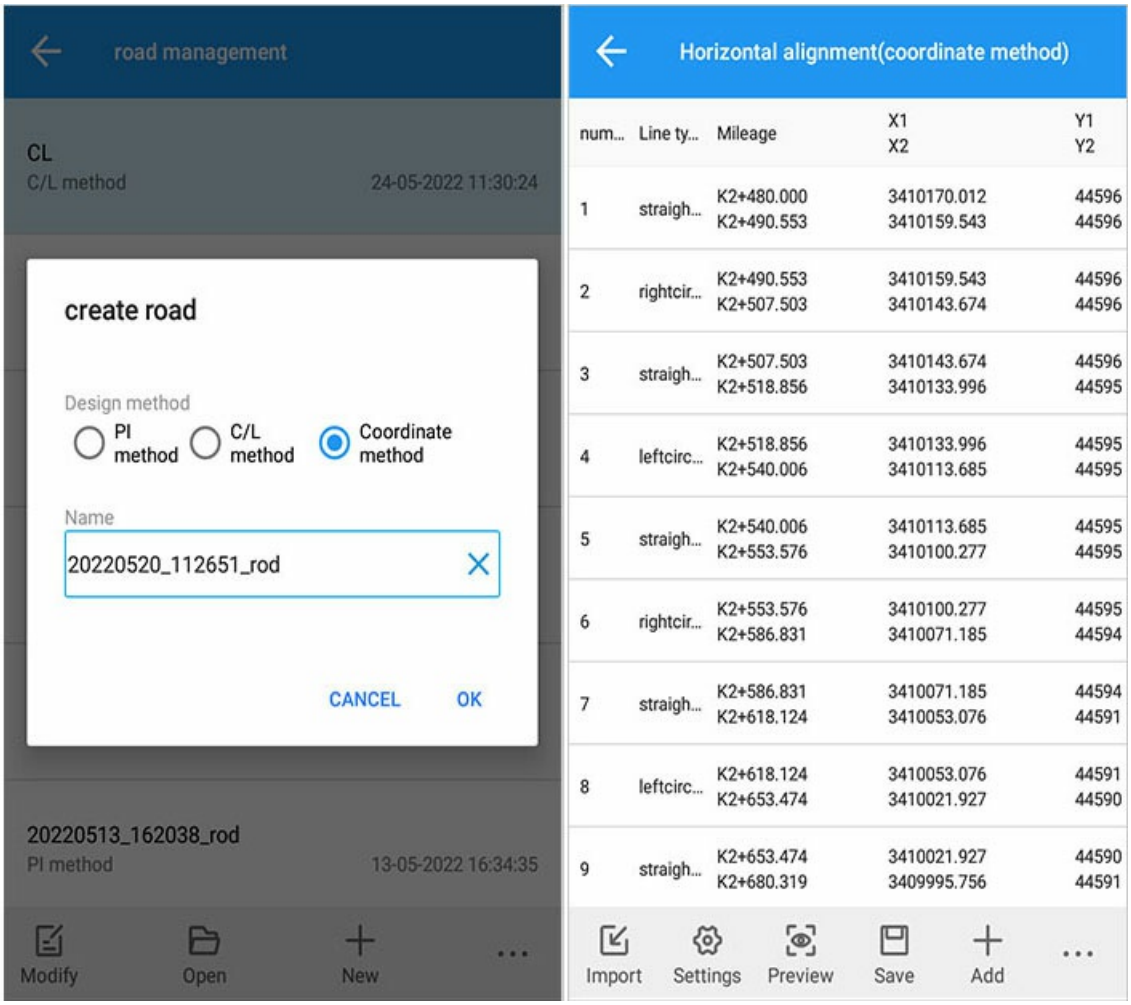
1.2.6 Clear



Click on the three small dots of the logo 1 to display the logo 2 to clear, click to clear the prompt: Are you sure you want to clear the data? Confirm to clear, cancel to cancel.

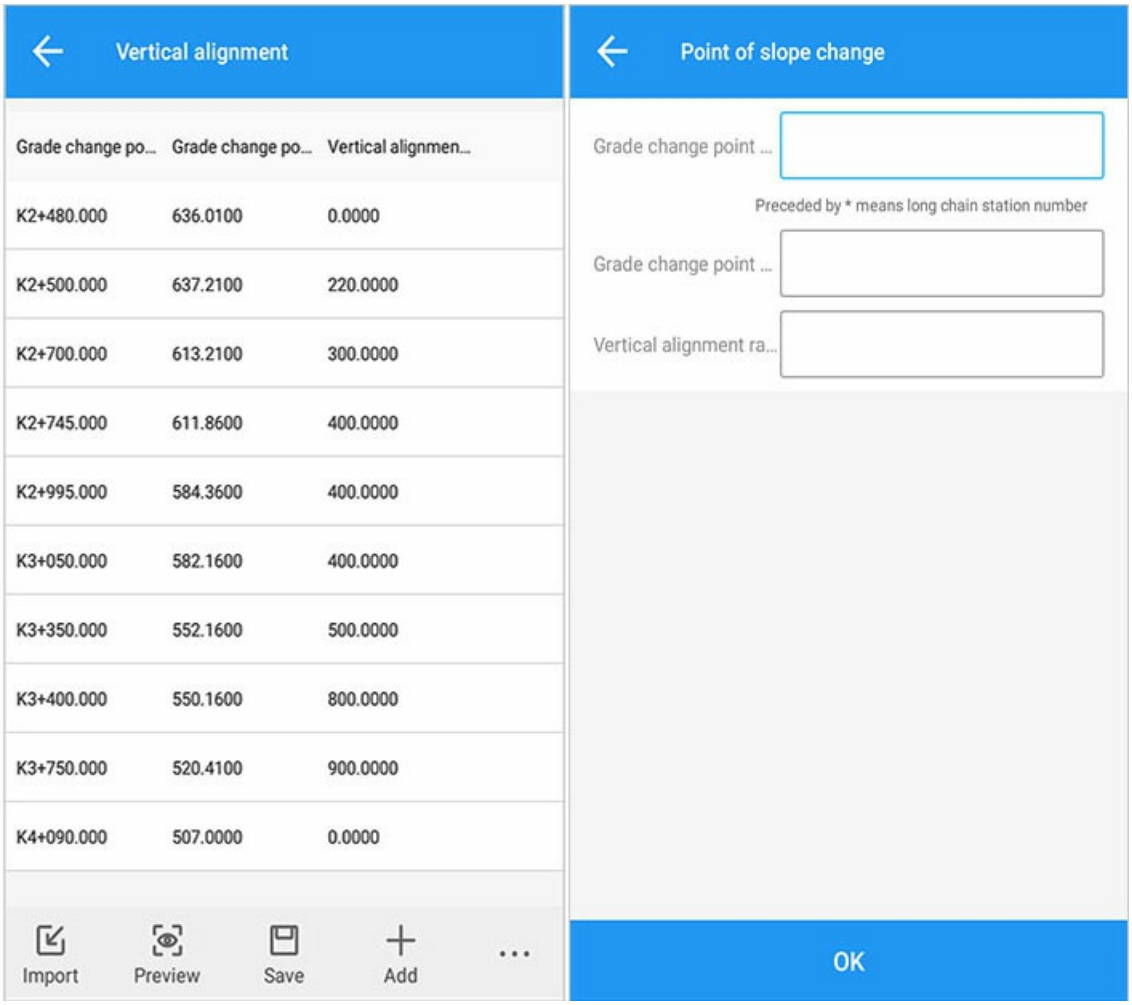
1.3 Coordinate method

1.3.1 New

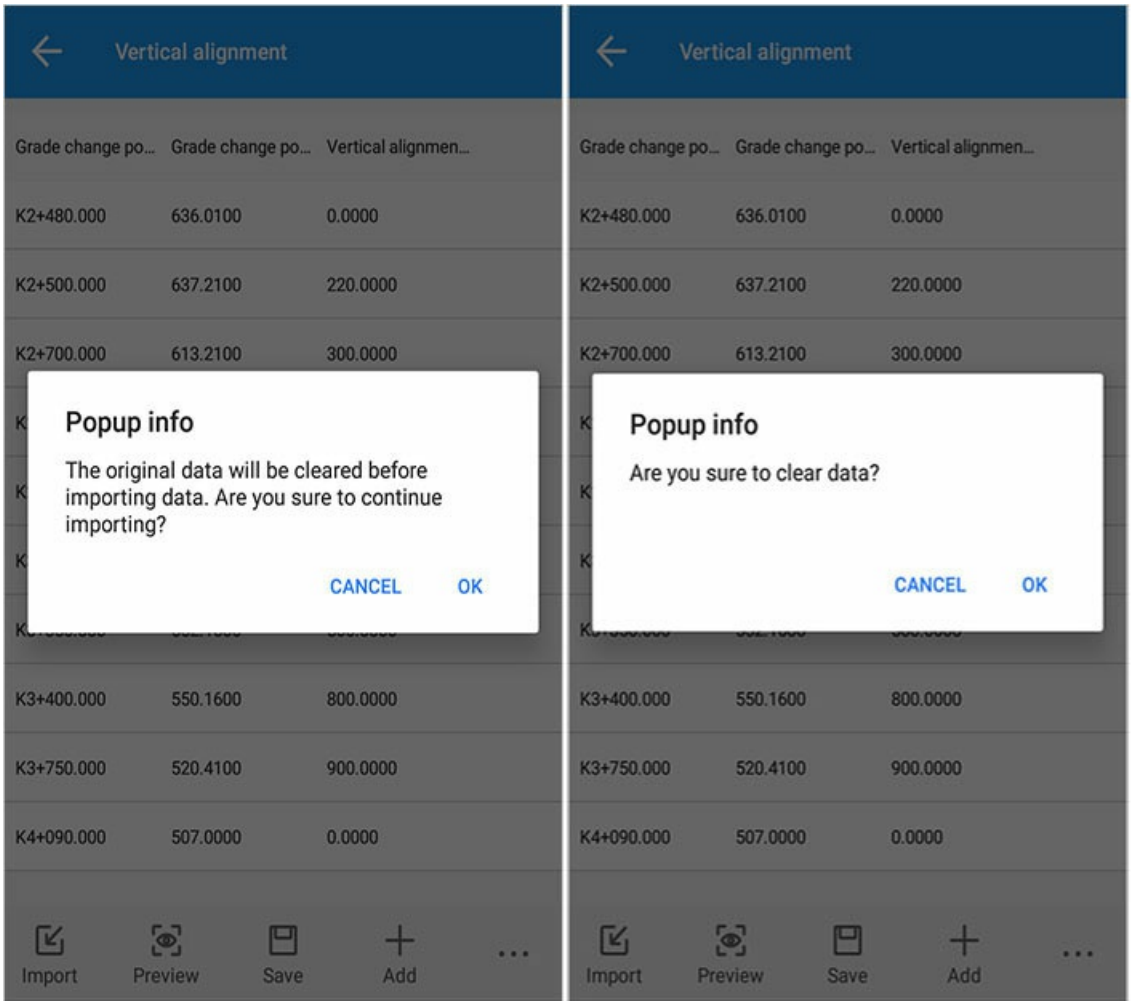


2. Vertical curve

2.1 New



2.2 Import empty



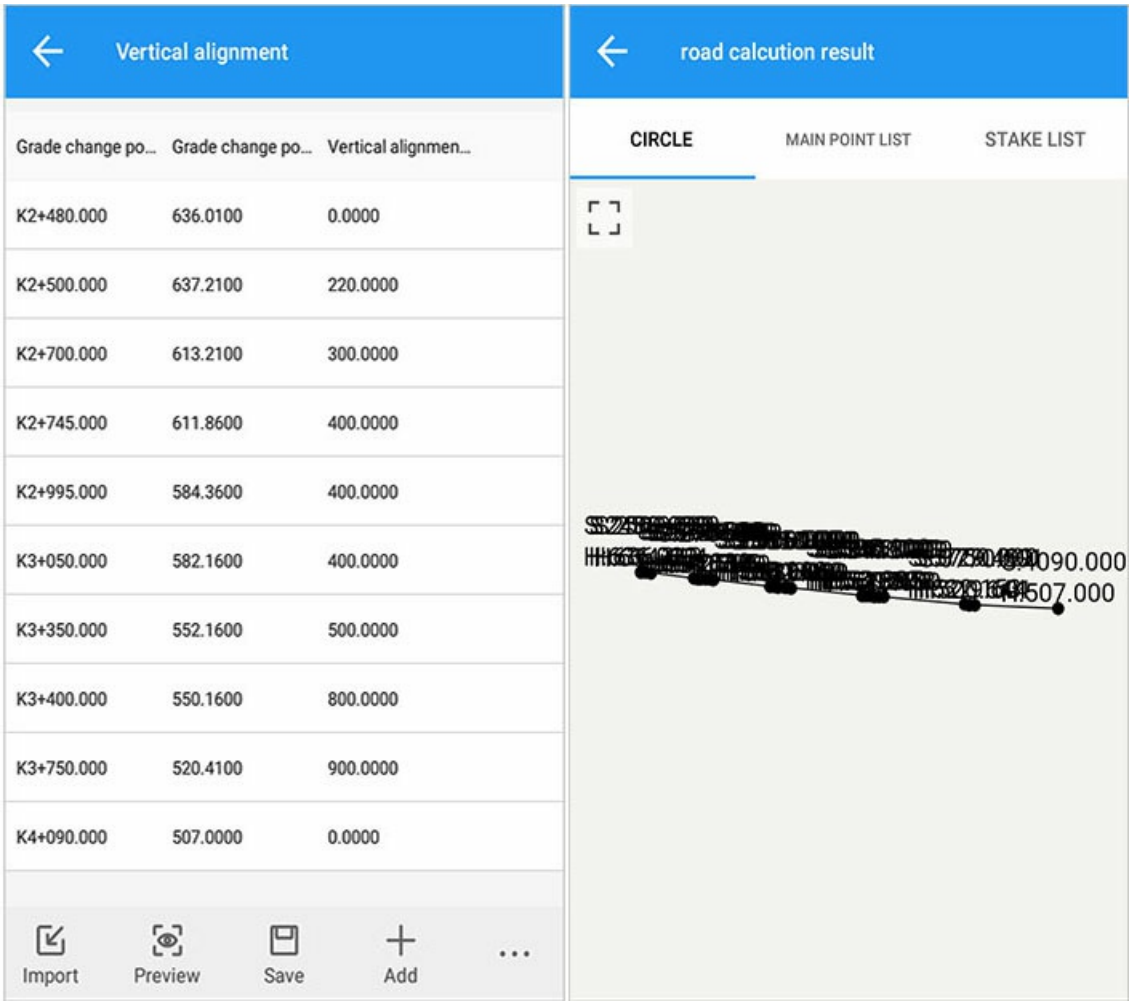
1) Import: Import the vertical curve design file (file format: xxx.sqx).

2) Save: Save the design file. If it is opened, the original name can be used to overwrite and save. If it is a new road, the project name will be used by default.

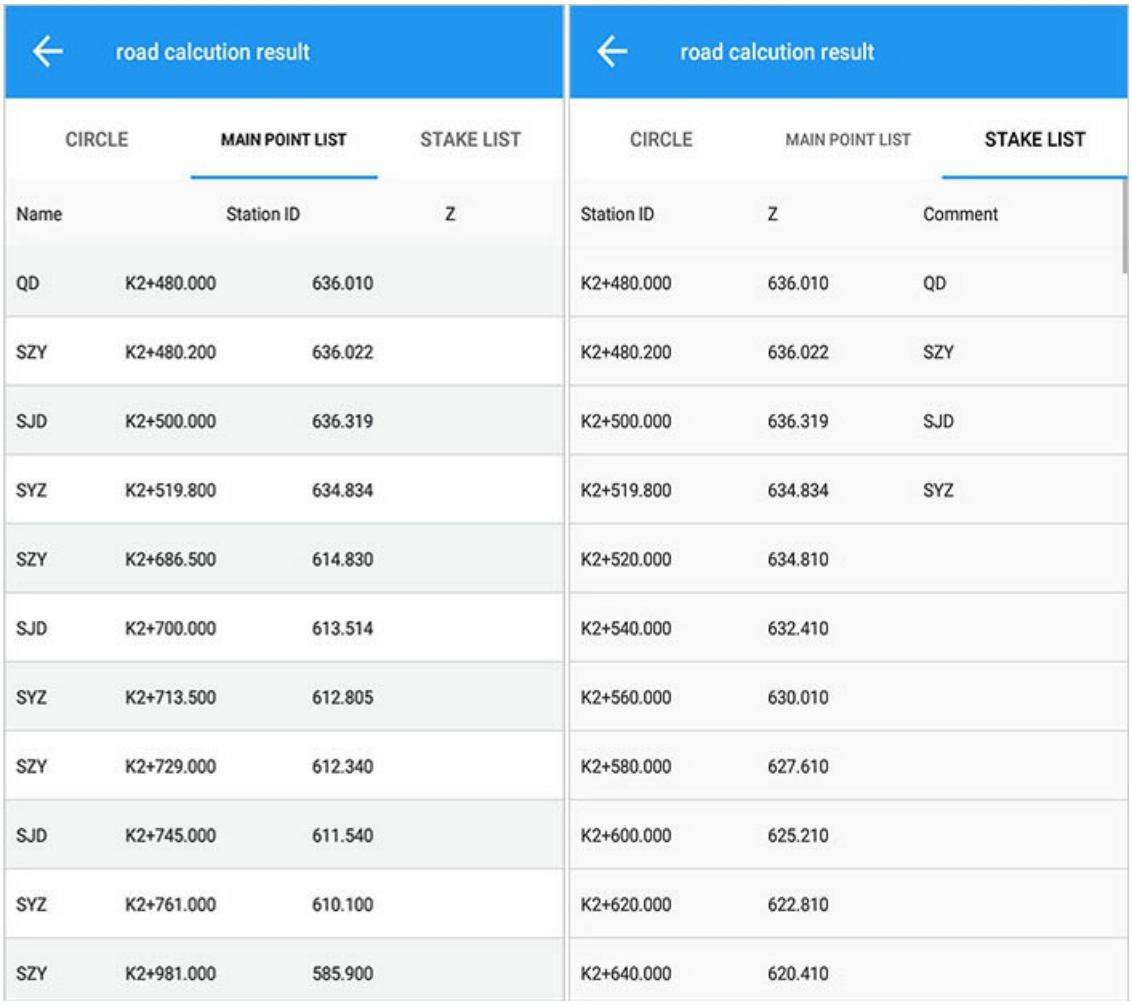
3) Clear: Click the three small dots to display clear, clear all data.

2.3 Preview

Operation Click Preview - Enter Graphics



Click to switch between graphics, main point table, and pile-by-pile table.



road calcution result

CIRCLE | MAIN POINT LIST | STAKE LIST

Name	Station ID	Z
QD	K2+480.000	636.010
SZY	K2+480.200	636.022
SJD	K2+500.000	636.319
SYZ	K2+519.800	634.834
SZY	K2+686.500	614.830
SJD	K2+700.000	613.514
SYZ	K2+713.500	612.805
SZY	K2+729.000	612.340
SJD	K2+745.000	611.540
SYZ	K2+761.000	610.100
SZY	K2+981.000	585.900

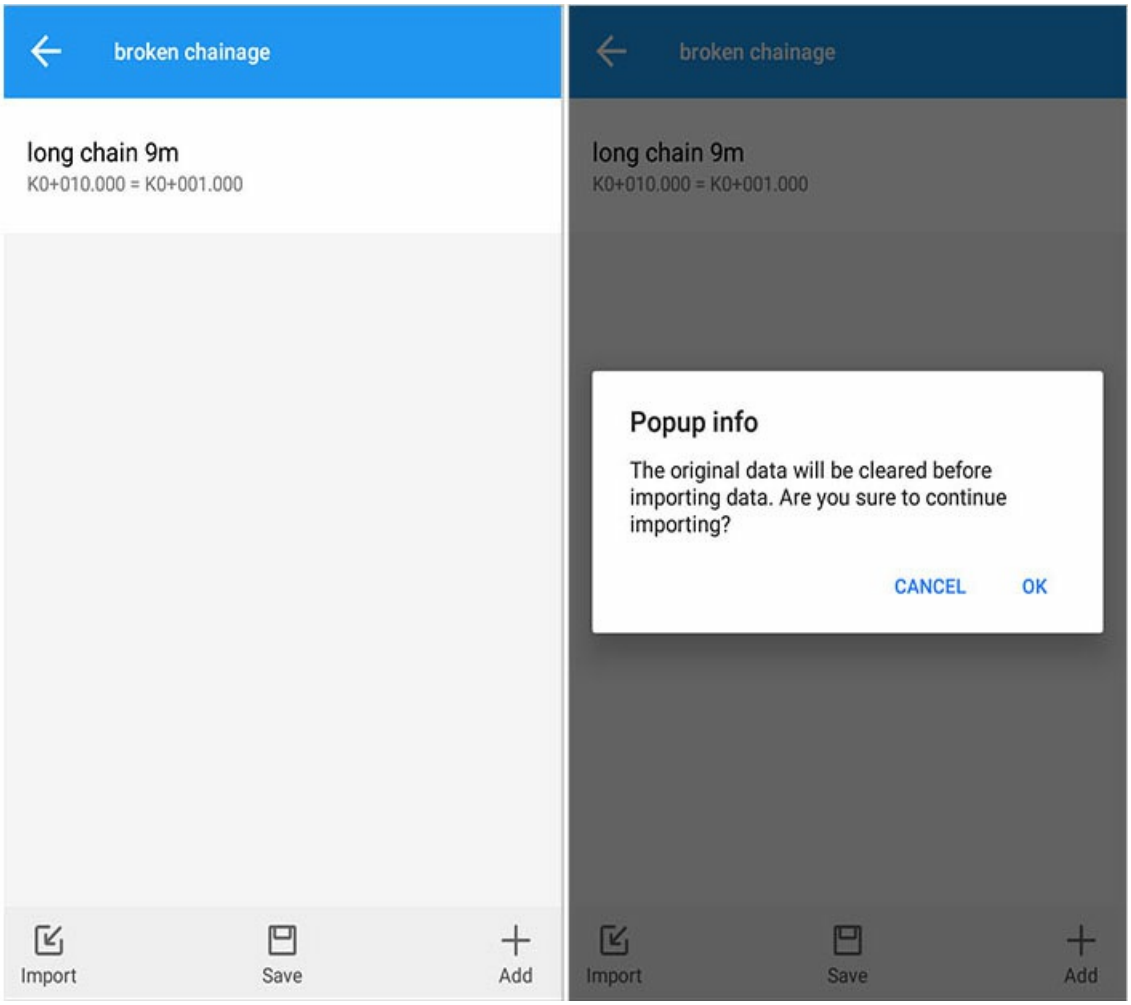
road calcution result

CIRCLE | MAIN POINT LIST | STAKE LIST

Station ID	Z	Comment
K2+480.000	636.010	QD
K2+480.200	636.022	SZY
K2+500.000	636.319	SJD
K2+519.800	634.834	SYZ
K2+520.000	634.810	
K2+540.000	632.410	
K2+560.000	630.010	
K2+580.000	627.610	
K2+600.000	625.210	
K2+620.000	622.810	
K2+640.000	620.410	

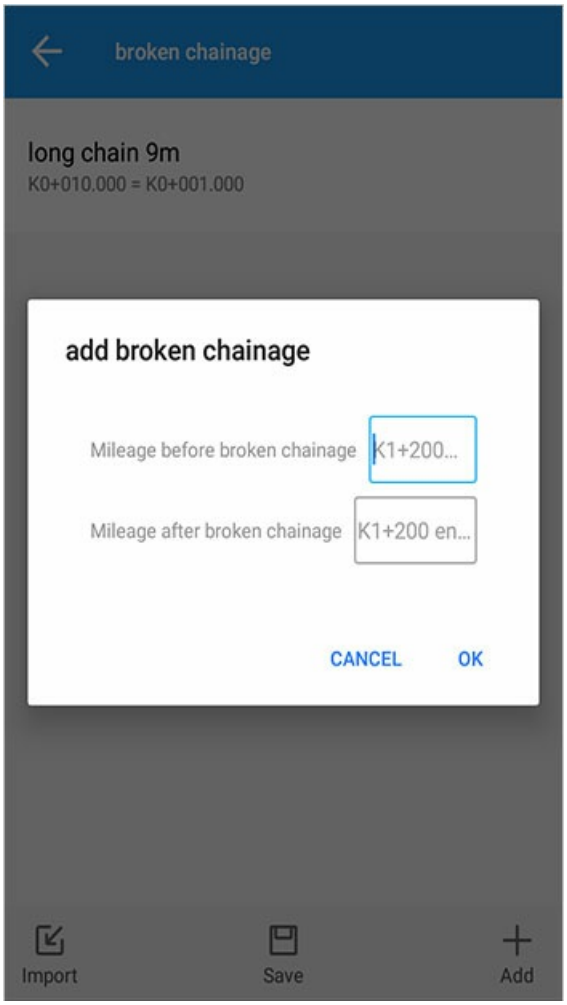
3. Broken chain

3.1 Import



Import: Import the broken link design file. (Note that the existing road disconnection data will be cleared)

3.2 Added



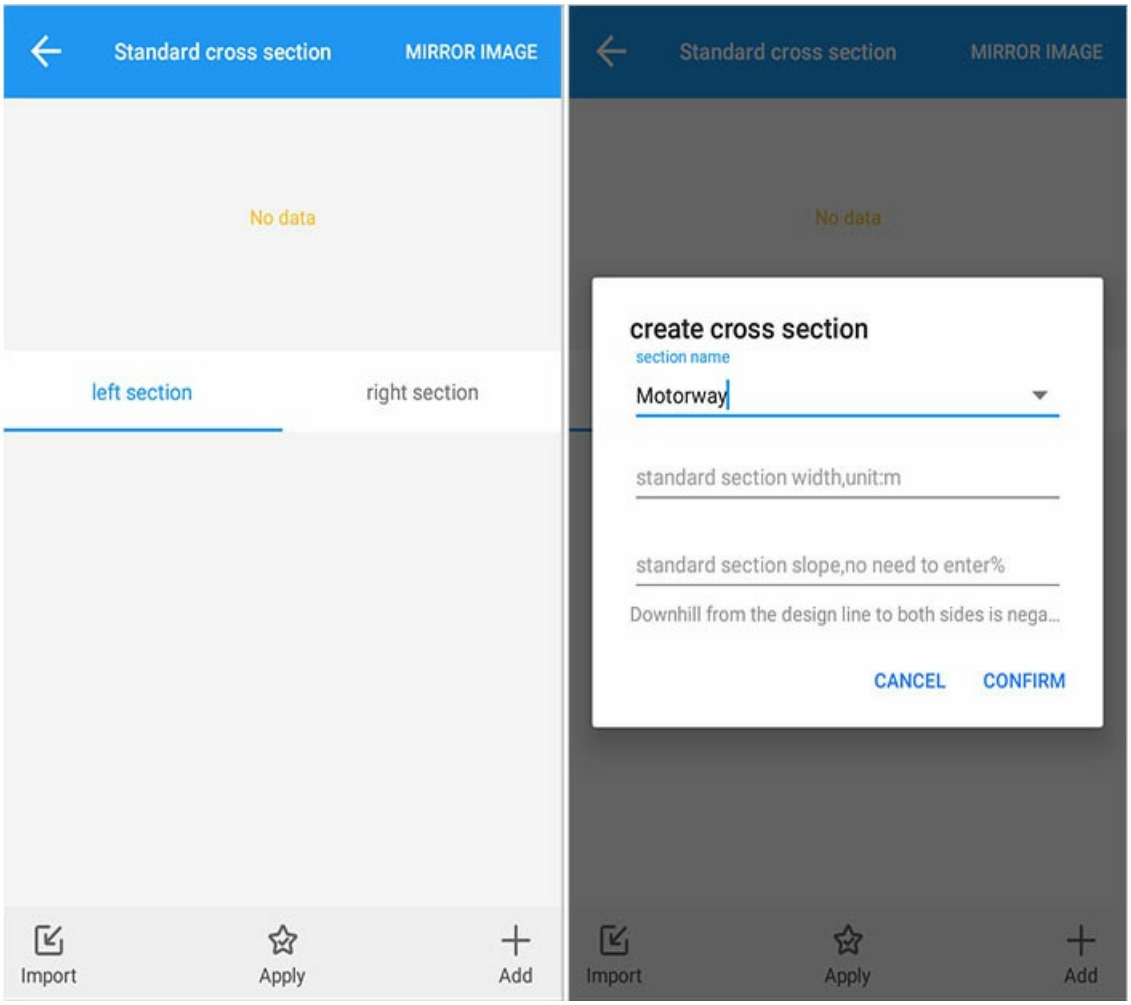
1) Save: After clicking, it will prompt: "Save successfully"

Save: The saved road disconnection data is saved under the rod road path.

2) Mileage before breaking: Enter the current value of the mileage before breaking.

3) Mileage after disconnection: Enter the current value of the mileage after disconnection.

4. Standard cross section



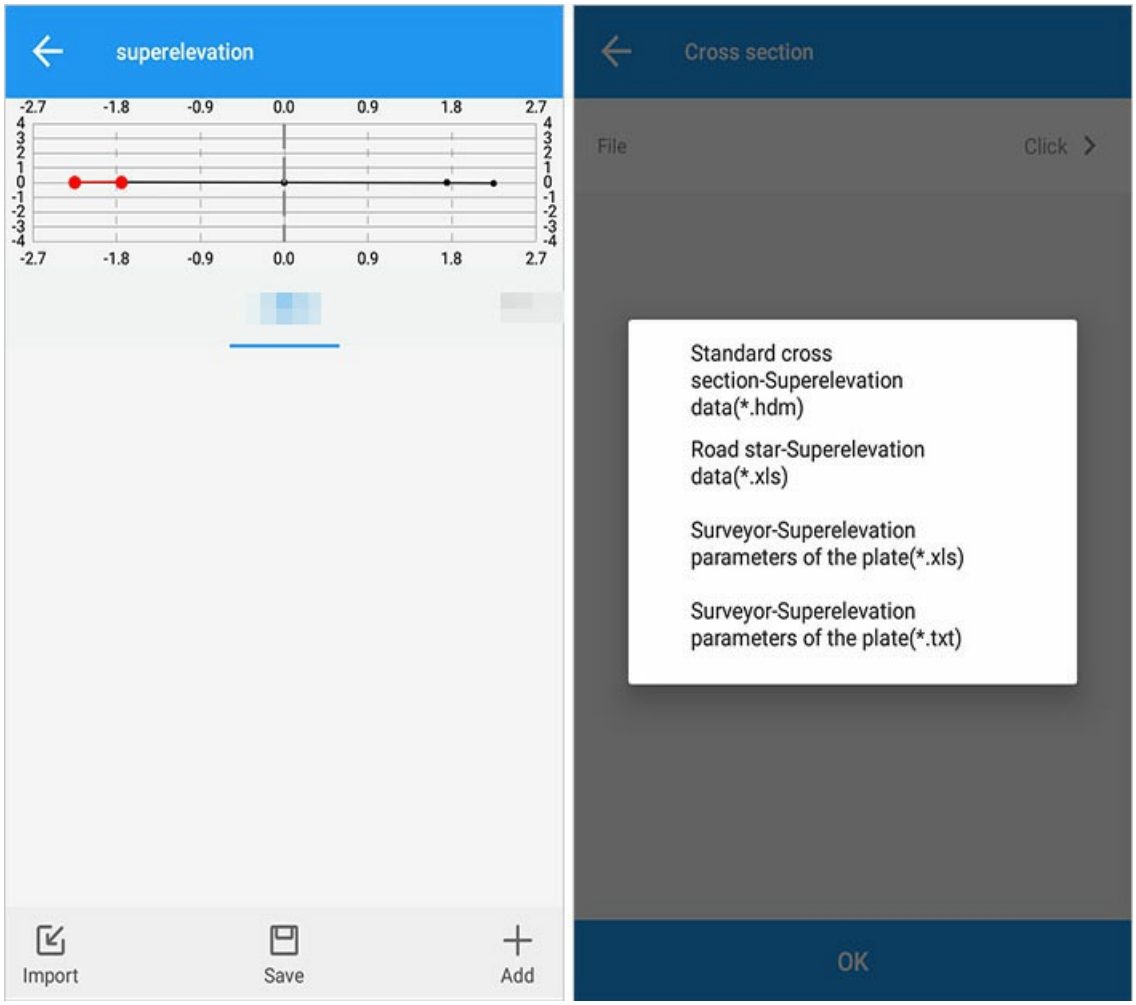
1) Add: Create a new cross section.

2) Import: Import the cross section file.

3) Apply, apply the currently added or imported cross-sectional data.

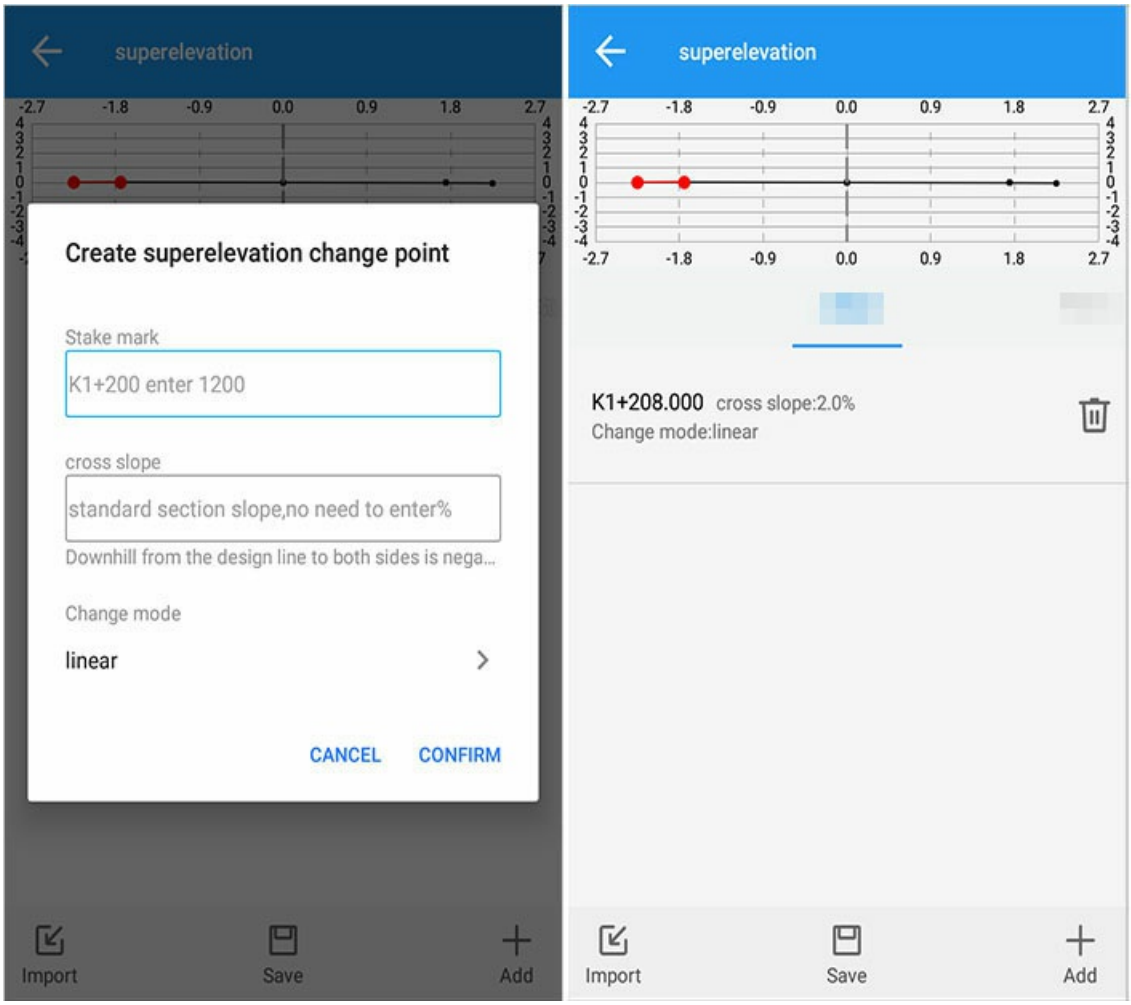
5. Super wide and wide

5.1 Import



Roadstar and surveyor data can be imported. When the imported cross-section data contains superelevation widening data, superelevation widening will be automatically imported.

5.2 Added



1) Station: Add the station of superelevation or widening change point.

2) Cross slope: The cross slope of superelevation or widening change point.

3) Change method: the change method of the current superelevation/widening.

6. The format is explained separately

6.1 Description of the road flat curve pqx file

PI.pqx

```
0
QD,3410170.01200,445968.78700,2481.000
JD1,3410151.00800,445966.37100,40.0000,0.000,0.000,0.0000,0.0000
JD2,3410124.58900,445950.16600,30.0000,0.000,0.000,0.0000,0.0000
JD3,3410081.93000,445956.82300,30.0000,0.000,0.000,0.0000,0.0000
JD4,3410041.47300,445899.80500,30.0000,0.000,0.000,0.0000,0.0000
JD5,3409965.03400,445917.27200,45.0000,0.000,0.000,0.0000,0.0000
JD6,3409921.40200,445849.73400,20.0000,0.000,0.000,0.0000,0.0000
JD7,3409862.78100,445856.05400,80.0000,0.000,0.000,0.0000,0.0000
JD8,3409785.22700,445799.57200,50.0000,0.000,0.000,0.0000,0.0000
JD9,3409773.68500,445779.36600,60.2880,0.000,0.000,0.0000,0.0000
JD10,3409753.76200,445764.49300,55.0610,0.000,0.000,0.0000,0.0000
JD11,3409708.84800,445680.20600,21.0000,0.000,0.000,0.0000,0.0000
JD12,3409700.88600,445801.36600,220.0000,0.000,0.000,0.0000,0.0000
JD13,3409685.43900,445849.13900,94.5000,0.000,0.000,0.0000,0.0000
JD14,3409698.94600,445931.61900,40.0000,0.000,0.000,0.0000,0.0000
JD15,3409653.73400,445942.48600,40.8000,0.000,0.000,0.0000,0.0000
JD16,3409622.71600,445967.86000,20.0000,0.000,0.000,0.0000,0.0000
JD17-1,3409578.40000,445927.39500,15.0000,0.000,0.000,0.0000,0.0000
JD17-2,3409557.96000,445957.71000,15.0000,0.000,0.000,0.0000,0.0000
JD18,3409617.30000,445983.48800,50.0000,0.000,0.000,0.0000,0.0000
JD19,3409662.75700,445963.54200,50.0000,0.000,0.000,0.0000,0.0000
JD20,3409704.98100,445958.25700,50.0000,0.000,0.000,0.0000,0.0000
JD21,3409751.63100,445883.66900,28.0000,0.000,0.000,0.0000,0.0000
JD22,3409828.15800,445995.19500,100.0000,0.000,0.000,0.0000,0.0000
JD23-1,3409896.50000,446031.51500,20.0000,0.000,0.000,0.0000,0.0000
JD23-2,3409886.51100,446069.00100,20.0000,0.000,0.000,0.0000,0.0000
JD24,3409825.07900,446044.11200,60.0000,0.000,0.000,0.0000,0.0000
JD25,3409765.87100,445938.97300,28.0000,0.000,0.000,0.0000,0.0000
JD26,3409722.32700,445994.11900,50.0000,0.000,0.000,0.0000,0.0000
ZD,3409680.23200,446005.70600,0.0000,0.000,0.000,0.0000,0.0000
```

CL.pqx

```
1
3410170.01200,445968.78700,2480.000
L,0.0000,0.0000,10.553,0,187.144276000
A,40.0000,40.0000,16.950,1,187.144276000
L,0.0000,0.0000,11.353,0,211.312748000
A,30.0000,30.0000,21.150,0,211.312748000
L,0.0000,0.0000,13.570,0,171.074960000
A,30.0000,30.0000,33.255,1,171.074960000
L,0.0000,0.0000,31.293,0,234.383291000
A,30.0000,30.0000,35.350,0,234.383291000
L,0.0000,0.0000,26.845,0,167.074223000
A,45.0000,45.0000,54.984,1,167.074223000
L,0.0000,0.0000,36.567,0,237.080986000
A,20.0000,20.0000,22.092,0,237.080986000
L,0.0000,0.0000,15.750,0,173.504791000
A,80.0000,80.0000,58.949,1,173.504791000
L,0.0000,0.0000,54.339,0,216.035606000
A,50.0000,50.0000,21.117,1,216.035606000
A,60.2880,60.2880,24.750,0,240.155141000
A,55.0610,55.0610,24.223,1,216.443202000
L,0.0000,0.0000,9.503,0,241.565711000
A,21.0000,21.0000,54.314,0,241.565349000
```

1) Save: Select the path and file to output, and the user can modify it as needed; the name is the task name by default, and the user can modify it as needed.

2) Format: xxx.pqx can be opened with Notepad.

3) Format details:

6.1.1 Intersection method format

PI.pqx

```
0
QD,3410170.01200,445968.78700,2481.000
JD1,3410151.00800,445966.37100,40.0000,0.000,0.000,0.0000,0.0000
JD2,3410124.58900,445950.16600,30.0000,0.000,0.000,0.0000,0.0000
JD3,3410081.93000,445956.82300,30.0000,0.000,0.000,0.0000,0.0000
JD4,3410041.47300,445899.80500,30.0000,0.000,0.000,0.0000,0.0000
JD5,3409965.03400,445917.27200,45.0000,0.000,0.000,0.0000,0.0000
JD6,3409921.40200,445849.73400,20.0000,0.000,0.000,0.0000,0.0000
JD7,3409862.78100,445856.05400,80.0000,0.000,0.000,0.0000,0.0000
JD8,3409785.22700,445799.57200,50.0000,0.000,0.000,0.0000,0.0000
JD9,3409773.68500,445779.36600,60.2880,0.000,0.000,0.0000,0.0000
JD10,3409753.76200,445764.49300,55.0610,0.000,0.000,0.0000,0.0000
JD11,3409708.84800,445680.20600,21.0000,0.000,0.000,0.0000,0.0000
JD12,3409700.88600,445801.36600,220.0000,0.000,0.000,0.0000,0.0000
JD13,3409685.43900,445849.13900,94.5000,0.000,0.000,0.0000,0.0000
JD14,3409698.94600,445931.61900,40.0000,0.000,0.000,0.0000,0.0000
JD15,3409653.73400,445942.48600,40.8000,0.000,0.000,0.0000,0.0000
JD16,3409622.71600,445967.86000,20.0000,0.000,0.000,0.0000,0.0000
JD17-1,3409578.40000,445927.39500,15.0000,0.000,0.000,0.0000,0.0000
JD17-2,3409557.96000,445957.71000,15.0000,0.000,0.000,0.0000,0.0000
JD18,3409617.30000,445983.48800,50.0000,0.000,0.000,0.0000,0.0000
JD19,3409662.75700,445963.54200,50.0000,0.000,0.000,0.0000,0.0000
JD20,3409704.98100,445958.25700,50.0000,0.000,0.000,0.0000,0.0000
JD21,3409751.63100,445883.66900,28.0000,0.000,0.000,0.0000,0.0000
JD22,3409828.15800,445995.19500,100.0000,0.000,0.000,0.0000,0.0000
JD23-1,3409896.50000,446031.51500,20.0000,0.000,0.000,0.0000,0.0000
JD23-2,3409886.51100,446069.00100,20.0000,0.000,0.000,0.0000,0.0000
JD24,3409825.07900,446044.11200,60.0000,0.000,0.000,0.0000,0.0000
JD25,3409765.87100,445938.97300,28.0000,0.000,0.000,0.0000,0.0000
JD26,3409722.32700,445994.11900,50.0000,0.000,0.000,0.0000,0.0000
ZD,3409680.23200,446005.70600,0.0000,0.000,0.000,0.0000,0.0000
```

The corresponding line format content sample is:

The first line: 0 means the intersection method.

Second line: qd, 2642996.290, 510979.925, 0.000

The second line explains: qd is the first intersection, 2642996.290, 510979.925 are NE coordinates, and 0.000 is the starting stake.

The third row Jd1, 2642031.479, 511944.258, 1000.000, 0.000, 0.000

Intersection name	Coordinate N	Coordinate E	Radius	In-spiral length	Out-spiral length
Intersection	Intersection coordinate x	Intersection coordinate y	Circle curve radius	Ease in	Ease out

The third line description: Jd1 is represented as an intersection (the first intersection name is defined by the user), 2642031.479, 511944.258 are NE coordinates, 1000 is the radius of the circular curve, the first 0 is the slow

The sum curve enters the helix length, and the last 0 is the spiral curve outgoing length.

is the NE coordinate, 1000 is the radius of the circular curve, the first 0 is the length of the spiral into the spiral, and the last 0 is the length of the spiral out of the spiral.

Fourth row Jd2, 2641500.679, 512302.501, 800.000, 50.000, 50.000

The fourth line description: Jd2 is expressed as the intersection (the second intersection name is defined by the user), 2641500.679, 512302.501 are the NE coordinates, 800 is the radius of the circular curve, and the first 50 is the slow

And curve into the helix length, after 50 is the spiral curve out of the spiral length.

Other line intersection method road elements can be deduced by analogy.

6.1.2 Line element method format

CL. pqx

```
1
3410170.01200,445968.78700,2480.000
L,0.0000,0.0000,10.553,0,187.144276000
A,40.0000,40.0000,16.950,1,187.144276000
L,0.0000,0.0000,11.353,0,211.312748000
A,30.0000,30.0000,21.150,0,211.312748000
L,0.0000,0.0000,13.570,0,171.074960000
A,30.0000,30.0000,33.255,1,171.074960000
L,0.0000,0.0000,31.293,0,234.383291000
A,30.0000,30.0000,35.350,0,234.383291000
L,0.0000,0.0000,26.845,0,167.074223000
A,45.0000,45.0000,54.984,1,167.074223000
L,0.0000,0.0000,36.567,0,237.080986000
A,20.0000,20.0000,22.092,0,237.080986000
L,0.0000,0.0000,15.750,0,173.504791000
A,80.0000,80.0000,58.949,1,173.504791000
L,0.0000,0.0000,54.339,0,216.035606000
A,50.0000,50.0000,21.117,1,216.035606000
A,60.2880,60.2880,24.750,0,240.155141000
A,55.0610,55.0610,24.223,1,216.443202000
L,0.0000,0.0000,9.503,0,241.565711000
A,21.0000,21.0000,54.314,0,241.565349000
```

The corresponding line format content sample is:

The first line: 1 indicates the line element method.

Second line: 4359324.440, 539302.369, 2805.350

Description of the second line: the starting point of the line element, 4359324.440, 539302.369 are the NE coordinates, and 2805.350 is the starting station number.

Third line: L, 0.000, 0.000, 255.758, 0, 273.052467596

Line Type	Start Radius	End Radius	Length	Direction
L straight line/A circular curve/S transition curve				Left 0/Right 1

The third line description: straight line, starting point radius 0, ending point radius 0, straight line length 1268.087, direction is left offset, azimuth angle is 273°05′24.67596″.

Fourth row S, 0.000, 2500.000, 60.000, 1

Description of the fourth line: the easing curve, the starting point radius is 0, the ending point radius is 2500, the easing length is 60, and the direction is to the right.

Fifth row A, 2500.000, 2500.000, 135.468, 1

The fifth line description: circular curve, the starting point radius is 2500, the ending point radius is 2500, the arc length is 135.468, and the direction is rightward.

Other line element method road elements can be deduced by analogy.

Flat Curve Design Notes:

1) When opening the horizontal curve design file, you must pay attention to check whether the current road is the intersection method or the line element method. The road edited by the line element method can only be opened by the line element method, and the road edited by the intersection method can only be opened by the intersection method. Open the design file with Notepad to see if the first line is 0 or 1).

2) For the flat curve designed for the first time, there will be a prompt to save when returning or exiting, and all designs will be cleared when canceled.

3) After the opened road design file is modified, there will be a prompt to save it when returning or exiting, and the edited element will not take effect if it is canceled.

4) The road flat curve design file can be edited in the notepad format after familiar with the composition of the road file to complete the design and save it as .pqx for use.

6.2 Description of vertical curve sqx file

Road.sqx

```
1  K2+480.000,636.0100,0.0000
2  K2+500.000,637.2100,220.0000
3  K2+700.000,613.2100,300.0000
4  K2+745.000,611.8600,400.0000
5  K2+995.000,584.3600,400.0000
6  K3+050.000,582.1600,400.0000
7  K3+350.000,552.1600,500.0000
8  K3+400.000,550.1600,800.0000
9  K3+750.000,520.4100,900.0000
10 K4+090.000,507.0000,0.0000
11
```

The corresponding line format content sample is:

Description of the first line: k0+000.000 is the first slope change point, 129.098 is the slope change point elevation, and 0.000 is the slope change point radius.

Second line: k0+070.000, 128.048, 2000.000

Explanation of the second line: k0+070.000 is the second slope change point, 128.048 is the slope change point elevation, and 2000.000 is the slope change point radius

Other row and vertical curve road elements can be deduced by analogy.

6.3 Description of cross section hdm file

6.3.1 No super widening

ROAD.hdm

```
1  0,Motorway,1.75,1.5,0.0
2  0,Sidewalk,0.5,-3.0,0.0
3  1,Motorway,1.75,-1.5,0.0
4  1,Sidewalk,0.5,-3.0,0.0
```

Corresponding row format content samples such as: left/right plate, standard plate type, standard plate width, standard plate cross slope, standard plate height difference. Description of the first line: 0, left plate, motor vehicle lane, means plate, 1.25 means standard plate width, 2.0 means standard plate cross slope, 0.0 means standard plate height difference.

The third line description: 1, right plate, motor vehicle lane, means plate, 1.25 means standard plate width, 2.0 means standard plate cross slope, 0.0 means standard plate height difference.

Other row elements can be deduced by analogy.

The following are the details of the section information element:

Left and right panels

Plate Orientation	Number Type
Left	0
Right	1

Cross slope and height difference of standard slabs

Name	Cross Slope Slope Direction
Standard plate transverse slope (unit % user does not need to input)	Up positive and down negative (positive value uphill, negative value downhill)
Standard plate height difference (relative to the previous plate, in meters)	High positive low negative o

6.3.2 Contains super high

Cubic Parabola.hdm

```
0,Motorway,1.75,1.5,0.0
0,K2+480.000,1.5,1
0,K2+490.552,2.56,1
0,K2+500.000,3.0,1
0,K2+518.855,-2.27,1
0,K2+520.000,-2.73,1
0,K2+529.431,-3.0,1
0,K2+540.000,-2.72,1
0,K2+540.006,-2.72,1
0,K2+553.576,2.71,1
0,Sidewalk,0.5,-3.0,0.0
0,K2+480.000,1.5,1
0,K2+490.552,2.56,1
0,K2+500.000,3.0,1
0,K2+518.855,-2.27,1
0,K2+520.000,-2.73,1
0,K2+529.431,-3.0,1
0,K2+540.000,-2.72,1
0,K2+540.006,-2.72,1
0,K2+553.576,2.71,1
```

Linear.hdm

```
0,Motorway,1.75,1.5,0.0
0,K2+480.000,1.5,0
0,K2+490.552,2.56,0
0,K2+500.000,3.0,0
0,K2+518.855,-2.27,0
0,K2+520.000,-2.73,0
0,K2+529.431,-3.0,0
0,K2+540.000,-2.72,0
0,K2+540.006,-2.72,0
0,K2+553.576,2.71,0
0,Sidewalk,0.5,-3.0,0.0
0,K2+480.000,1.5,0
0,K2+490.552,2.56,0
0,K2+500.000,3.0,0
0,K2+518.855,-2.27,0
0,K2+520.000,-2.73,0
0,K2+529.431,-3.0,0
0,K2+540.000,-2.72,0
0,K2+540.006,-2.72,0
0,K2+553.576,2.71,0
```

Corresponding line format content sample, such as: file type, station number, cross slope, change mode

Description of the first line: 0, superelevation, K81+649.633, superelevation change point stake, -2, superelevation change point cross slope, 1, superelevation change method

The first red square indicates: this superelevation data is the left lane data

Description of the second red square: This superelevation data is the left hard shoulder data

Below is the superelevation data on the right

And so on...

Superelevation change method

Name	Number Type

Linear	0
Cubic Parabola	1

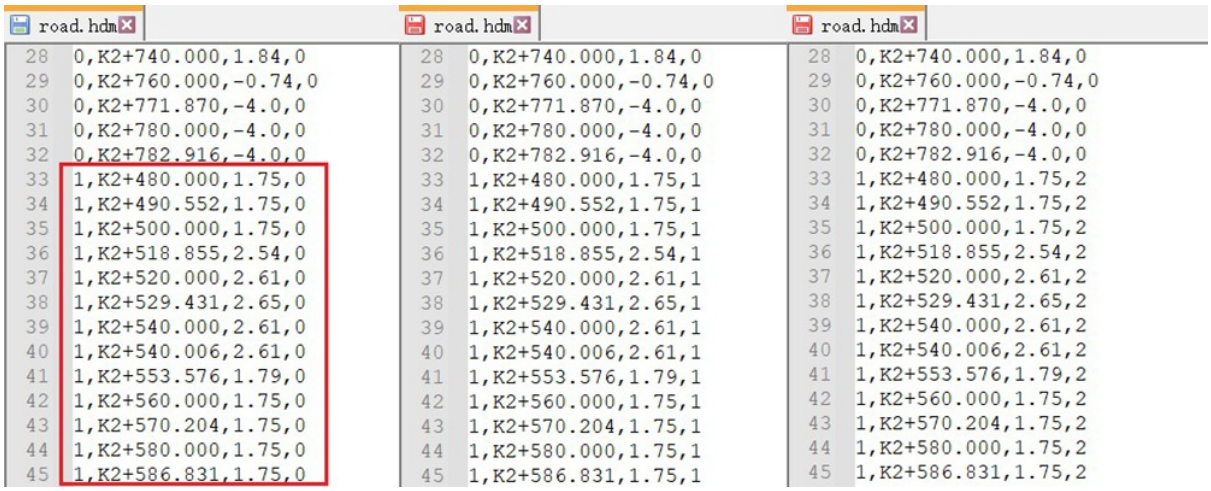
Document superelevation display order

Name	Order
Main section on the left	First
Other plates on the left	Second
Main section on the right	Third
Other plates on the right	Fourth

File type

Name	Number Type
super high	0
Widen	1

6.3.3 Including widening



The widening data is usually below the superelevation data, and the corresponding format style is such as: file type, station number, cross slope, change method

The first line: 1, representing widening, K2+480, representing the chainage of the widening change point, 1.75, representing the width of the widening change point, 0, representing the linearity

The data display order is consistent with the superelevation.

Widening change method

Name	Number Type
Linear	0
Cubic Parabola	1
quartic parabola	2

Document Display Order

Name	Order
The main section on the left is super high	The first
Left main section widened	Second
The other plates on the left are super high	The third
Widening of other plates on the left	Fourth

The main section on the right is super high	Fifth
The main section on the right is widened	Sixth
Other plates on the right are super high	Seventh
Widening of other plates on the right	Eighth

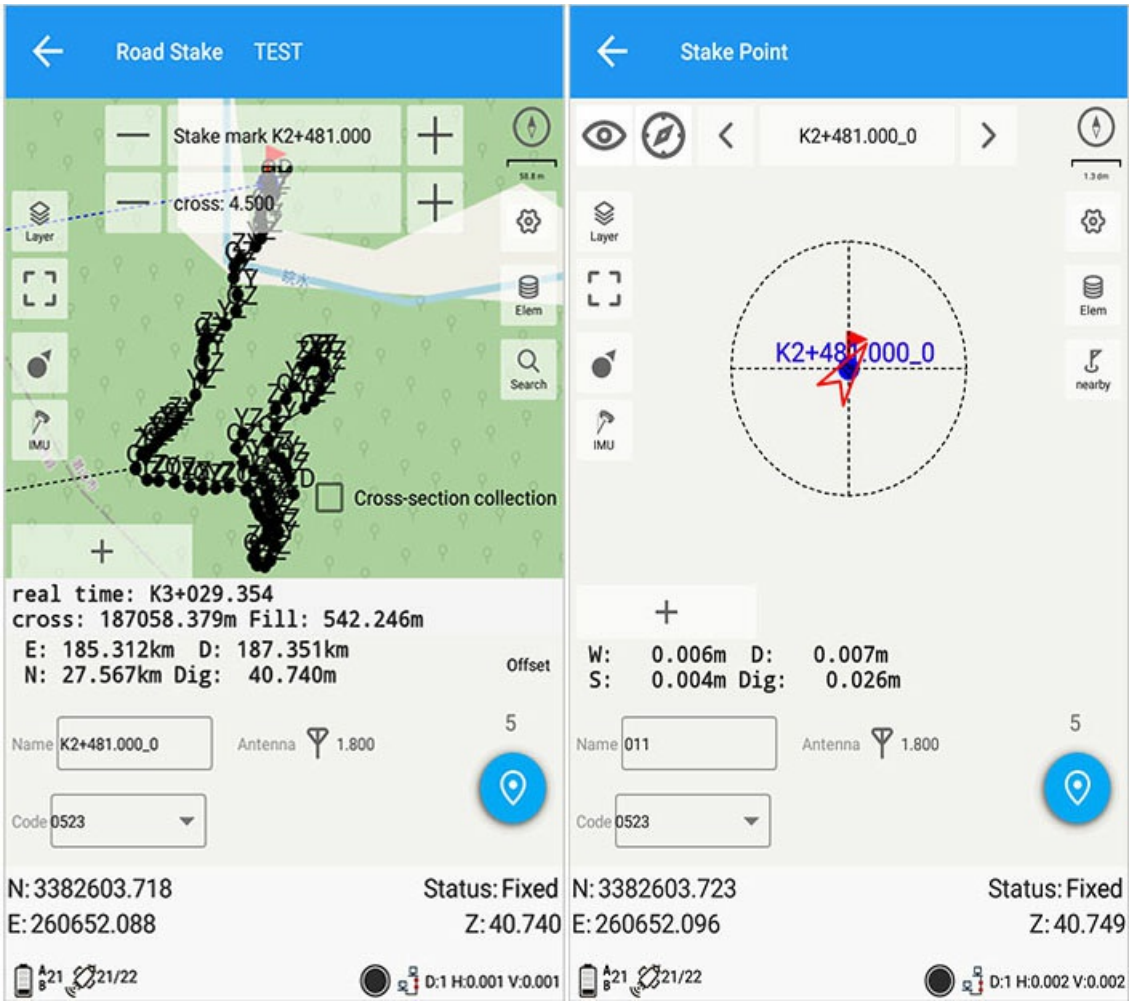
Icon:

Road Stake

Interface icon meaning

Icon	Meaning	Icon	Meaning
	Layer Options		Settings
	Full screen center		Point Library
	Single View		Query
	Multi-view		Solution reset

Main interface->【Measurement】->【Road Stakeout】.



The whole map of the staked road and the staked road points are displayed.

Stake out direction:

1) South-east, north-west: Refers to the current azimuth application of south-east, north-west indication.

2) Front, back, left and right: Refers to the current orientation using the front, back, left and right directions.

3) Distance: the horizontal distance between the current target point and the mobile station.

4) Height difference/fill and cut: the height difference between the current target point and the mobile station (the height reference is: when setting out the point).

5) Offset/Navigation: Switch the current bearing display mode.

The azimuth display content is set according to the stakeout options: there are southeast, northwest, front, back, left, right, and azimuth distance. For details, see: [Measurement Options].

Right shortcut menu:

1) Solution reset: Re-acquire the differential signal.

2) Point library: Quickly enter the road point library.

3) Pile distance: The default distance between piles is 20, which can be quickly entered into the settings.

4) Add piles: Quickly add piles according to the pile distance.

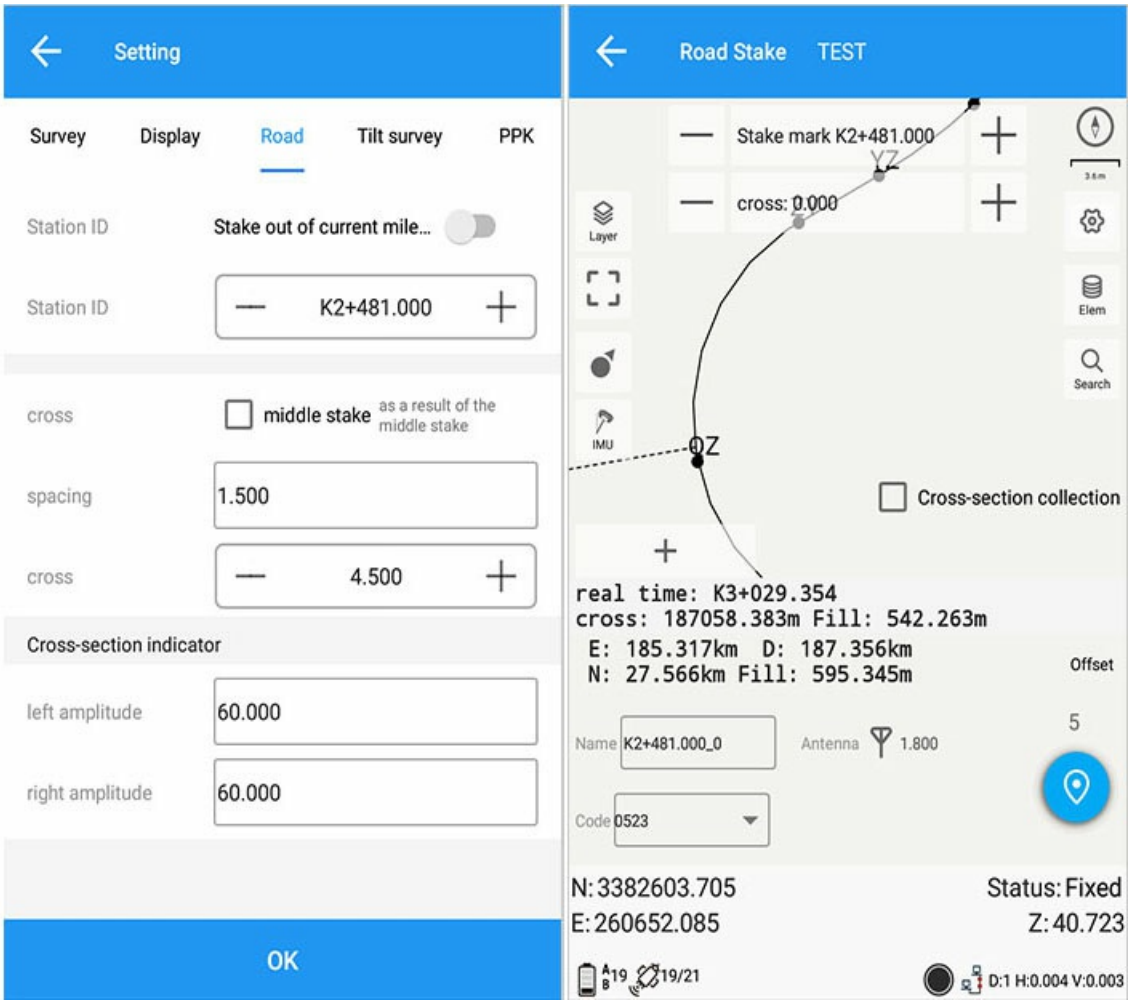
5) Pile reduction: Quickly reduce piles according to the pile distance.

6) Query: Quickly query mileage or station number.

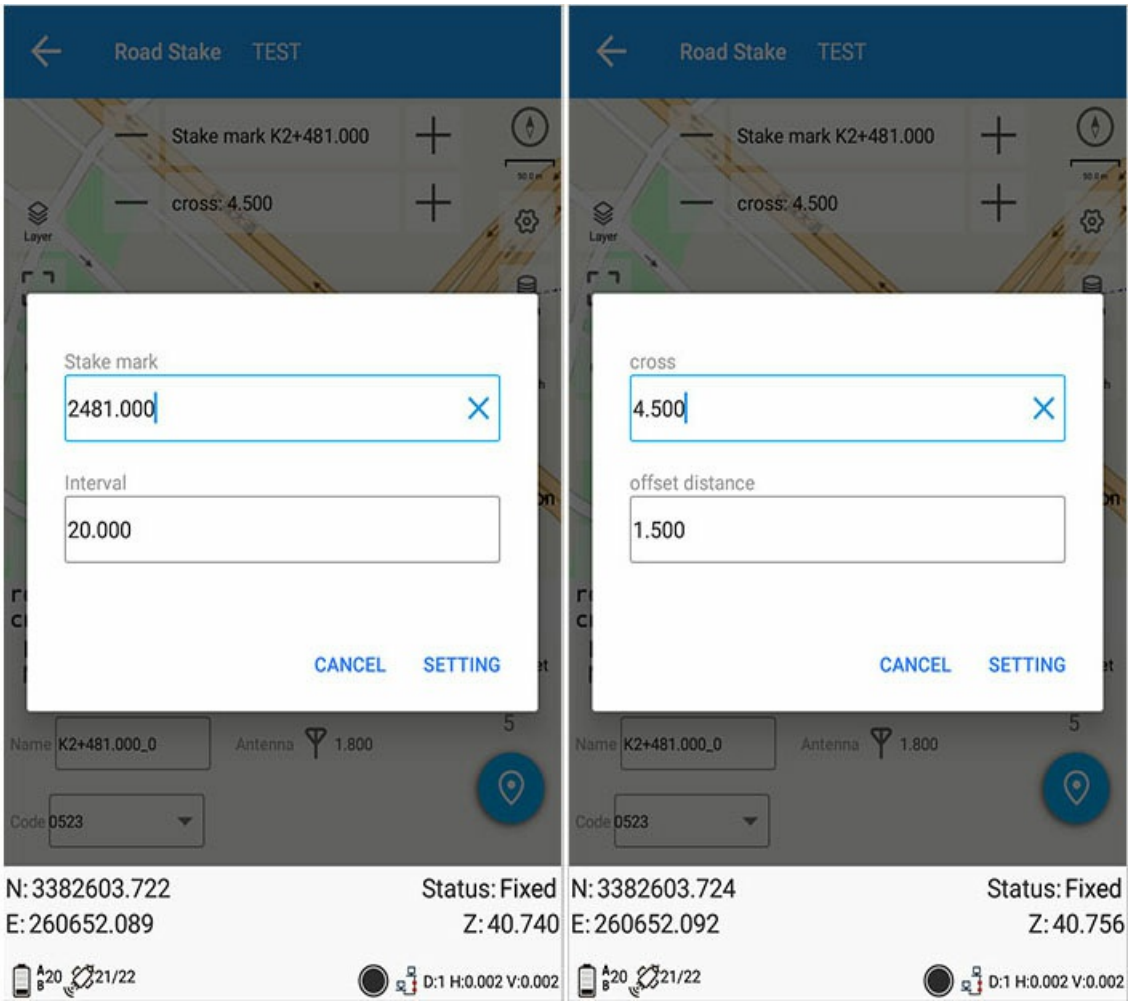
1. Road file

Open: The current road file will be staked out.

2. Target Mileage Pile



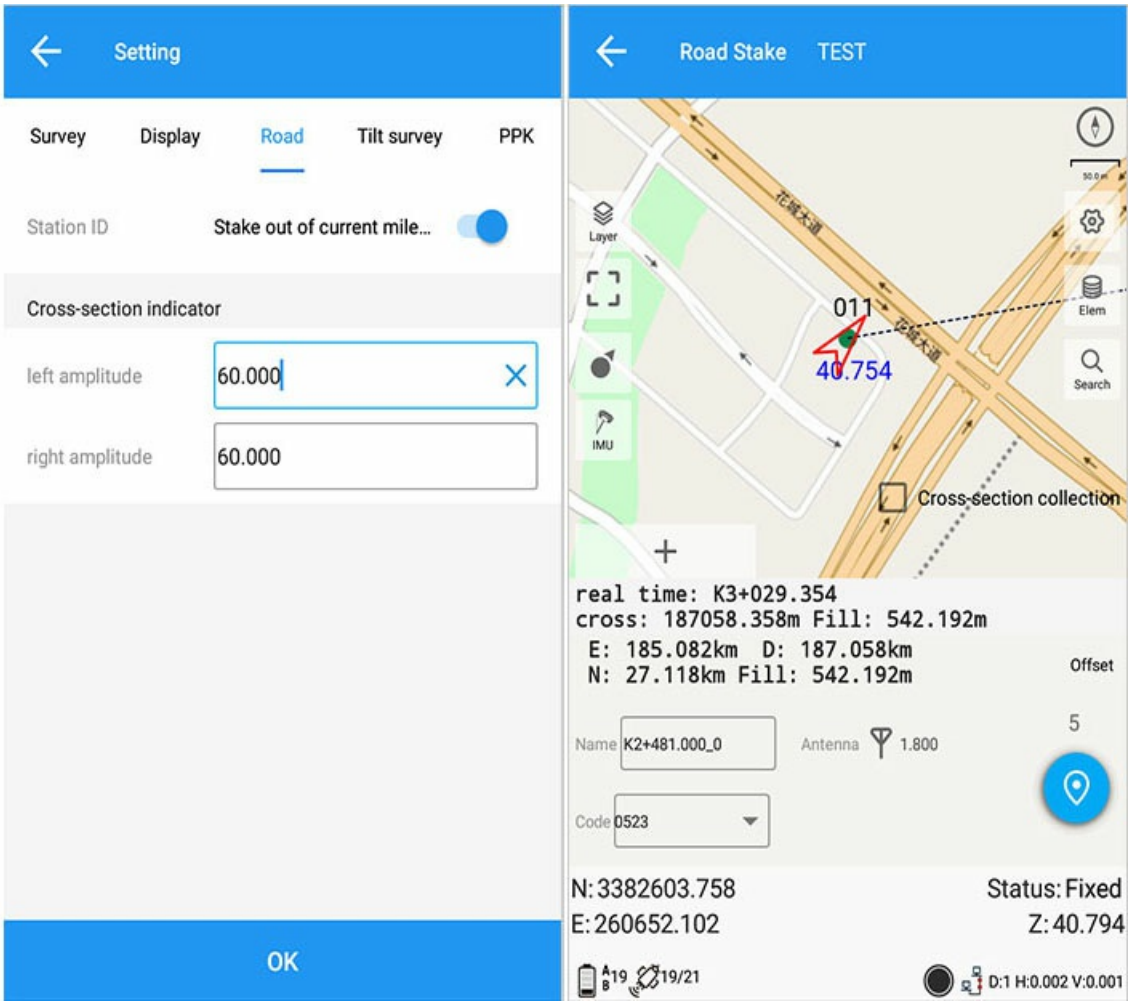
You can set it quickly in the stakeout interface.



1) Add/Subtract: You can increase or decrease the target value.

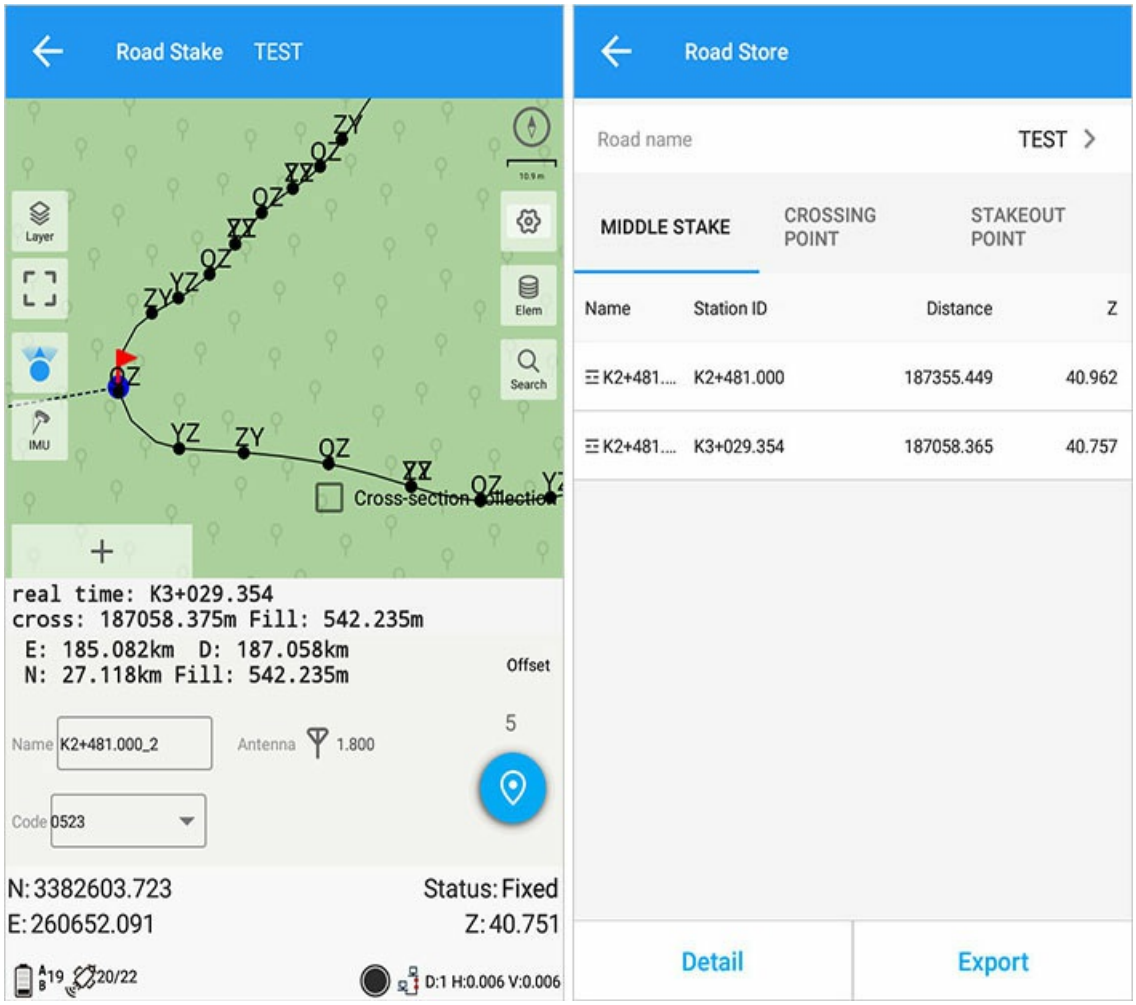
2) Click the center post or the horizontal offset, and a dialog box will pop up to quickly set the relevant properties.

3. Current Mileage Pile



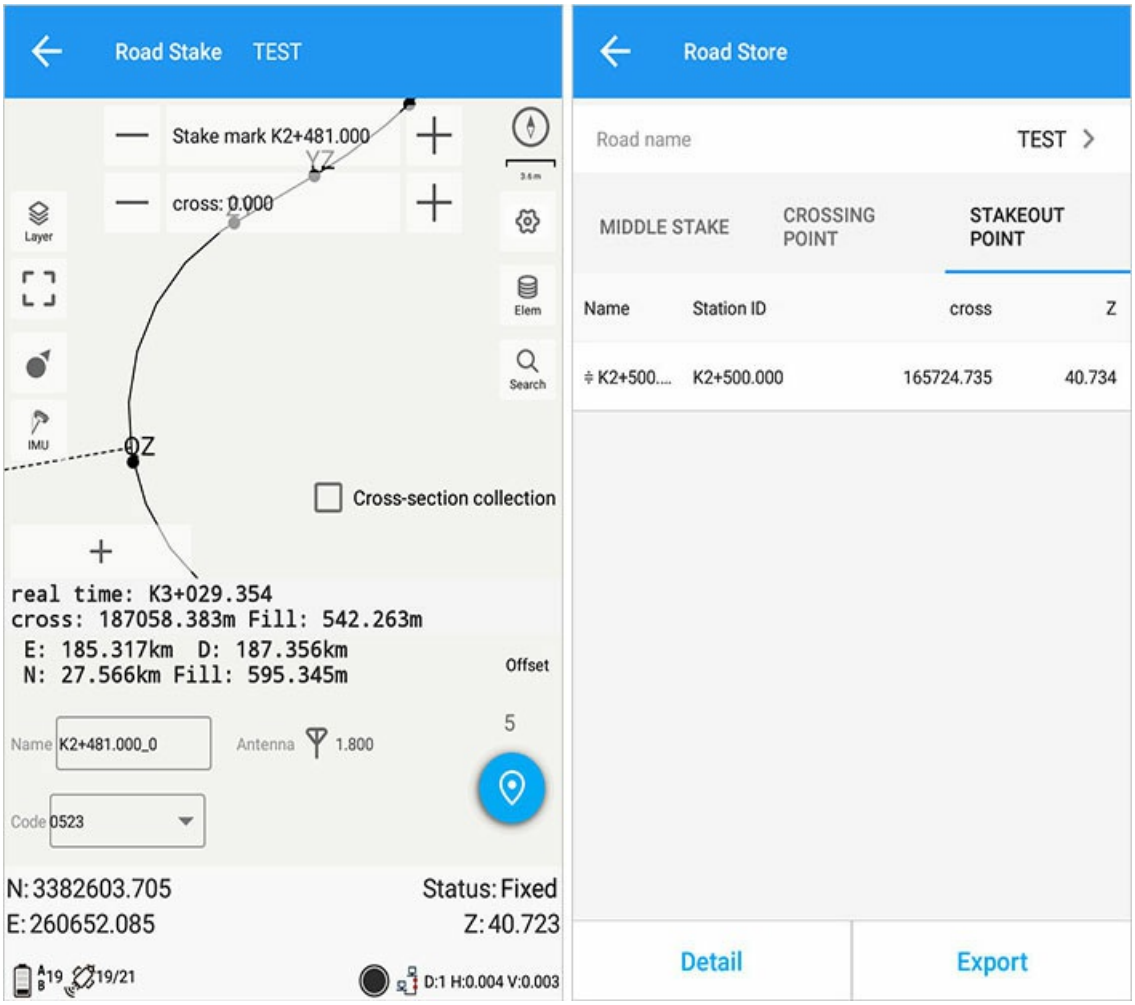
4. Stakeout point

Middle stakes



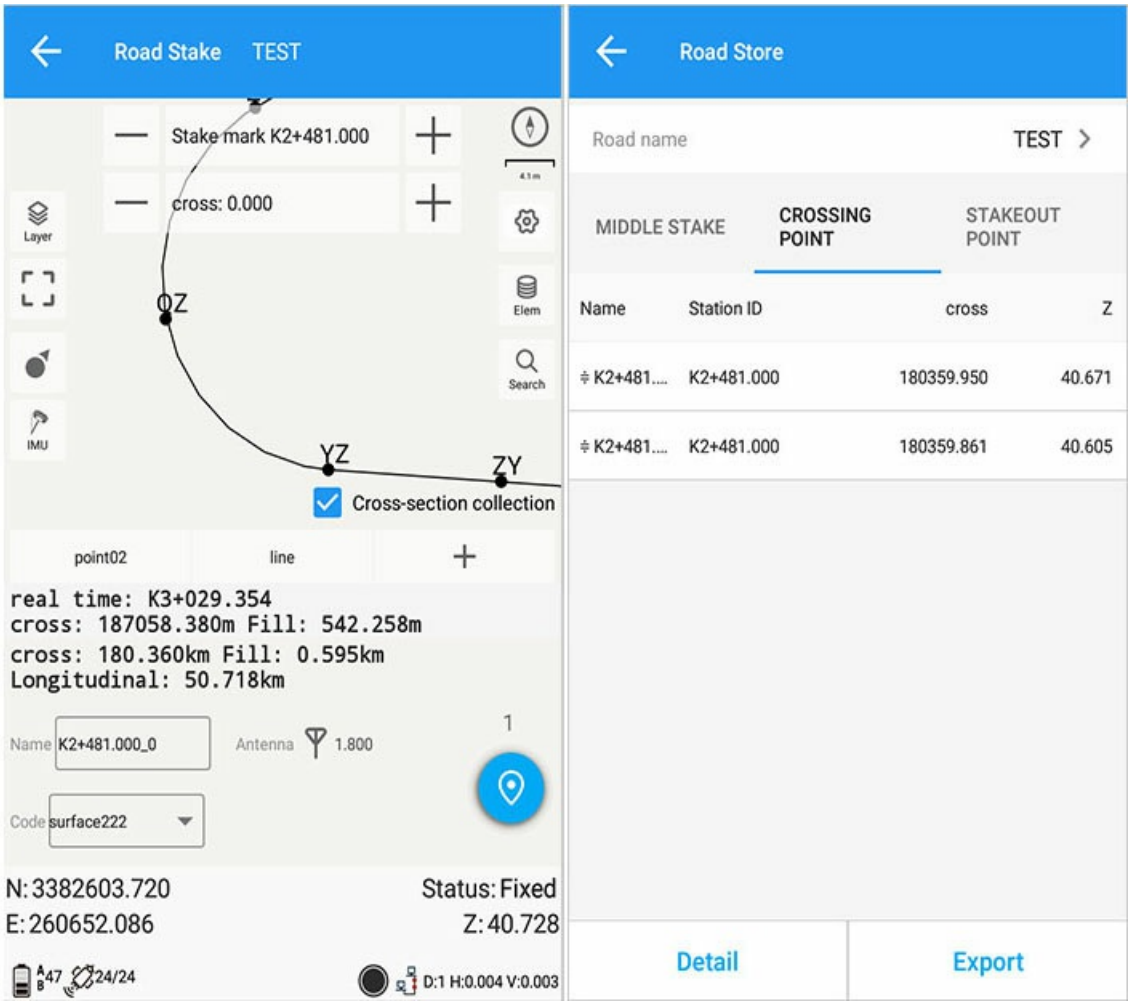
Crossing Stakeout Points

Cross-Stakeout Points: Add points for the cross-out measurement.

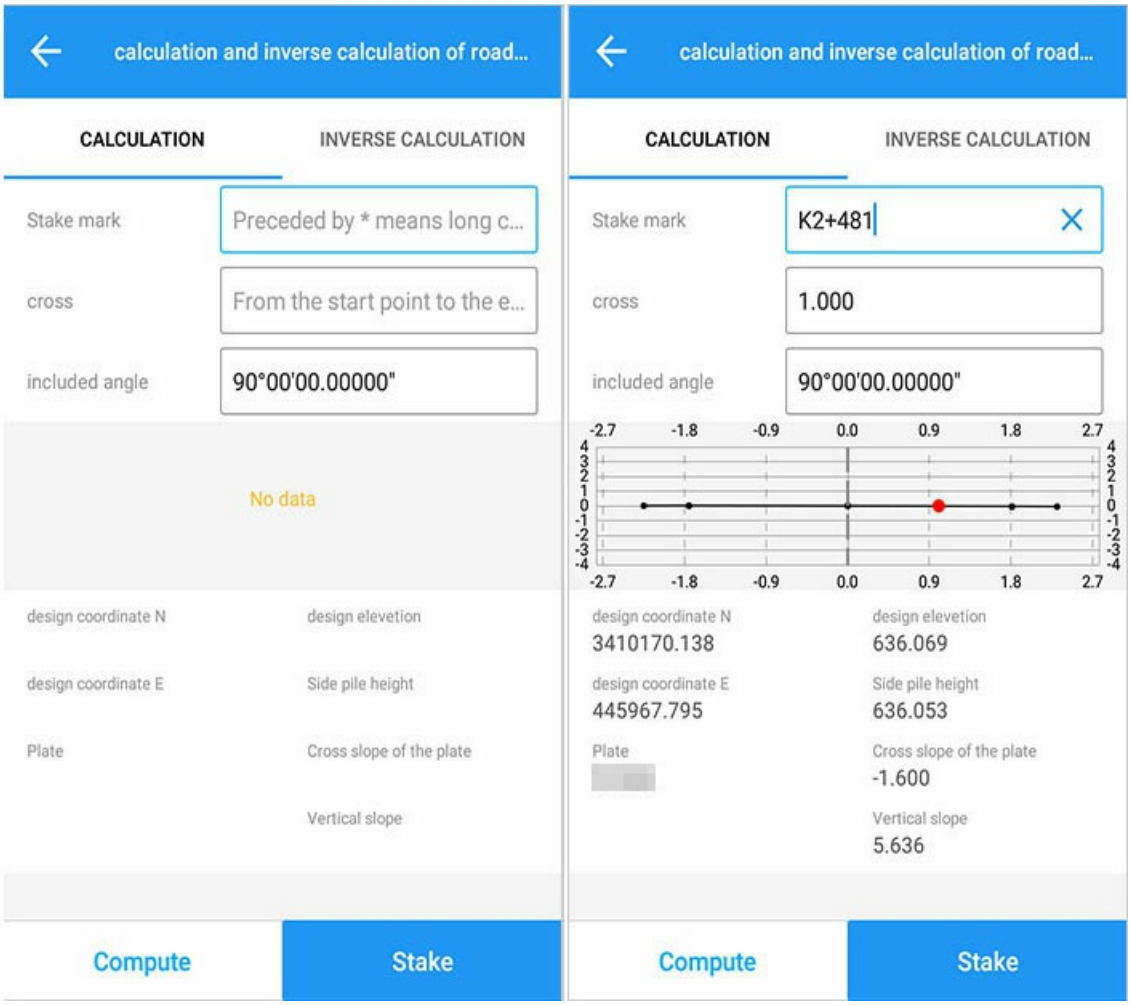


Crossing point

Cross-section point: Select the point measured by [Cross-section Acquisition].


Road Stake TEST
Stake mark K2+481.000
cross: 0.000
Layer
IMU
Elem
Search
OZ
YZ
ZY
Cross-section collection
point02
line
real time: K3+029.354
cross: 187058.380m Fill: 542.258m
cross: 180.360km Fill: 0.595km
Longitudinal: 50.718km
Name K2+481.000_0
Antenna 1.800
Code surface222
N:3382603.720
E:260652.086
Status: Fixed
Z:40.728
24/24
D:1 H:0.004 V:0.003
Road Store
Road name
TEST
MIDDLE STAKE
CROSSING POINT
STAKEOUT POINT
Name
Station ID
cross
Z
K2+481....
K2+481.000
180359.950
40.671
K2+481....
K2+481.000
180359.861
40.605
Detail
Export

5. Query



Positive calculation: Enter the pile value and the lateral deviation value.

1) Station number: Input the station number to be calculated.

2) Horizontal offset: Enter the horizontal offset value (left negative and right positive) that need to calculate the chainage.

3) Design coordinates N, E: the coordinates calculated according to the above data.

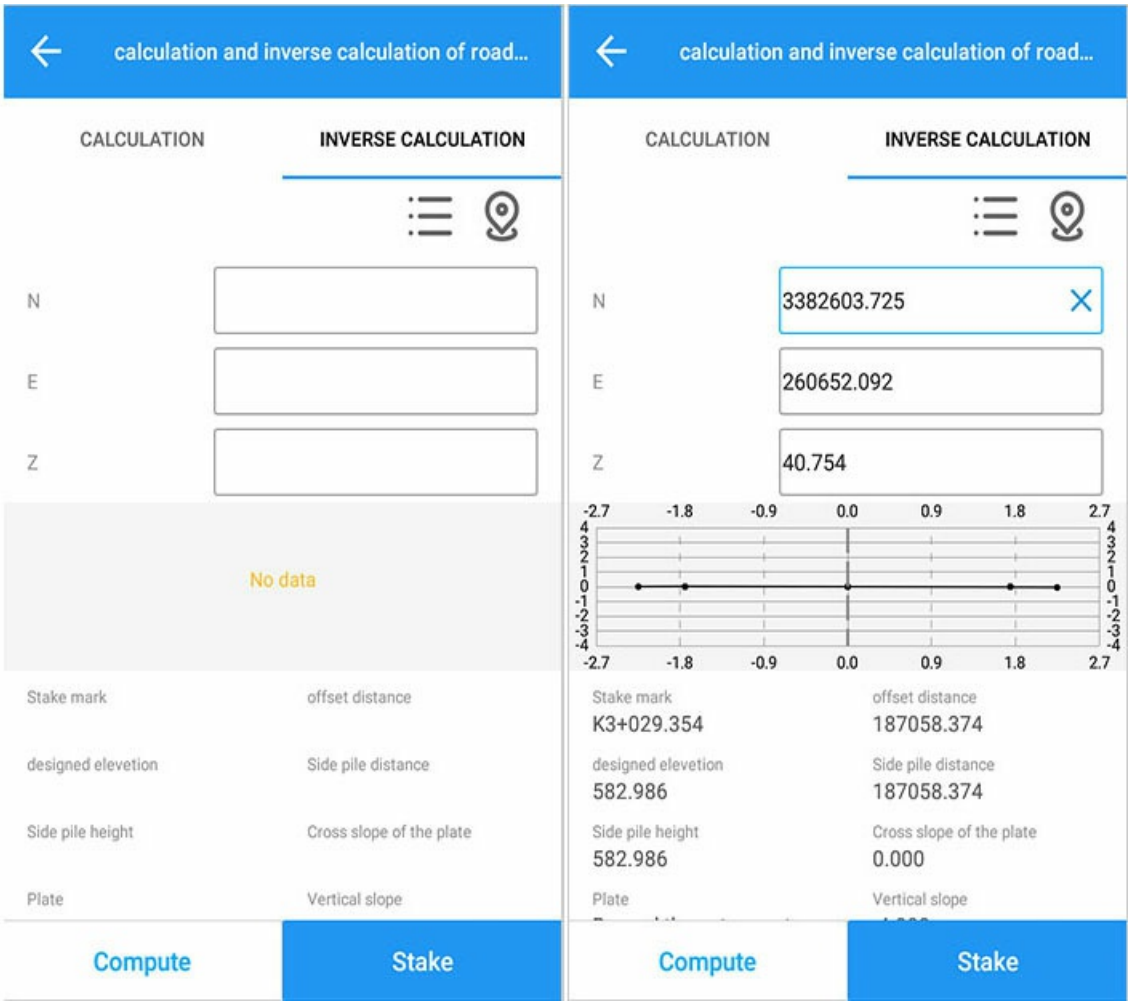
4) Sector: the sector where the calculation point is currently located.

5) Design elevation: the elevation value of the center line where the point is calculated based on the above values.

6) Side pile height: the height of the calculated point.

7) Cross slope of the plate it belongs to: the current cross slope value of the plate where the calculation point is located.

8) Vertical slope: the current vertical slope value of the plate where the calculation point is located.



Inverse calculation: Enter the coordinates N, E and Z values.

1) Station number: the currently queried station number value.

2) Design elevation: the elevation value of the center line where the point is calculated according to the input value.

3) Side pile height: Calculate the point elevation.

4) Section: The section to which the query result belongs.

5) Width of the plate: the width of the plate where the query result is located.

6) Offset: the horizontal offset value of the current plate.

7) Side pile distance: Calculate the lateral offset value of the point.

8) Cross slope of the plate it belongs to: the current cross slope value of the plate where the calculation point is located.

9) Vertical slope: the current vertical slope value of the plate where the calculation point is located.

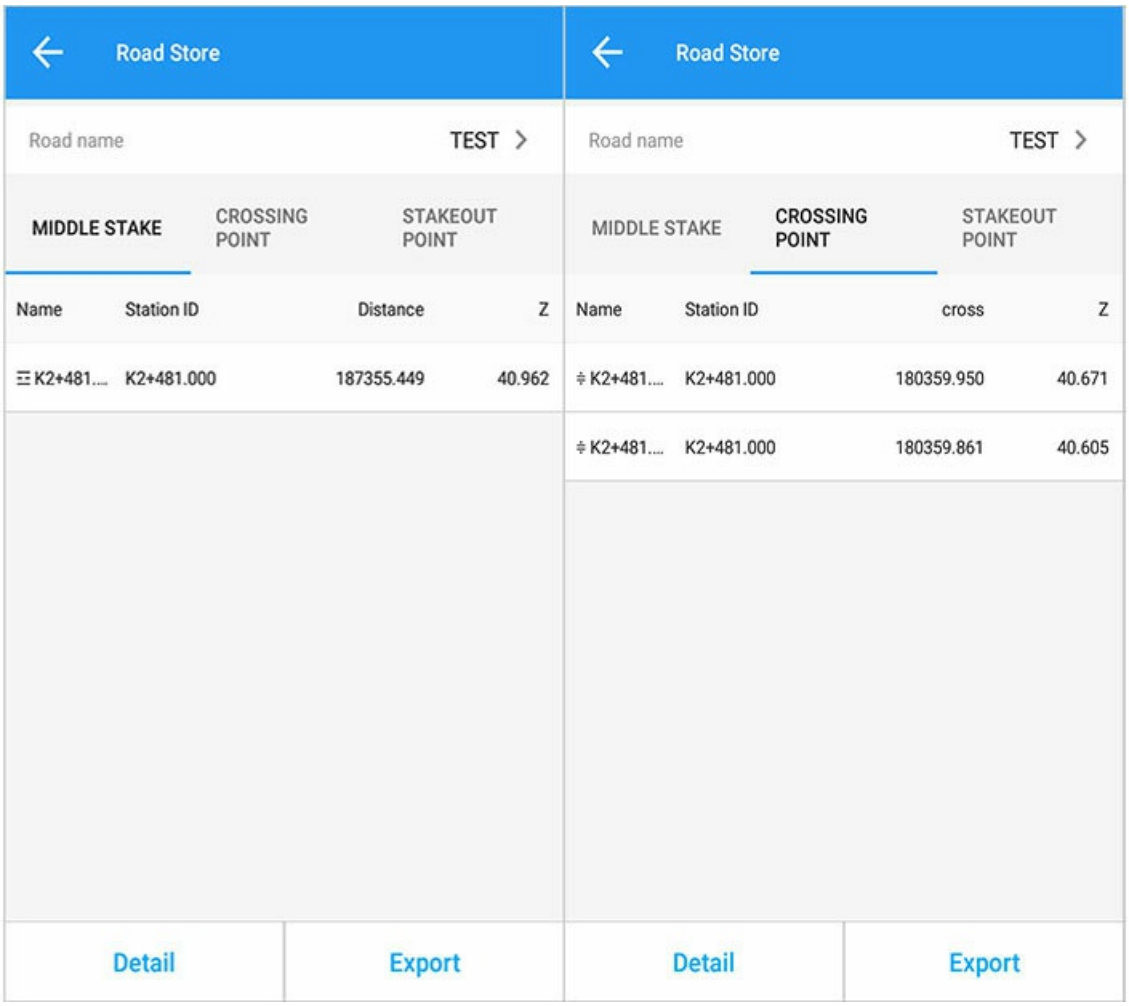
6. Options

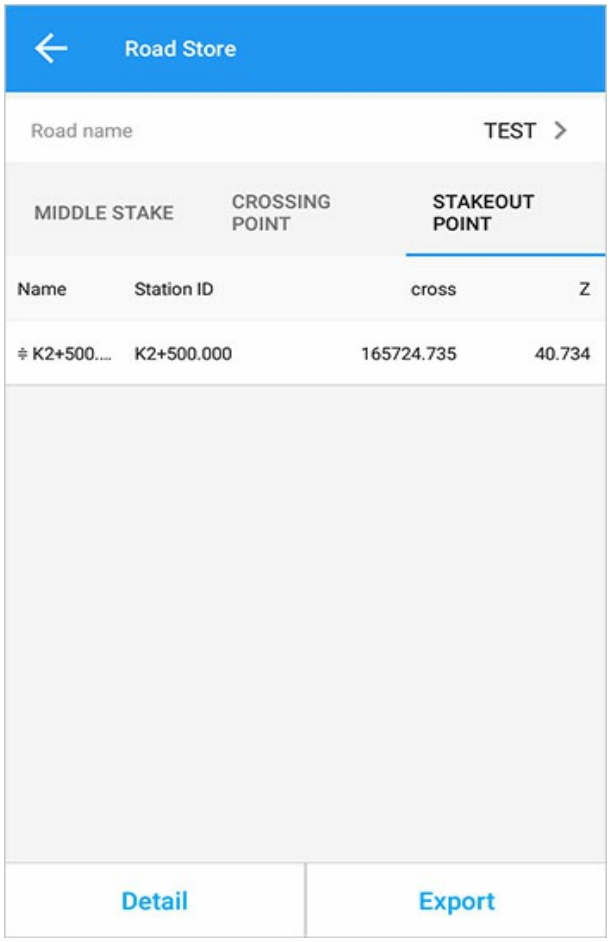
See Measurement Options.

Road Point Library

Enter:

1. Main interface -> [Measurement] -> [Road Point Library].
2. Main interface->[Survey]->[Road Stakeout]->[Point Library].





1) Station number: the station number to which the measurement point belongs.

2) Distance: the horizontal distance between the measuring point and the middle pile.

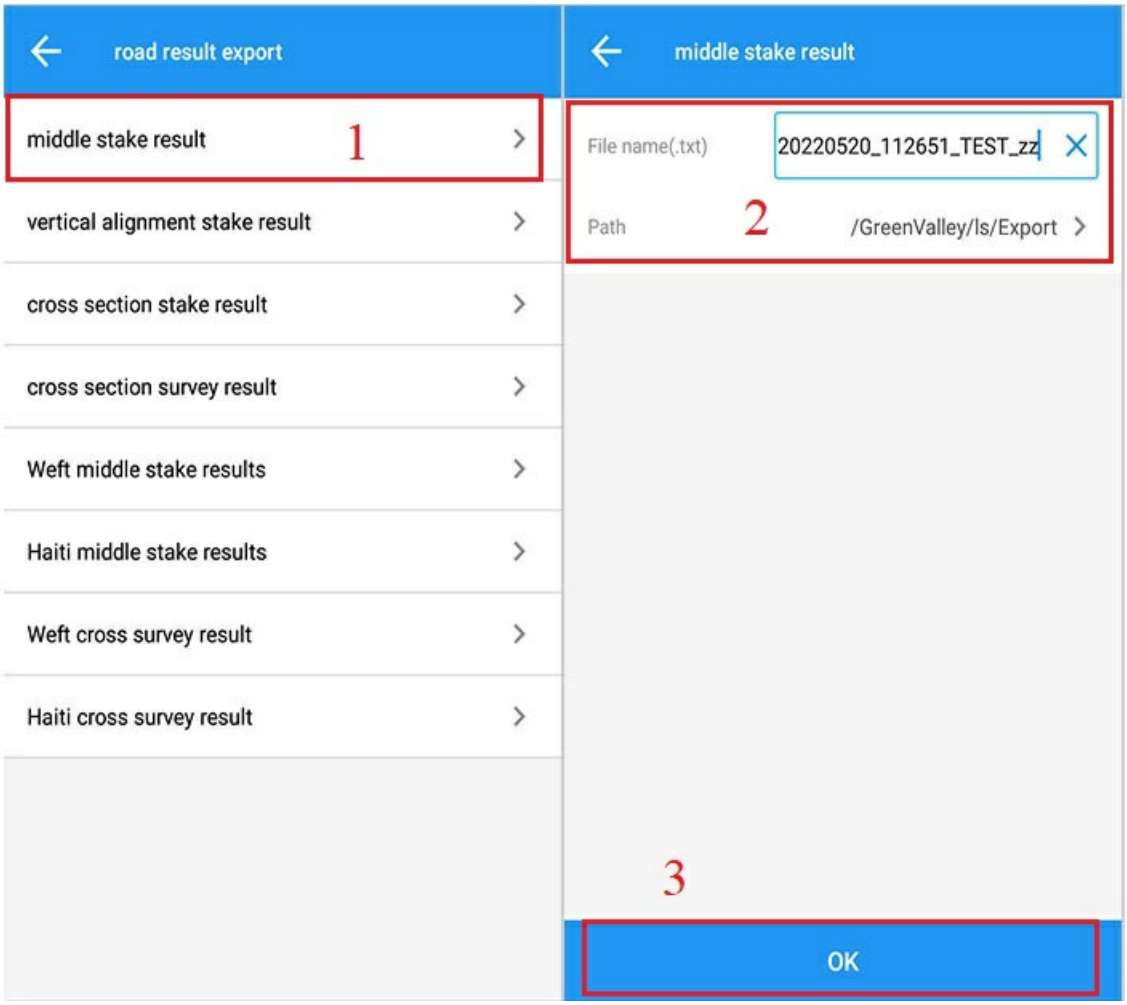
3) Lateral deviation: the vertical distance from the measuring point to the tangent of the middle pile.

4) Z: Measurement point elevation

1. Point Details

2. Middle stub and transection export

2.1. Middle pile results export



2.2. Export results of middle pile results

20220520_112651_TEST_zz.txt

```
Name,mileage,N,E,Z
K2+481.000_0,K2+481.000,3382602.571,260652.569,40.962
```

2.3. Vertical curve stakeout export

20220520_112651_TEST_sqx.txt

```
Name,Z,Start time,RMS_h,mileage,Design height,dh
K2+481.000_0,40.962,2022/05/24 10:09:39,0.115,K2+481.000,636.069,-595.106
```

2.4. Cross section stakeout export

20220520_112651_TEST_hdf.txt

```
mileage,Design height
Left:Cross distance,Slope,Name,N,E,Z,Start time,RMS_x,RMS_y,RMS,Cross difference,dh
Right:Cross distance,Slope,Name,N,E,Z,Start time,RMS_x,RMS_y,RMS,Cross difference,dh
K2+500.000,636.319
-
3.000,1357.799,K2+500.000_0,3382601.840,260652.429,40.734,2022/05/24 10:12:35,0.061,0.061,0.096,165721.735,40.734
```

2.5. Transverse measurement export

20220520_112651_TEST_hdc.txt

```
mileage
Left:Count,Cross,Height
Right:Count,Cross,Height
K2+481.000
0
2,180359.861,40.605,180359.950,40.671
```

Description of the format of cross-sectional measurement results:

The first line: 0+000.000 is the first stake, and so on.

Second row: 2, 1.540, 129.031, 3.4.400, 129.026.

In order: the left frame of the second row, the total number of measured cross-sections is 2, the order is: a distance and the measured elevation (1.540, 129.031), and so on.

Third row: 2, 1.493, 129.062, 2.815, 129.106.

In order: the third row of the right frame, the total number of measured cross-sections is 2, the order is: a distance and the measured elevation (1.493, 129.062), and so on.

2.6. Results of latitudinal piles

20220520_112651_TEST_hint_zz.dmx

```
HINTCAD5.8_DMX_SHUJU
2481.000,40.962
```

Format description of the results of the piles in the latitude ground (this is defined according to the specification of the latitude ground):

The first line: information about the file version and file type name, each of the following lines

Record the ground level of a stake. The format is divided into station number and ground level.

2.7. Haitian Pile Results

20220520_112651_TEST_hand_zz.dmg

```
2481.000,40.962
```

Description of the format of Haitian medium pile results (this is defined according to the Haitian specification): Each line records the ground level of a chainage. The format is divided into station number and ground level.

2.8. Haiti Transverse Survey Results

20220520_112651_TEST_hand_hdc.dmx

```
1
2481.000
0
2,180359.861,-0.357,180359.950,-0.291
```

Description of the format of the Haitian transect measurement results (this is defined in accordance with the Haitian specification):

First row: 1

Indicates the first format used in Haiti. There are a total of 6 formats in Haiti, and the software currently supports the first format.

Second line: 0.000

Indicates the stake number, and so on.

Third row: 2, 1.540, -0.071, 3.4.400, -0.076

In order: the left frame of the second row, the total number of measured cross-sections is 2, the order is: a distance and a height difference (1.540, -0.071), and so on.

Fourth row: 2, 1.493, -0.040, 2.815, 0.004

In order: the third row of the right frame, the total number of measured cross-sections is 2, the order is: a distance and a height difference (1.493, -0.040), and so on.

Note:

1) The latitude and ground format is absolute height difference, which means that both distance and height difference are calculated according to the measured value of the middle pile.

2) When measuring multiple intermediate stakes, use the nearest intermediate stake for calculation.

skills: If you need the second type of Haitian transect survey results, you can change the information of the version and file type name of the latitudinal format file to 2, and then change the suffix to dmx. The other four formats are not supported temporarily.

2.9. Results of latitudinal transect

Line	Data	Remark
1	File version and file type information	Exp:HINTCAD5.8 _HDM_SHUJU
2	Medium stake	
3	Total points, horizontal distance 1, height difference 1, horizontal distance 2, height difference 2,...	Left data
4	Total points, horizontal distance 1, height difference 1, horizontal distance 2, height difference 2,...	Right data
5	Medium stake	
6	Total points, horizontal distance 1, height difference 1, horizontal distance 2, height difference 2,...	Left data
7	Total points, horizontal distance 1, height difference 1, horizontal distance 2, height difference 2,...	Right data
8	Medium stake	
9	Total points, horizontal distance 1, height difference 1, horizontal distance 2, height difference 2,...	Left data
10	Total points, horizontal distance 1, height difference 1, horizontal distance 2, height difference 2,...	Right data

Note: If you need to export the latitudinal Haiti transection measurement results, you need to set out the middle pile. If there is no middle pile result, the current transection pile result cannot be exported.

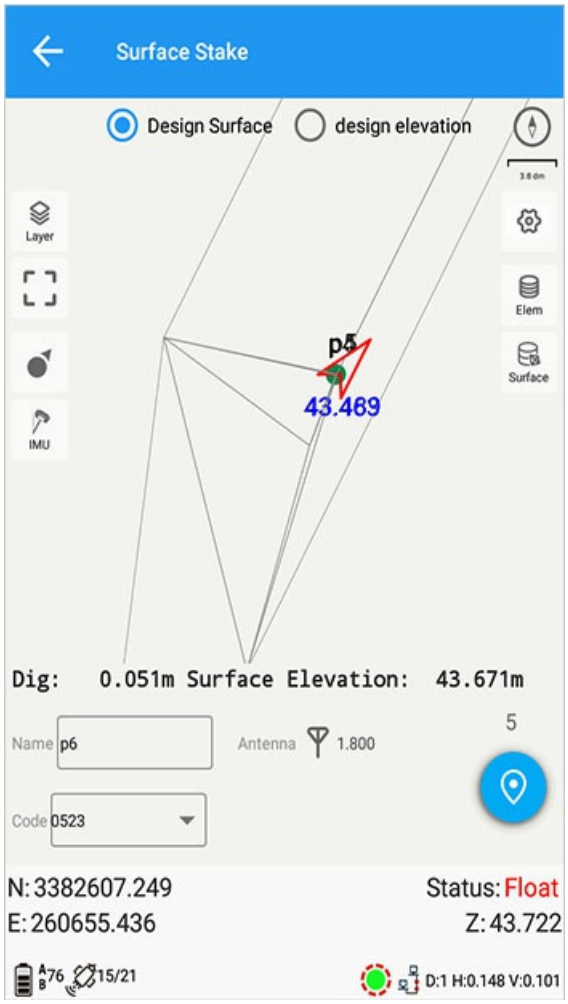
Surface Stake

1. Surface lofting

Interface icon meaning

Icon	Meaning	Icon	Meaning
	Layer Options		Settings
	Full screen center		Point Library
	Single Perspective		File
	Multi-view		Solution reset

Main interface->【Measurement】->【Surface Stakeout】.



1)【Rolling】: You can customize the rolling;

2)【Code】: You can choose the code you want to set;

3)【Antenna】: Set the height of the antenna pole or the slant height;

5) If it is within the design surface, the filling data will be displayed. If it is not within the design surface, it will prompt "Not within the design surface!"

6)【Design surface】: Select this button, the software will calculate the fill and cut value according to the current position elevation and the design surface elevation;

7)【Design Elevation】: Select this button and give a design elevation, the software will calculate the fill and cut value according to the current position elevation and this input elevation;

8) [Point Library]: Jump to the coordinate point library interface, please refer to Point Library for details.

10) [Surface Store]: Jump to the Surface Store interface, please refer to Surface Store for details.

11) [Settings]: Jump to the options interface, please refer to Options for details.

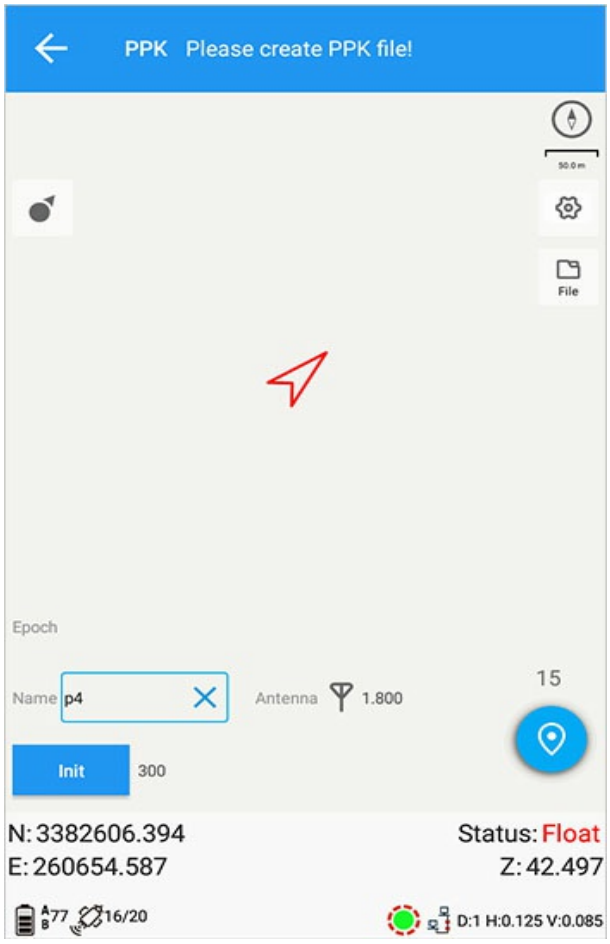
12)【Reset solution】: Re-acquire the differential signal.

PPK Survey

Interface icon meaning

Icon	Meaning	Icon	Meaning
	Single Perspective		Settings
	Multi-view		File
	Solution reset		

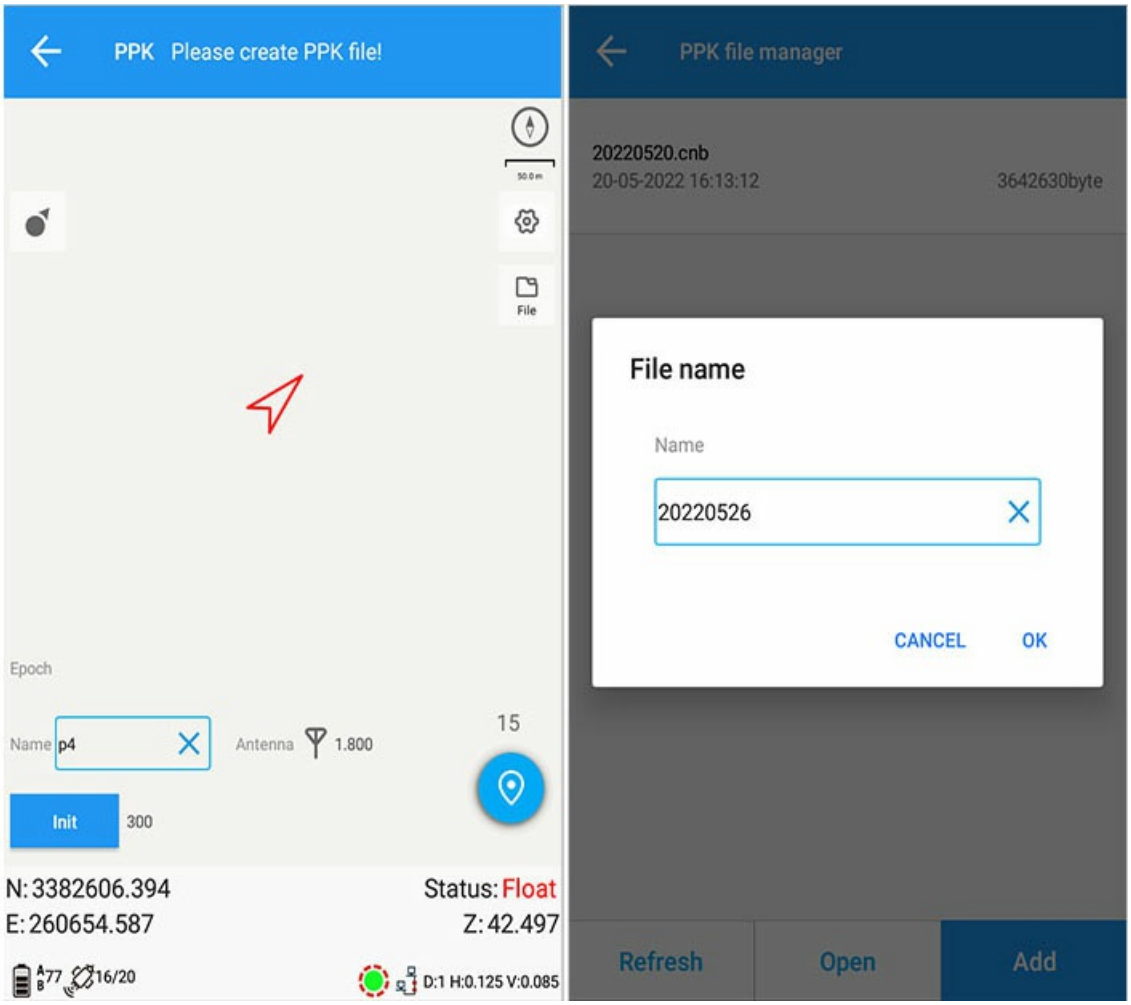
Main interface ->【Survey】->【PPK】.



1. File

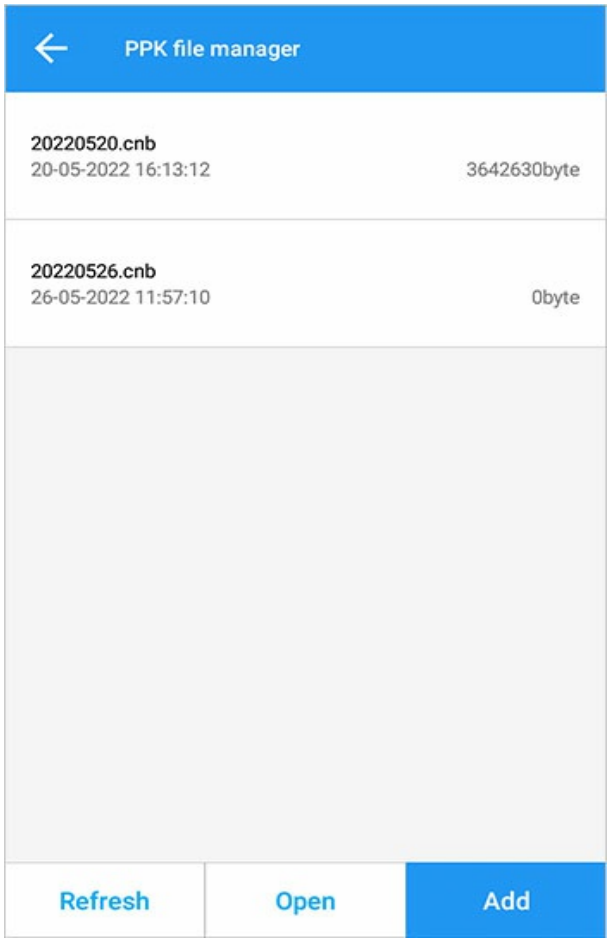
Click the icon on the right interface -> [File].

Click [Add] to create a new file.



When the file name is named, it will detect whether it has the same name, and the same name will prompt.

PPK measurement meaning: a special method of dynamic measurement, which is used as an auxiliary post-processing result measurement when there is no differential data, and the accuracy is equivalent to RTK measurement.



PPK file management:

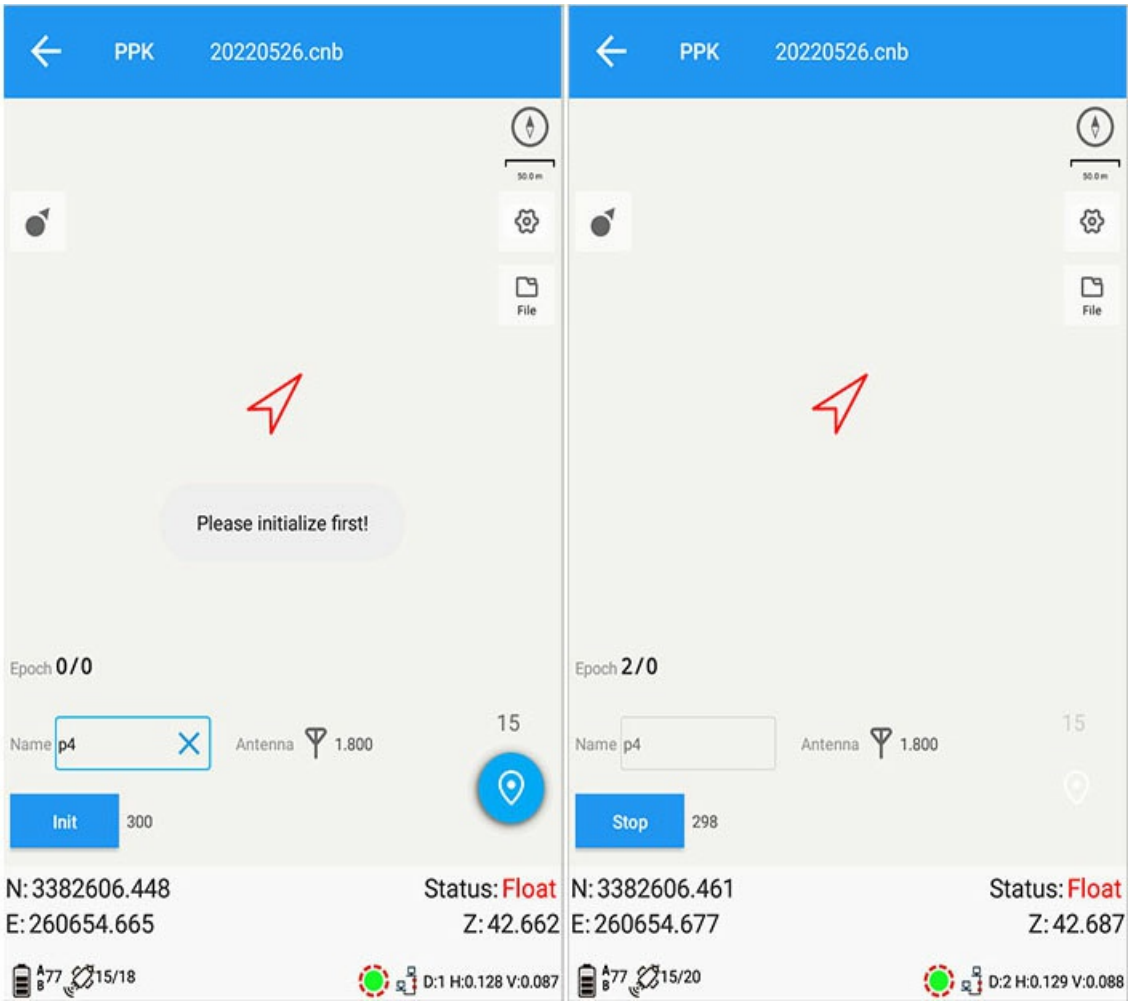
1) Add: You can create a new PPK file task.

2) Refresh: The current PPK file management can be refreshed.

3) Open: The file can be opened as the current PPK task.

2. Measurement

Normal measurement can be performed only after initialization.



Every epoch recorded is counted.

1) Point name: Set the measurement point name.

2) Code: Set the measurement code.

3) Layer: You can choose to open point name, code, elevation, map, and apply it according to user needs.

Note: PPK measurement must be initialized before normal measurement, and is not affected by any differential state.

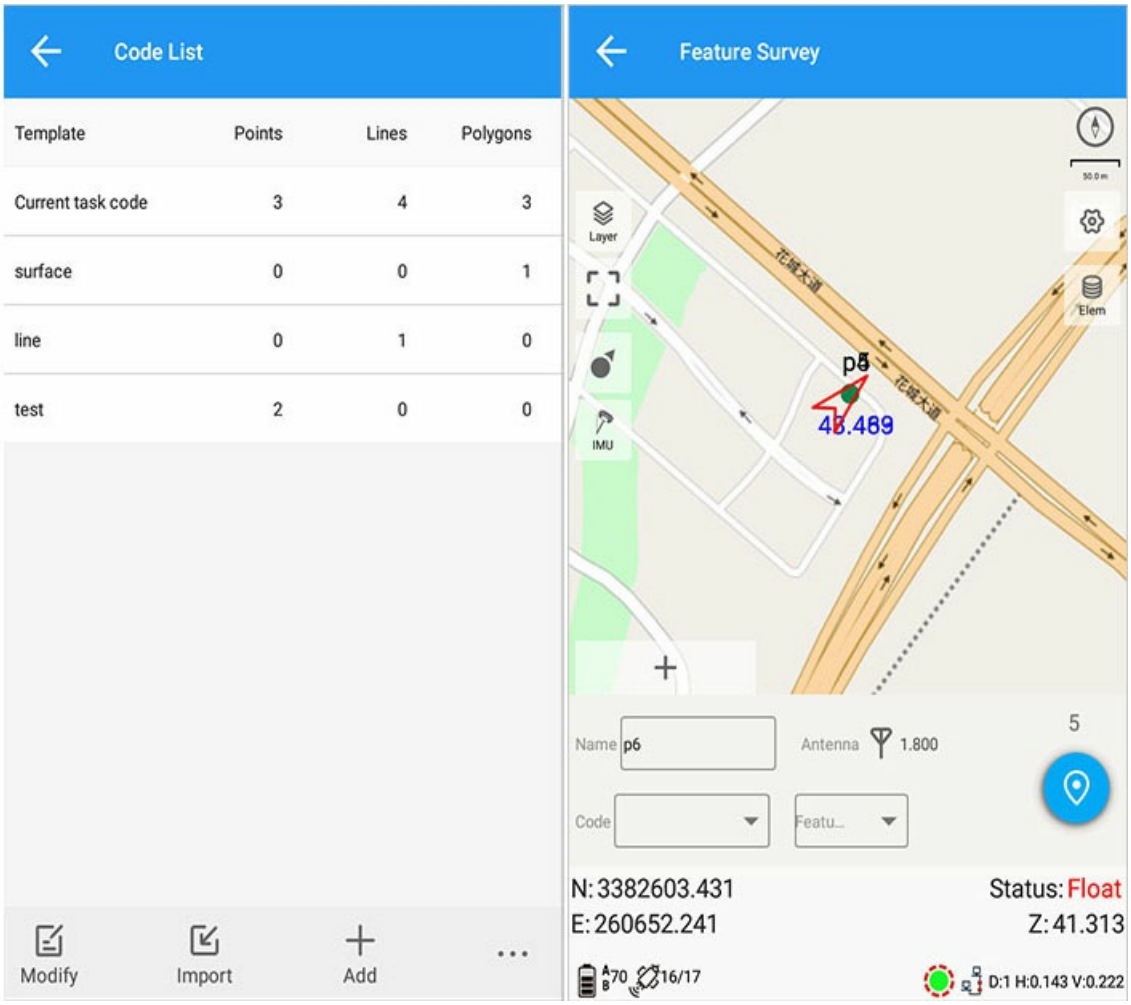
3. Options

See Measurement Options.

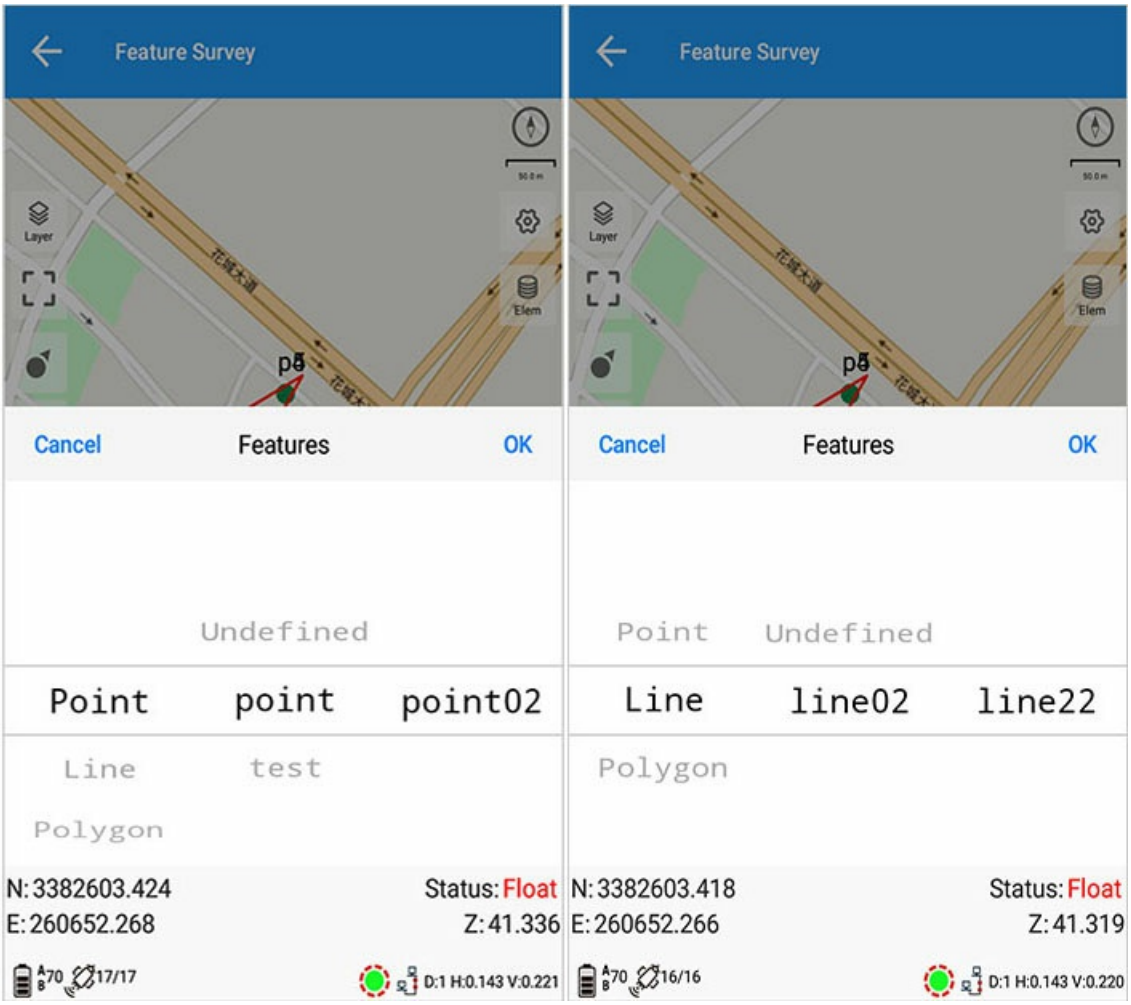
Feature Survey

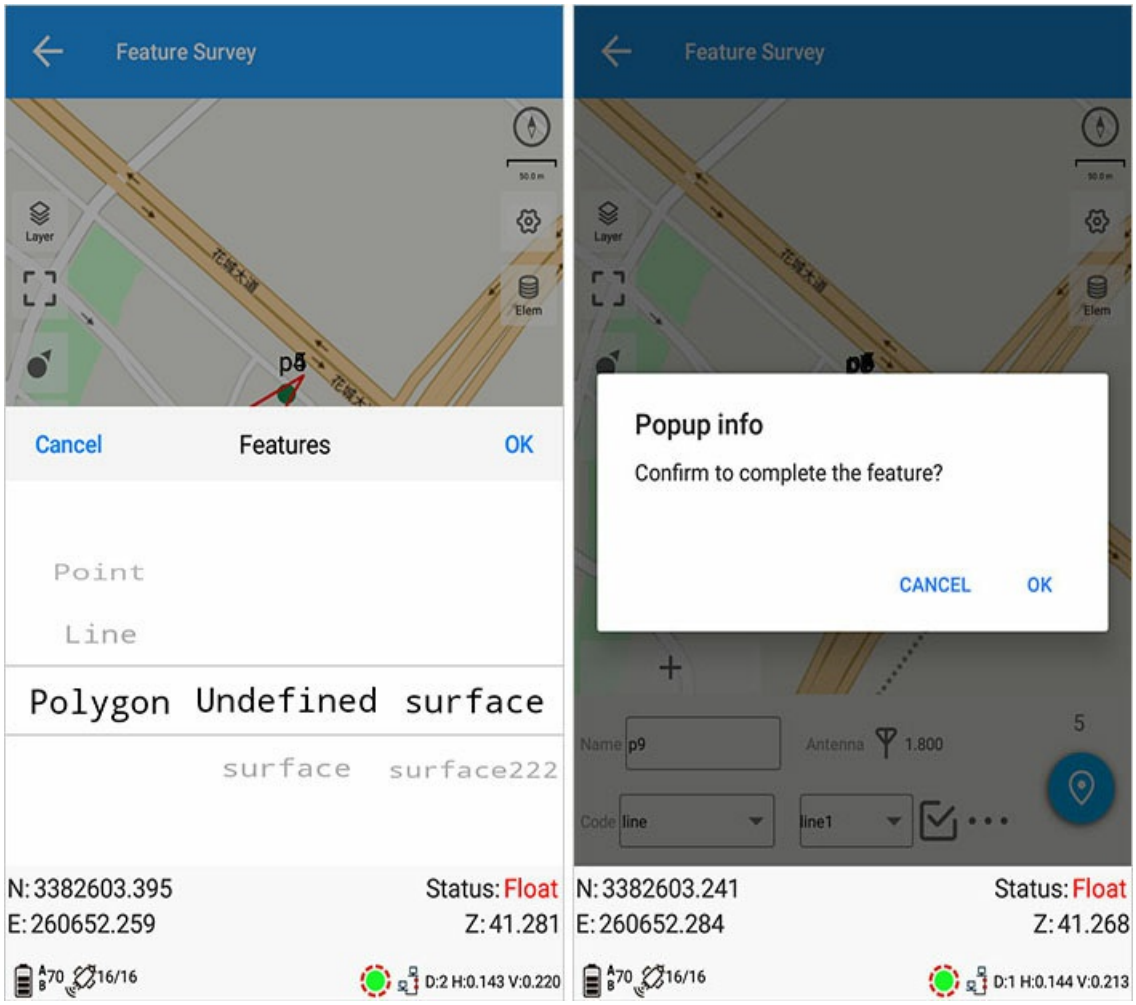
Main interface ->【Survey】->【Feature Survey】.

Select a code set: You can select a code set when creating a new task, or enter the code set application after the task is created successfully.

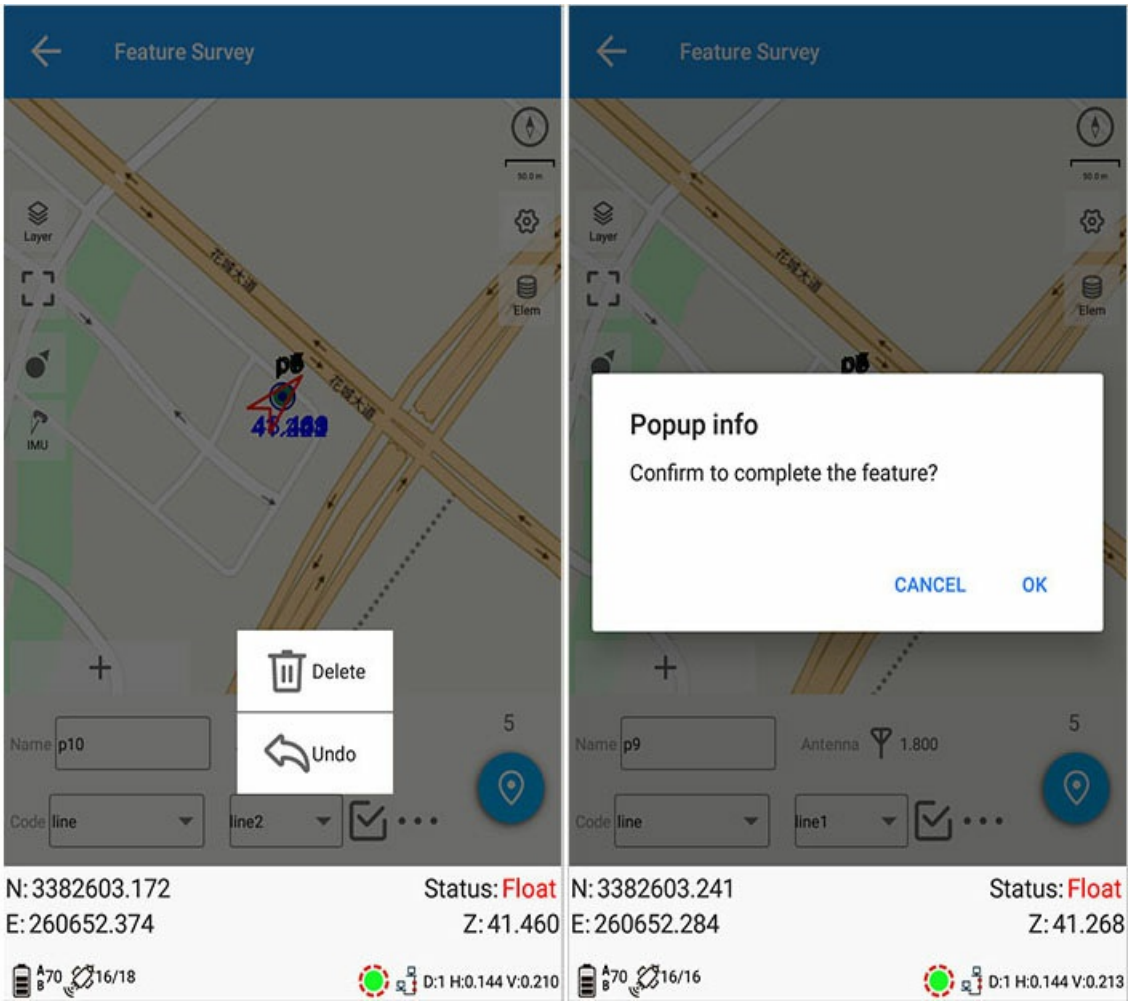


Select point, line, area code for feature survey.


Feature Survey
Layer
Elem
Cancel
Features
OK
Undefined
Point
point
point02
Line
test
Polygon
N:3382603.424
E:260652.268
Status:Float
Z:41.336
17/17
D:1 H:0.143 V:0.221
Feature Survey
Layer
Elem
Cancel
Features
OK
Point
Undefined
Line
line02
line22
Polygon
N:3382603.418
E:260652.266
Status:Float
Z:41.319
16/16
D:1 H:0.143 V:0.220



Use shortcut code survey: In the measurement option, enable quick survey using common codes, click "+" to enter shortcut code management, and you can add and delete codes.



When surveying, it must be ensured that the input point name meets the differential requirements, and the following contents are input:

1) Point name: set the measurement point name

2) Code: Set the measurement code, you can directly input the desired code and automatically save it into the current code set (for details, see Code Set).

3) Receiver system height: The default is 1.8 meters, which can be modified as needed. The measurement method of the pole height can be modified, the pole height or the oblique height.

4) Point library: Click on the right column "point library" to execute, enter the point library operation.

5) After the feature survey is completed, it is saved with the point name and the feature name by default. You can also customize the feature name in the feature name input box, and save it as a custom point name after surveying.

6) At least two points for line feature surveys, the feature name is generated by default, and can be customized; click [Tick] to complete the feature survey and save the feature; click [three small dots] to choose to delete or cancel the survey point .

7) At least three points are measured for surface features, and the name of the feature is generated by default, which can be customized and modified; click [Tick] to complete the feature survey and save the feature; click [three small dots] to choose to delete or cancel the surveyed point .

8) When the previous code survey is not completed, switch to other types of code survey, you can click the inverted triangle of the feature name to display the previously surveyed feature, and switch to the feature to continue to complete.

9) Reset: Re-acquire the differential signal to prevent flying spots.

Note: Please refer to Survey Options for details.

Tool

Tool includes below modules:

Site Calibration

Grid Shift

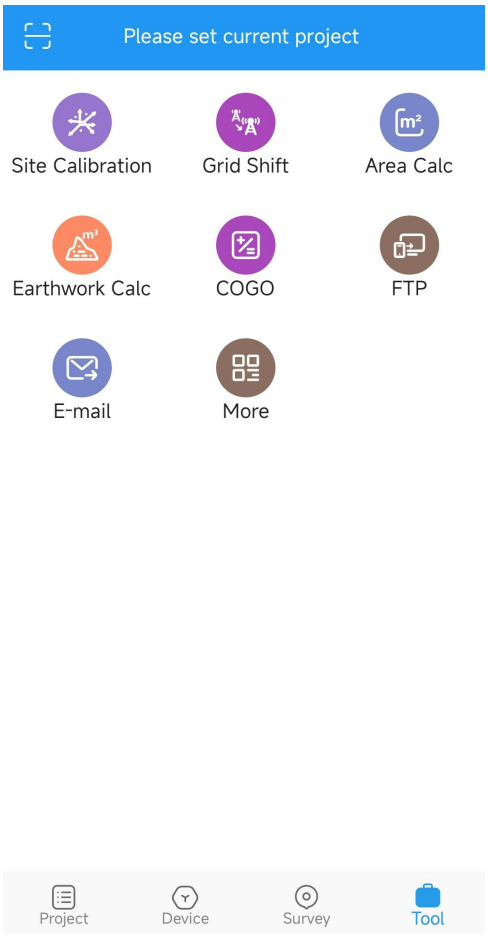
Area Calc

Earthwork Calc

COGO

FTP

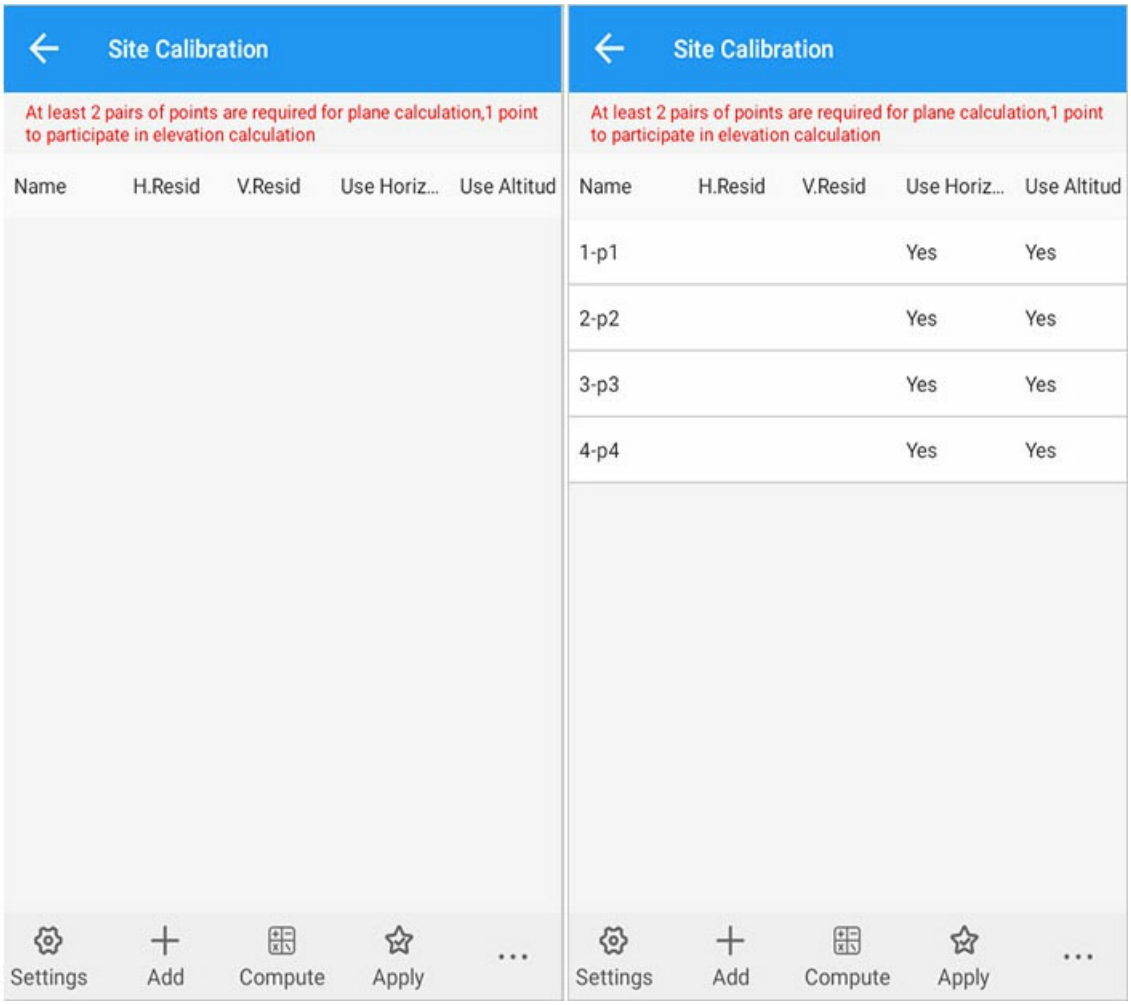
E-mail



Main Interface

Parameter Calculation

Tool > Parameter Calculation: Match control point with measure point.

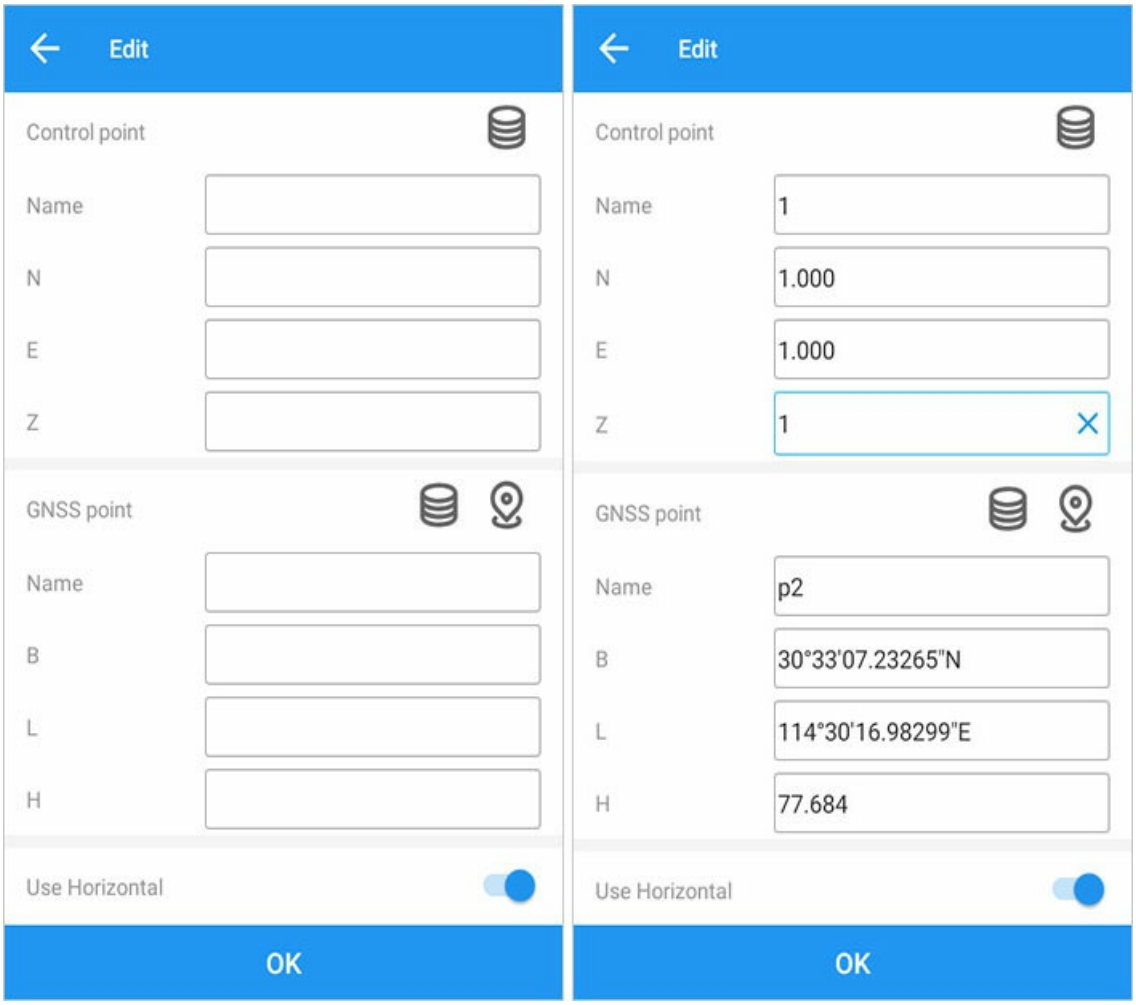


Parameter calculation is to find the mathematical conversion relationship (conversion parameter) between WGS-84 and the local plane Cartesian coordinate system. The data collected by the GPS satellite positioning system in engineering applications is the WGS-84 coordinate system data, and currently our measurement results generally use the coordinate data based on the CGCS2000 coordinate system or the local (arbitrary | local) independent coordinate system. Therefore the WGS-84 coordinates must be converted to the CGCS2000 coordinate system or a local (arbitrary) independent coordinate system.

1. Apply

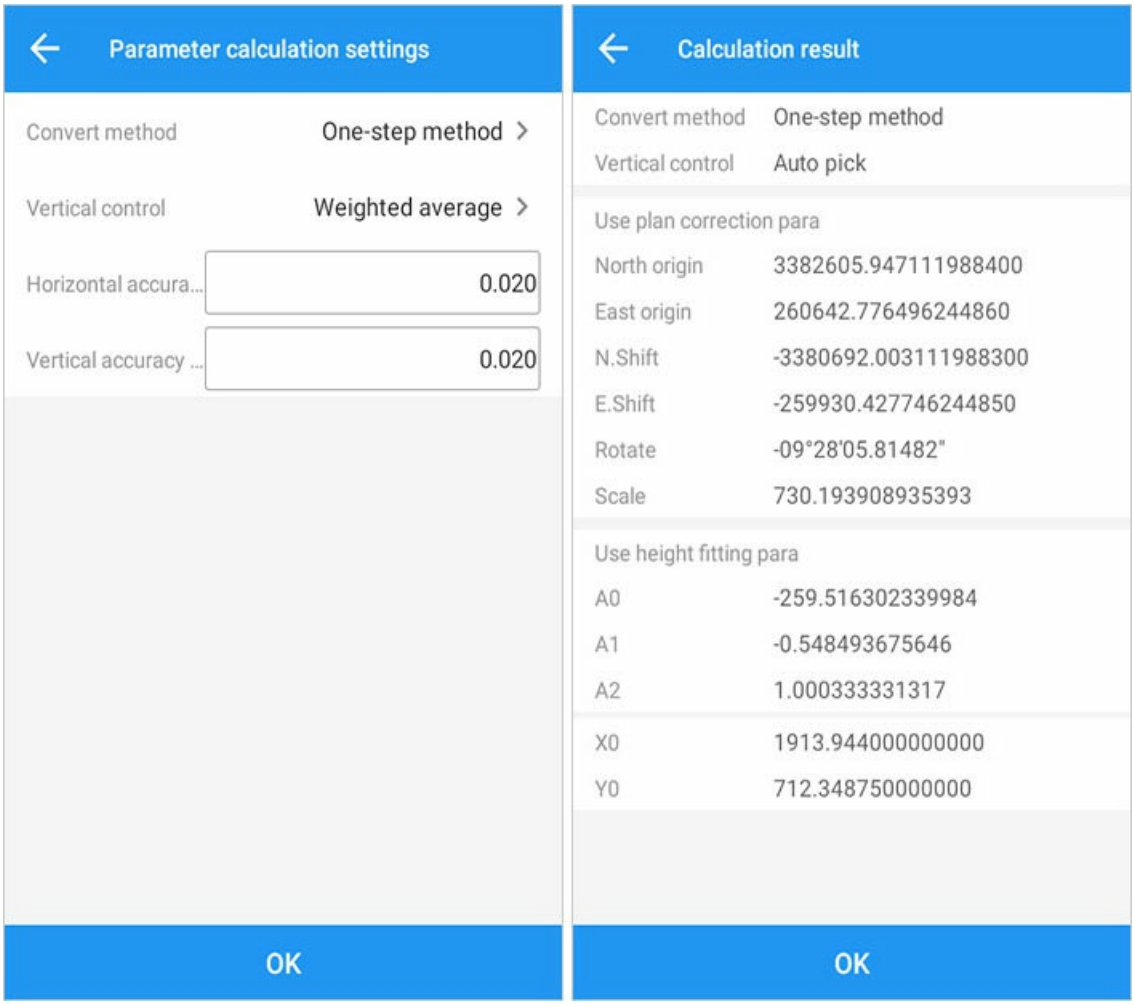
1.1.Add points

The same point name parameter calculation can be automatically paired and added. If there are multiple GNSS points with the same point name, the first survey point is used. Select the control point and GNSS point, select the calibration method, and click OK to save. Control points can be selected and entered, and GNSS points can be selected, measured or entered.



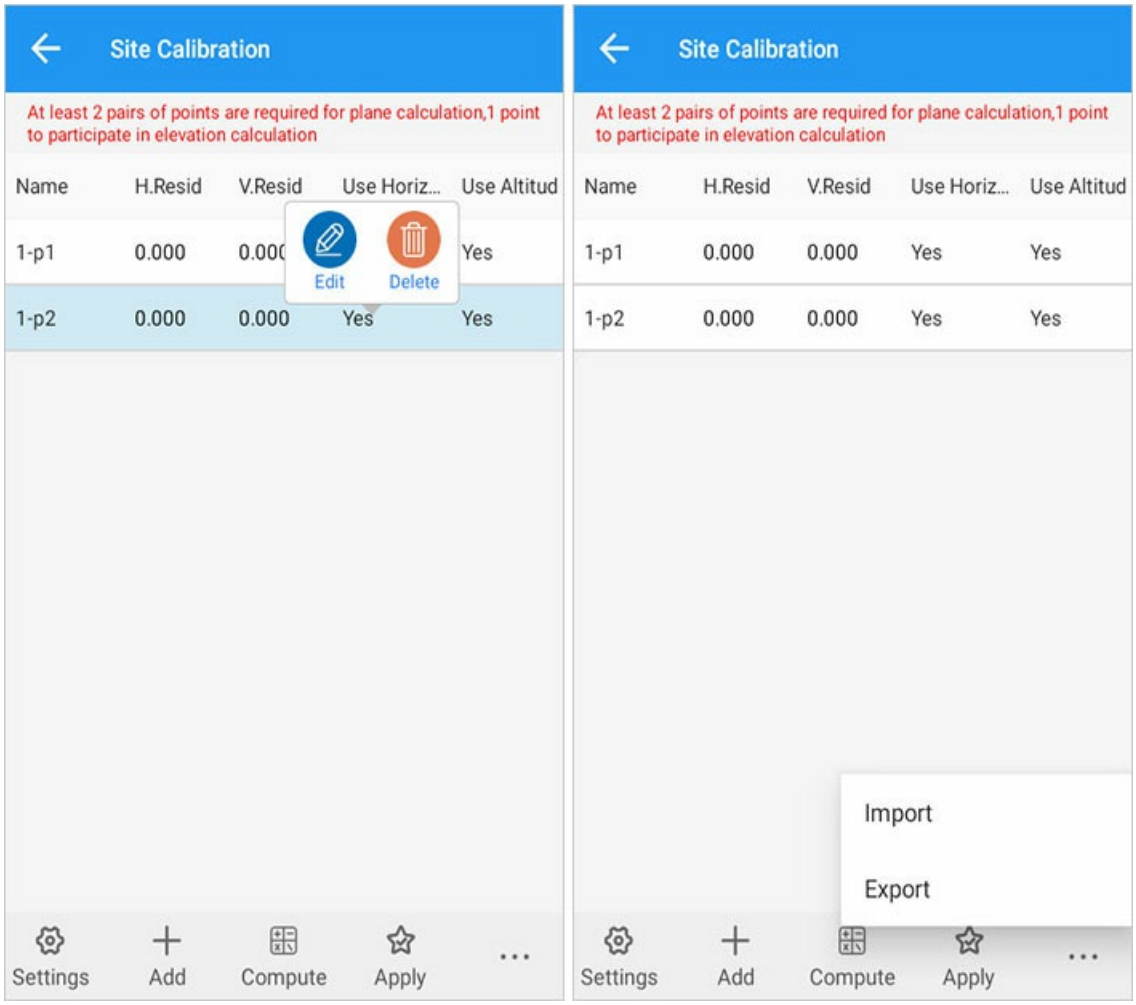
1.2.Settings and Calculate

Click Settings to set the coordinate conversion method, height fitting method (automatic selection is the most reasonable method), horizontal accuracy threshold and vertical accuracy threshold; click Calculate in the menu bar to calculate and confirm the parameter calculation information.



Check the calculation results "horizontal adjustment", "vertical adjustment" to apply.

1.3. Calibration



Input or export: Can input or export .loc file.

Delete: Select the data in the list and long press the modify/delete button; Click modify to edit data, or click delete to delete data.

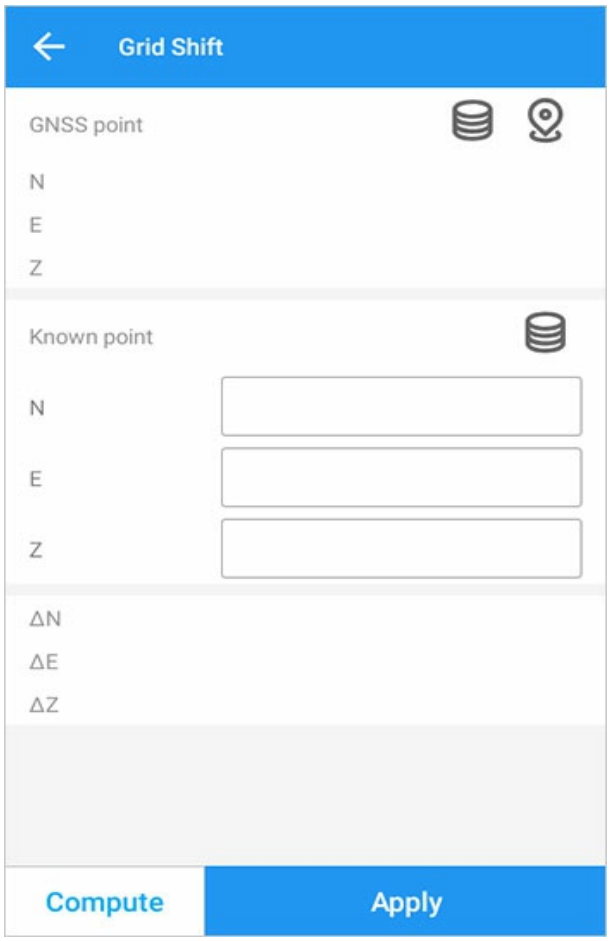
Purpose: Solve the conversion parameters from WGS84 coordinates to local coordinates (such as CGCS2000). After "parameter calculation", if the prompt dialog box that pops up is all selected, the obtained parameters are saved under "current task parameters" and "coordinate system management".

The points selected for parameter calculation should preferably cover the entire work area, and the more points selected, the higher the precision. If the survey area is relatively small (generally the longest distance does not exceed 3 kilometers), and the selected coordinates are standard coordinates, such as CGCS2000, Beijing 54 or Xi'an 80, selecting one can basically meet the accuracy requirements.

Note： If there are three pairs of points in the points calculated by parameters, there will be "horizontal residuals", and four pairs of points will have "vertical residuals". Generally speaking, "horizontal residuals" and "vertical residuals" should not exceed 2cm. If it exceeds 2cm, it means that the control points involved in the parameter calculation are not in the same system or have gross errors (the maximum may be the point with the largest residual error), and the software will prompt the residual error to exceed the limit during application.

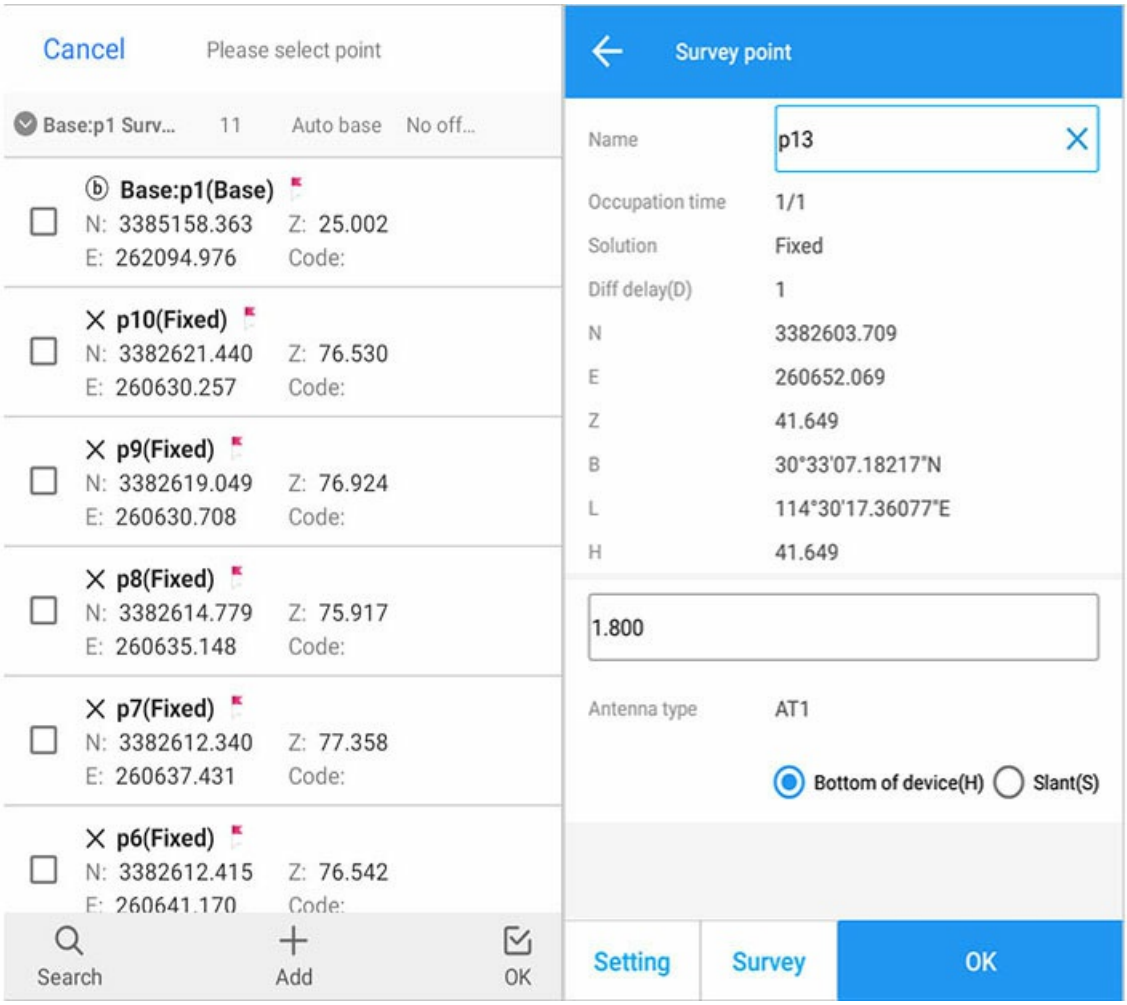
Grid Shift

Go to Tool > Grid Shift, which need to select or measure GNSS point, select or enter known point. Move the point related to the current base station to the coordinate system with the known point as the origin:



1. Select Point

1. select or measure GNSS point



Select point: Go to point library.
Measure point: Measure a point directly.

1. Select or enter known point

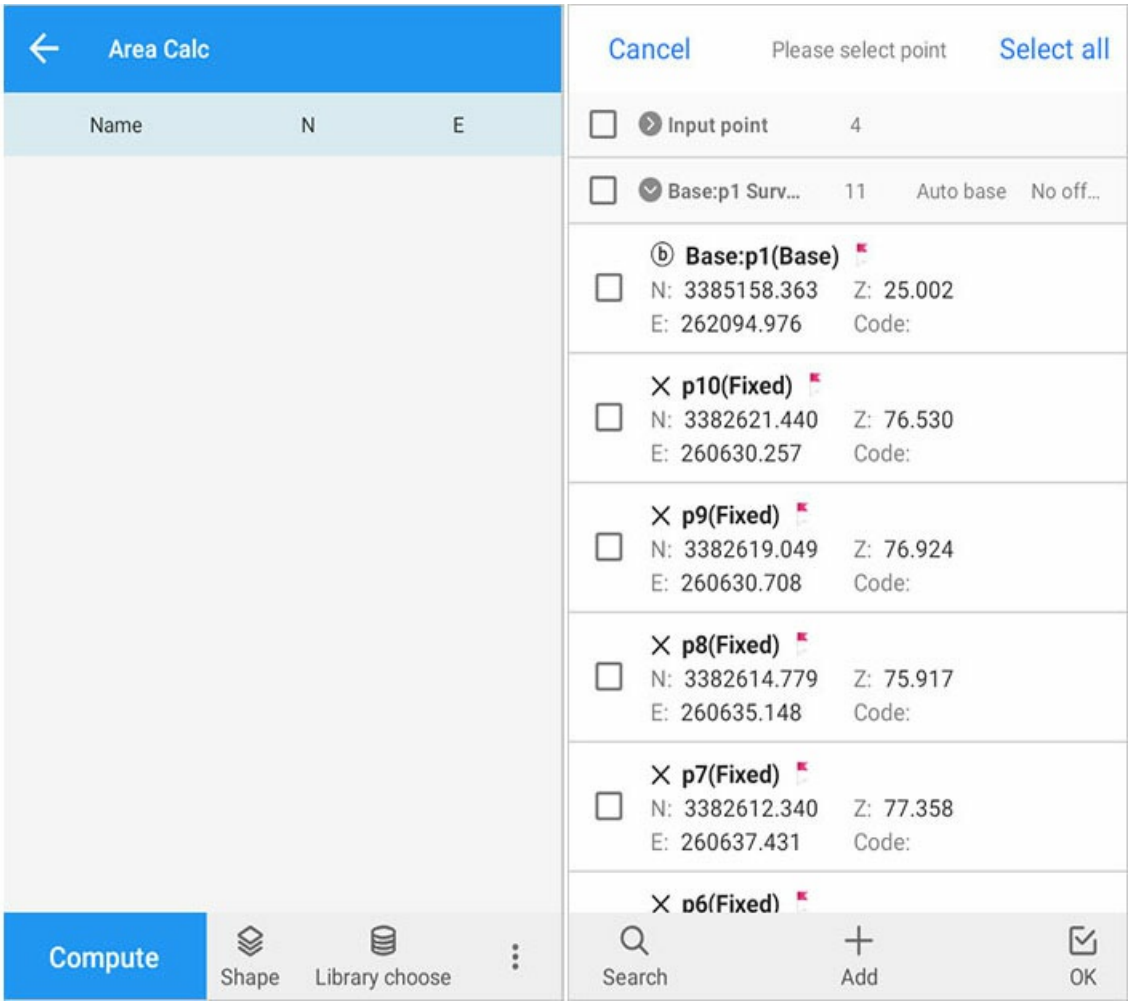
2.Calculation and Apply

After selection, it will automatically calculate the shift along N, E, Z direction, and click Apply to set the shift to base station related to GNSS point.

Area Calculation

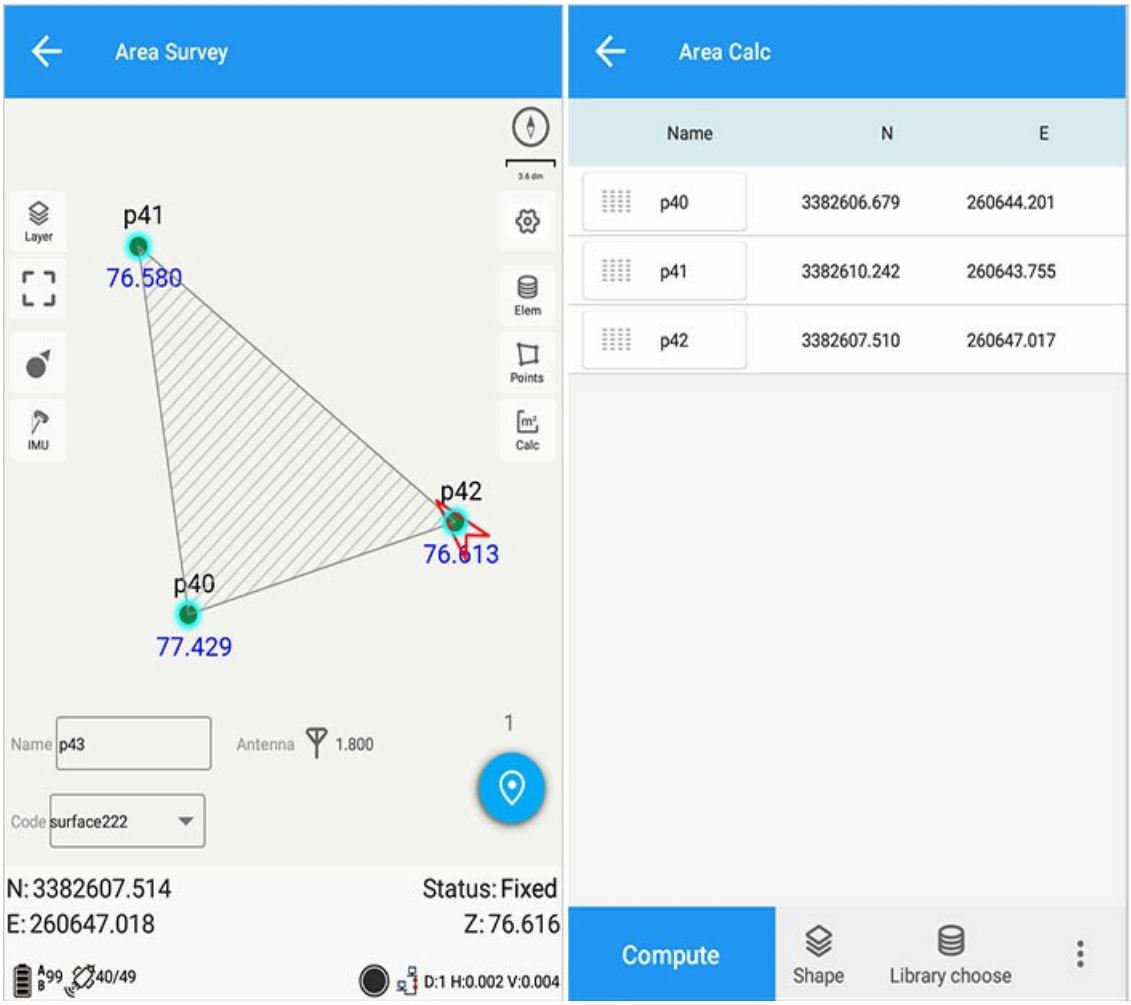
Go to Tool > Area calculation on main interface.

1. Select from Store



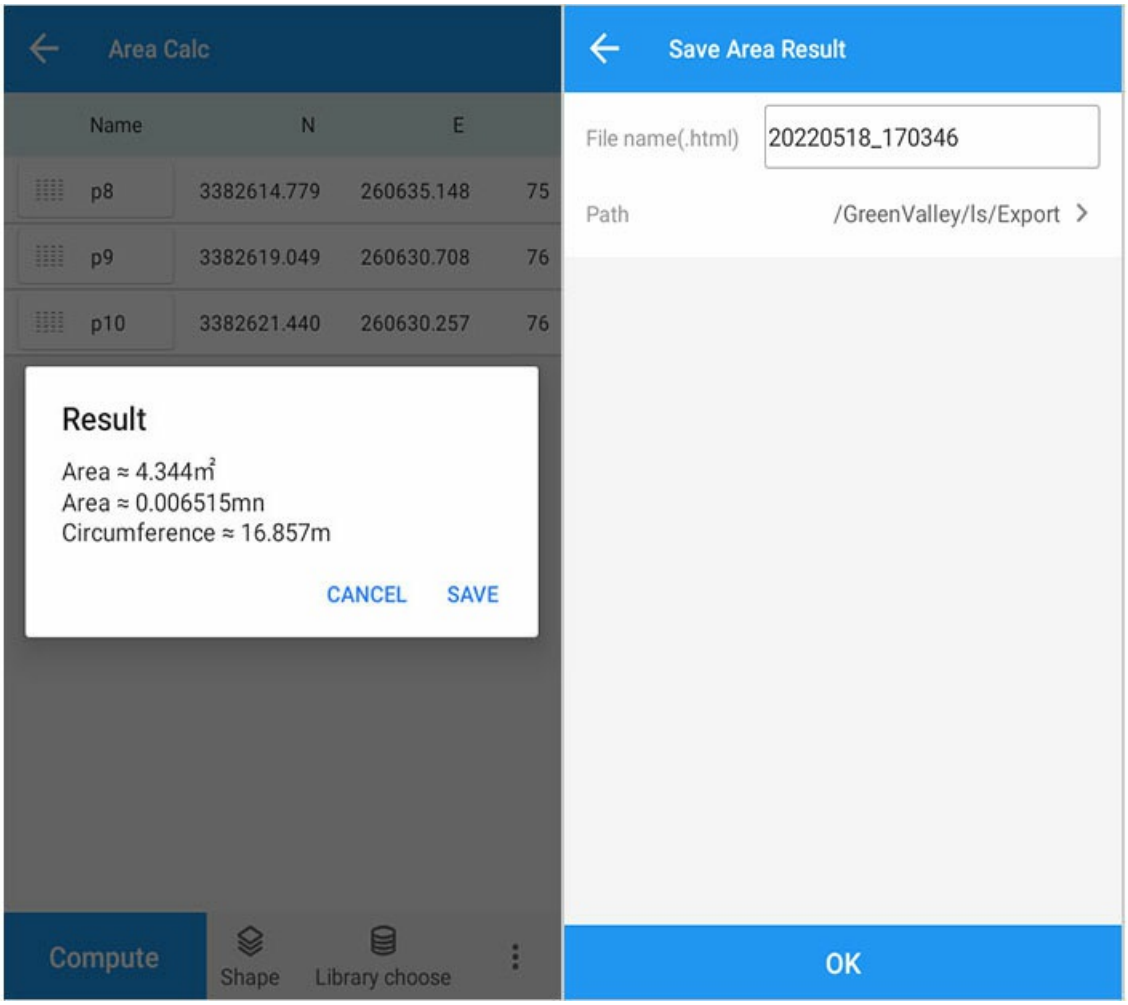
Go to store and select point, you can select single point or all points.

2. Graphics and Sort



Click Grphacis to check area's graphic, and drag graphic to sort.

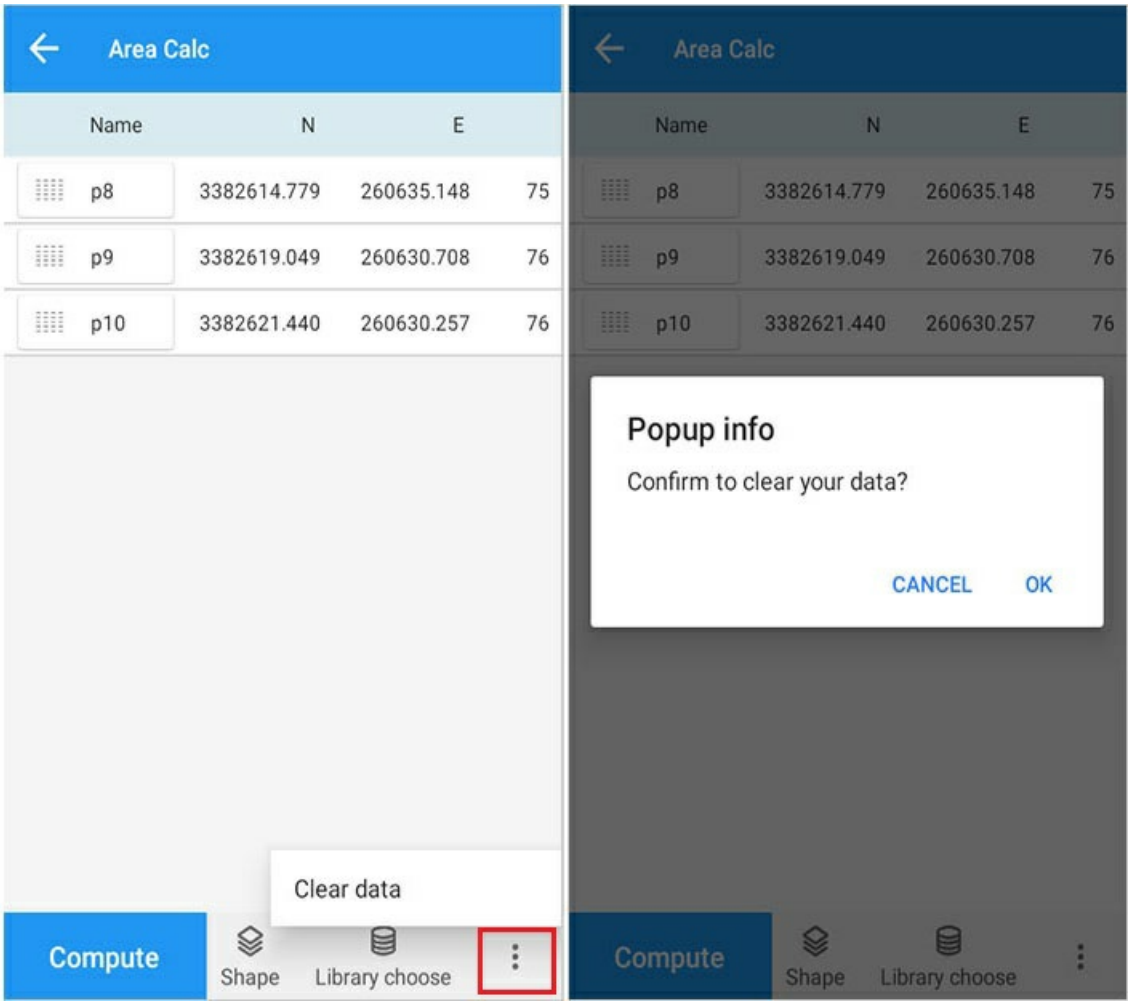
3. Calculation and Save

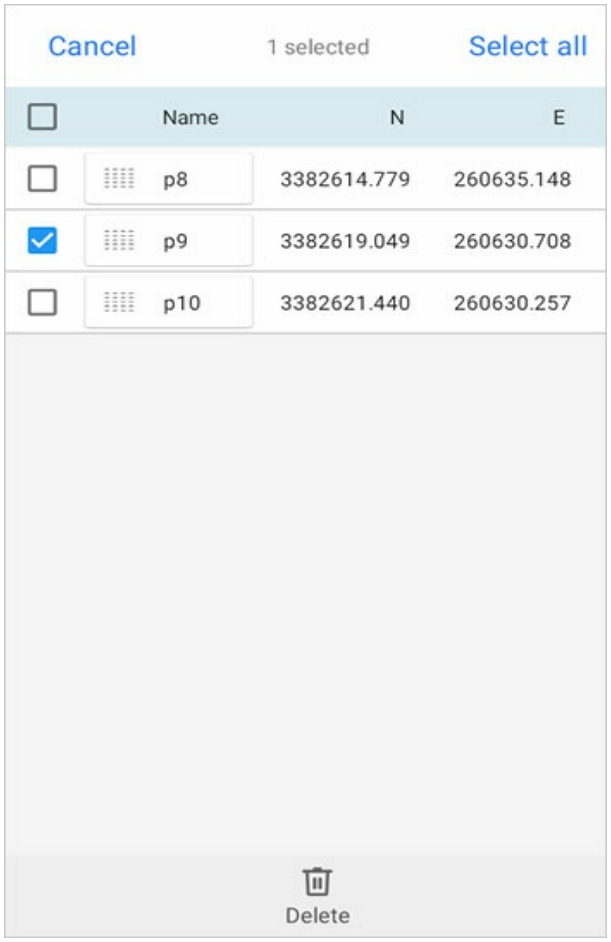


Click Calculation and save the result, set output path and name, then click OK.

4. Clear and Delete

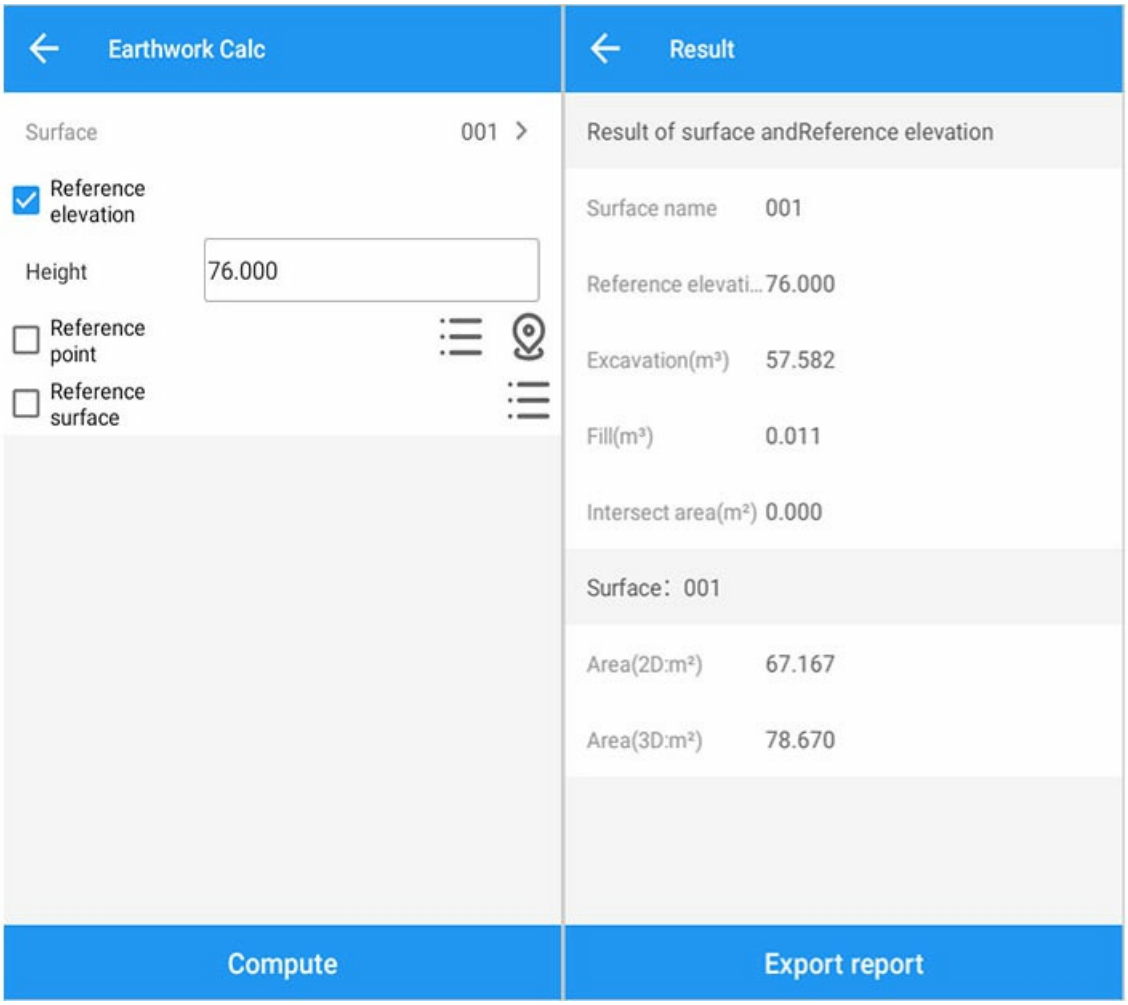
Click the button to clear, select OK to clear point stored, or click cancel to go back to the point list.


Area Calc
Name
N
E
p8
3382614.779
260635.148
75
p9
3382619.049
260630.708
76
p10
3382621.440
260630.257
76
Clear data
Compute
Shape
Library choose
Area Calc
Name
N
E
p8
3382614.779
260635.148
75
p9
3382619.049
260630.708
76
p10
3382621.440
260630.257
76
Popup info
Confirm to clear your data?
CANCEL
OK
Compute
Shape
Library choose

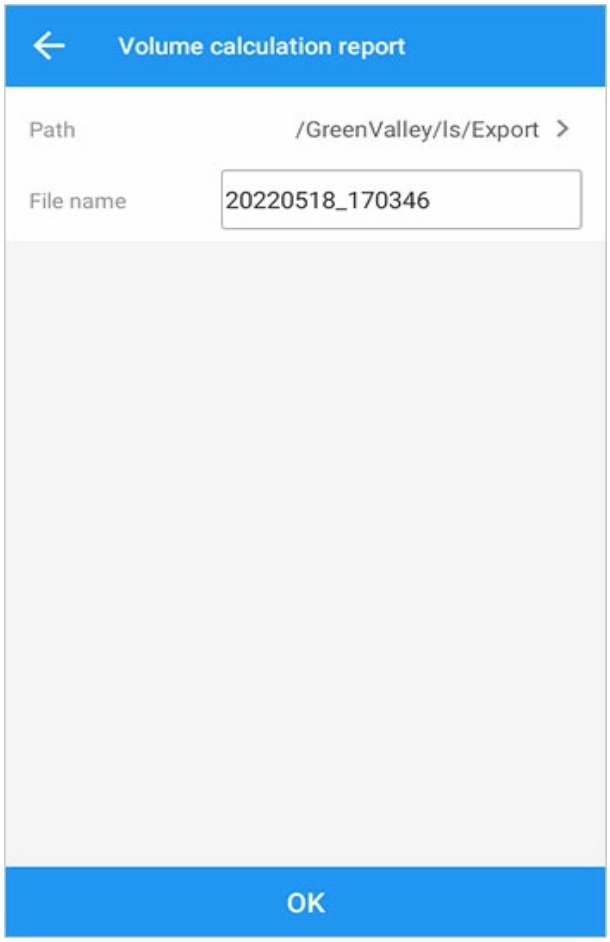

Cancel
1 selected
Select all
Name
N
E
p8
3382614.779
260635.148
p9
3382619.049
260630.708
p10
3382621.440
260630.257
Delete

Earth Work

Go to Tool > Earth Work on the main interface.



1. plane: The plane on which to cut or fill.
2. reference elevation: The earthwork is calculated according to the elevation.
3. reference point: Calculate the earthwork according to the elevation of the reference point. The reference point can be obtained through the point library or on-site measurement.
4. reference plane: Earth work calculation between planes.



1. export report: Export earth work report.

LiSurvey
Volume calculation report

Basic information

Project name:	20220518_170346
Calculation date:	5/18/22 5:54 PM
Coordinate system:	China/CGCS2000
Input surface name:	001
Reference method:	Reference elevation

Calculation result

Surface(2D):	67.167 m^2
Surface(3D):	78.670 m^2
Excavation:	57.582 m^3
Fill:	0.011 m^3

Reference elevation: 76.000 m

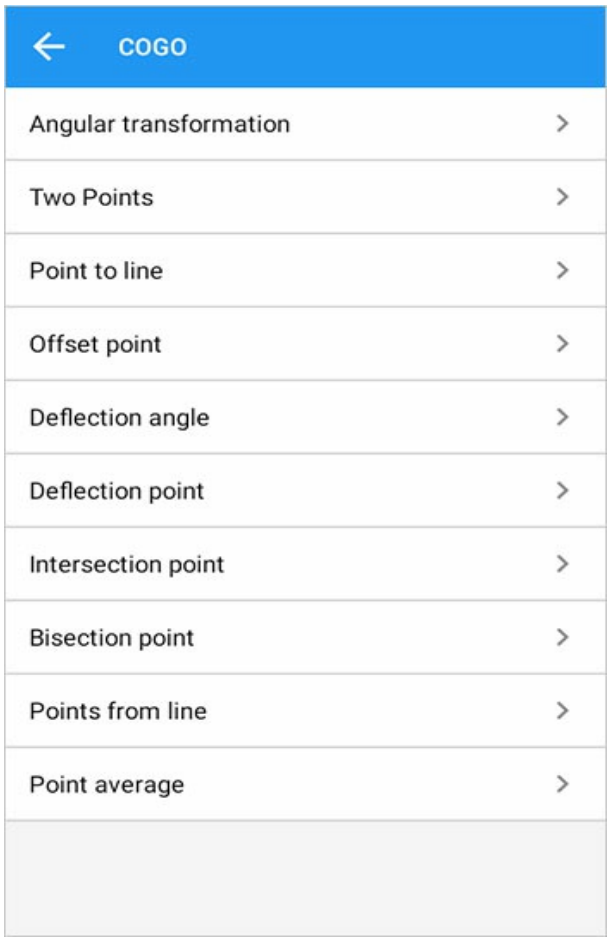
Coordinate list of input surface:

Point name	N	E	Z
p1	3382604.483	260641.206	77.684

The export report includes: task information, calculation date, calculation method, calculation result, and coordinates of points in the plane.

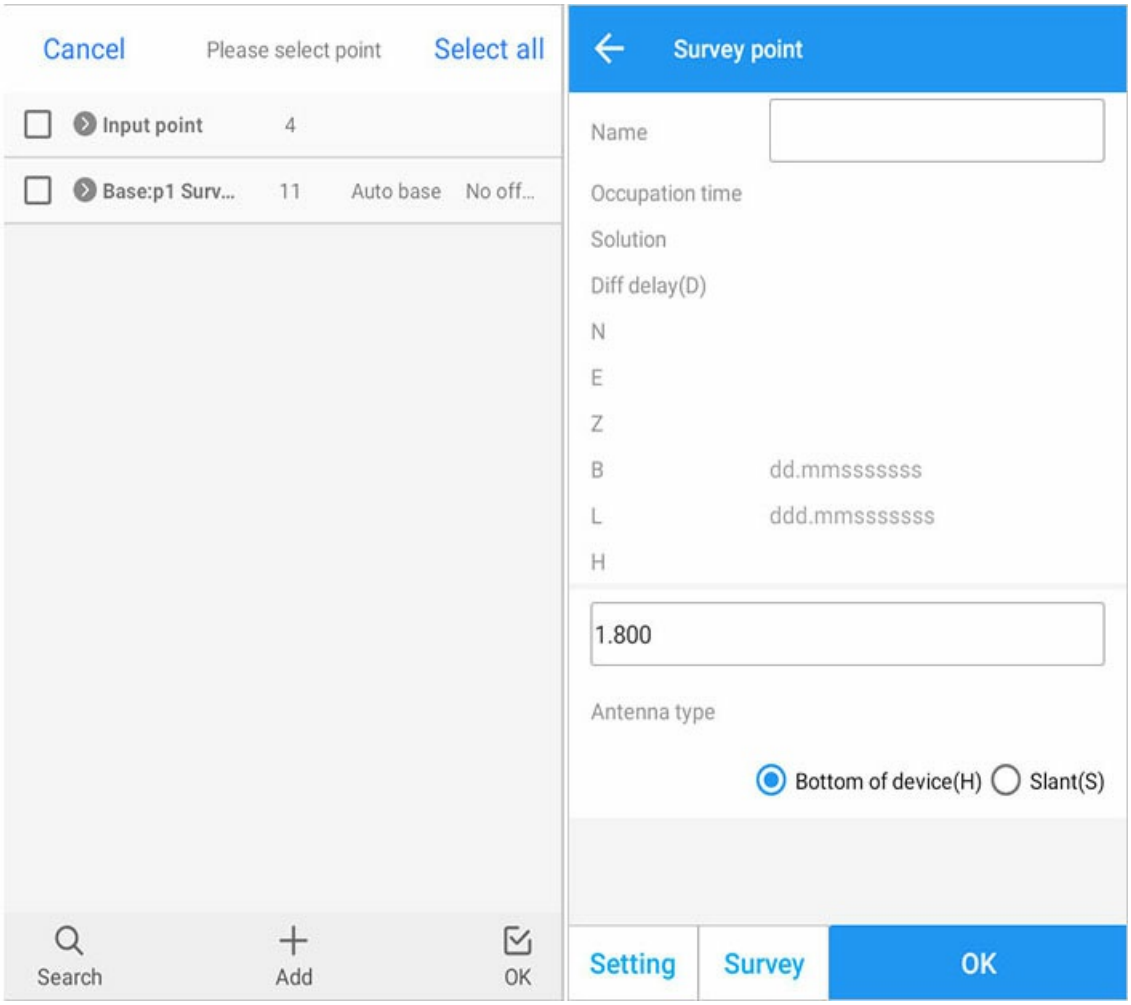
Other Calculation

Task > Other Calculation provides functions including: Angle Conversion, Two-Point Calculation, Point-Line Distance, Eccentric Point, Deflection Angle, Deflection Point, Intersection Point, Equal angle Point, Isometric Point Set, measure point average.



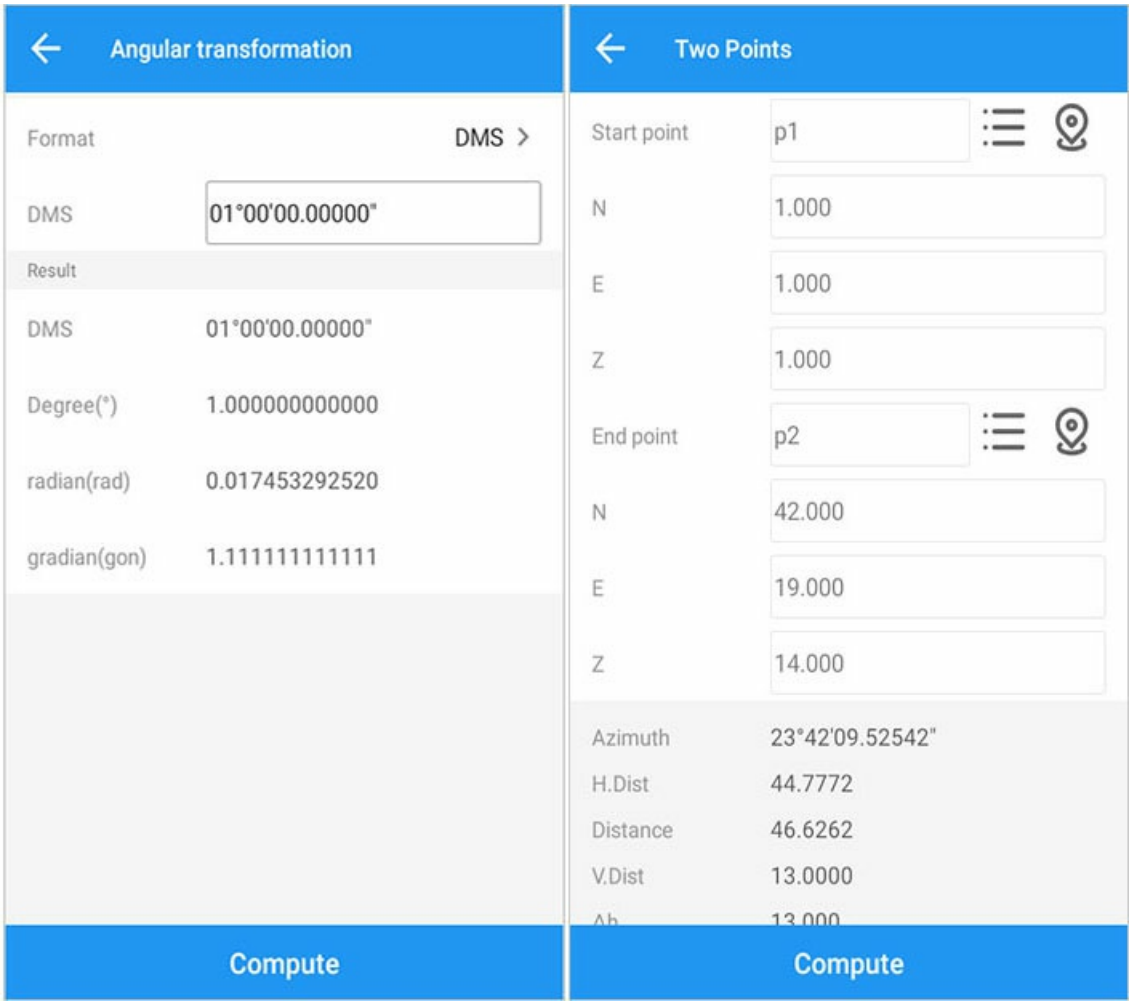
Point selection have two types: 1. Select from point library. 2.Select Measure point.

Measure point: Click Measure to get coordinates of receiver, click OK and set start/end location. Click Setting to set measure point.See Option for detailed information.



1. Angle Conversion, Two-Point Calculation

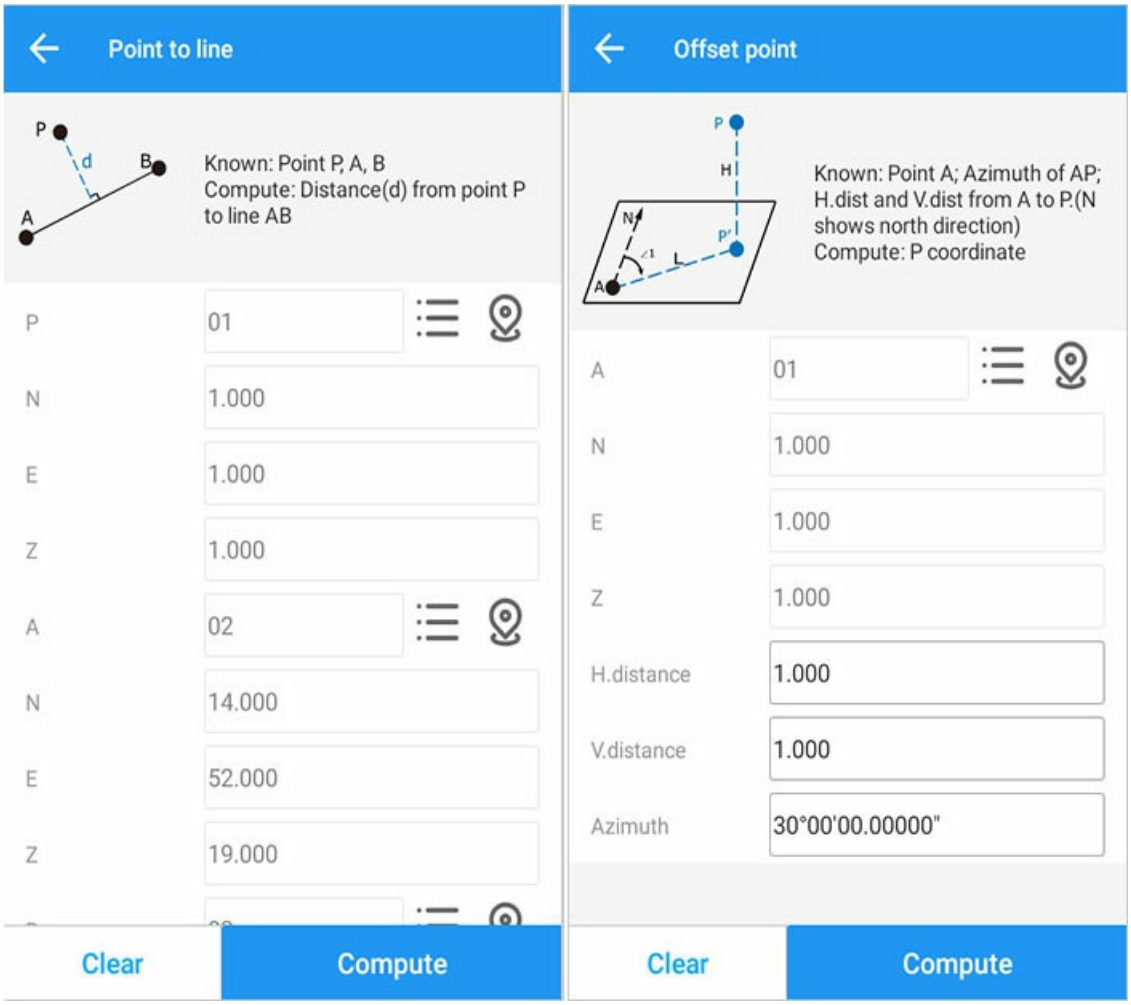
Angle Conversion: You can choose the appropriate format, including degrees, minutes, seconds, degrees (°), radians (rad), and degrees (gon); enter the value to be calculated in the input box below, and click Calculate to calculate below. displayed in the results. Two-Point Calculation: You can select two points from point library, or click button to measure calculation.



2. Point-Line Distance, Eccentric Point

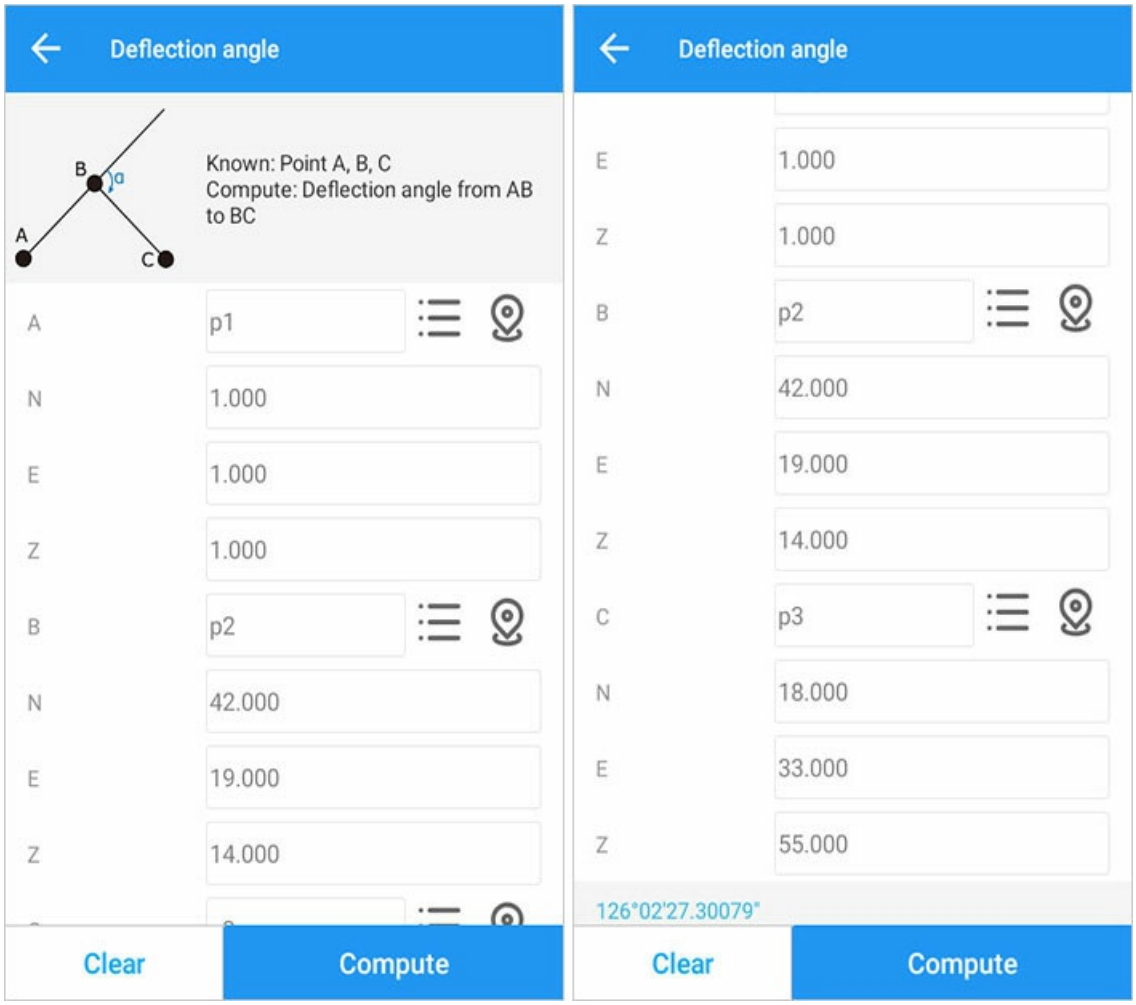
Point-Line Distance: Calculate distance between point and line.

Eccentric Point: Calculate eccentric point coordinates, after calculation, you can add this point to point library.



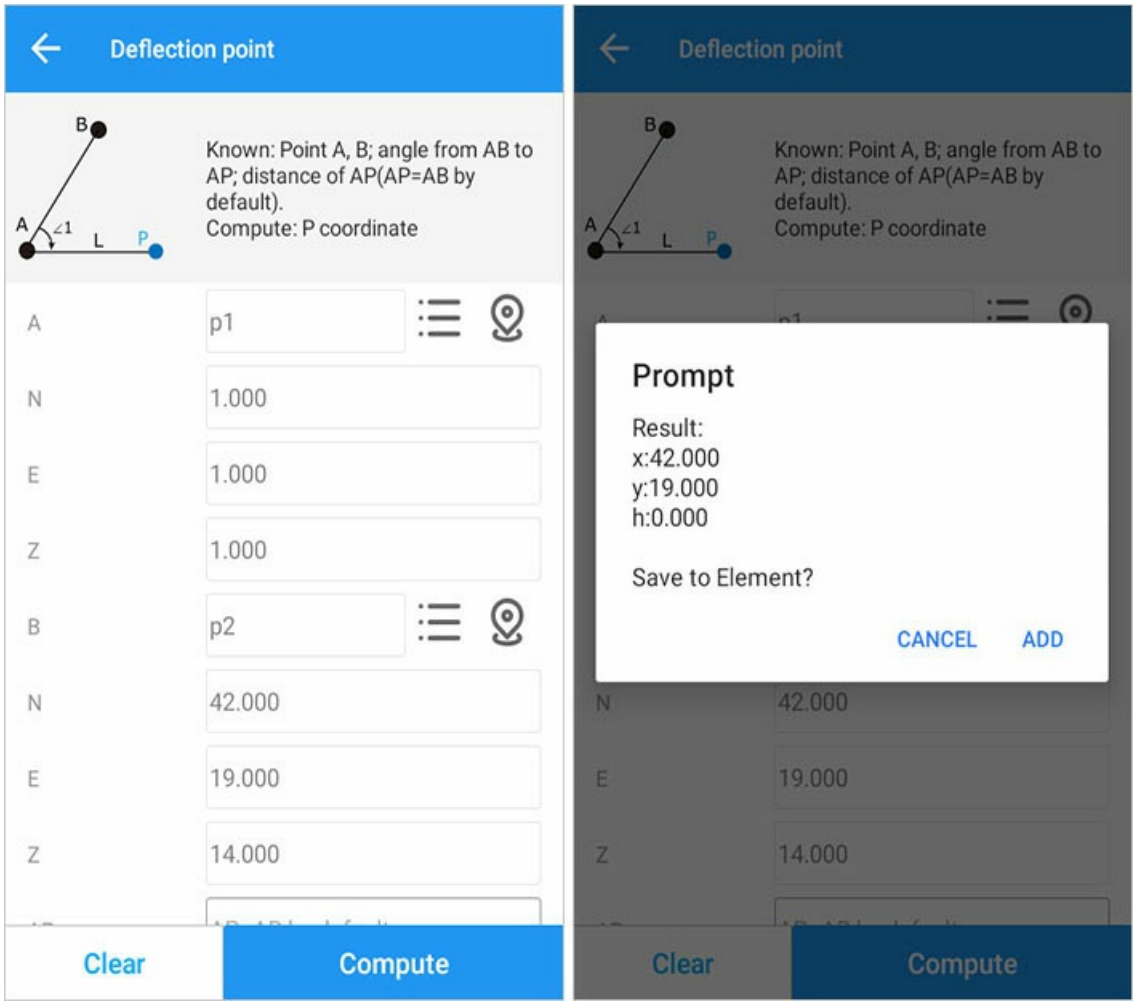
3. Deflection Angle

Calculation is performed through the point library or the points obtained by measurement, and the calculation result is displayed at the bottom.



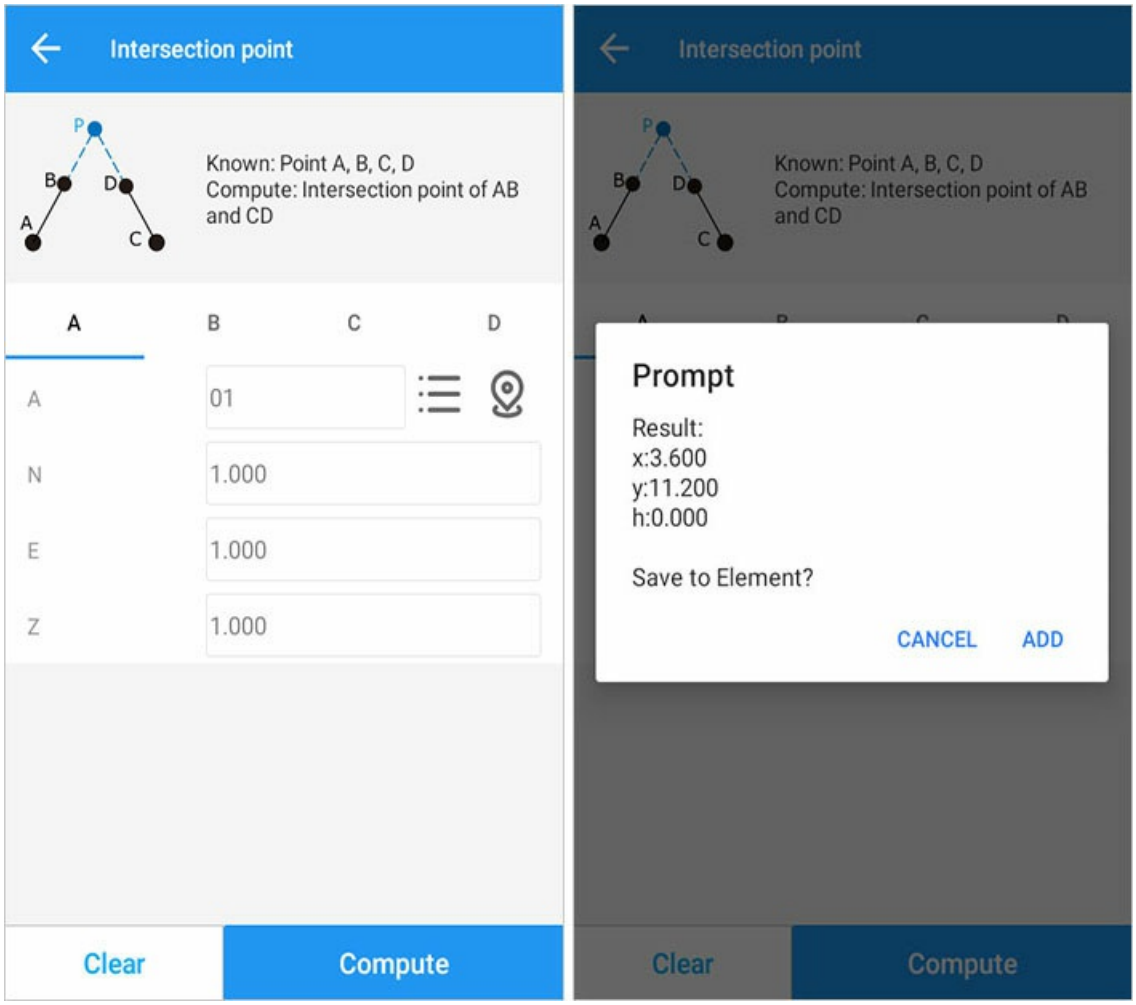
4. Deflection Point

Calculation is performed through the point library or the points obtained by measurement, and the calculation result is displayed at the bottom.



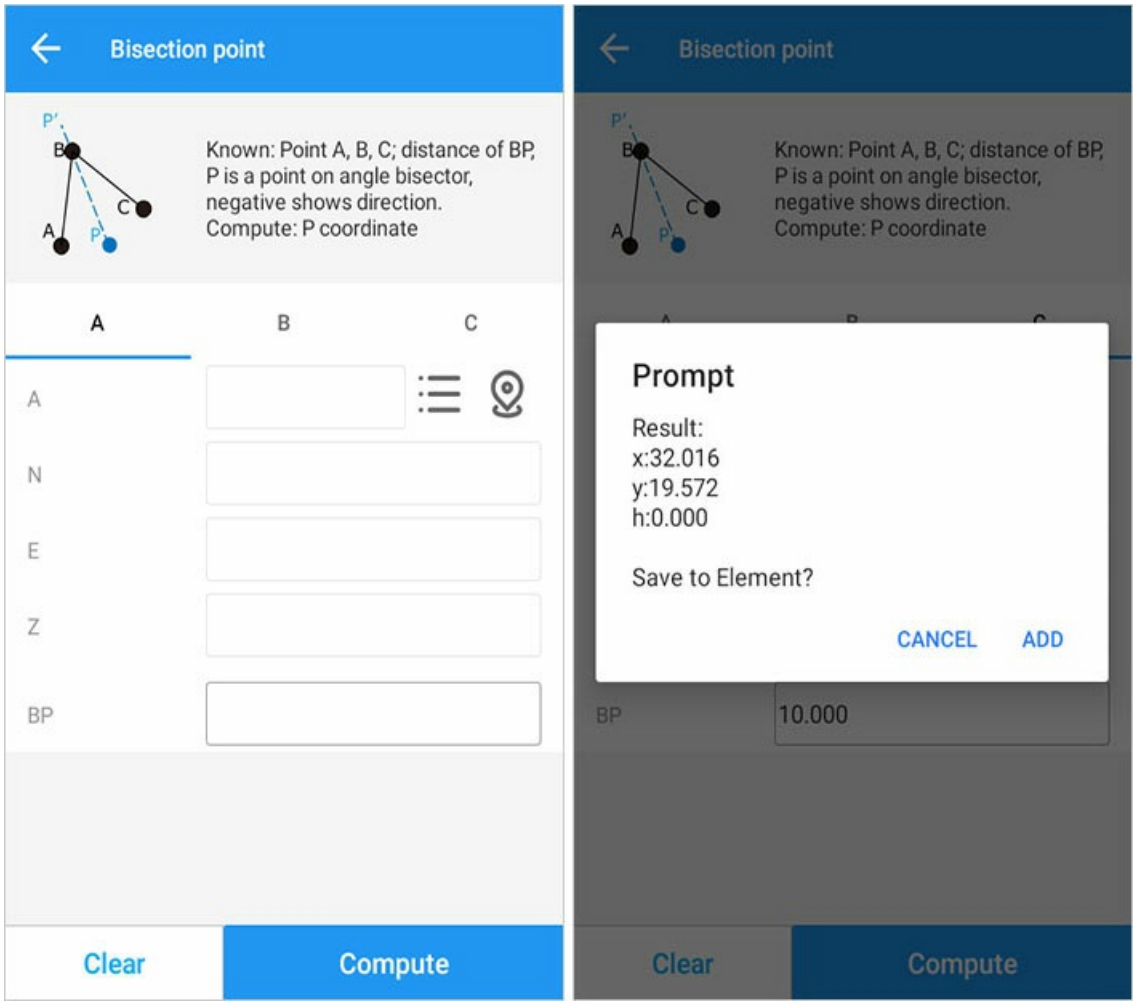
4. Intersection Point

Calculation is performed through the point libraryor the points obtained by measurement, and the calculation result is displayed at the bottom.

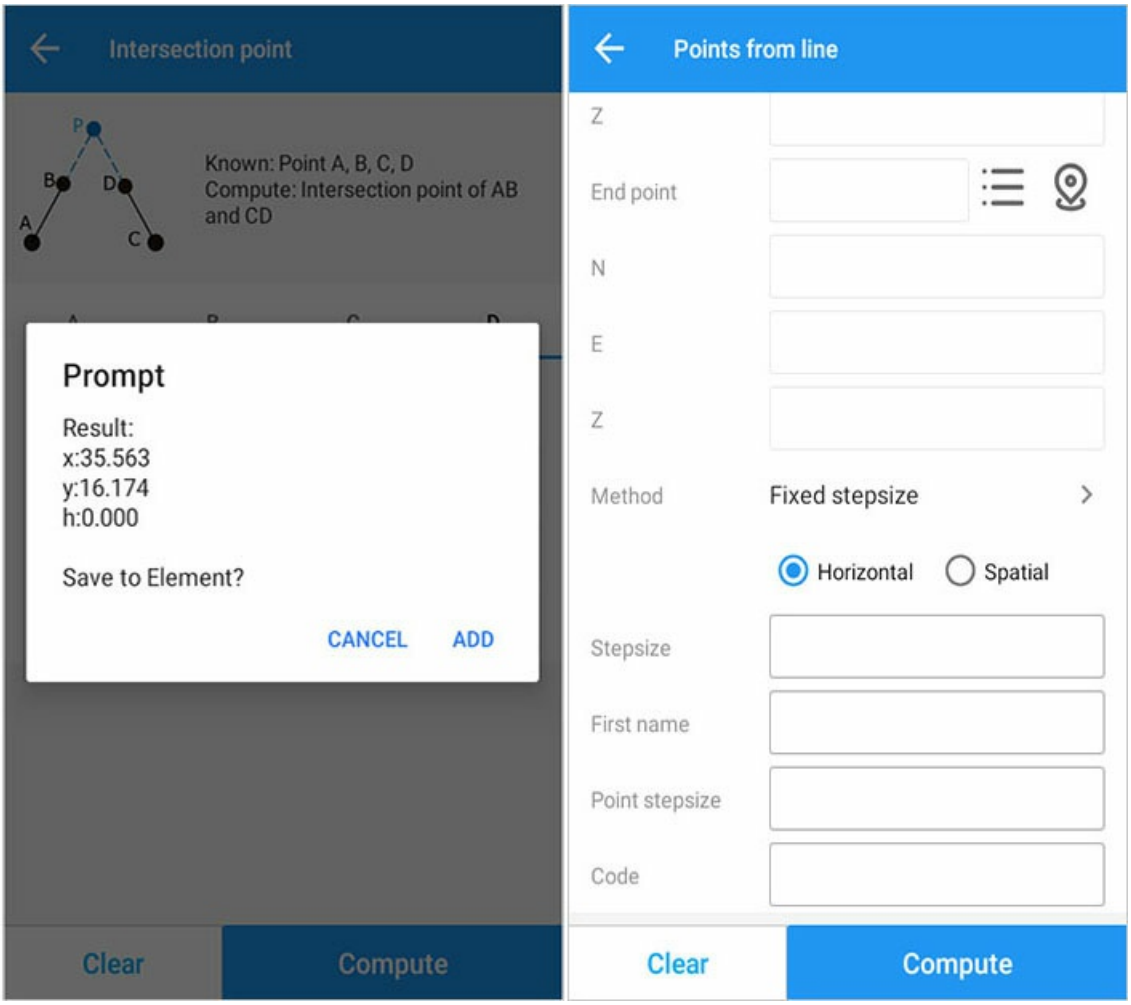


5. Equal Angle Point

Calculation is performed through the point library or the points obtained by measurement, and the calculation result is displayed at the bottom.



6.Isometric Point Set



Plane step size: The interval value set in the two-dimensional plane. After setting the step size, the first point name, the point name step, and the code (optional), click Calculate to calculate the plane between the two points. The distance divides the points according to the interval value, and the obtained points are stored in the coordinate point library->input point.

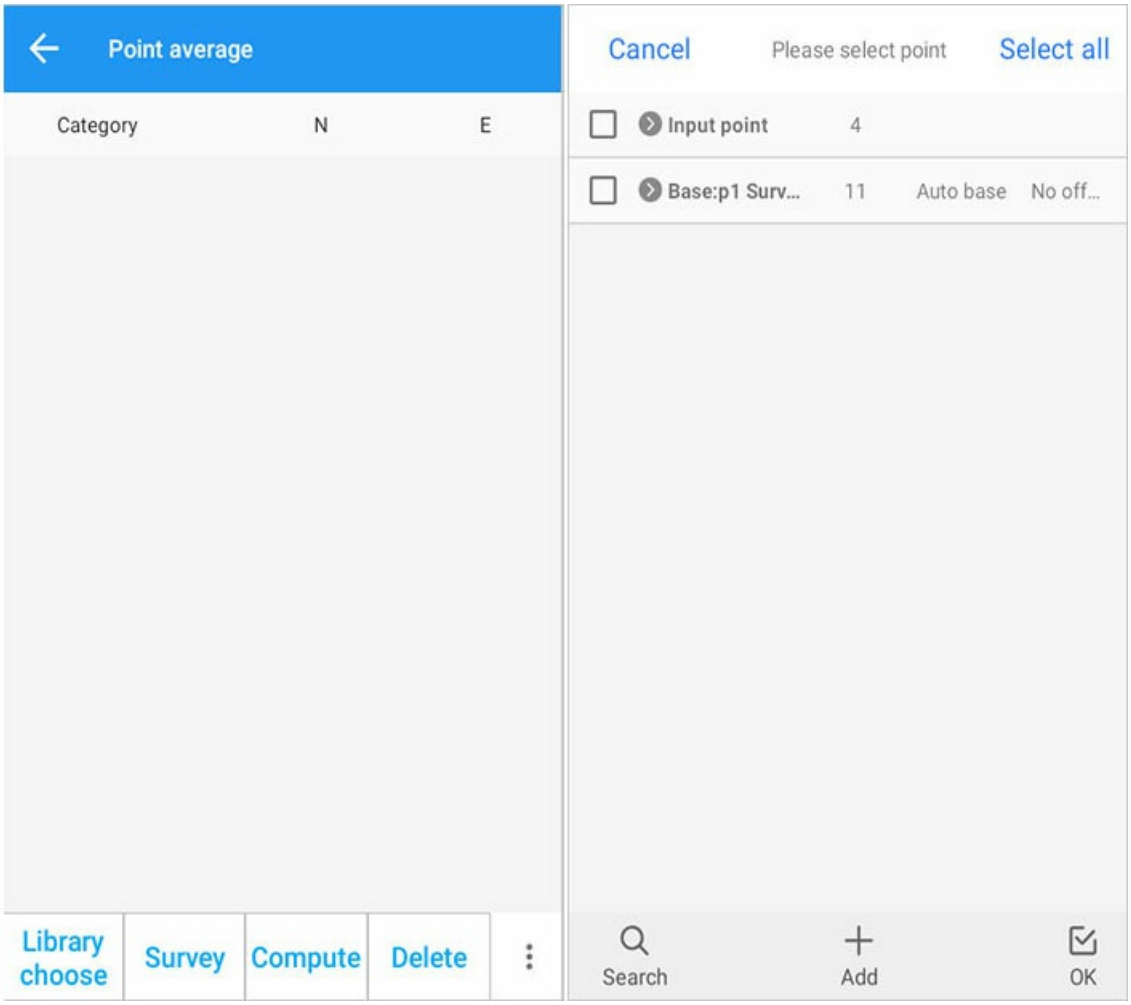
Space step length: The interval value set in the three-dimensional space. After setting the step length, the name of the first point, the step of the point name, and the code (optional), click Calculate to calculate the spatial distance between the two points. The points are divided according to the interval value, and the obtained points are stored in the coordinate point library->input point.

Number of segments: The number of line segments between two points. After setting the number of segments, the name of the first point, the step of point name, and the code (optional), click Calculate to calculate the space distance between the two points according to the number of segments. Divide the points, and the obtained points are stored in the coordinate point library -> input points.

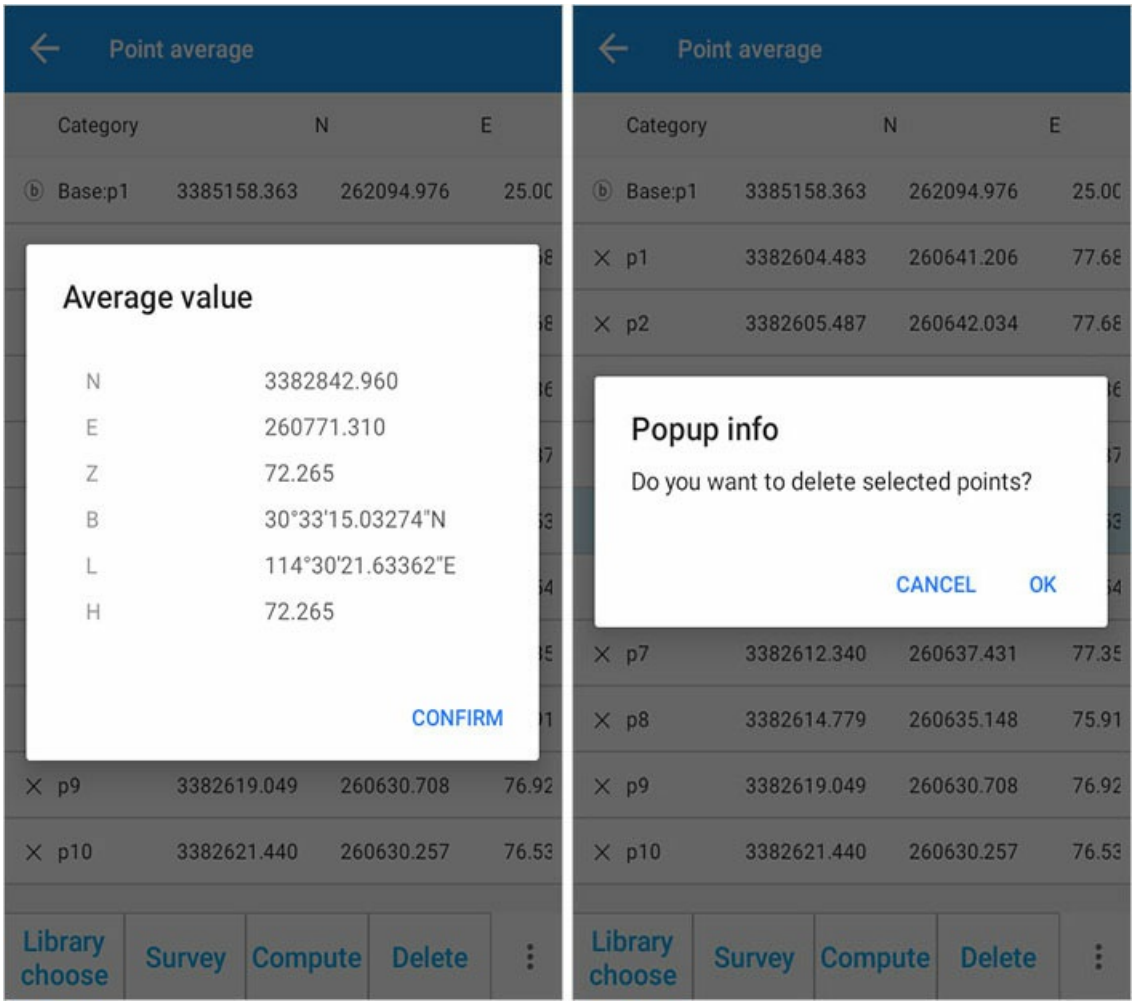
7. Average Point Measurement

7.1. Library and measurement

Consistent with other point selection methods, you can select points through library selection, or select points by measurement.



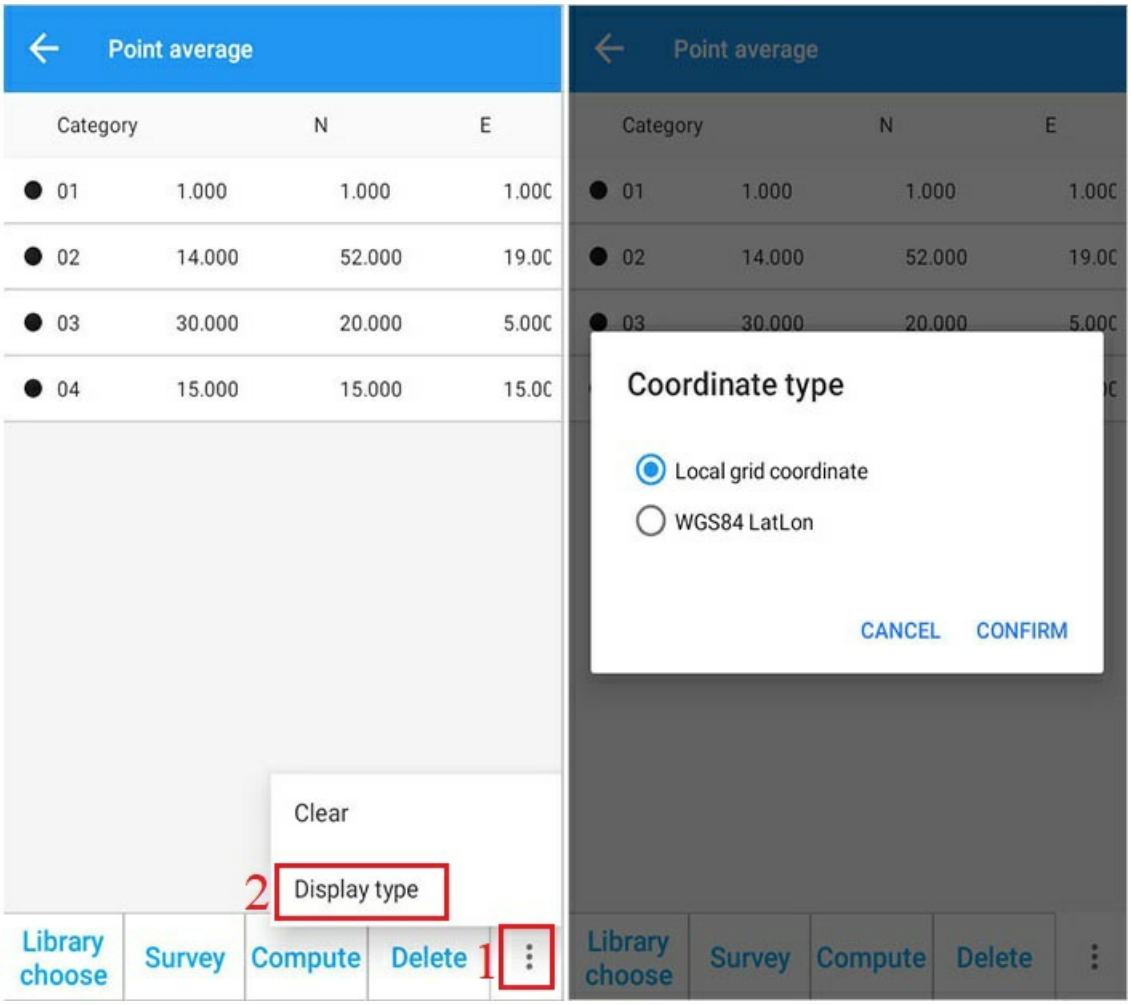
7.2. Calculate and delete



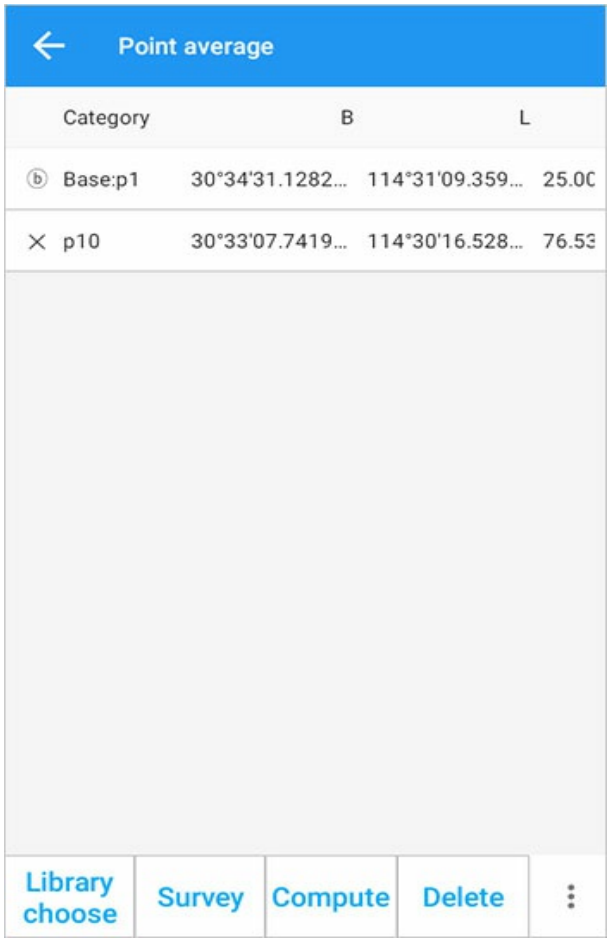
7.3 Coordinate Type

7.3.1 local plane coordinates

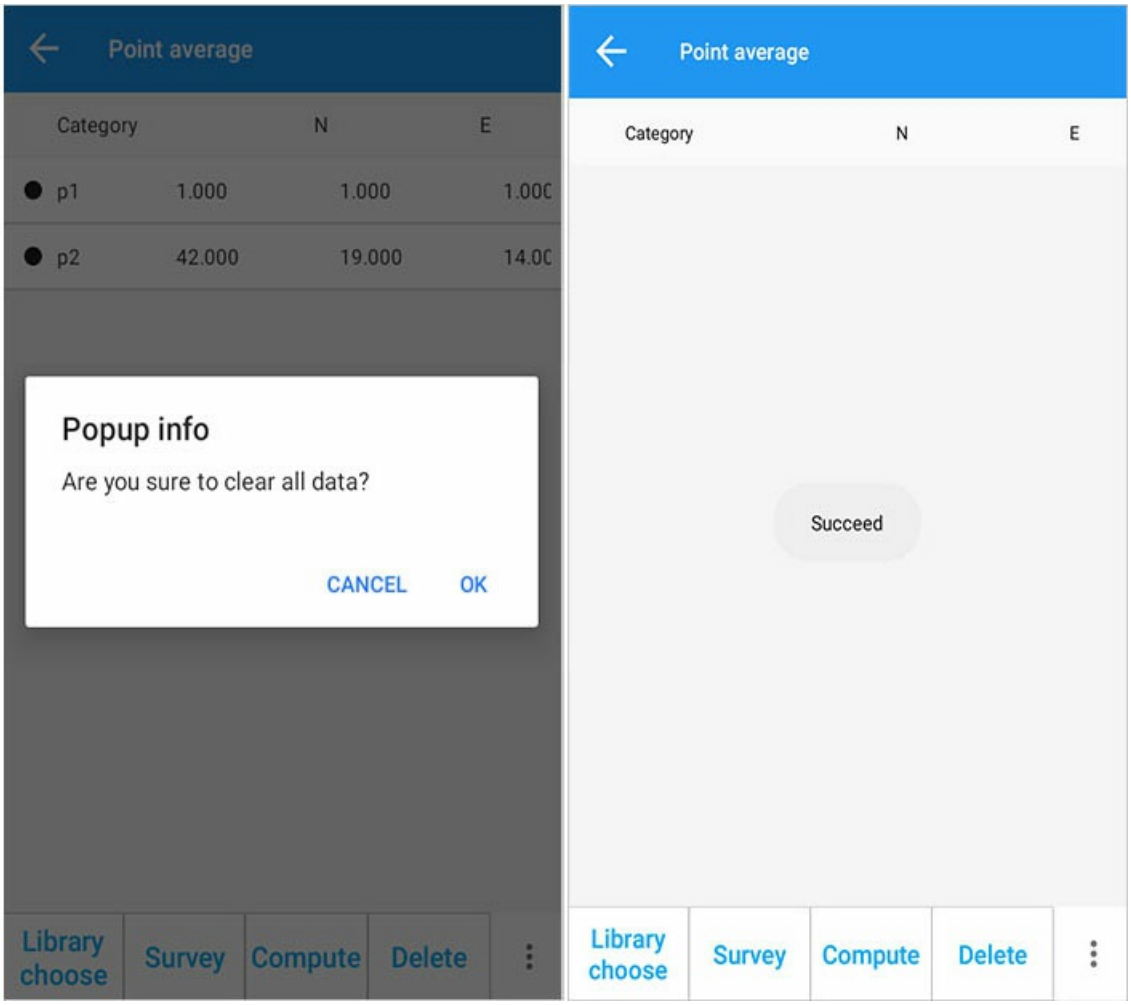
Click the coordinate type option in [three small dots], you can choose local plane coordinates or WGS84 latitude and longitude coordinates, the default local plane coordinates.



7.3.2 WGS84 latitude and longitude coordinates

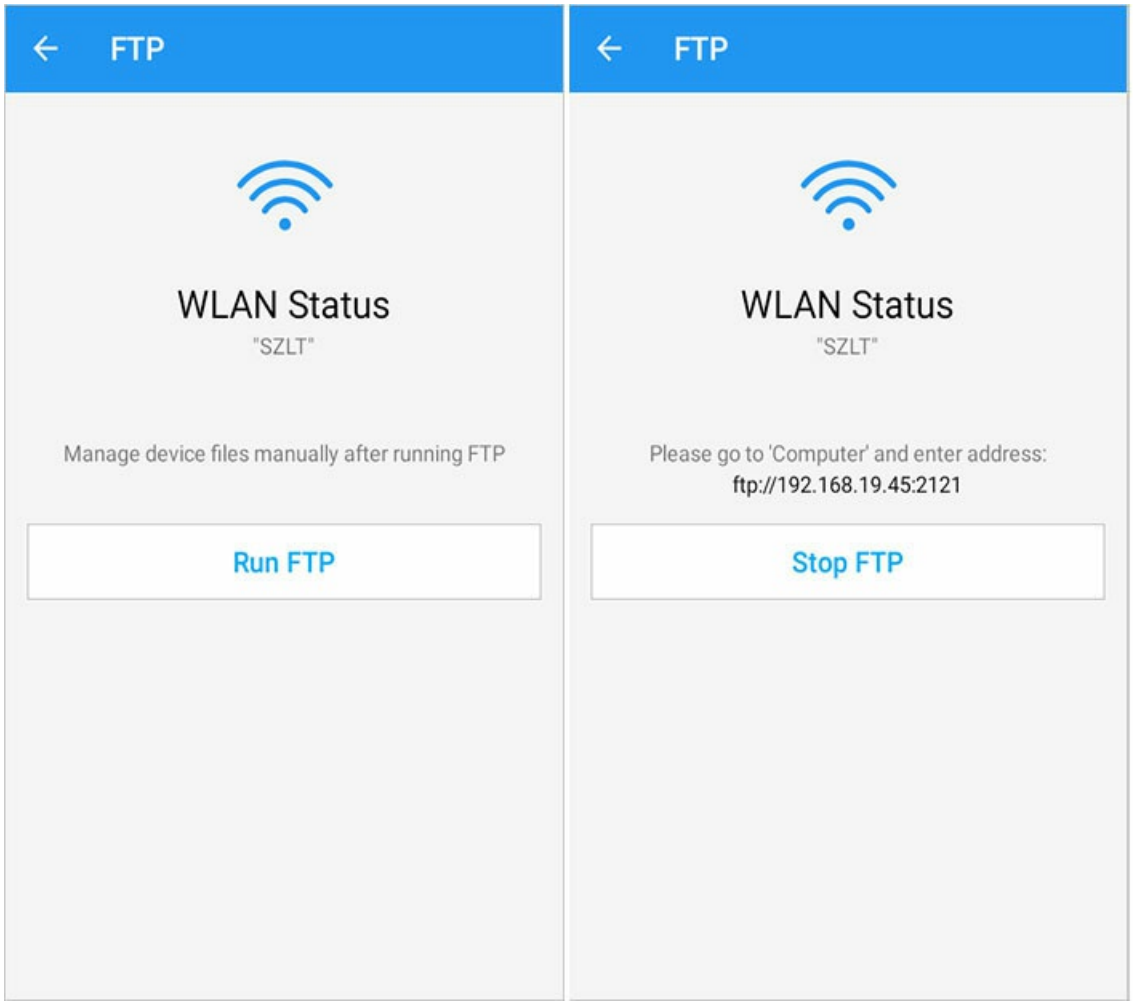

Point average
Category
B
L
Base:p1
30°34'31.1282...
114°31'09.359...
25.0(
p10
30°33'07.7419...
114°30'16.528...
76.53
Library choose
Survey
Compute
Delete

7.4. Clear


Point average
Category
N
E
p1
1.000
1.000
1.000
p2
42.000
19.000
14.00
Popup info
Are you sure to clear all data?
CANCEL
OK
Library choose
Survey
Compute
Delete
Point average
Category
N
E
Succeed
Library choose
Survey
Compute
Delete

FTP transfer

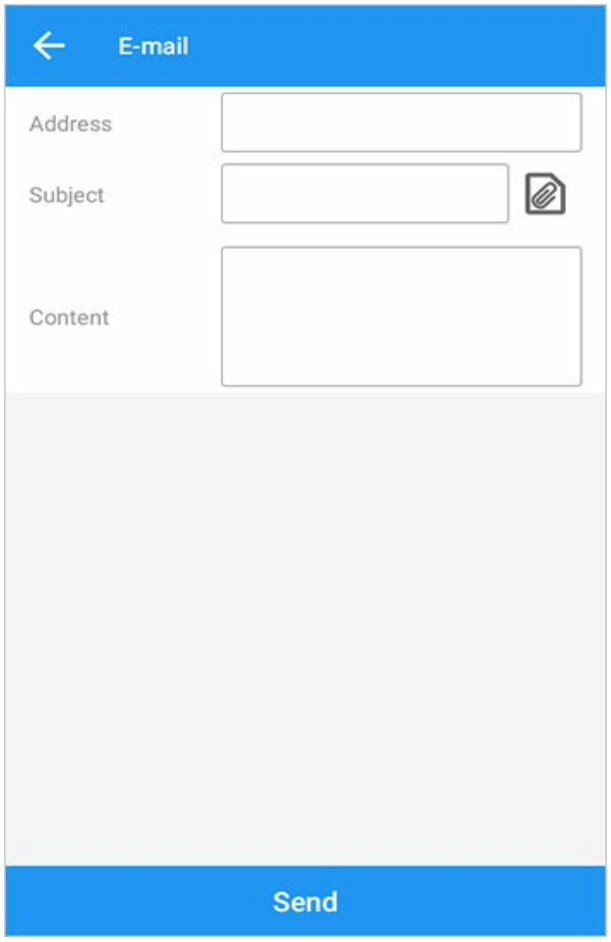
Go to Tool > FTP on the main interface.



Click Start service > enter FTP address on the computer.

Mail

Go to Tool > Mail on the main interface.



Note: the email address, topic and content are not allowed to miss.