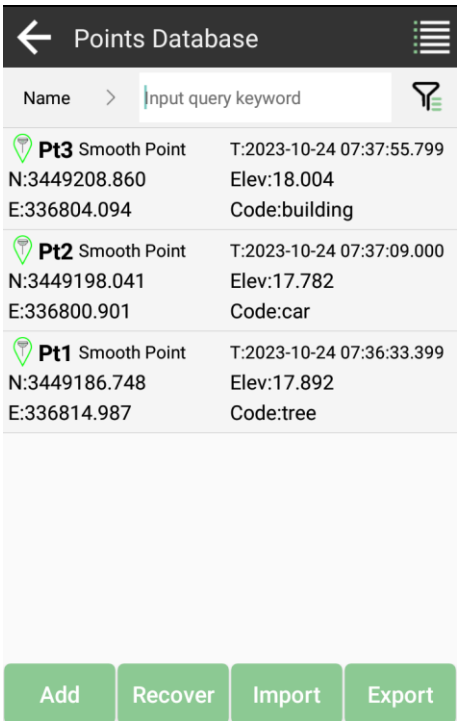
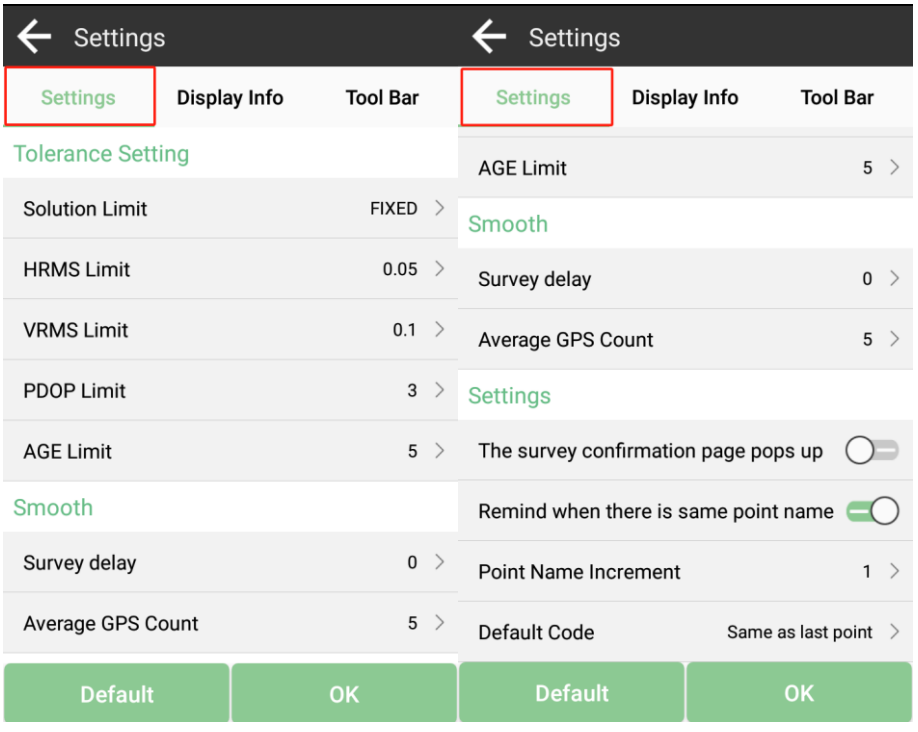


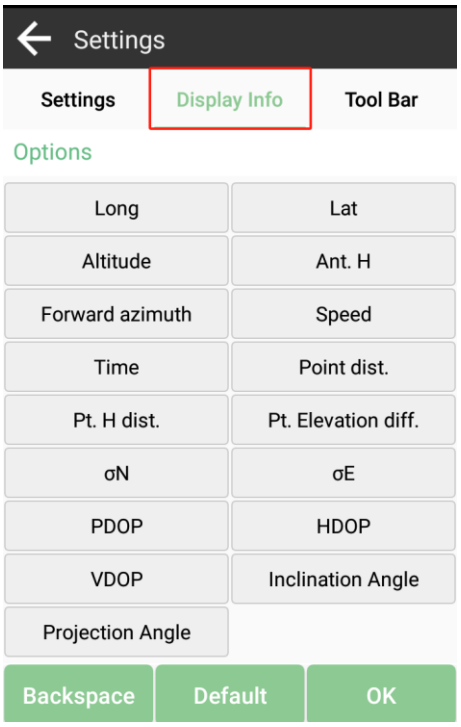
- Click  to enter Settings interface.

In ***Settings*** interface, you can modify ***Tolerance Setting*** such as solution limit, HRMS limit, VRMS limit and etc. And modify ***Smooth*** parameters and configure ***Settings*** options.

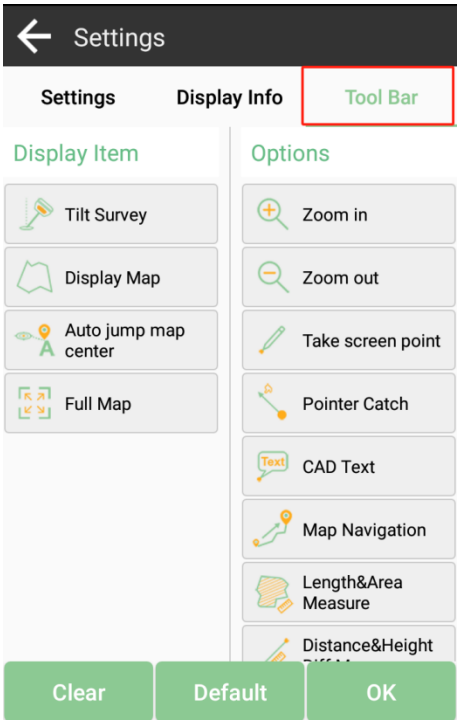


In ***Display Info*** interface, you can set the display information to the floating

window, such as longitude, latitude, altitude and etc.



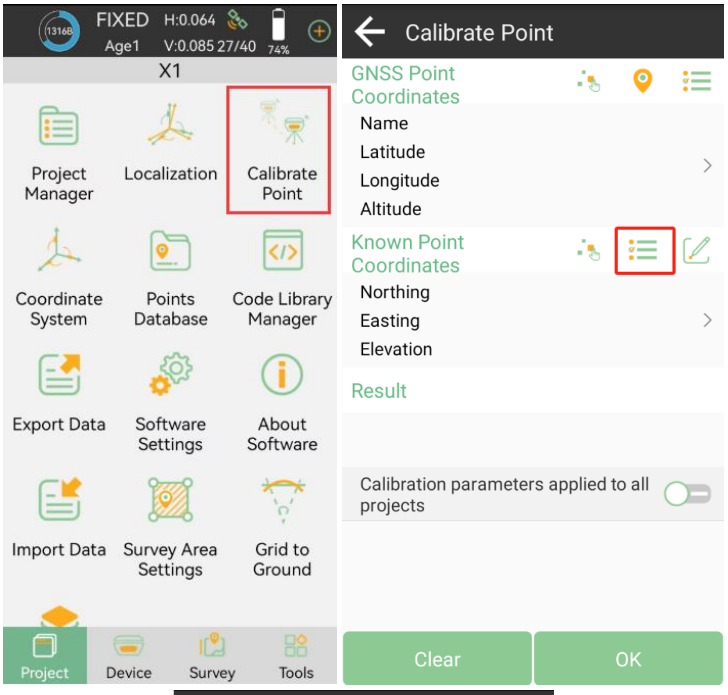
In ***Tool Bar*** interface, you can add or delete options that displayed on the point survey interface. You can customize the interface layout to suit your usage habits.

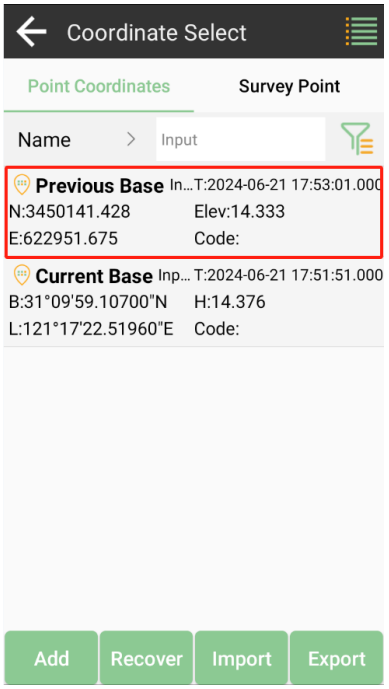


5.3 Calibrate Point

When changing the position of the base station, there will be offsets between surveying points base on different base stations. Users can use the Calibrate Point to calibrate the offset.

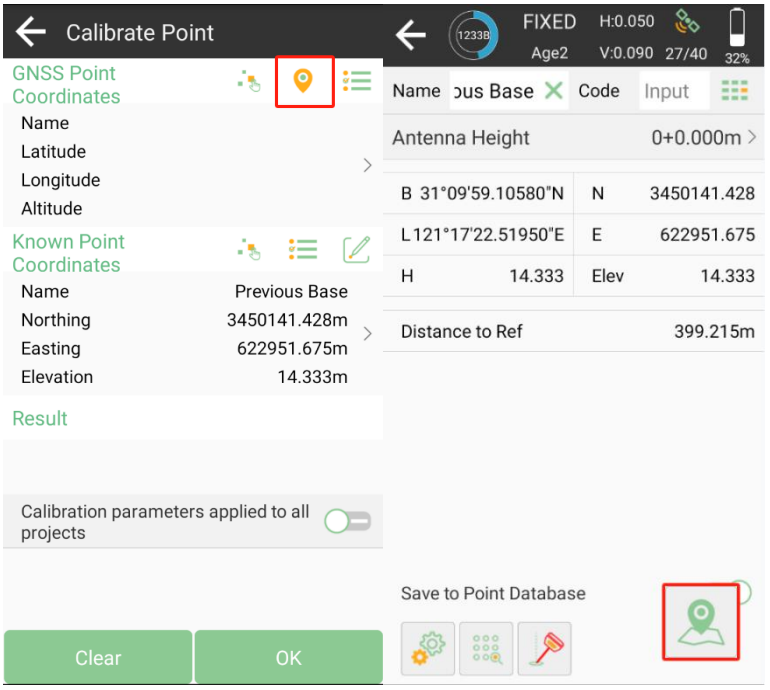
Go to ***Project*** > ***Calibrate Point***. Add a point measured under the previous base station as ***Known Point Coordinates***, and measure the same point under current base station as ***GNSS Point Coordinates***.



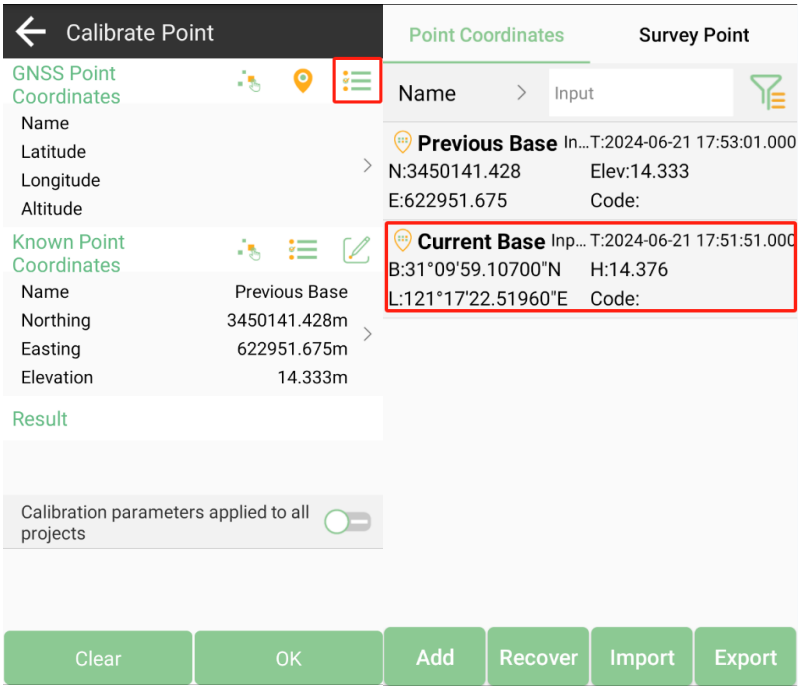


For the GNSS Point Coordinates, you can click the surveying icon to measure under the current base directly.

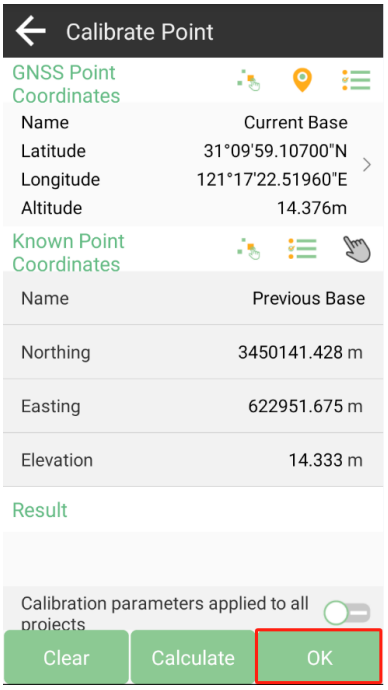
Note: Please confirm the RTK status is FIXED.



Or measure the GNSS point under the current base station in advance and click to select from the point database.



Then click ***OK*** to complete the Calibrate Point.



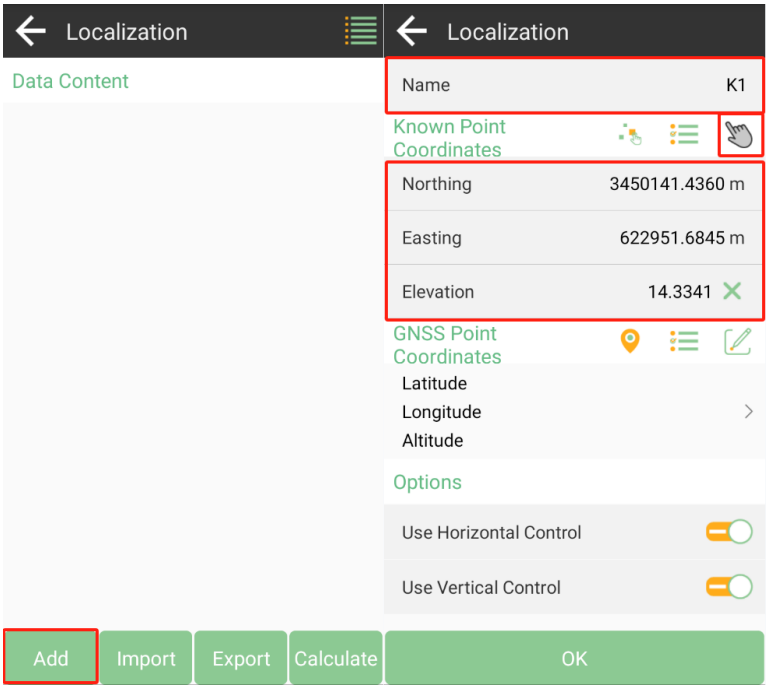
5.4 Localization

When starting a new project, if you are using the local small-scale coordinate system, you can use this function to transform the geodetic coordinates system to your local system.

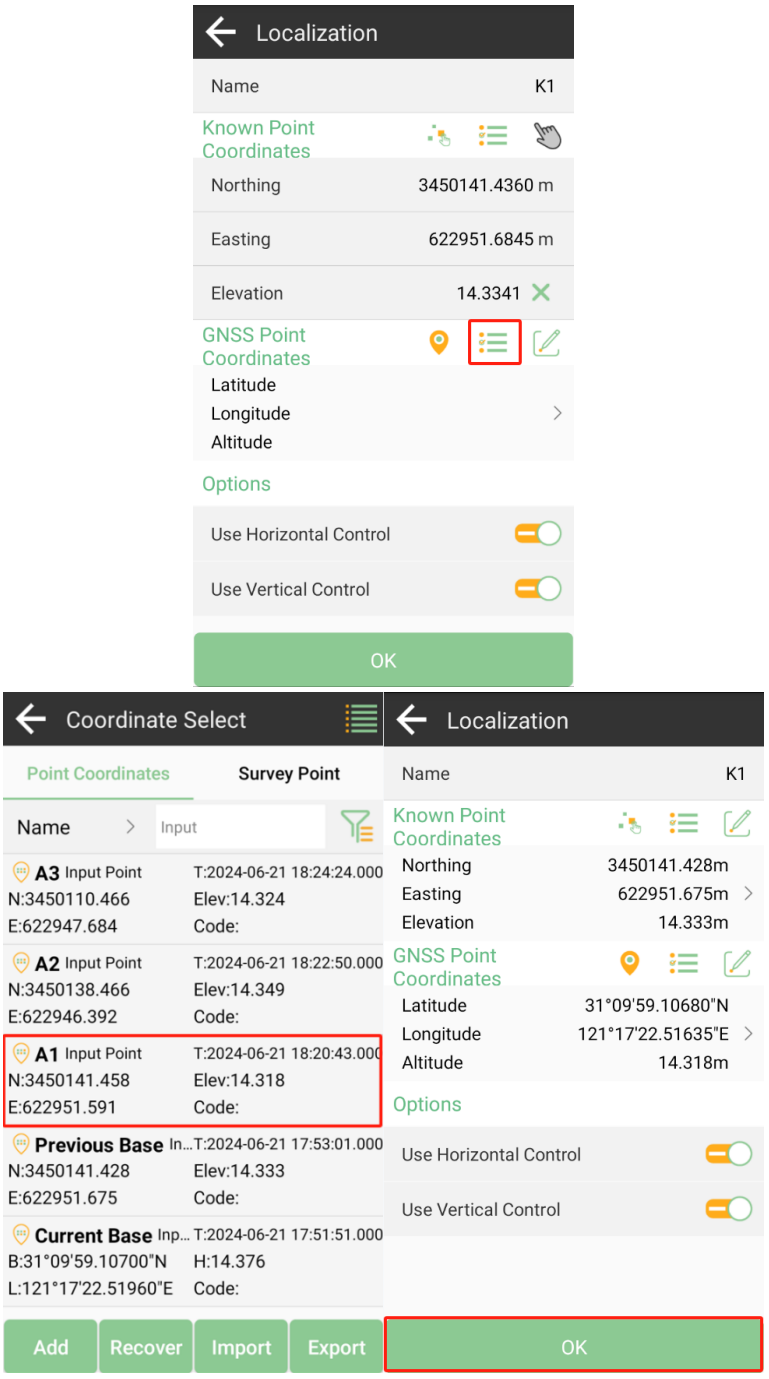
Go to ***Project*** > ***Localization***, add at least 3 pairs of points for the Localization.

Note: A pair of points are the known local coordinates and the surveying coordinates of the same point.

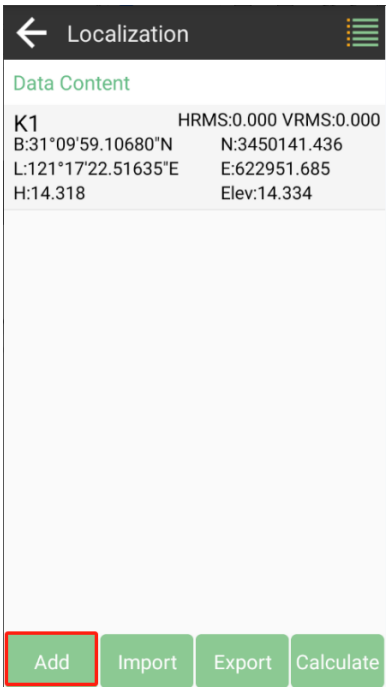
Click ***Add*** to add the corresponding pairs. Input the Known Point Coordinates.



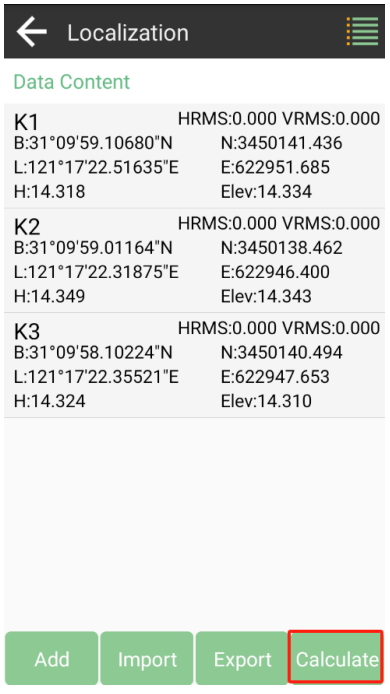
Then select the corresponding GNSS coordinates of the known point.



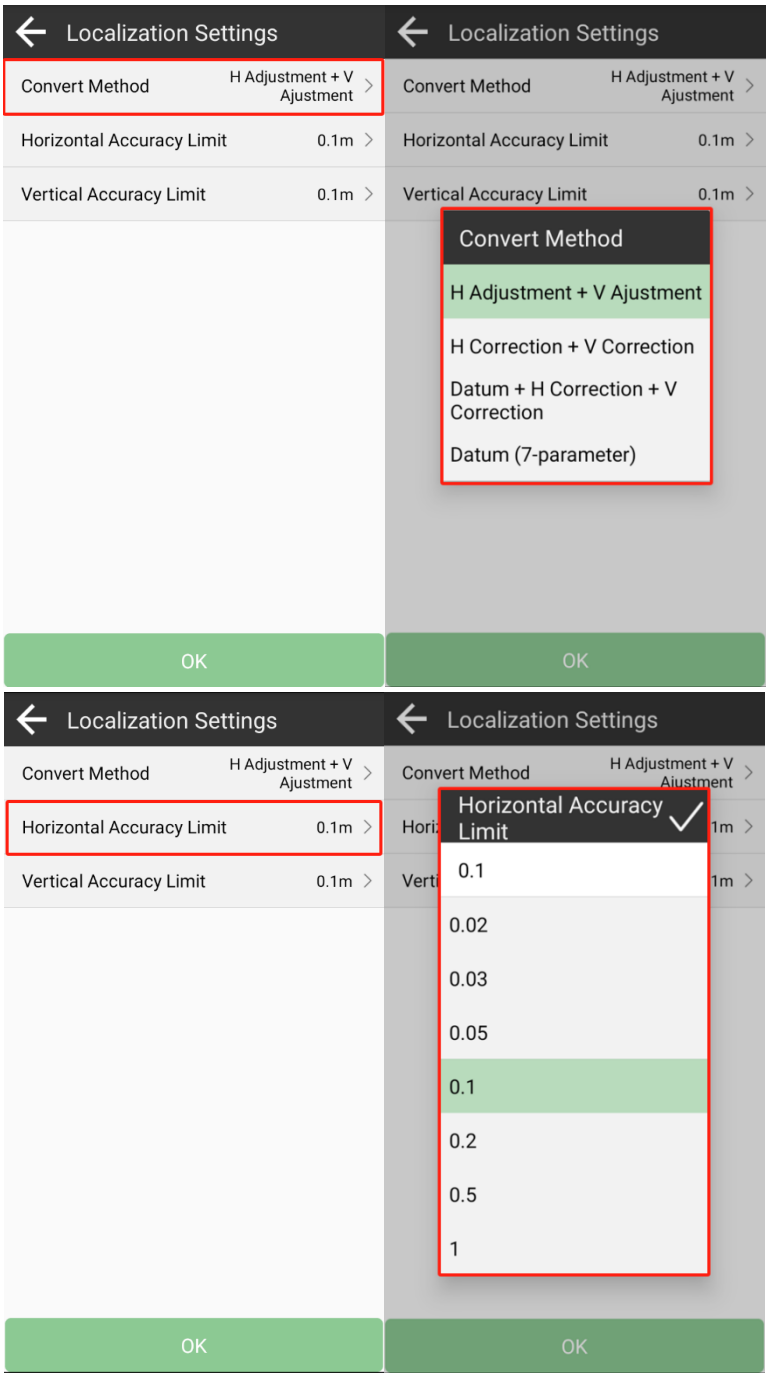
Add the remaining point pairs in sequence. You can also enter the known point in point database in advance and select the input points.

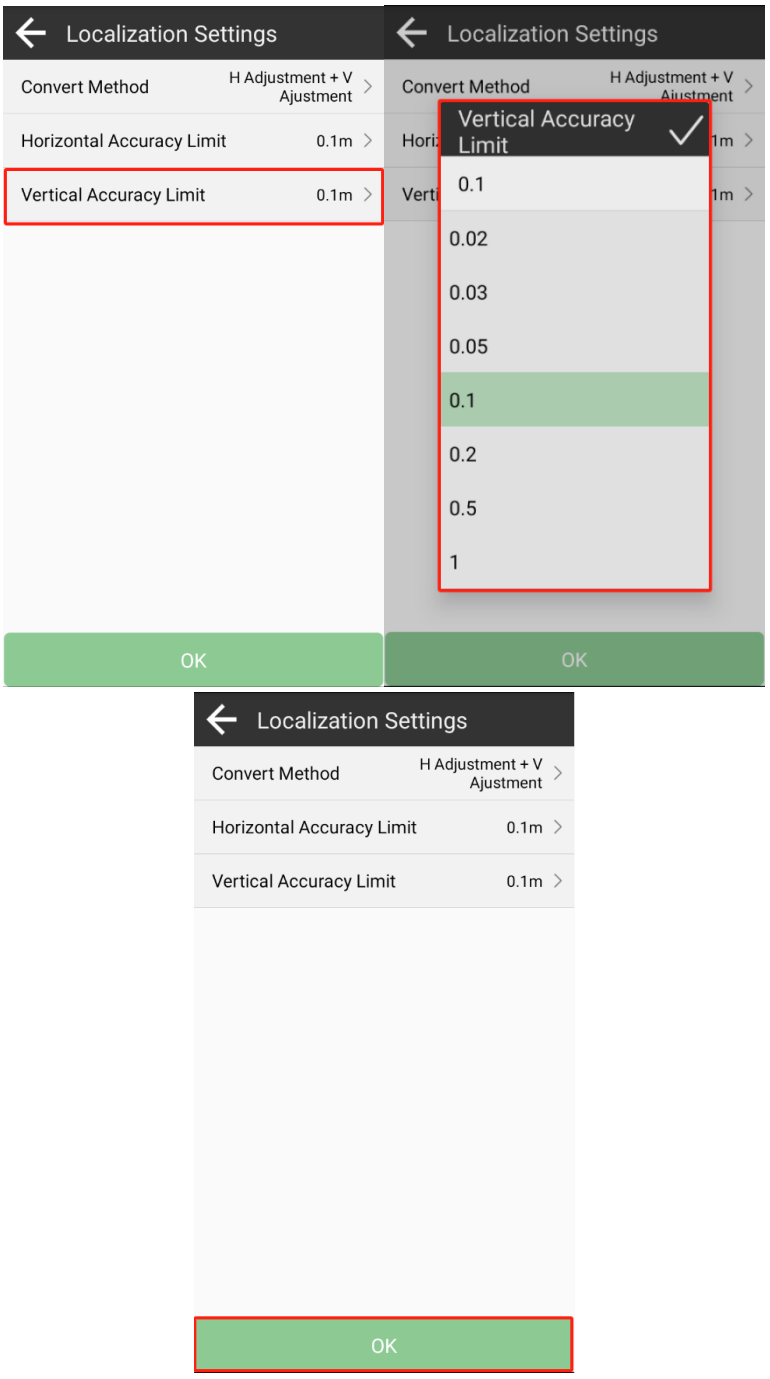


After adding all the point pairs, click ***Calculate***.

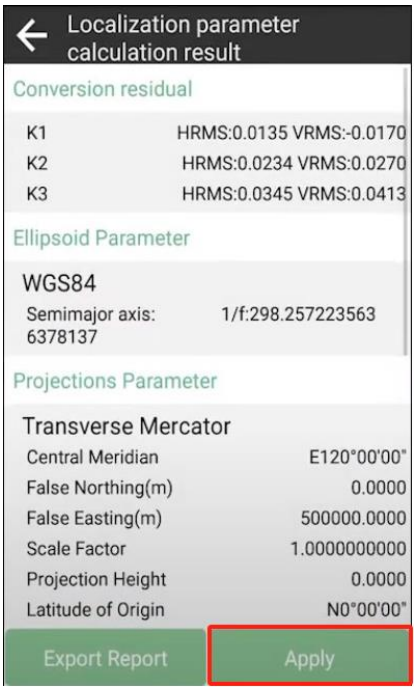


Select the convert method and the accuracy limit according to your project requirements.


Localization Settings
Convert Method
H Adjustment + V Ajustment
Horizontal Accuracy Limit
0.1m
Vertical Accuracy Limit
0.1m
OK
Localization Settings
Convert Method
H Adjustment + V Ajustment
Horizontal Accuracy Limit
0.1m
Vertical Accuracy Limit
0.1m
Convert Method
H Adjustment + V Ajustment
H Correction + V Correction
Datum + H Correction + V Correction
Datum (7-parameter)
OK
Localization Settings
Convert Method
H Adjustment + V Ajustment
Horizontal Accuracy Limit
0.1m
Vertical Accuracy Limit
0.1m
OK
Localization Settings
Convert Method
H Adjustment + V Ajustment
Horizontal Accuracy Limit
0.1
0.02
0.03
0.05
0.1
0.2
0.5
1
OK



You can click Export Report to save the projected coordinate system parameters. Click ***Apply*** to apply the localization.



5.5 Tilt survey

The X1 GNSS receiver has a built-in IMU module that supports tilt surveying up to 60°. The system will accurately calculate the actual offset based on the tilt angle, reducing the user's burden on centering pole at each measurement.

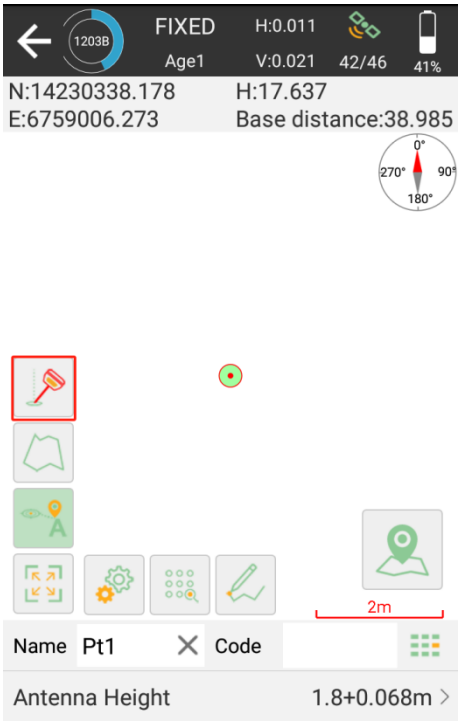
The tilt function option  will appear in each survey/stakeout function interface. You can click to turn this function on/off.

Tilt initialization is required when using it for the first time or when its calibration expires.

The following steps give an example of tilt survey.

1. Open IMU: Go to survey >> Point Survey >> click the  button to open.

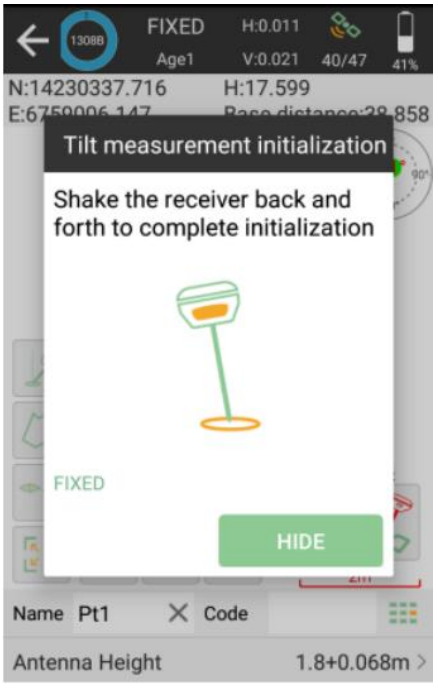
After clicking the tilt IMU button, the system will prompt you to check the antenna information, pls check whether the antenna height is correct.



2. Initialization

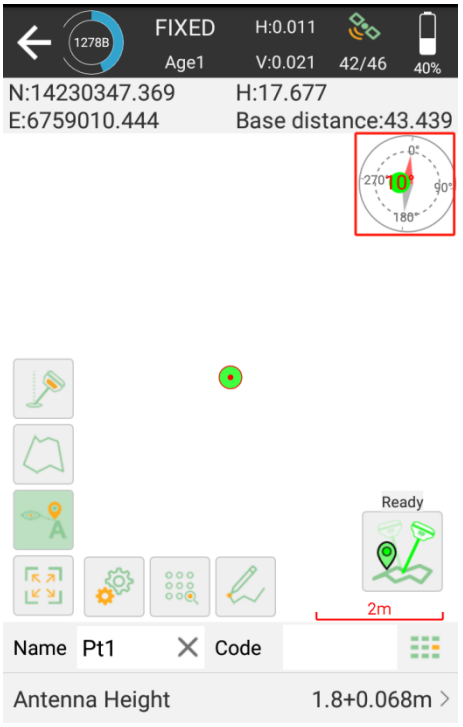
After clicking the IMU button, you can follow the guidance on the interface to complete it.

During operation, ensure that the receiver can search the satellites and obtain a fixed RTK solution.



> **NOTE**
>
> If the receiver is powered off or reset, it will need to be reinitialized.

In survey interface, you can find the bubble and angle value showing how you tilt the pole in real time. To ensure the accuracy, please keep the tilt angle less than 60°. When the pole tilts within 60°, the built-in IMU precisely calculates the actual offset, the accuracy of which can be accurate to ±2.5cm.

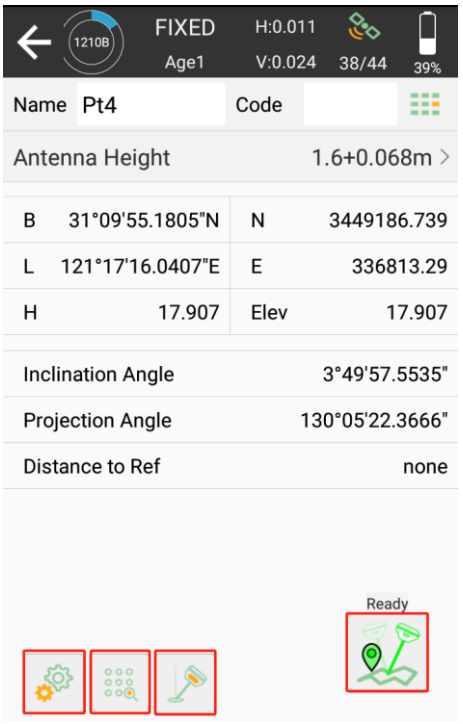


Tip: Do not shake or rotate the receiver violently, otherwise you need to re-initialize.

5.6 Detail survey

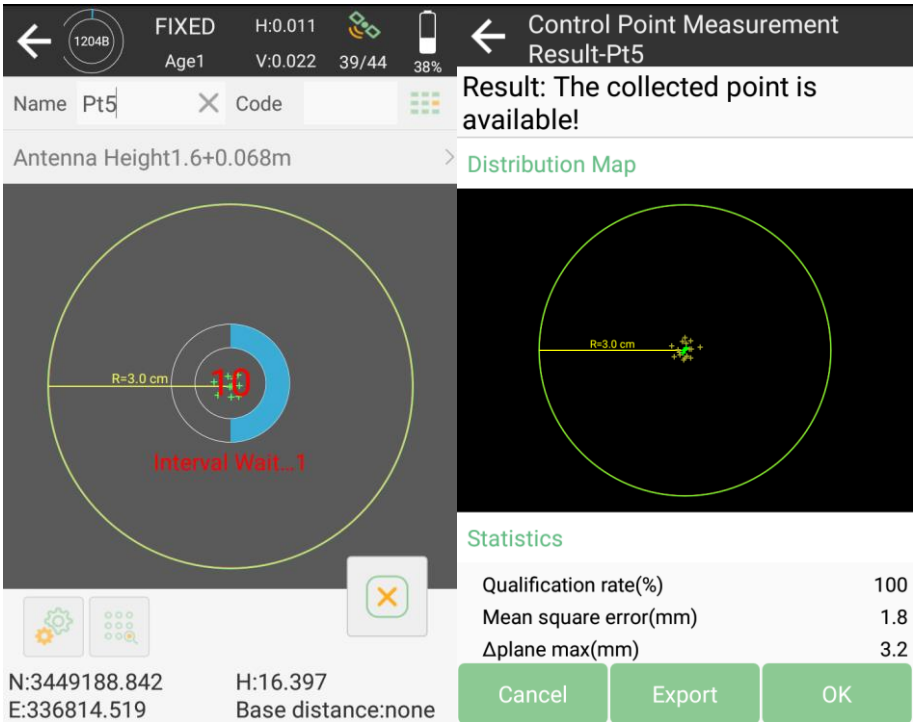
In detail survey interface, both local coordinates and Latitude/Longitude will be displayed when measuring.

- Click  to start or stop collecting data
- Click  to set settings, display info and tool bar.
- Click  to check point coordinates; you can add note, info, arrow drawing and photo.
- Click  to open IMU to do tilt survey.


1210B
FIXED
Age1
H:0.011
V:0.024
38/44
39%
Name
Pt4
Code
Antenna Height
1.6+0.068m
B
31°09'55.1805"N
N
3449186.739
L
121°17'16.0407"E
E
336813.29
H
17.907
Elev
17.907
Inclination Angle
3°49'57.5535"
Projection Angle
130°05'22.3666"
Distance to Ref
none
Ready

5.7 Control point survey

By measuring the coordinates of the same point several times and taking the average, you can get more accurate coordinates. This function is usually used to measure control points.

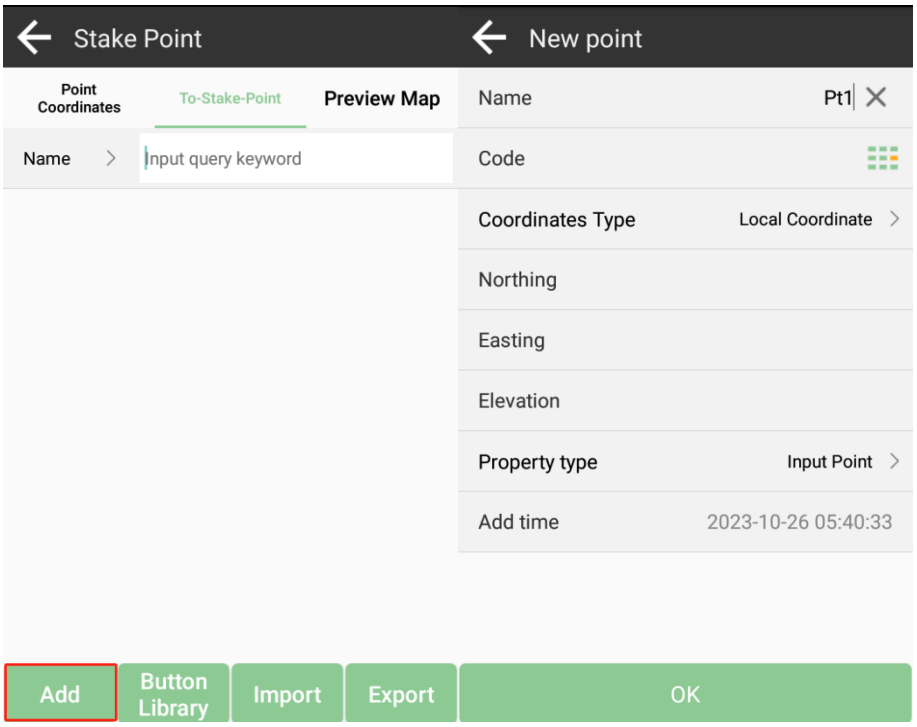


- Click  to start or  stop collecting data.
- Click  to set settings, display info and tool bar.
- Click  to check point coordinates; you can add note, info, arrow drawing and photo.

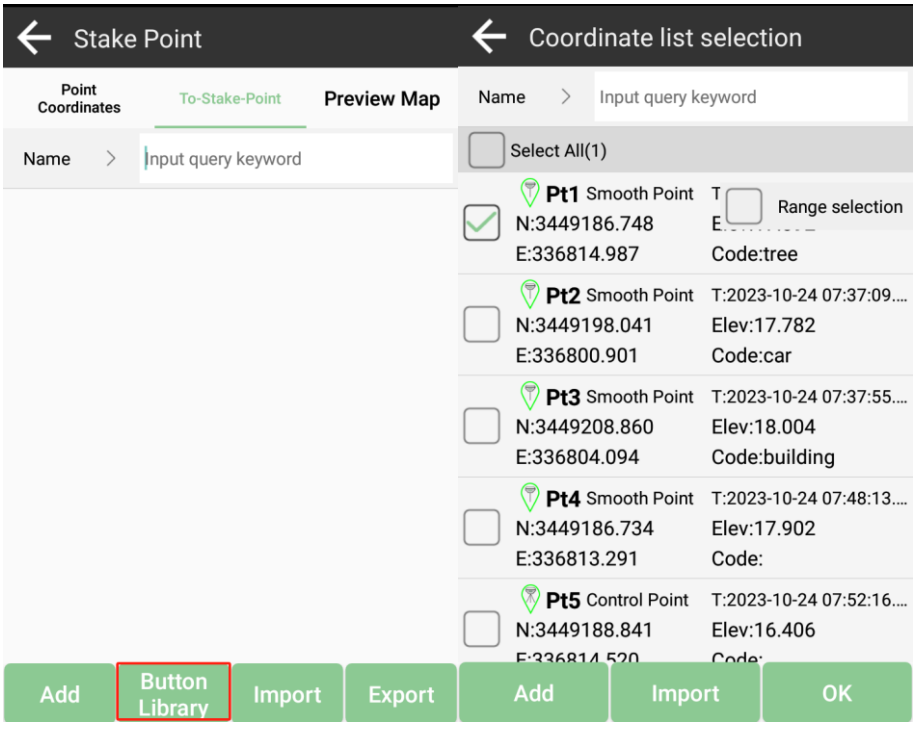
5.8 Point stakeout

Go to ***Stake point*** interface, add or import the point coordinates you need to stake out, you can also click Button Library to select from the point database.

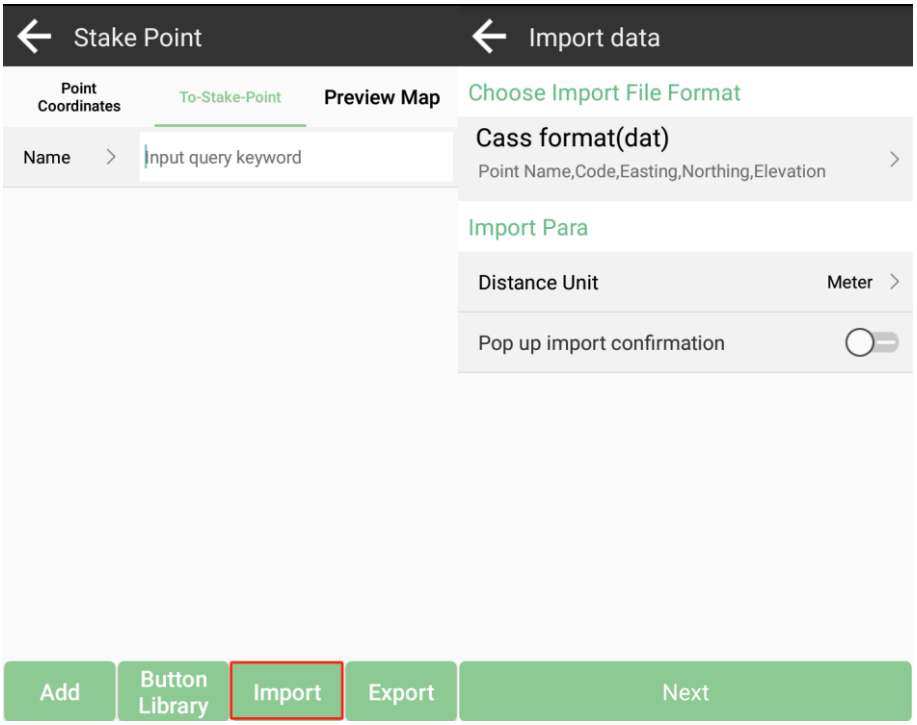
- Click ***Add*** to input coordinates



- Click button library to choose one

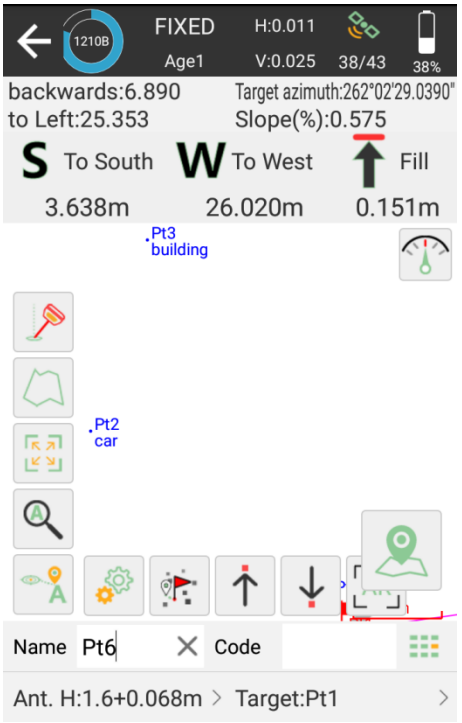


- Click Import to import point data with different file types. You can also define a new format according to your needs.

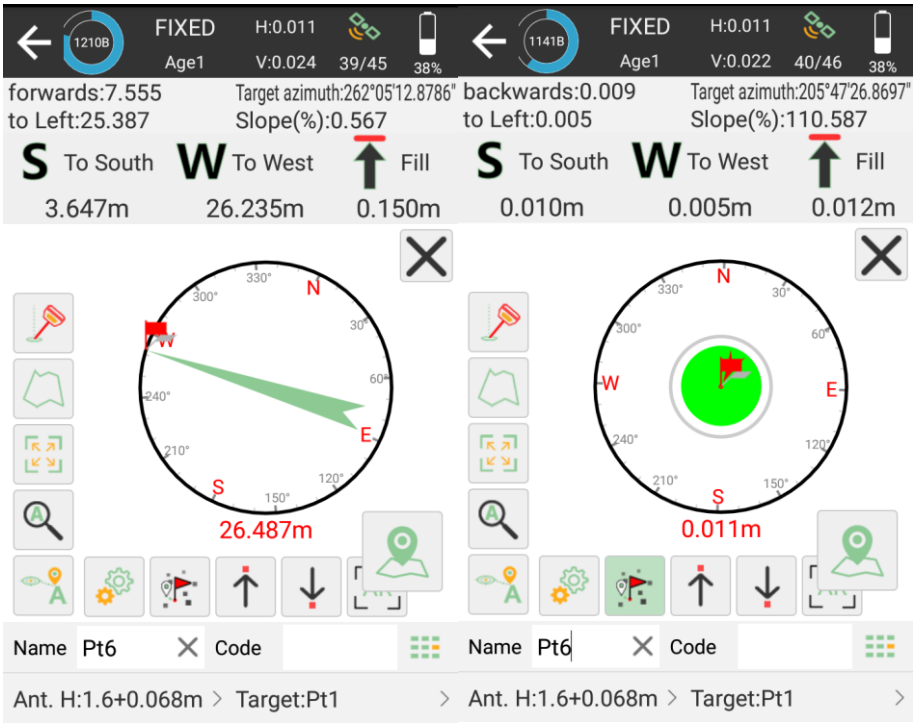


Select a point to stake out, SingularPad provides a navigation map when staking points/lines. The software alerts you when you approach the target point to the set range value.

For X1 receiver, you can use IMU staking feature. In the IMU staking, you can turn on the IMU feature without keeping the receiver perpendicular to the ground. The maximum tilt angle is 60°.

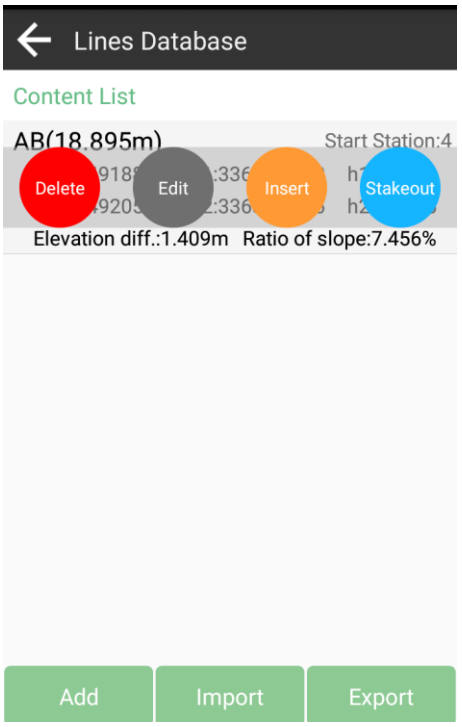


- There is a direction prompt on the floating window
- Click  to start or stop stake points
- Click  to open or close IMU
- Click  to scale automatically to full map
- Click  to jump to current point
- Click  to jump to next point
- Click  to jump to previous point
- Click  to set skate out settings, display info and tool bar, you can edit the prompt range and range error
- Click  to open compass

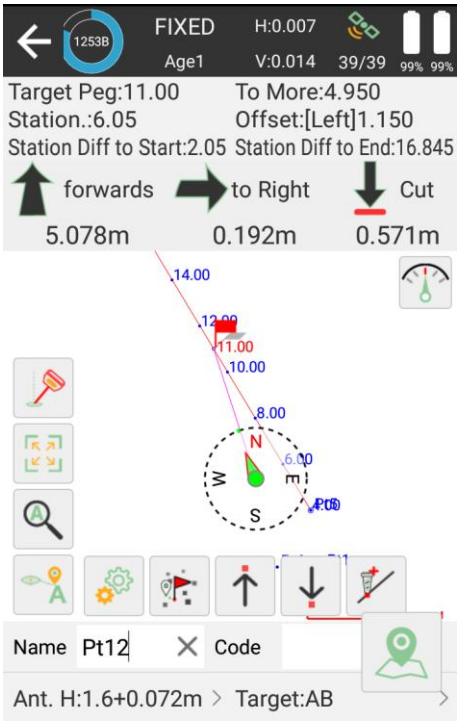


5.9 Line stakeout

Go into Stake line interface, add or import lines you need to stake out.



- Click Add to input line parameters
- Click Import to import point data in different file types. You can also define a new format according to your needs.



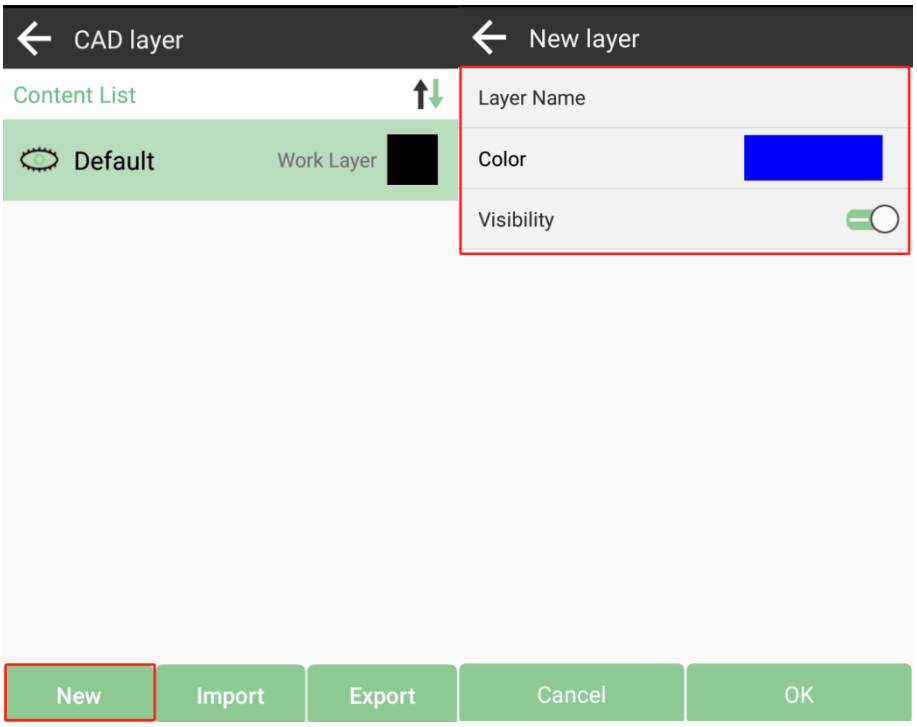
Choose a line to stake, set Offset, Cross-Section Slop and Stakeout by Pile-to-Pile Coordinate parameters.

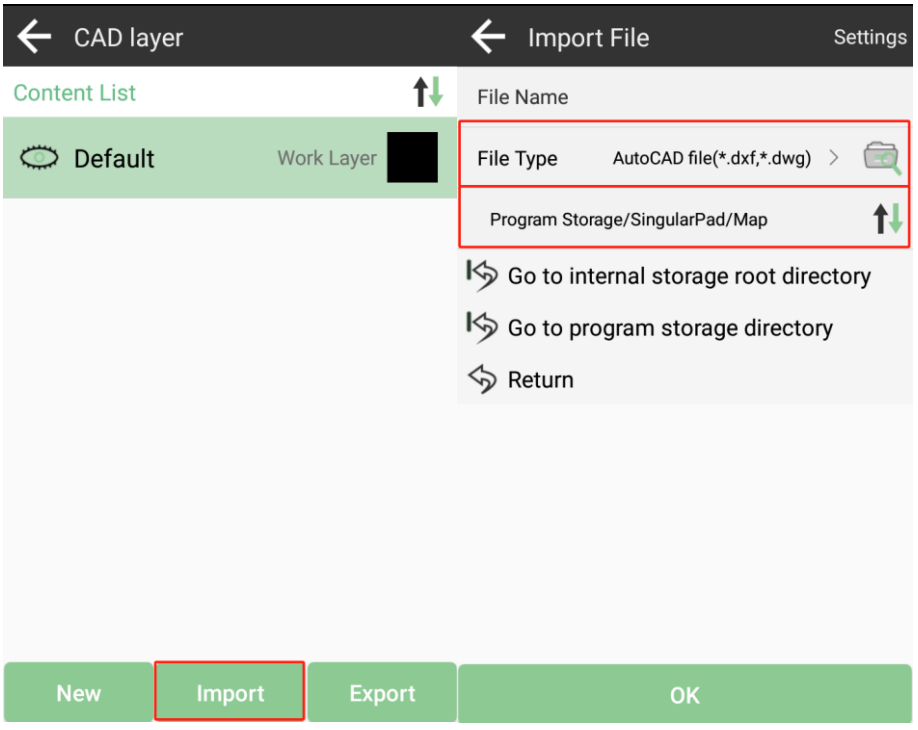
- Click  to jump to next line
- Click  to jump to previous line
- Click  to add stake

5.10 CAD mapping and stakeout

When using this fuction for the first time, the CAD interface has no layers and floating window to display the features you need to stake.

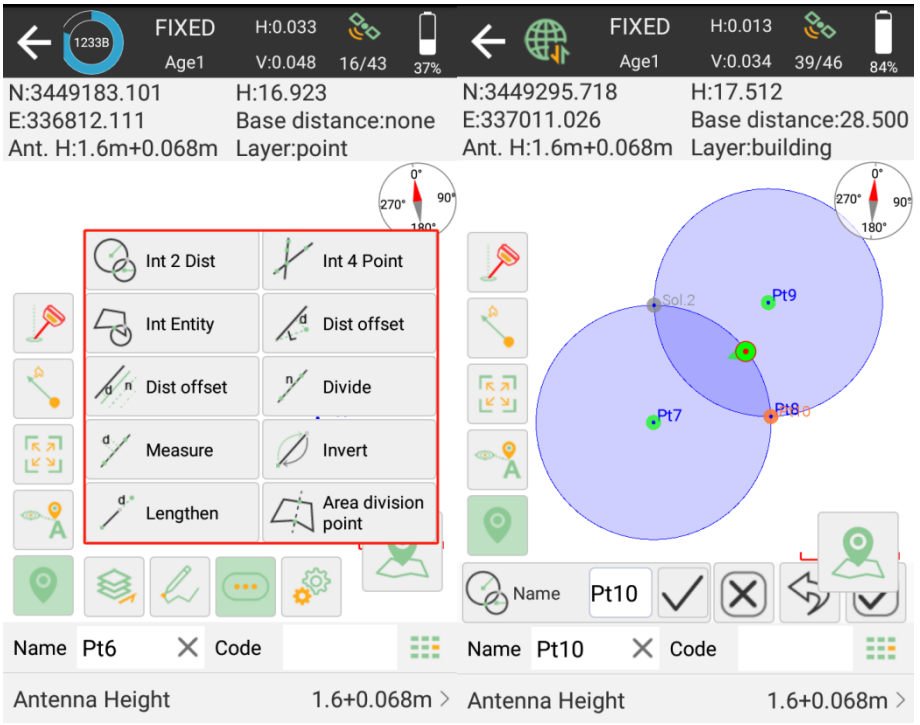
- Click  to create or import a CAD file, supporting *.dxf, *.dwg format





- Click  to draw features, there are 12 types and methods you can choose, follow the prompts and draw.

- Click  on the Find tools. They can help you to work smoothly. For example, to find the intersection points of neighboring circles.



In the CAD interface, you can choose a feature you want to stake, it will show up in blue. You can know the details about it, including length, start point, end point and center point. And choose the way to stakeout.

- Setting: Set the method of stake out, offset distance, interval etc.

- Start station: If you set the start station as 5m, then the final mileage will plus 5m.
- Offset: If you set the offset 5m, then you will stake the line 5m away from the line you choose. The plus and minus represent different sides of the line.
- Setting out by pile by coordinate: including station number, station distance and segment
- Station distance: Stake the line at a specified distance, for example, if the line is 40m, you set the specified distance as 8m, then you will stake the line at 8m distance every segment.
- Segment: For example, if you set the segment as 4, then you will stake the line at 4 segments, every segment length is the same.
- Station number: You will stake the line at the station at each interval point. You can stake it out according to the direction.
- Key node: It will stake out the line with starting point, ending point, midpoint, fold point, etc.

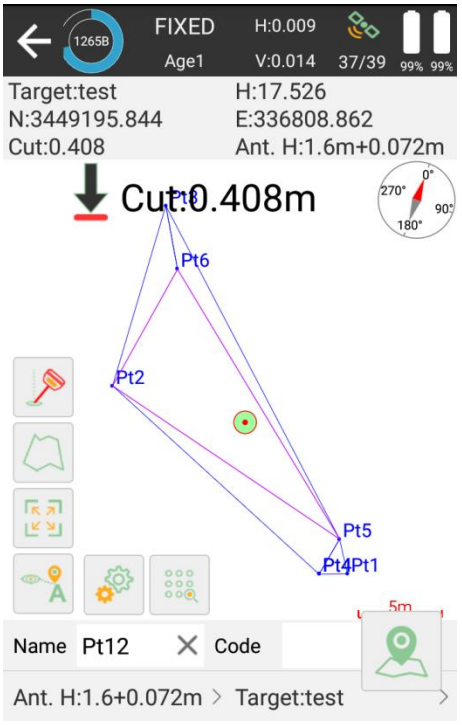
5.11 DSM stakeout

You can stake a surface by staking out elevation of each point on the surface.

if you haven't used a surface file before, you need to create one by adding, importing or selecting from the database.

You can get a preview map of the surface after adding points and don't forget save it.

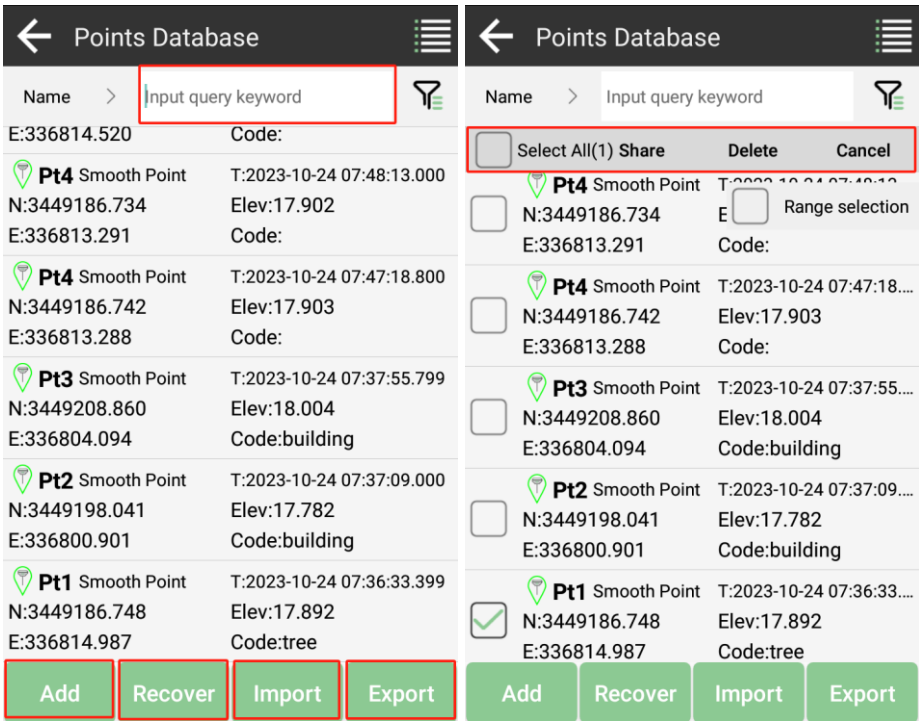
At the content list interface, you can find the surfaces you created, and you can edit, share and stake them.



If the current position is not within the design surface, it will prompt “Out of surface!”. If the current position is within the design surface, it will show the fill or excavation value.

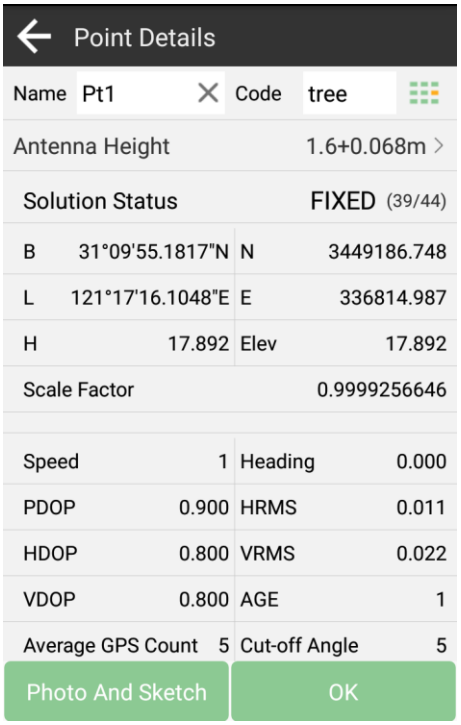
5.12 Points Database

The points, which are surveyed, staked, added, imported, and input from display map, will be stored in point database. The surveyed points will be shown under one base while surveying. Also, no matter where you need to select a point, all the points of the database are available.



- Add: Support to add Input Point, and display type supports local coordinate and geodetic coordinate
- Recover: After deleting the points, you can recover them in deleted points interface
- Import: Import points by different formats of files
- Export: Export points by different formats of files
- Search: Enter the name of the point you want share or delete

Tap any point to view the detailed information. The information includes antenna height, solution status, WGS84 Coordinate, local grid coordinate, base id and measure time. If the point has been calibrated, the offset parameters will be displayed.

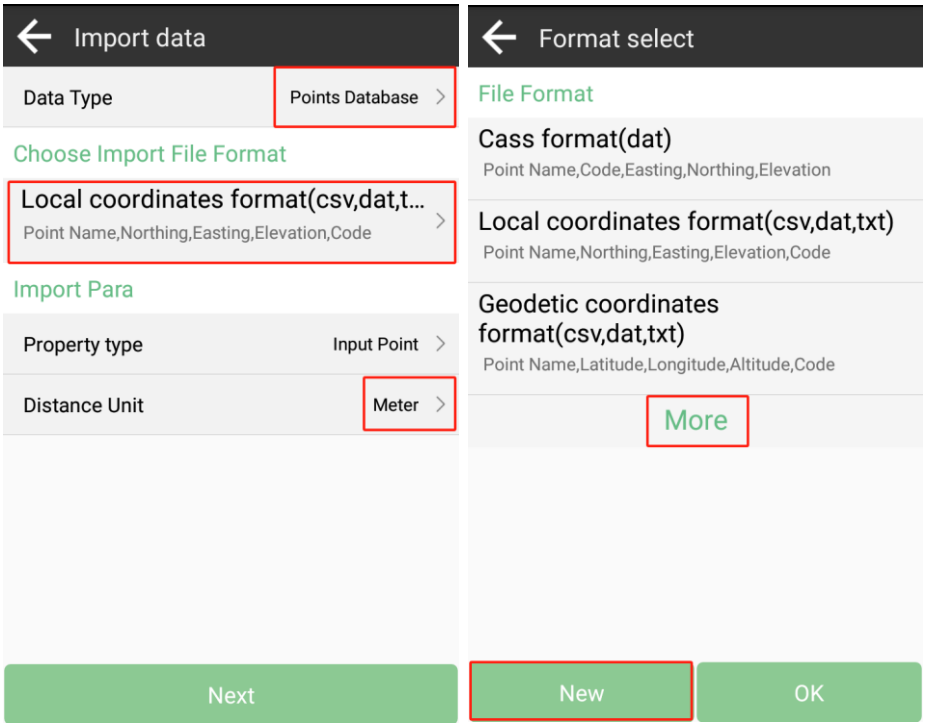


5.13 Data export/ import

SingularPad supports to export/ import data including grid coordinate, Lat/Lon coordinate with various data format, and supports importing *.dat/*.csv/*.kml file and export result of *.dxf/*.kml/*.shp/*.xls/*.csv.

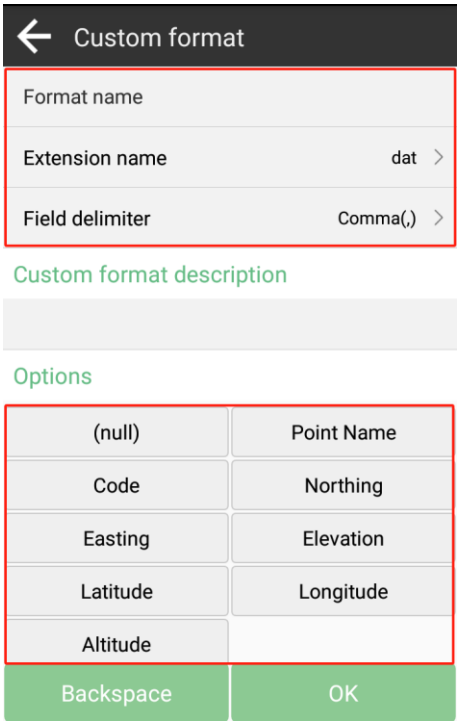
5.13.1 *Import points data*

Tap Import data in project interface, there are some predefined data formats, click More to get more predefined formats.



- Data Type: support point database, transformation parameters file and code library
- Import File Format: support *.csv, *.dat, *.txt, *.kml format etc.
- Distance Unit: support meter, US survey feet and international feet

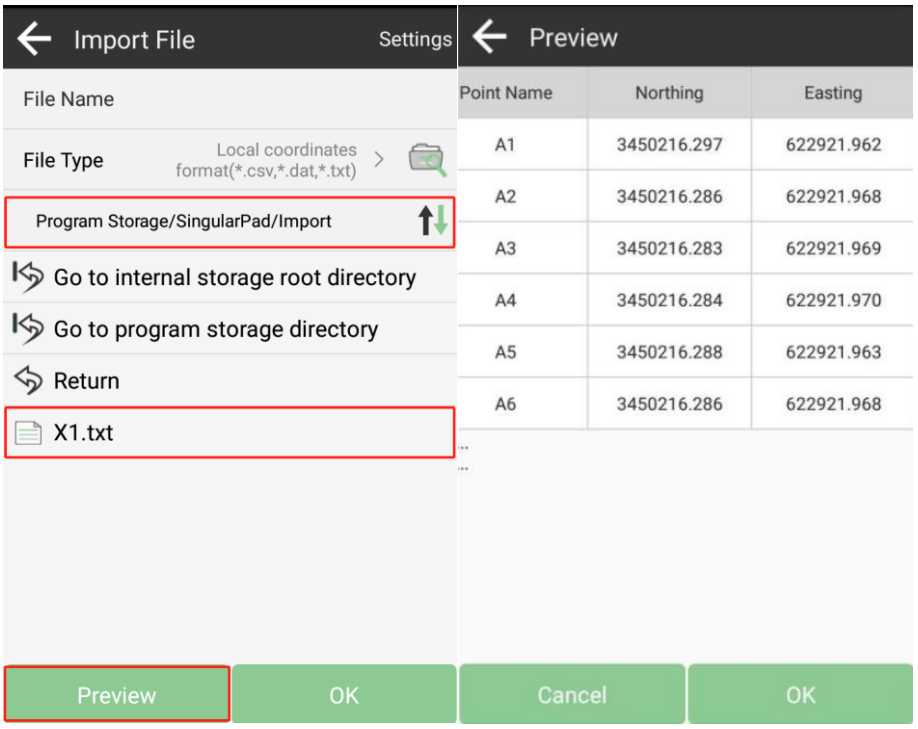
Besides, you can click now to create a User defined type.



- Format name: Enter the name for the format
- Extension name: support *.csv, *.dat, *.txt, *xlsx format
- Delimiter: support comma (,), semicolon (;), space ( ), tab (Tab)

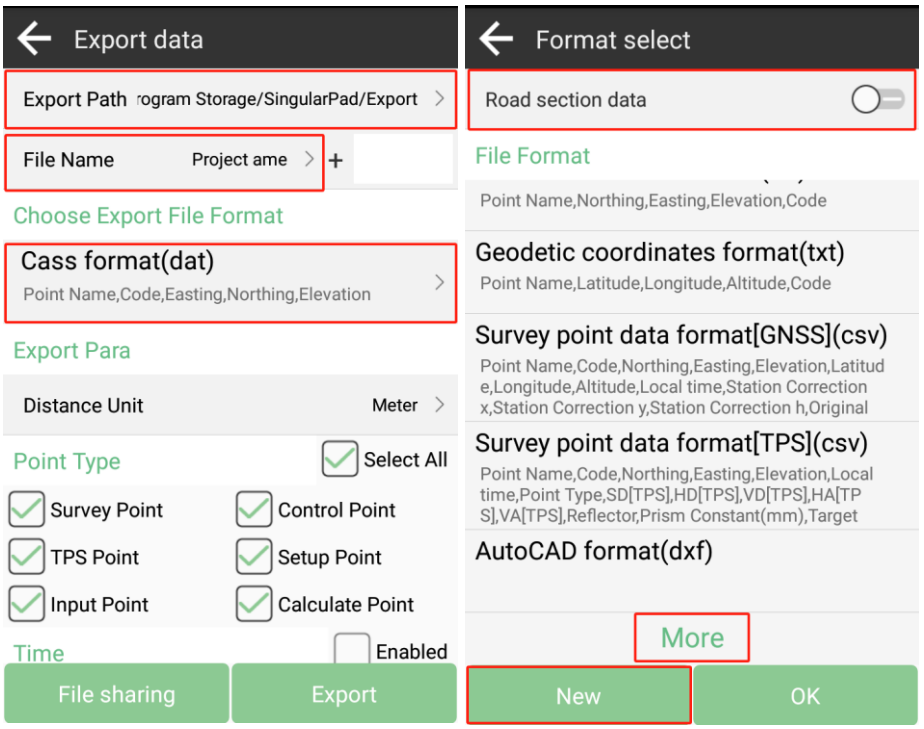
Click to choose elements in the options list, click backspace to eliminate the previous element selected. The elements include: code, northing, easting, elevation, latitude, longitude, altitude.

Choose one format to import data. The default export path is internal storage/ SingularPad/import. You can also change to any other path where the file is. Click preview to take an inspection whether the format is right.



5.13.2 *Export points data*

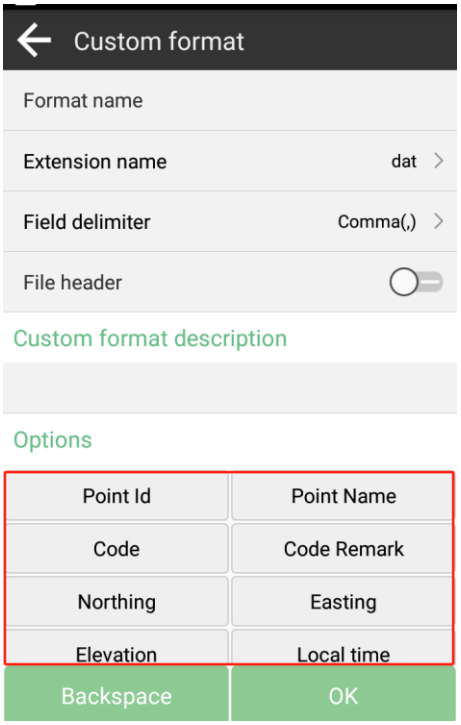
Tap Export in Project interface to export point data. Also, click More formats to export the survey points in various formats like stake points/ lines, DXF, SHP, KML, RAW, RW5, HTML, CASS feature result.



- Export Path: the default export path is internal storage/SingularPad/export; you can also change to any other path where the file is
- File Name: support project name, operator,data, data time
- Export File Format: support *.csv, *.dat, *.txt, *kml format etc.
- Distance Unit: support meter, US survey feet and international feet
- Road section data: open to export road section data

Besides, you can click New to create a user defined type. The elements include: id, name , code, latitude, longitude, altitude, northing, easting, elevation, N, E, Z, type, local time, UTC time, solution status, AGE, max delay, min delay, use satellites, tracked satellites, cut-off angle, mount point, measurement method, repeat, start data, end time, RMS, HRMS, VRMS, PDOP, VDOP, speed, heading, antenna type, measuring type, measuring height, antenna height, base id, base latitude, base longitude, base altitude, distance to ref, original latitude, original longitude, original altitude, undulation height, station correction h, inclination correction, pitch, roll, yaw, inclined angle, projected angle, stakeout type, target, station, offset, north diff, east diff, elevation diff.

For the points, lines and polygons you surveyed in point survey, you can export dxf file, then you can edit them in third party CAD software, or import to base map to check, or import to CAD to stake. Choose the data that you want to export including survey point, input point, control point, stake point, line and polygon, and the layer properties includes name, code and height.



FCC Statement
Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for controlled environment .This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.

Note : This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates,uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.