



Mobile Topographer GIS



The era of mobile surveying is here...

What is Mobile Topographer GIS?

As our mobile devices are becoming more and more powerful, a new era of mobile applications is rising. Mobile Topographer GIS is the first of its kind being a complete software solution for the professional surveyor, far more complete than a simple helpful tool.

Real time collection and processing of data was never before an option. Mobile Topographer GIS goes even further, offering GIS capabilities that you cannot find even into desktop solutions.

Following and fully covering the GIS standards, it offers organization of data into GIS compatible shapes. Even more, it offers a new approach that supports team collaboration via our new “**unlimited nesting & linking**” technologies. Furthermore, being fully optimized for multi-core processing, is lightning fast, even faster than most desktop solutions.

Surveying the whole planet starting from a point (data organization)

The basic data entity of Mobile Topographer GIS is a “**point**”. Points can be manually entered, collected using a GNSS receiver or imported from other sources like shape files. The properties of each point are, Name, coordinates, notes and collection related values like accuracy, DOP values, number of readings, time stamp etc.

Points are organized into groups called “**shapes**”. Although a *shape* can be empty, a *point* cannot exist without being a member of at least one *shape*. The same *point* can exist

as a member of multiple *shapes* even if these *shapes* are of different types and reside inside independent *surveys*.

Shapes can be divided by type into:

- **Individual point shapes,**
- **Multiple points shapes,**
- **Polyline shapes** and
- **Polygon shapes.**

Individual point shapes can have one and only one *point* as a member. (For example a mailbox near the main entrance of a plot can be stored inside an *individual point shape* as it is a seldom point not related to anything else.)

Multiple points shapes can have one or more *points* as members. The points of a *multi points shape* are sharing a common property. (For example all pine trees of an area can be stored as *points* of a *multiple points shape*. The common property is that they are all pine trees).

Polyline shapes can have one or more *points* as members. The *points* of a *polyline* are ordered. Its *point* represents a vertex of the *polyline*. Each polyline shape represents a segment of a polyline. (For example a road segment can be stored as a *polyline shape*).

Polygon shapes can have three or more *points*. The *points* are representing the vertices of a *polygon*. The first *point* must NOT be repeated as the last one. The *points* of *polygon shapes* are always ordered. The direction of the *points* can be either clockwise or counterclockwise. The direction has no special meaning. Each polygon shape represent a “Container ring” or a “Hole”

Shapes are organized into groups called “**entities**”. Each *entity* consists of one or more *shapes* of the same type.

Entities can be divided by type into:

- **Individual points entities,**
- **Multiple points entities,**
- **Polyline entities** and
- **Polygon entities**

Individual points entities can have one or more *individual point shapes* as members. (For example a mailbox near the main entrance of a plot can be stored inside an *individual point shape* as it is a seldom *point* not related to anything else. A flagpole can also be stored as another *individual point shape*. Both *shapes* can be stored as members of an *individual points entity* called “Various landmarks”)

Multiple points entities can have one or more *multiple points shapes* as members. The *multi points shapes* of a *multiple points entities* are sharing a common property. (For example all pine trees of an area can be stored as *points* of a *multiple points shape*. All oak trees of an area can also be stored as *points* of another *multiple points shape*. Both

shapes can be stored as members of a *multiple points entity* called “Trees”. The common property is that they are all trees).

Polyline entities can have one or *polyline shapes* as members. Each *polyline shape* inside the same *polyline entity* is considered a segment of the same polyline. *Polyline shapes* inside a *polyline entity* are ordered. (For example a segment of a road covered with asphalt can be stored in a *polyline shape*. Another segment of the road that is covered with dirt can be stored as another *polyline shape*. Both shapes can be stored inside the same *Polyline entity* as they are segments of the same road).

Polygon entities can have one or more *polygon shapes*. *Polygon shapes* inside the same *polygon entity* can either be RINGs or HOLEs. A *ring* represents the area which encloses. A *hole* represents the area outside of it. *Rings* and *holes* are ordered inside the *polygon entity*. Each *ring* is followed by each *holes*. Lets imagine a small garden. The garden is fully covered with grass. Inside the garden exists a small pool and a paved playground. In order to describe the area that is covered with grass we must firstly create a *polygon entity* named “grass”. Inside this *entity* we will create three *polygon shapes*. The first one will be of type *ring*, will be named “garden” and consists of the vertices of the outside border of the garden. The second *polygon shape* will be of type *hole*, will be named “pool” and consists of the vertices of the border of the pool. The third *polygon shape* will also be of type *hole*, will be named “playground” and consists of the vertices of the border of the playground. In other words: “grass = garden – pool – playground”. Please note, that the *polygon shapes* of the same *polygon entity*, must not intersect.

Finally *entities* are organized into “**surveys**”. *Surveys* are the top level entries into the data hierarchy of Mobile Topographer GIS. Apart from *entities* a *survey* can also contain *3D terrain – Contours areas*, and other *surveys* as sub-surveys. For example if you create a full *survey* of property A called “Survey A”, and your colleague have created a *survey* of the a neighbor property B called “Survey B”, you can then create a new *survey* called “Survey A-B” and add “Survey A” and “Survey B” as sub-surveys. The newly created “Survey A-B” is now containing all the entities, shapes, points and 3D terrain – contours areas of both its children *surveys*. Later on, when you have completed more *surveys*, you can create another master survey called “Survey whole area” into which you can add Survey A-B as a sub-survey. Since, there is no limit into the depth of nesting, feel free to use nesting. It will help you keep your data organized and clear.

Unlimited nesting & linking technology

As described above an existing *survey* above can be added as a sub-survey of another parent *survey*. This parent *survey* in its turn, can also be added as a sub-survey of another existing *survey*. The procedure of adding an object as a child of another object of the same type is called “nesting”. You can keep nesting surveys as deep as you want. Mobile Topographer GIS will always check for and prevent circular references.

Till now we have talked about nesting of surveys. But what exactly do we mean by “adding a survey as child of another survey”? Mobile Topographer GIS offers three different ways to “add” an existing *survey* as a child (sub-survey) of another *survey*:

- **Link,**
- **Link – Copy,** or
- **Full copy.**

Lets examine the differences of these methods using the example of adding “Survey A” as a child (sub-survey) of “Survey A-B”.

Link means to add a link of the child *survey* as a sub-survey of the parent *survey*. Any post changes into the linked *survey* or its contents will be reflected in all instances of it and vice versa. For example if you have added “Survey A” as a link under “Survey A-B”, as a consequence you will have two difference instances of “Survey A”. The first instance is as an independent and complete *survey* while the second instance is as a child (sub-survey) of the parent “Survey A-B”. Both instances are referring onto the same object, thus any change made to any of the instances will be reflected into both instances. For example if you add a new entity under the independent instance of Survey A, then the newly inserted entity will automatically appear under the instance that exists as a child of Survey A-B.

Link copy means to create a new *survey* (lets say “Survey A copy”) and add it as a child of the parent *survey*. The newly created “Survey A copy” has links to all the contents of “Survey A”. That means that adding or removing an entity to “Survey A” will NOT be reflected into “Survey A copy” and vice versa. In the other hand adding a shape into an entity that exists into both “Survey A” and “Survey A copy” will be reflected into both objects. In other words “Survey A” and “Survey A copy” are different objects but they are sharing links to common contents.

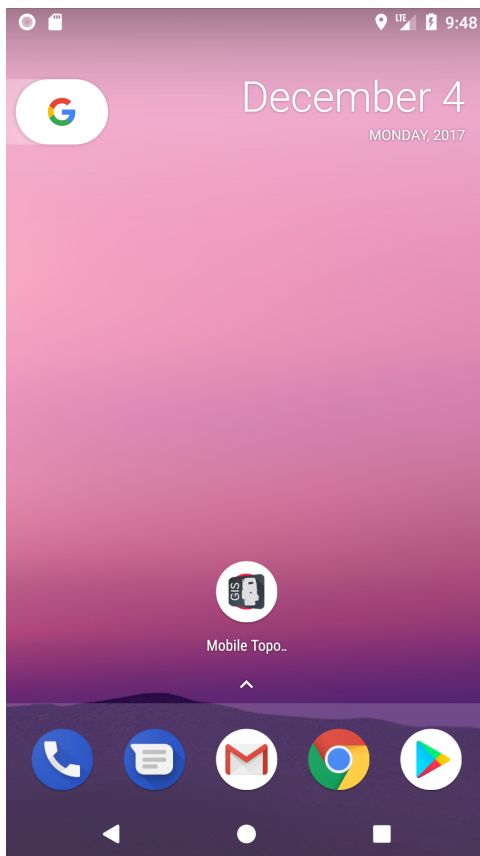
Full copy means to create a new *survey* and add it as a *survey* (lets say “Survey A copy”) and add it as a child of the parent *survey*. In this case the newly created “Survey A copy” will also have independent copies of all of the contents of “Survey A”. Any post changes to the “Survey A” and any of its contents will NOT be reflected into “Survey A copy” and vice versa.

As a synopsis, links re dynamic while copies are static.

The above three different methods of addition are giving us endless capabilities of dynamic linking. As we will discuss later entities shapes and points are also having linking capabilities.

Concluding we can say that the “**Unlimited nesting & linking technology**” of Mobile Topographer GIS is a groundbreaking innovation that brinks dynamic updates and collaboration to a new level.

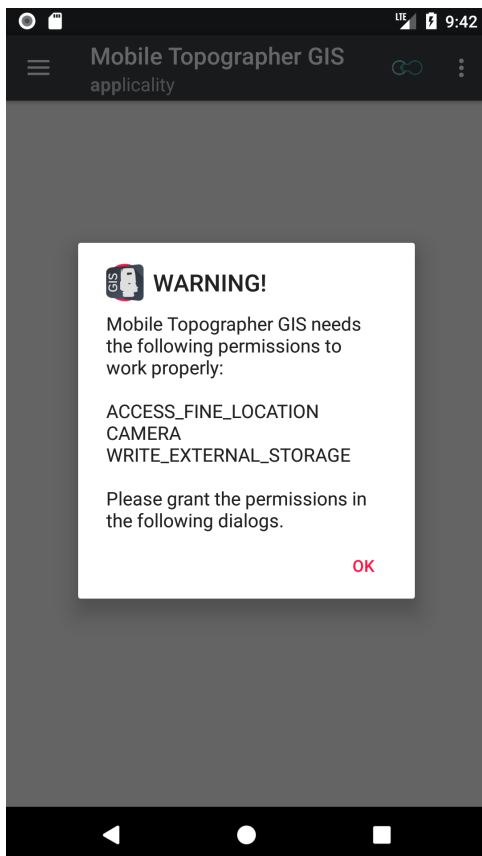
Starting the app for the first time



When you have finished downloading the app, just tap on the Mobile Topographer GIS icon in order to start the application.



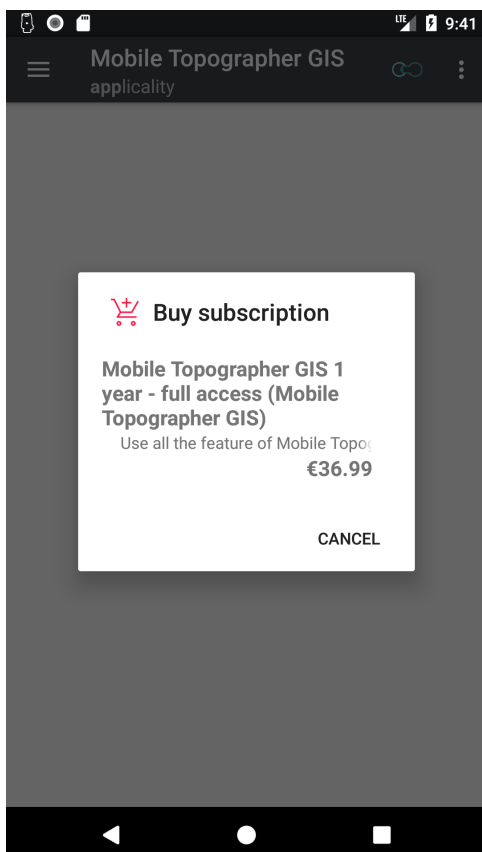
The splash screen with the app logo will appear, while some initialization procedures are taking places. This screen will stay on for 5 seconds. If you don't want to wait, just touch it anywhere to proceed with the next step



While in the next screen you will be asked to grant the following permissions to the app:

- **ACCESS_FINE_LOCATION** – Grant permanently this permission to the app in order to be able to collect data from the internal (or a connected external) GNSS receiver. Without this permission, the app cannot perform most of its tasks.
- **CAMERA** – The app uses the camera to provide the background of the Augmented Reality Satellites Projection. It also uses the camera to take photos to be used as survey, point, area, or route icons.
- **WRITE_EXTERNAL_STORAGE** – The app uses this permission to store or retrieve data to the storage devices of your device.

Feel free to grant all of the above permissions, Mobile Topographer GIS and applicality do not collect any personal or any other type of data. See <http://applicality.com/mobile-topographer-gis-privacy-policy/> for more details.

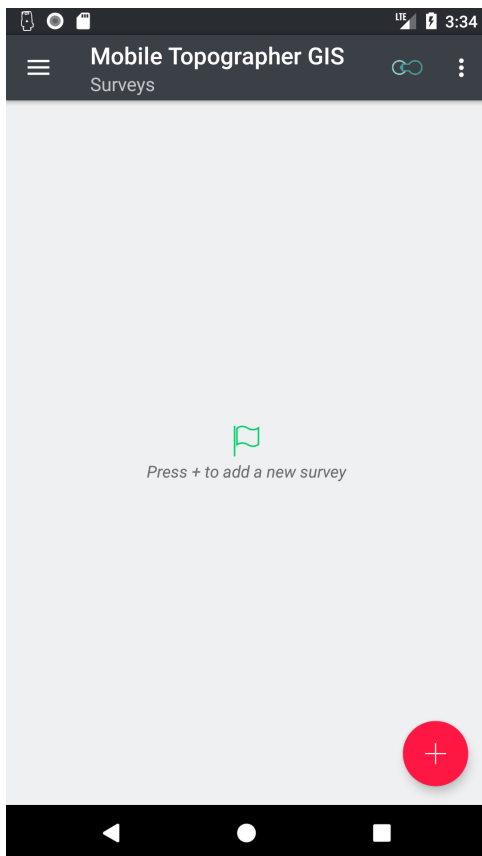


Mobile Topographer GIS is working with subscriptions. A valid subscription is needed in order to go on. During the next initialization step, you'll be asked to buy a subscription.

Subscriptions are valid for a certain amount of time (for example one year). After the end of this period your subscription will be auto renewed. You can cancel your subscription at any time. A canceled subscription will be active till the end of its period, but will not be auto renewed.

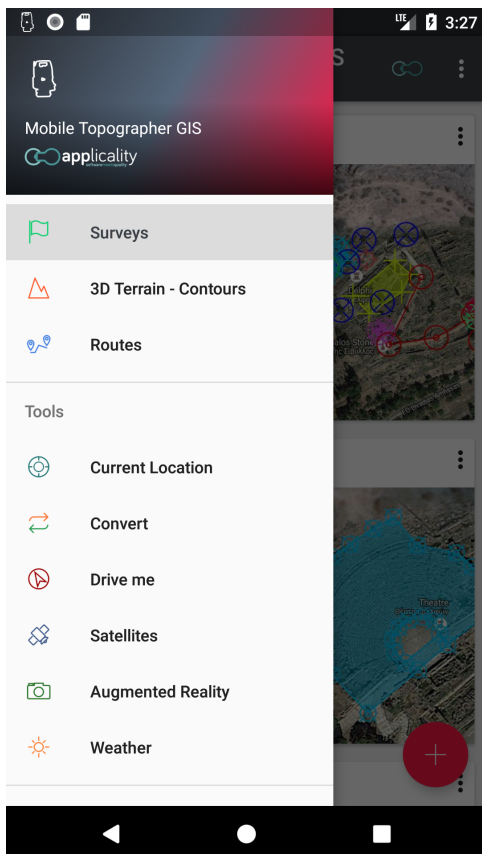
We are offering a three days trial for all subscriptions. This means that your credit card will not be charged till after this free trial period ends. So feel free to download the app and try it.

The app needs internet connection in order to check the validity of your subscription. So if you plan to use the app in an area that has no internet coverage, please start the app at least once before leaving internet coverage.



You are now in the main screen of Mobile Topographer GIS. This is the list of surveys where you can see all your saved jobs. As you've just started the app the list is empty. Press the + button to add a new survey and start using the the app.

Before, seeing in details how to add a survey, let's take a look at the main menu of the app



Just press the hamburger button at the upper left corner of you screen, or swipe from the left. The main menu of the app will appear.

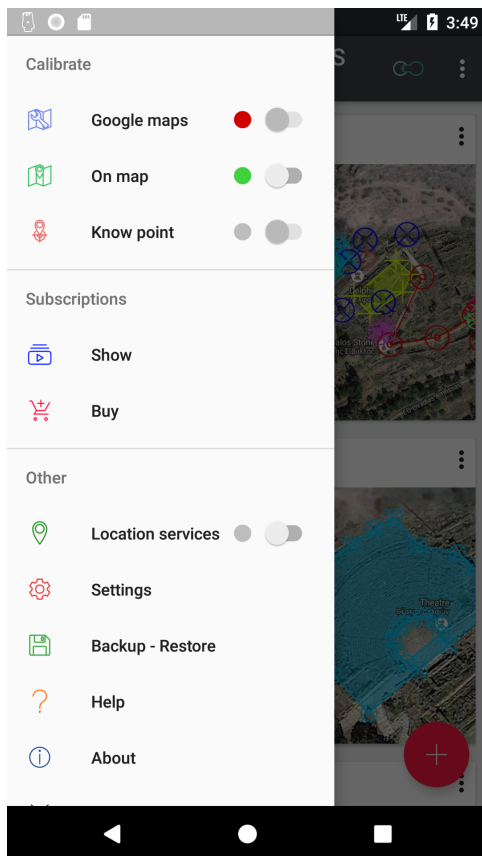
This menu is divided into four areas.

The main area, containing:

- Surveys
- 3D Terrain – Contours
- Routes

The **Tools** area, containing:

- Current Location
- Convert
- Drive me
- Satellites
- Augmented Reality



- Weather

The **Calibrate** area, containing:

- Google Maps
- On map
- Know point

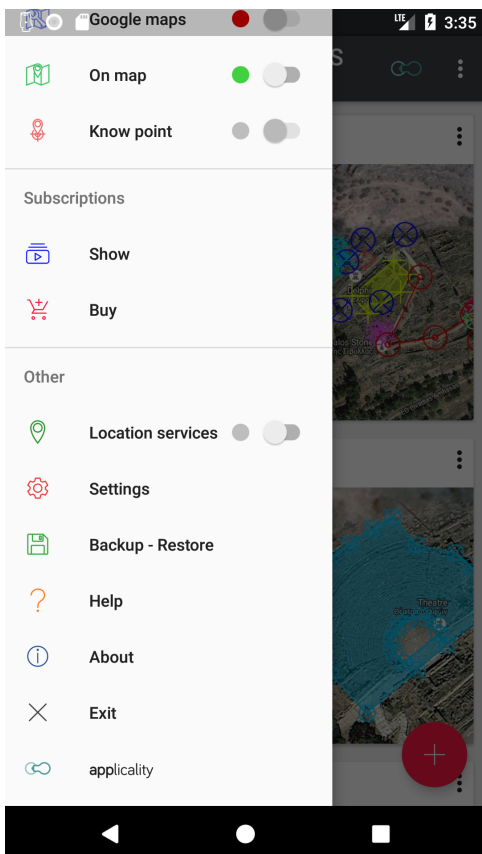
The **Subscriptions** area, containing:

- Show
- Buy

The **Other** area, containing:

- Location services
- Settings
- Backup – Restore
- Help
- About
- Exit

-  applicality



Just select an item of this menu and you will be forwarded to the corresponding screen.

To the right of the three calibrations you can find an indicator and a switch. The indicator show the quality of the calibration if any.

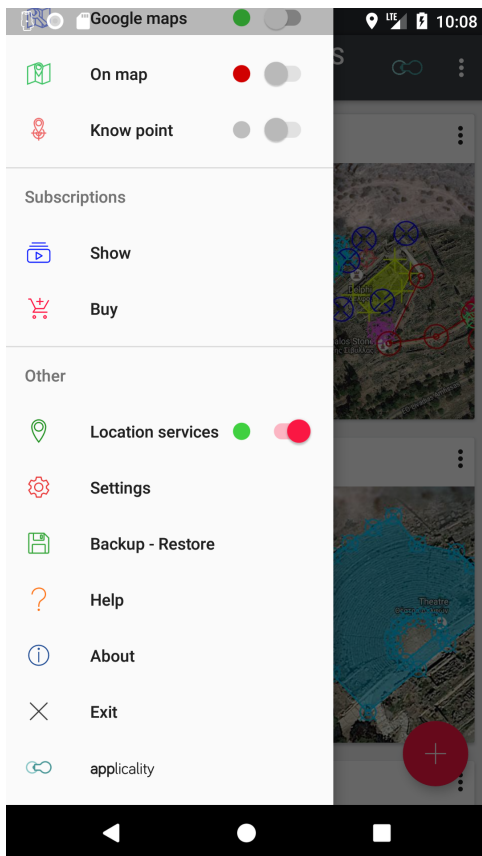
Grey indicator means that a calibration of this kind does not exist.

Green indicator means that the calibration of this type exists, is valid and of good quality.

Yellow indicator means that the calibration of this type exists, it is valid but it is not very good. Although it is not recommender, you can use such a calibration.

Red indicator means that the calibration of this type exists but it is not valid, so you cannot use it.

Use the switch to the right of each calibration to enable or disable the use of valid calibrations.



An indicator and a switch can also be found to the right of Location services.

Grey indicator means that location services are inactive.

Green indicator means that location services are active, and the provided location information are of good quality.

Yellow indicator means that location services are active and the provided location information are of poor quality,

Red indicator means that location services are active but there is no fix, so no location information are provided.

Location services are activated and deactivated automatically by the application whenever they are needed,

You can use the switch to activate and deactivate location services manually. This is useful when you want to keep location service active for a period of time before start collecting points. Having your receiver

activated for about ten minutes before start collecting reading, will increase accuracy under certain circumstances.

When you have manually activated location service, the app will not automatically deactivate them, even if they are not needed anymore. Don't forget to deactivate them when you don't need them anymore. Extensive use of high accuracy location services using the internal GNSS receiver will drain the battery of your device.

In the other hand, while the app needs location services to be active, you cannot use the switch to deactivate them.

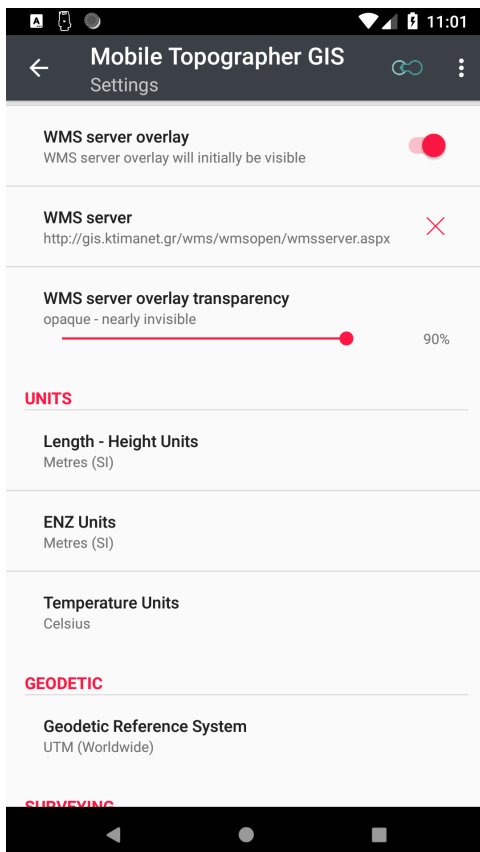
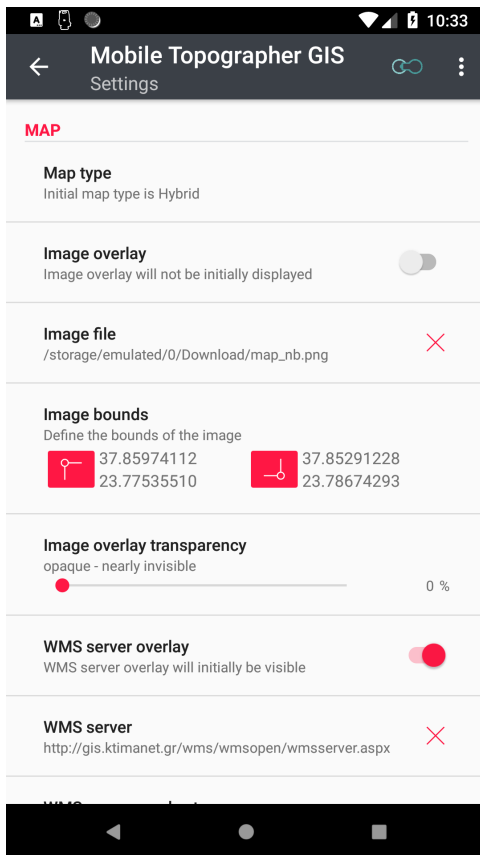
At this point, we must say that Mobile Topographer GIS is constantly running in the background even if you leave the app screen and start another application. This is because we don't want to interrupt a possible measuring process. So feel free to leave your device performing any work at the background and use any other application at the same time. Even a phone call won't interrupt the measuring process!

Even killing the app from task manager won't stop it. The only way to close the app is to use the Exit option.

An permanent notification icon at the upper left corner of your devices status bar indicates that Mobile Topographer GIS is running to the background. Use the action buttons of the notification in order to return to the app, or close it permanently.

In the unlikely event of an application crash you can always force quit via the application manager of the operating system.

Settings



You can access **Settings** screen from the navigation menu, or the main menu (the three dots located at the upper right part of the action bar).

There are four main categories of settings:

- **MAP:** providing setting regarding the map projection:

Map type: Select between Map – Satellite – Hybrid, Terrain or None. This will be the initial type of the map when you start a map projection. While in the “Survey map” you can later change the type of map.

Image overlay: Enable or disable image overlaying.

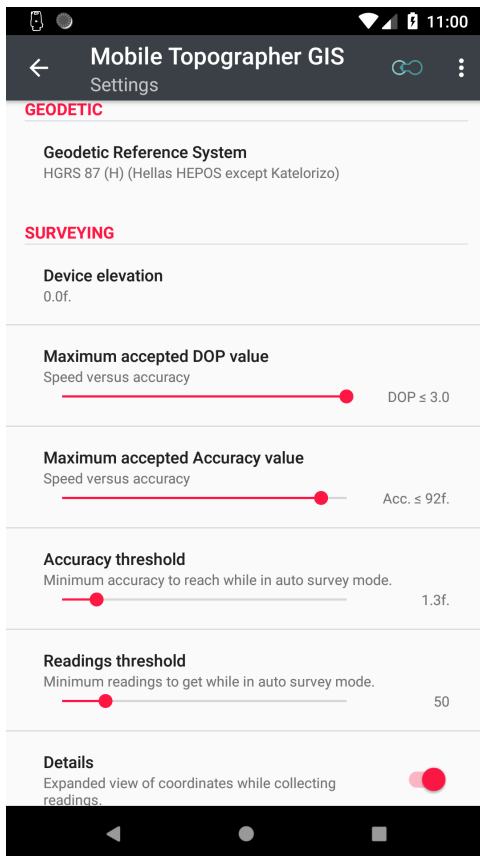
Image file: Select a picture file (*.jpg, .jpeg, .png or .bmp) in order to use it as a custom background. The image will be overlaid on the map.

Image bounds: Define the coordinates of the upper left bottom right corner of the image file you previously selected. These coordinates will be used to anchor the image on the map. This overlay can be used with any type of map projection.

Overlay transparency: Define the transparency of the overlaid image on the map projection.

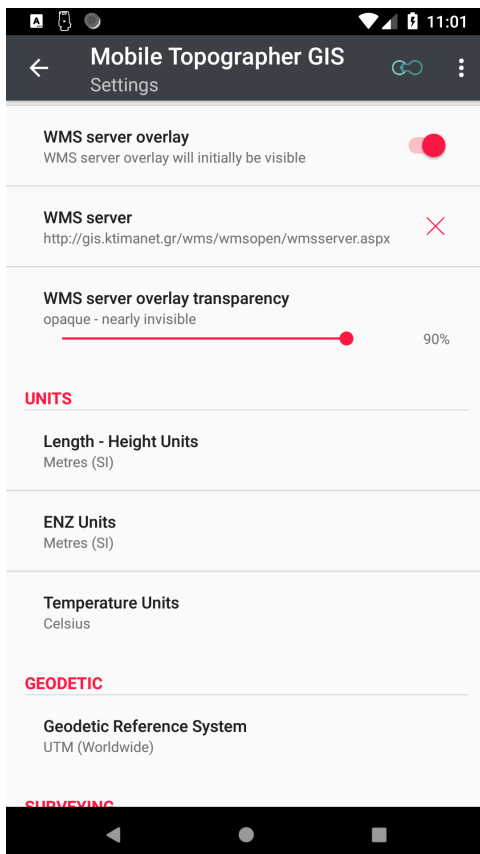
WMS server overlay: Enable or disable wms server overlaying.

WMS server: Define the URL of a WMS server to overlay on the a map.



Device Elevation: This value will be subtracted from altitude while collecting readings.

Maximum accepted DOP value: Readings with DOP values greater than this setting, will be ignored while collecting points. Lower values of this setting will increase



WMS server overlay transparency: Define the transparency of the overlaid WMS server on the map projection.

- **UNITS:** proving unit setting like:

Length – Height Units: Select between meters, feet and US surveying feet. This setting applies to all length and altitude and height values.

ENZ Units: Select between meters, feet and US surveying feet. This setting applies to E, N & Z values of all local coordinates reference systems.

Temperature Units: Switch between Celsius and Fahrenheit.

- **GEODETIC:** where you can select the Local Coordinates projected Geodetic Reference System to be used as default.

- **SURVEYING:** where you can set:

Maximum accepted Accuracy value: Readings with Accuracy values greater than this setting, will be ignored while collecting points. Lower values of this setting will increase accuracy, but too low values can cause readings collection with auto finish enabled to last forever.

Accuracy threshold: Specify the value that accuracy must meet while collecting readings with auto finish enabled, before process can finish. Lower values of this setting will increase accuracy, but too low values can cause readings collection with auto finish enabled to last forever.

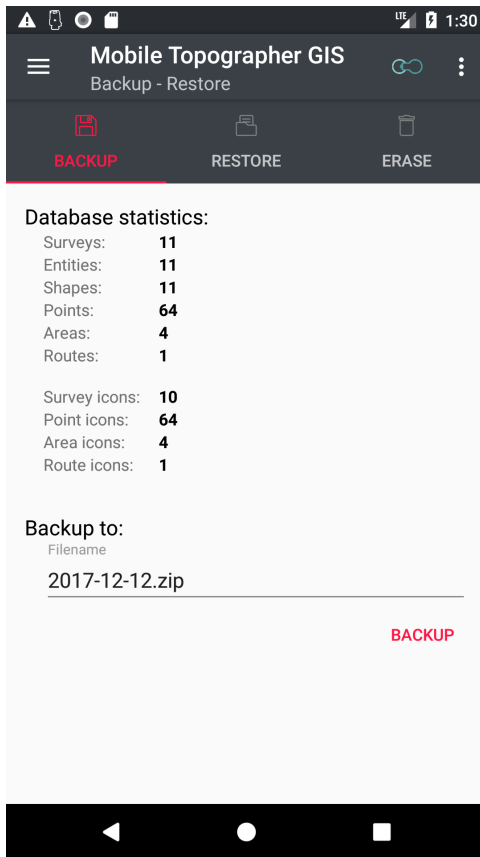
Readings threshold: Specify the least amount of readings that must be gathered while collecting readings with auto finish enabled, before

process can finish. Greater values of this setting will increase accuracy. but will make the process last longer.

Details: Deactivate this setting to condense “Current reading” and “Accurate reading” windows while you are collecting GNSS readings. This setting is useful for devices with small screens.

All of the above settings can be changed at any time. Changes are applied immediately.

Backup – Restore – Clear database



Your data are always extremely valuable, so Mobile Topographer GIS is offering a backup / restore mechanism in order to keep them safe.

From the navigation menu choose “**Backup**”.

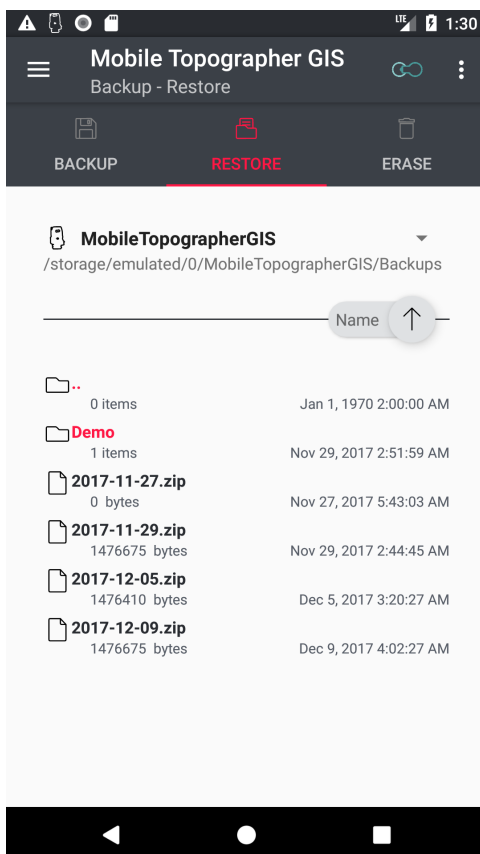
The “Backup – Restore” screen will be displayed.

This screen contains three tabs corresponding to the three main actions that can perform.

- The “**Backup**” tab shows some statistics regarding the contents of the database. Choose a filename and press the [BACKUP] button. Your data are now safe! Backup files are stored under:

[internal storage]/MobileTopographerGIS/Backups

This folder will survive even application uninstallation. In a case you want to move your data to a new device, just sent the backup file to it, and use the restore function.

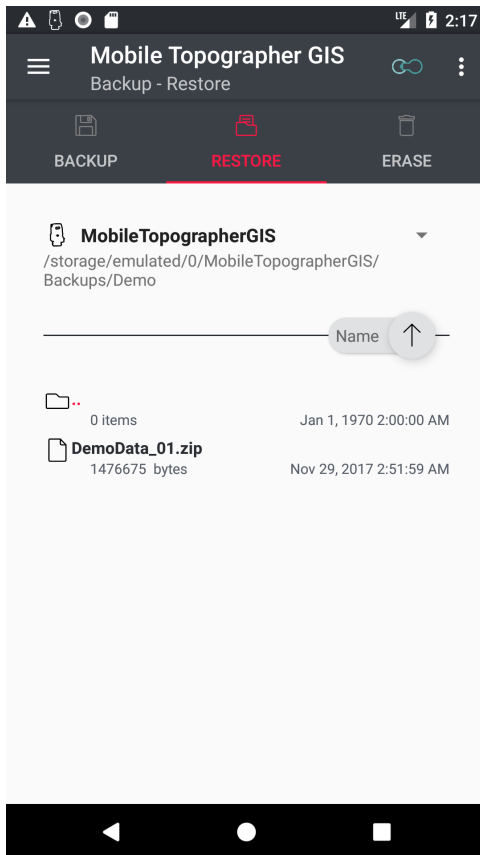


- The “**Restore**” tab reveals the file manager of the application. (See the “File manager” section for more info on how to use it). Use it to select a .zip backup file and touch or click [RESTORE] button.

If the database is not empty, a restore procedure will overwrite everything! All previous data will be lost forever. So proceed to restore with caution, providing confirmation to the dialog that will warn you.

- The “**Clear**” tab shows once more the database statistics. Proceed clearing the database with caution, providing confirmation to the dialog that will warn you.

Demo data



If this is the first time you are using Mobile Topographer GIS it may be helpful to have some demo data in order to test the functionality of the app.

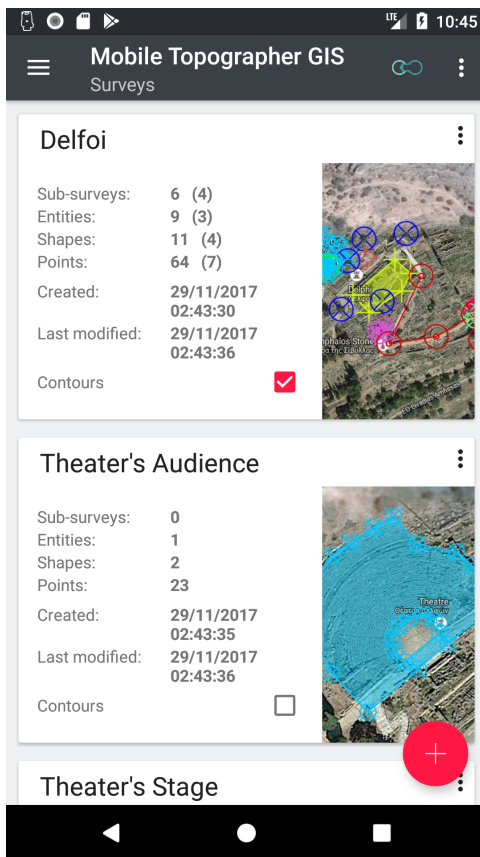
We have some ready for you!

- From the navigation menu select “**Backup – Restore**”.
- Select the “**Backup**” tab. If there are data stored into the database and you want to keep them, create a backup of them. After having finished testing the app with the demo data, you could restore back your data.
- Select the “**Restore**” tab.
- Inside the file manager you will find a folder called “*Demo*”. Touch it or click on it, in order to display its contents.
- Selecte the file named “*DemoData_XX.zip*”

Demo data are now ready for you!

Don’t hesitate to repeat this procedure, whenever you want to test something.

Surveys



From the navigation menu select **Surveys**. A list of all stored *surveys* will be displayed. This is also the default screen that will appear immediately after startup.

Each *survey* is represented by an individual card containing statistics of its contents. *Surveys* are ordered inside the list by modification time-stamp, where the last modified *survey* appears first.

Sub-surveys gives the number of *surveys* included into this one as children. The first value is the total number of *sub-surveys* while the value inside the parenthesis is the number of primary *sub-surveys*. For example “6 (4)” in the screen-shot means that *survey* “Delfoi” contains 6 *sub-surveys* of which 4 are primary *sub-surveys* (direct children) and 2 more are indirect children (direct children of one or more of the *sub-surveys*).

Entities gives the number of *entities* included into the *survey*. Again the first value is the total number of *entities*, while the value inside the parenthesis represents the number of primary *entities* of the *survey*. Primary *entities* are considered the ones that are direct children of the *survey*.

Shapes gives the number of *shapes* included into the *survey*. Again the first value is the total number of *shapes*, while the value inside the parenthesis represents the number of primary *shapes* of the *survey*. Primary *shapes* are the ones that are direct children of primary *entities* of the *survey*.

Points gives the number of *points* included into the *survey*. Again the first value is the total number of *points*, while the value inside the parenthesis represents the number of primary *points* of the *survey*. Primary *points* are the ones that are direct children of primary *shapes* of the *survey*.

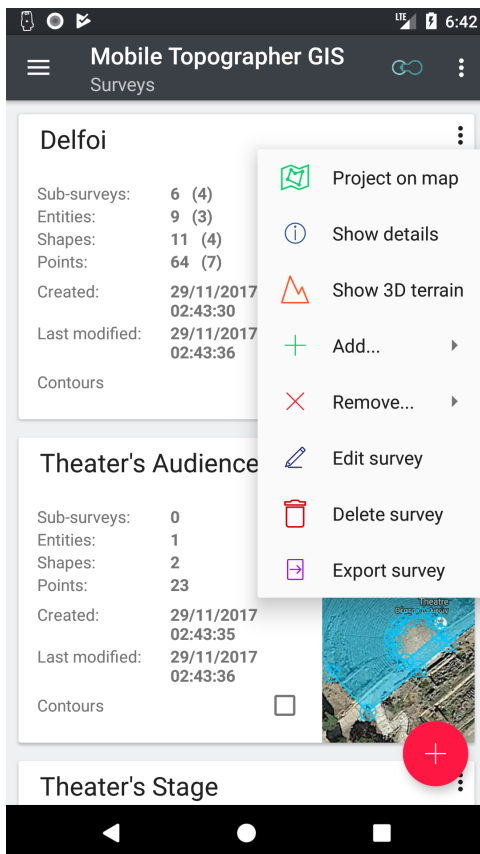
Created is the time-stamp of the creation of the *survey*.

Last modified is the time-stamp of the last modification of the *survey*.

Contours is checked if the *survey* contains one or more *3D terrains* with contours even directly or indirectly (from its *sub-surveys*).

Touching or clicking the card of a *survey* opens the “[Survey map](#)” screen where the *survey* is fully projected on a map. (see “[Survey map](#)” section for more details)

Long touching or long clicking the card of a *survey* opens the “[Survey details](#)” screen a detailed presentation of all of its contents. (see “[Survey details](#)” section for more details)

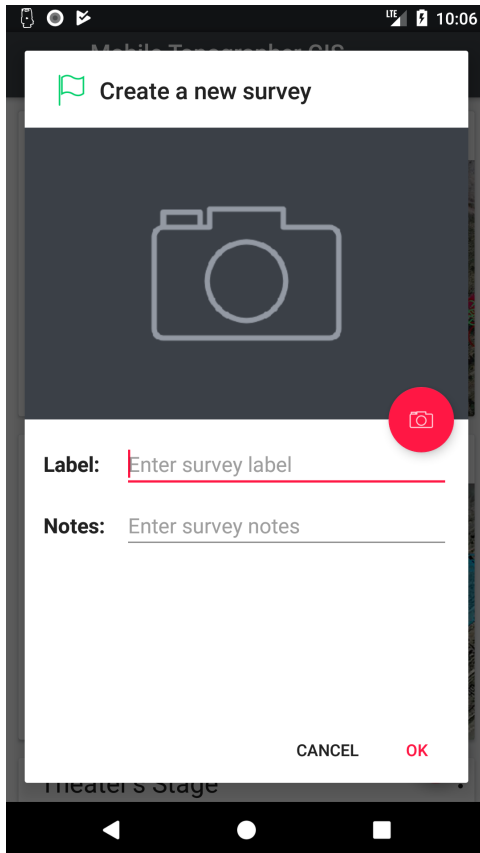


Each survey card actions menu. Touch or click the 3 dots to invoke this menu. From here, you can perform almost every possible action. Let's take a look:

- **Project on map** (the same as touching or clicking the card).
- **Show details** (the same as long touching or long clicking the card).
- **Show 3D terrain**, shows the 3D terrain(s) which have been linked with the survey.
- **Add** an existing or a new *sub-survey*, *entity*, *shape*, *point* or *area of contours* into the survey.
- **Remove** an existing *sub-survey*, *entity*, *shape*, *point* or *area of contours* from the survey.
- **Edit survey** properties (icon, label, notes).
- **Delete** the selected survey and all of its unique contents. (Contents that are also linked into another survey will not be deleted).
- **Export survey**. You can export all details of a survey into various files formats. You can choose between .txt, .csv, .gpx, .kml, .dxf or .shp (shape files) file formats. (*See exporting data for more details*).

In the following paragraphs we will see in details how to perform each action.

Create a survey



While in the list of surveys press the floating action button with the [+] at the lower right part of the screen in order to create a new survey.

The “*Create a new survey*” dialog appears.

Just enter a “Label” and optionally some “Notes” for the new survey.

The “Label” cannot left empty. Although it is not mandatory to be unique, it is highly recommended to avoid having two surveys with the same label.

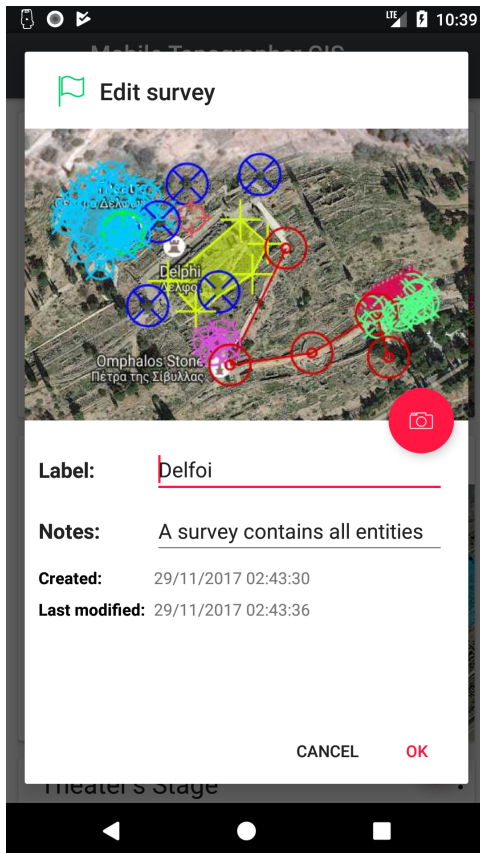
By pressing the floating action button with the camera you can add an icon to survey. There are four options:

- Take a screen-shot of a map view (available only when you invoke “create a new survey” from within a map view),
- Take a new photo,
- Choose a photo from the gallery, or
- “No photo”. This last option removes any previously defined icon.

After having finished with all of the above, press [OK]. The new survey will be created and will appear at the top of the list of surveys.

You can also create a new survey from the “Project on map”, or the “Survey details” screens.

Edit a survey



While in the list of surveys select “Edit survey” from the action menu of a survey card.

The “*Edit survey*” dialog appears.

You can now edit the “Label” or the “Notes” fields of the selected survey.

The “Label” cannot left empty. Although it is not mandatory to be unique, it is highly recommended to avoid having two *surveys* with the same label.

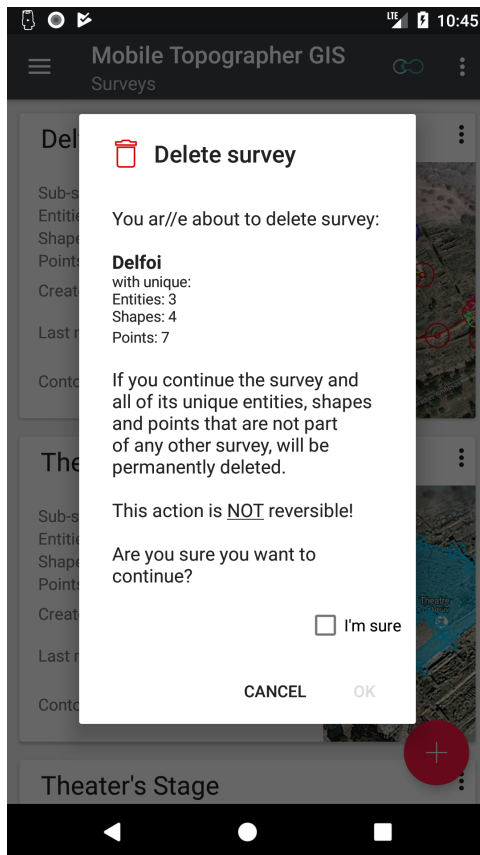
By pressing the floating action button with the camera you can also change the icon of the survey. There are four options:

- Take a screen-shot of a map view (available only when you invoke “edit survey” from within a map view),
- Take a new photo,
- Choose a photo from the gallery, or
- “No photo”. This last option removes any previously defined icon.

After having finished with all of the above, press [OK]. The selected survey will be updated and will appear at the top of the list of surveys.

You can also edit an existing survey from the “Project on map”, or the “Survey details” screens.

Delete a survey



Select “Delete survey” from the action menu of a survey card.

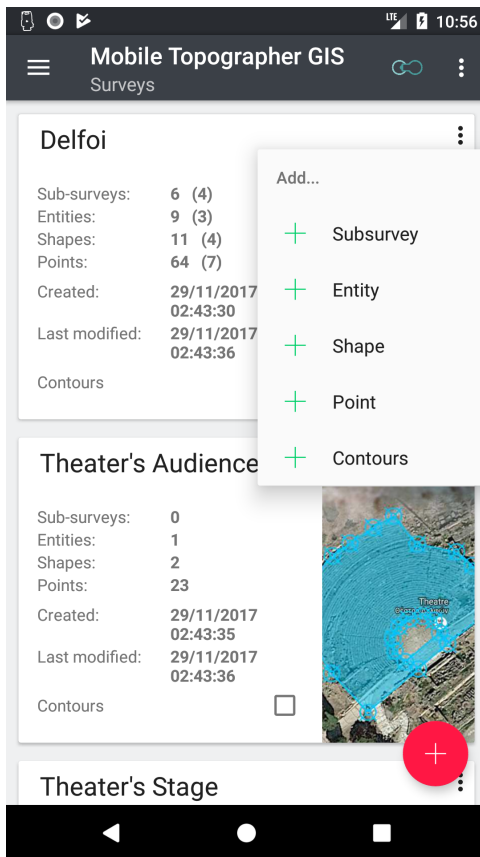
The “Delete survey” dialog will appear, showing some info for the selected survey and asking to confirm your will to delete it.

Proceed with caution to this action! If you go on deleting the survey ***all of its unique contents will be lost forever***. There is no way to undo this action!

If you are sure about it, just check the “*I’m sure*” check box and then press [OK].

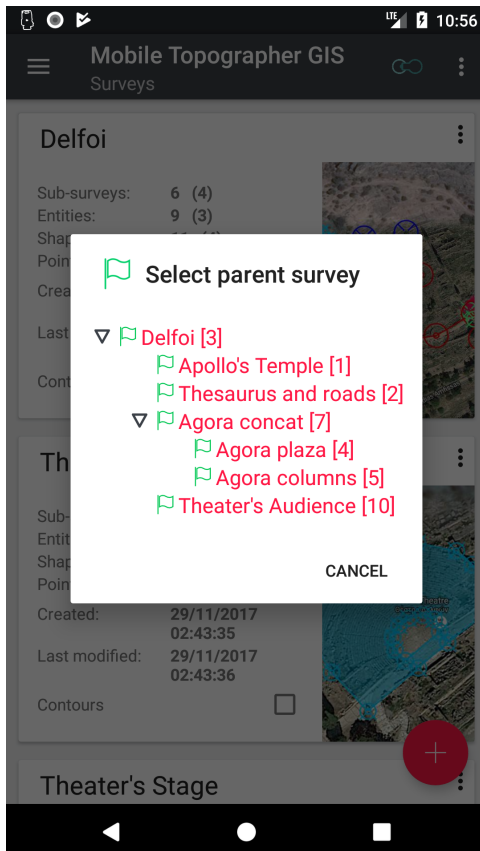
You can also invoke survey deletion from the “Project on map”, or the “Survey details” screens.

Add sub-survey



From the action menu of a survey card select:

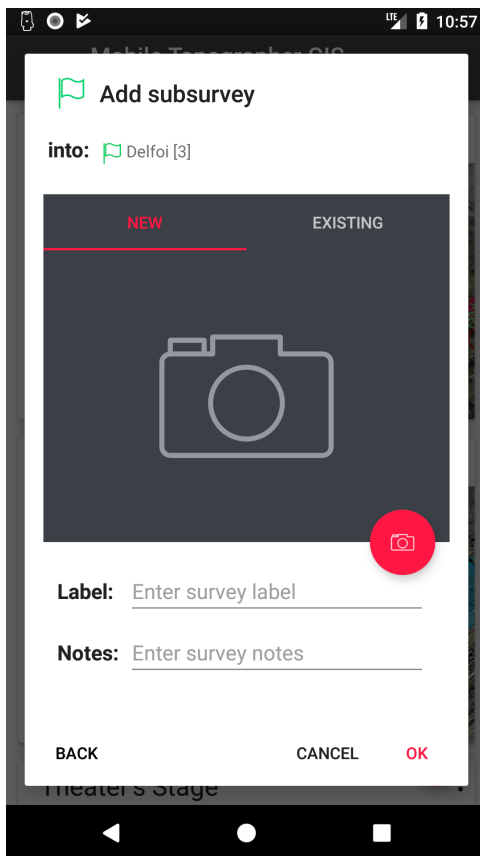
- “add → **Sub-survey**”



In the “**Select parent survey**” dialog select an existing survey from the displayed hierarchy tree. The selected survey will be the parent of the survey you are going to add as a sub-survey in the next step.

Hints:

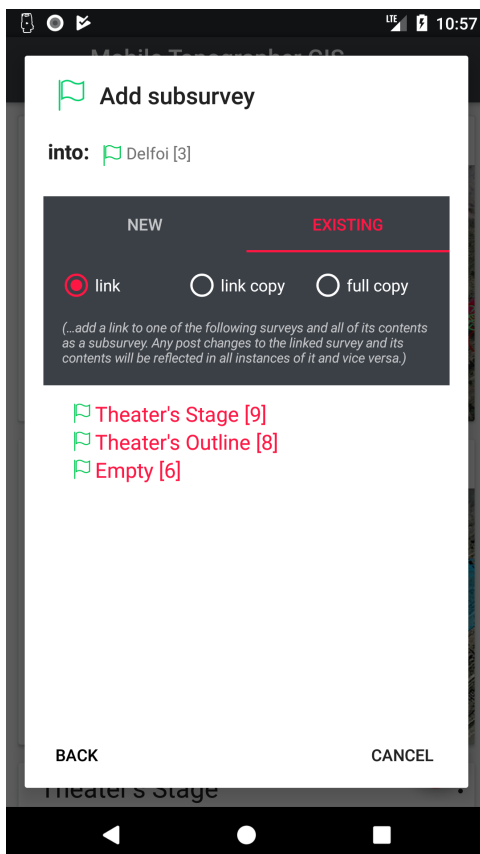
- Use the small black triangles at the left of some entries to expand or collapse the corresponding branch of the hierarchy tree.
- Long touch or click on any triangle of the view in order to expand or collapse all the branches of the hierarchy view.
- Only the entries of a hierarchy view that are presented into the accent color (red) are selectable.



The “**Add sub-survey**” dialog consists of the following entries:

- “**into:**” which displays the parent survey selected into the previous step. Just touch or click on it, or touch or click on the [BACK] button to return to the previous step and reselect the parent survey.
- “**NEW – EXISTING:**” switch between the two tabs if you want to add a new survey or an existing one as a sub-survey.

The “**NEW**” tab contains the familiar options “*Icon*”, “*Label*” and “*Notes*”. (See “add new survey” for more details on these options.



The “**EXISTING**” tab offers you the possibility to select an existing survey from the list and add it as a sub-survey of the parent survey.

The list contains only the valid candidate surveys to become a sub-survey.

The insertion type radio buttons “*link*”, “*link copy*” and “*full copy*” are letting you determine the type of insertion as explained above, into the ***unlimited nesting & linking*** section.

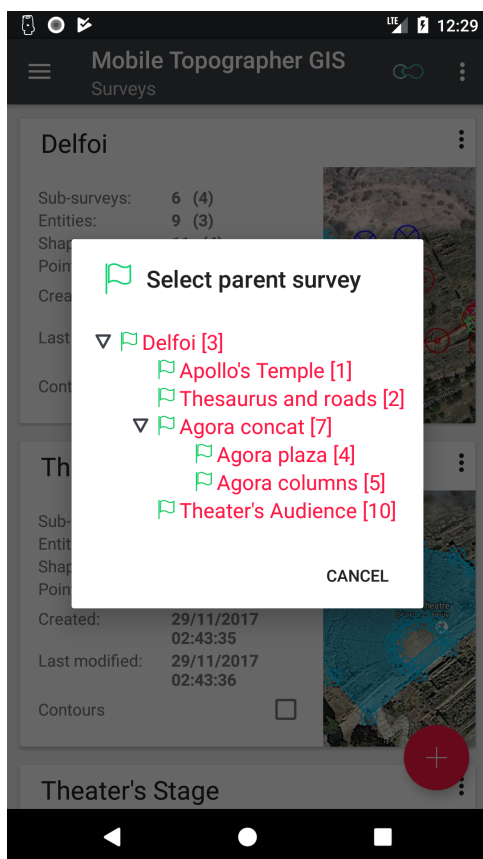
Changing the insertion type also changes the contents of the list of candidate sub-surveys.

Summarizing these three options we can say that “*link*” creates a link of the survey as a sub-survey. Any change to its properties or contents will be reflected in all of its instances. “*link copy*” creates a new copy of the selected survey and adds it as a sub-survey to the parent survey. The newly created copy will include links to the entities, sub-surveys and areas of the source survey. Any post changes to the contents of the source

survey (like adding or removing components) will NOT be reflected to this new copy and vice versa, but post changes to properties or components (entities, shapes, points) that are common to the new copy and the source surveys, will be reflected from one to the other. Finally the “*full copy*” option creates a new copy of the selected from the list survey and adds it as a sub-survey of the parent survey. The newly created copy will include copies of the sub-surveys, entities and contours areas of the source survey. Any post changes to the source survey will NOT be reflected to the new copy and vice versa.

You can also invoke sub-survey addition from the “Project on map”, or the “Survey details” screens.

Add Entity

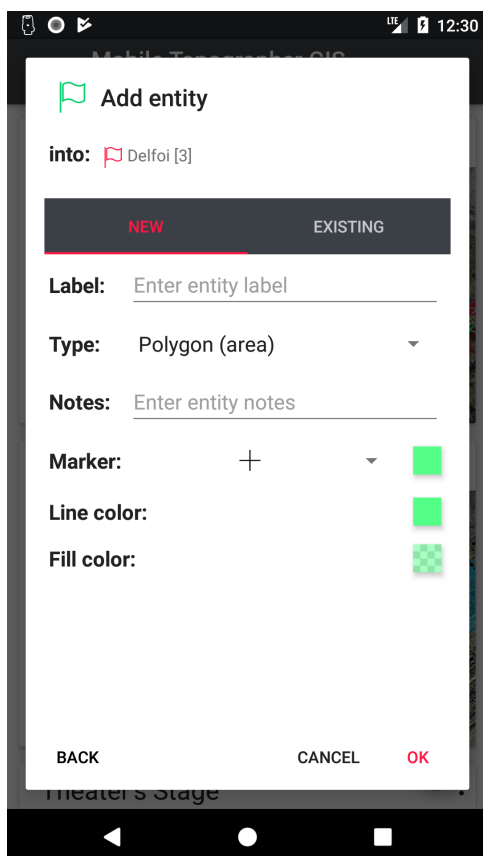


Use this option to add an entity into the survey or one of its sub-surveys.

From the action menu of a survey card select:

- “add → Entity”

In the “**Select parent survey**” dialog select an existing survey from the displayed hierarchy tree. The selected survey will be the parent of the entity you are going to add in the next step.



The “**Add entity**” dialog consists of the following entries:

- “**into:**” which displays the parent survey selected into the previous step. Just touch or click on it, or touch or click on the [BACK] button to return to the previous step and reselect the parent survey.
- “**NEW – EXISTING:**” switch between the two tabs if you want to add a new entity or an existing one.

The “**NEW**” tab contains the fields “*Label*”, entity “*type*”, “*Notes*”, “*Marker*” drawing and color, “*Line color*” and “*Fill color*”.

The entity “**type**” can be one of the “*Single points*”, “*Collections of points*”, “*Polyline*”, “*Polygon*”.

- A “**Single points**” entity can contain one or more individual points.
- A “**Collection of points**” entity can contain one or more groups of individual points.

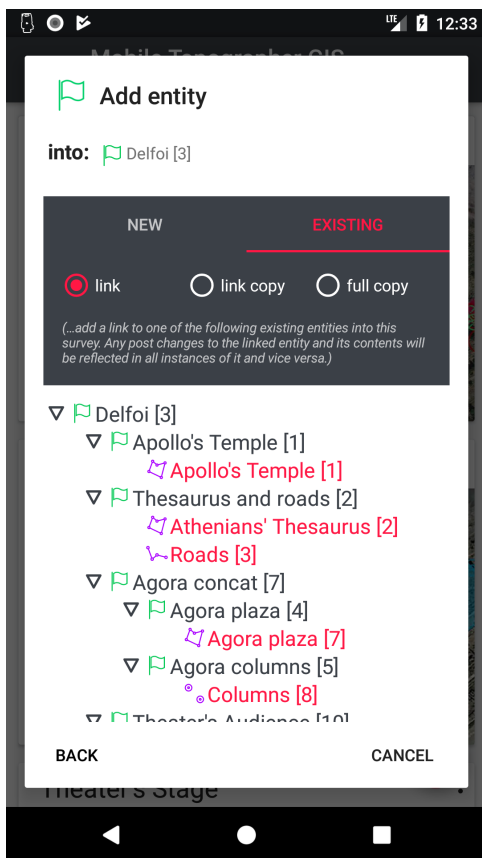
- A **“Polyline”** entity can contain one or more parts of the same polyline.
- A **“Polygon”** entity can contain one or more polygons with or without holes. All of them are defining an area.

(See “data organization” section for more details on types of entities).

From the **“Marker”** drop down list select one of the available marker drawings to be used while projecting this entity on the map. Touch or click the color sample to the right of the drop down list to select the color of the marker.

From the **“Line color”** select the color to be used while drawing this entity’s lines on the map. This option is only available for entities of type “Polyline” or “Polygon”. Touch or click the color sample to select a color. Long touch or click the sample color to copy the previously selected marker color.

From the **“Fill color”** select the color to fill a closed area while projecting it on the map. This option is only available for entities of type “Polygon”. The holes of each polygon are not filled. Touch or click the color sample to select a color. Long touch or click the sample color to copy the previously selected line color. The color will be copied with 50% transparency.



The **“EXISTING”** tab offers you the possibility to select an existing entity from the list and add it to the survey.

The list contains only the valid candidate entities to become members of the survey.

The insertion type radio buttons *“link”*, *“link copy”* and *“full copy”* are letting you determine the type of insertion as explained above, into the ***unlimited nesting & linking*** section.

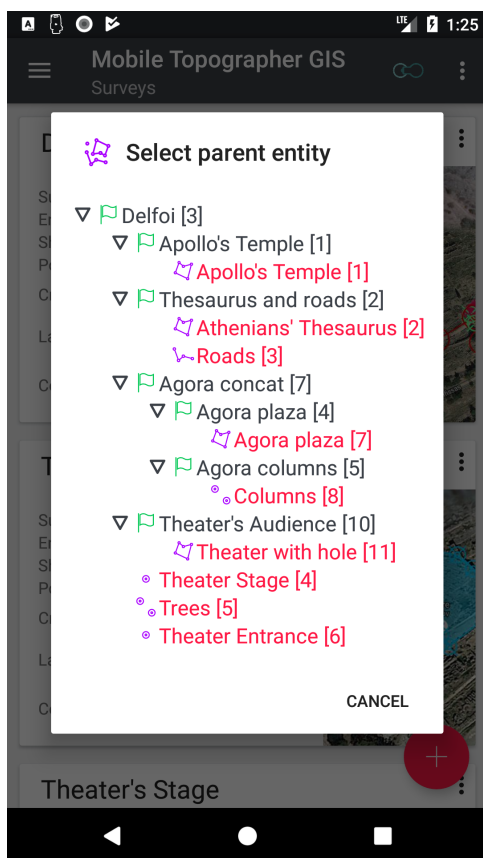
Changing the insertion type also changes the contents of the list of candidate entities.

Summarizing these three options, we can say that *“link”* creates a link of the entity into the survey. Any change to its properties or contents will be reflected in all of its instances. *“link copy”* creates a new copy of the selected entity and adds it as a member of the survey. The newly created copy will include links to the shapes of the source entity. Any post changes to the properties or the contents of the source entity (like adding or removing shapes) will NOT be reflected to this new copy and vice versa, but post changes to components (shapes, points) that are common to the

new copy and the source entity, will be reflected from one to the other. The *“full copy”* option creates a new copy of the selected from the list entity and adds it as a member of the parent survey. The newly created copy will include copies of the shapes of the source entity. Any post changes to the source entity will NOT be reflected to the new copy and vice versa.

You can also invoke entity addition from the “Project on map”, or the “Survey details” screens.

Add Shape

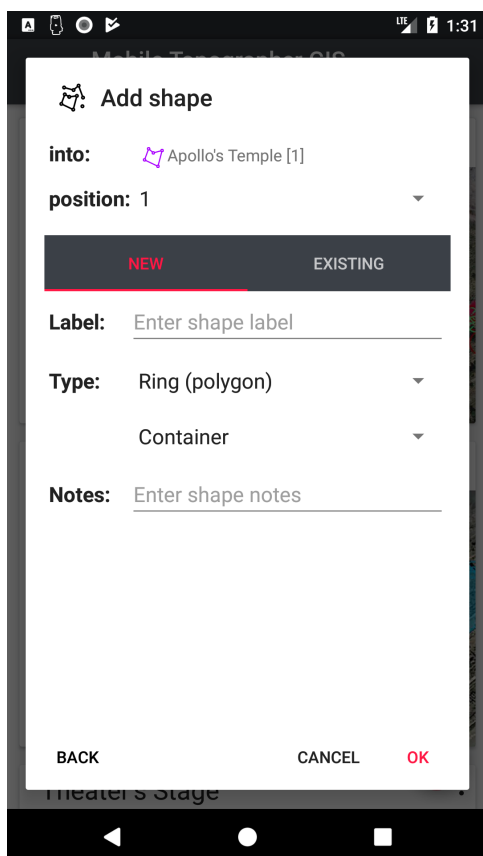


Use this option to add a shape into an entity.

From the action menu of a survey card select:

- “add → Shape”

In the “**Select parent entity**” dialog select an existing entity from the displayed hierarchy tree. The selected entity will be the parent of the shape you are going to add in the next step.



The “**Add shape**” dialog consists of the following entries:

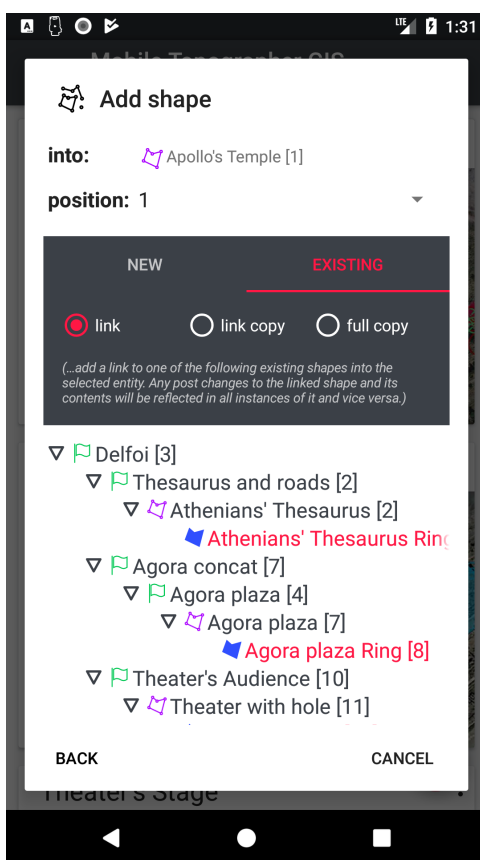
- “**into:**” which displays the parent entity selected into the previous step. Just touch or click on it, or touch or click on the [BACK] button to return to the previous step and reselect the parent entity.
- “**position**” which displays the position of the shape inside the entity. The first shape of the entity is into position “0”. The default value will always be to add the new shape at the end of the entity. You can change the position of the new shape by touching or clicking on the “position” value. *(See “selecting the position” at the end of this section for more details).*
- “**NEW – EXISTING:**” switch between the two tabs if you want to add a new shape or an existing one.

The “**NEW**” tab contains the fields “*Label*”, shape “*type*” and “*Notes*”.

The shape “**type**” can be one of the “*Single point*”, “*Multiple points*”, “*Polyline*”, “*Ring (Polygon)*”.

- A “**Single point**” shape can contain one and only one individual point.
- A “**Multiple points**” shape can contain one or more individual points.
- A “**Polyline**” shape can contain the points that are defining this part of the polyline.
- A “**Ring (Polygon)**” shape can be either a “**Container**” or “**Hole**”. The first ring of a Polygon must always be a container. Each container is followed by its holes if there are any.

(See “*data organization*” section for more details on types of shapes).



The “**EXISTING**” tab offers you the possibility to select an existing shape from the list and add it to the entity.

The list contains only the valid candidate shapes to become members of the entity.

The insertion type radio buttons “*link*”, “*link copy*” and “*full copy*” are letting you determine the type of insertion as explained above, into the ***unlimited nesting & linking*** section.

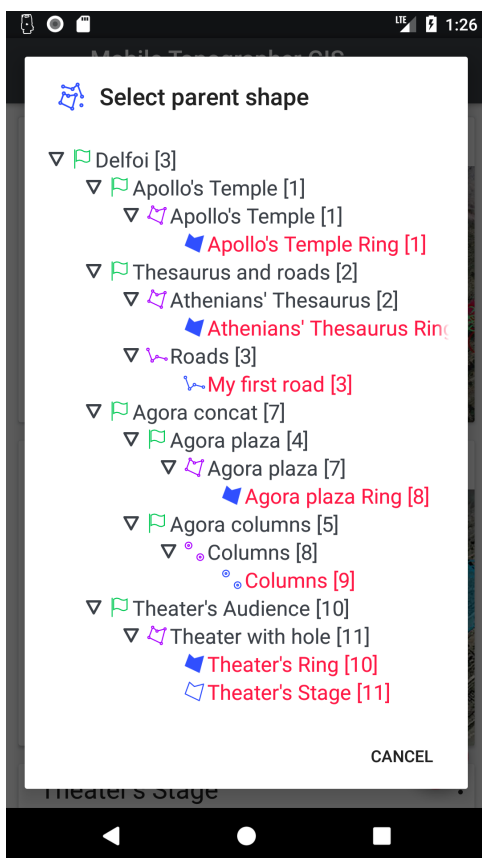
Changing the insertion type also changes the contents of the list of candidate shapes.

Summarizing these three options we can say that “*link*” creates a link of the shape into the entity. Any change to its properties or contents will be reflected in all of its instances. “*link copy*” creates a new copy of the selected shape and adds it as a member of the entity. The newly created copy will include links to the points of the source entity. Any post changes to the properties or the contents of the source shape (like adding or removing points) will NOT be reflected to this new copy and vice versa, but post changes to components (points) that are common to the new copy

and the source shape, will be reflected from one to the other. Finally the “*full copy*” option creates a new copy of the selected from the list shape and adds it as a member of the parent entity. The newly created copy will include copies of the points of the source shape. Any post changes to the source shape will NOT be reflected to the new copy and vice versa.

You can also invoke shape addition from the “Project on map”, or the “Survey details” screens.

Add Point

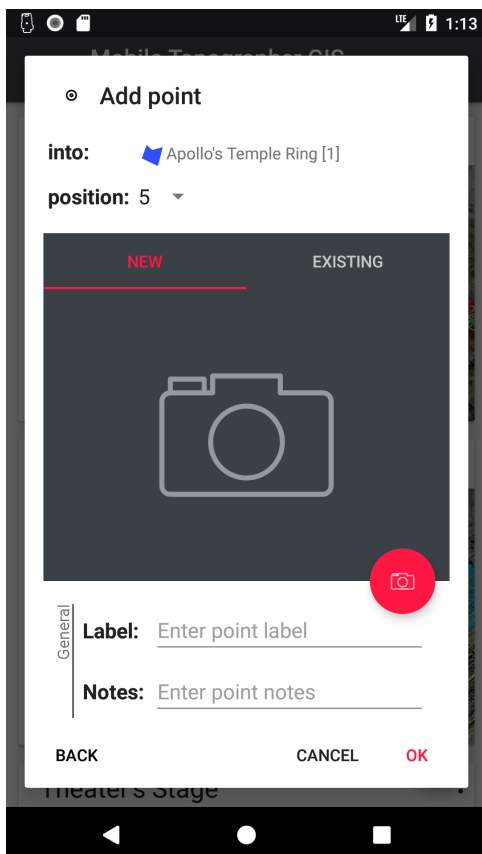


Use this option to add a point into a shape.

From the action menu of a survey card select:

- “add → **Point**”

In the “**Select parent shape**” dialog select an existing shape from the displayed hierarchy tree. The selected shape will be the parent of the point you are going to add in the next step.



The “**Add point**” dialog consists of the following entries:

- “**into:**” which displays the parent shape selected into the previous step. Just touch or click on it, or touch or click on the [BACK] button to return to the previous step and reselect the parent shape.
- “**position**” which displays the position of the point inside the entity. The first point of the shape is into position “0”. The default value will always be to add the new point at the end of the shape. You can change the position of the new point by touching or clicking on the “position” value. (*See “selecting the position” at the end of this section for more details*).
- “**NEW – EXISTING:**” switch between the two tabs if you want to add a new point or an existing one.

Add point

into: Apollo's Temple Ring [1]

position: 5 ▾

NEW **EXISTING**

Latitude: °

Longitude: °

Altitude: m. above ellipsoid

Height: m. above M.S.L.

Accuracy

Accuracy: -

HDOP: -

VDOP: -

Read: 0/0

BACK CANCEL OK

The “**NEW**” tab apart from the “Icon” which can be changed by the floating action button with the “camera” contains three groups of fields:

The General group which contains the fields: “*Label*”, “*Notes*”.

The Coordinates group which contains the “Projection switcher” button (the globe) and the fields: “Latitude”, “Longitude”, “Altitude” and “Height” when in WGS84 projection or the fields: “E”, “N”, “Z” and “Height” when in local CRS projection.

Touch or click the “Projection Switcher” button to change projection from WGS84 to local CRS. Displayed fields will also change. Already inputed values will be automatically converted into the new projection.

As “Altitude” or “Z” values are directly connected to Height values, changing one of them will automatically correct the other.

The Accuracy group contains the fields “Accuracy”, “HDOP”, “VDOP” and “Readings” (horizontal/vertical) which are not editable and are only displayed for completion reasons.

Add point

into: Apollo's Temple Ring [1]

position: 5 ▾

NEW **EXISTING**

☒ link ☐ full copy

(...add a link to one of the following existing points into the selected shape. Any post changes to the linked point and its contents will be reflected in all instances of it and vice versa.)

▽ Delfoi [3]

 ▽ Thesaurus and roads [2]

 ▽ Athenians' Thesaurus [2]

 ▽ Athenians' Thesaurus Ring [1]

 ⊕ AT Point 1 [6]

 ⊕ AT Point 2 [8]

 ⊕ AT Point 3 [10]

 ⊕ AT Point 4 [12]

 ▽ Roads [3]

 ▽ My first road [3]

BACK CANCEL

The “**EXISTING**” tab offers you the possibility to select an existing point from the list and add it to the shape.

The list contains only the valid candidate points to become members of the entity.

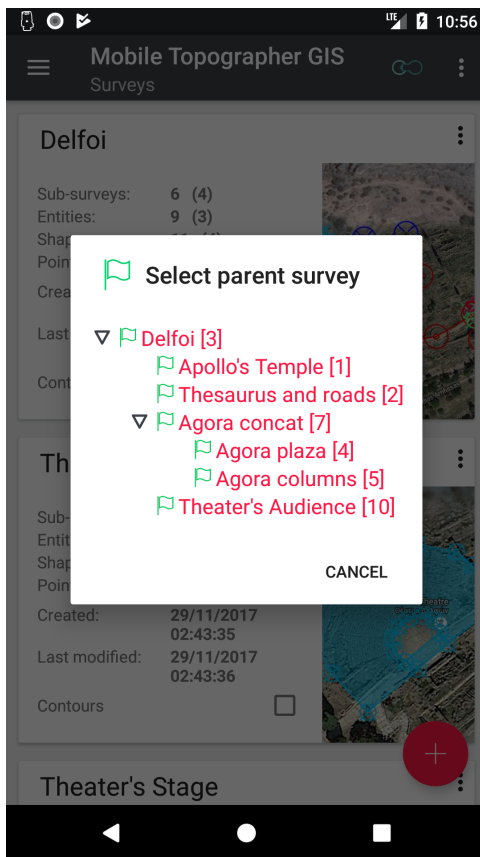
The insertion type radio buttons “*link*” and “*full copy*” are letting you determine the type of insertion as explained above, into the ***unlimited nesting & linking*** section.

Changing the insertion type also changes the contents of the list of candidate points.

Summarizing these two options we can say that “*link*” creates a link of the point into the entity. Any change to its properties will be reflected in all of its instances. On the other hand “*full copy*” option creates a new copy of the selected from the list point and adds it as a member of the parent shape. Any post changes to the source point shape will NOT be reflected to the new copy and vice versa.

You can also invoke point addition from the “Project on map”, or the “Survey details” screens.

Add contours (areas)

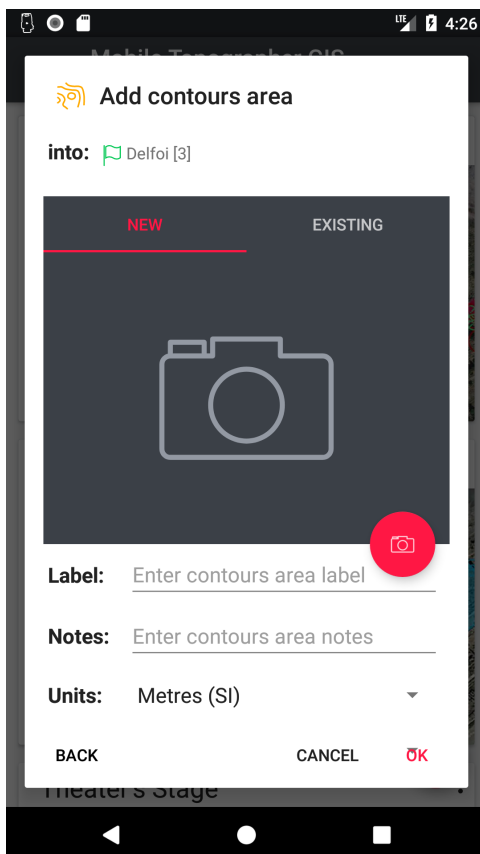


Use this option to add an area of contours into a survey.

From the action menu of a survey card select:

- “add → **Contours**”

In the “**Select parent survey**” dialog select an existing survey from the displayed hierarchy tree. The selected survey will be the parent of the area of contours you are going to add in the next step.



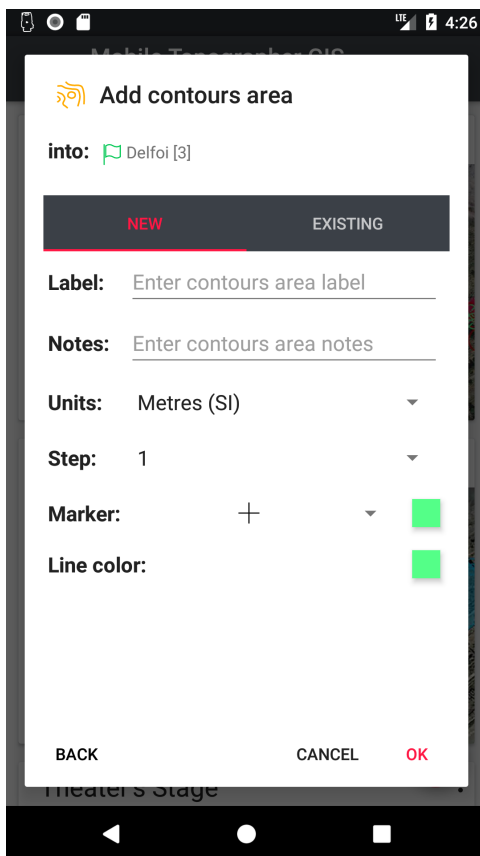
The “**Add contours area**” dialog consists of the following entries:

- “**into:**” which displays the parent survey selected into the previous step. Just touch or click on it, or touch or click on the [BACK] button to return to the previous step and reselect the parent survey.
- “**NEW – EXISTING:**” switch between the two tabs if you want to add a new contours area or an existing one.

The “**NEW**” tab apart from the “Icon” which can be changed by the floating action button with the “camera” contains the fields “*Label*”, “*Notes*”, “*Units*”, “*Step*”, “*Marker*” drawing and color and “*Line color*”.

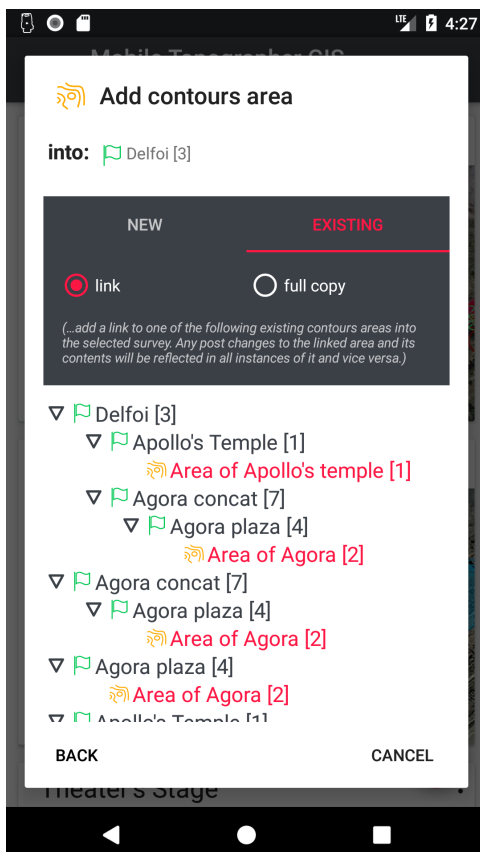
The “**Label**” field cannot left empty. Although it is not mandatory for the label to be unique it is highly recommended not to repeat existing labels.

From the “**Marker**” drop down list select one of the available marker drawings to be used while projecting



the readings that used to calculate the contours on the map. Touch or click the color sample to the right of the drop down list to select the color of the marker.

From the “**Line color**” select the color to be used while drawing the contours on the map. Touch or click the color sample to select a color. Long touch or click the sample color to copy the color that you have previously selected for the marker.



The “**EXISTING**” tab offers you the possibility to select an existing countours are from the list and add it to the survey.

The list contains only the valid candidate areas to become members of the entity.

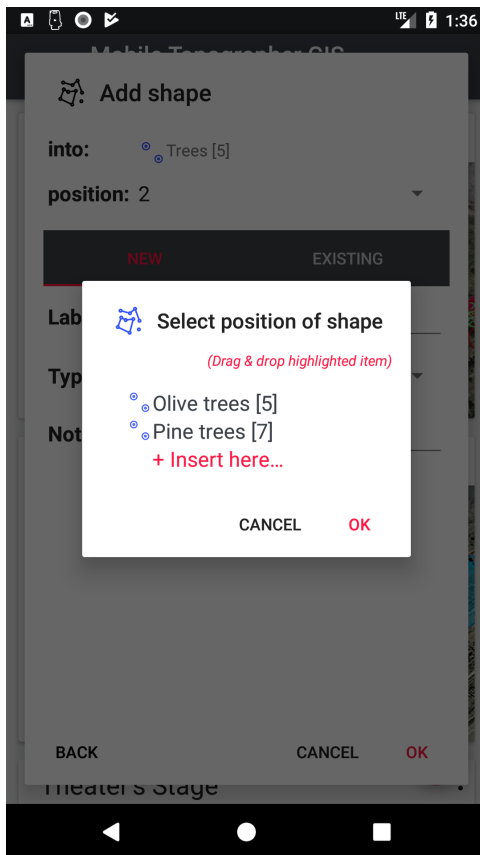
The insertion type radio buttons “*link*” and “*full copy*” are letting you determine the type of insertion as explained above, into the ***unlimited nesting & linking*** section.

Changing the insertion type also changes the contents of the list of candidate contours areas.

Summarizing these two options we can say that “*link*” creates a link of the contours area into the survey. Any change to its properties and contents will be reflected in all of its instances. On the other hand “*full copy*” option creates a new copy of the selected from the list contours area and adds it as a member of the parent survey. Any post changes to the source area will NOT be reflected to the new copy and vice versa.

You can also invoke contours area addition from the “Project on map”, or the “Survey details” screens.

Selecting the position

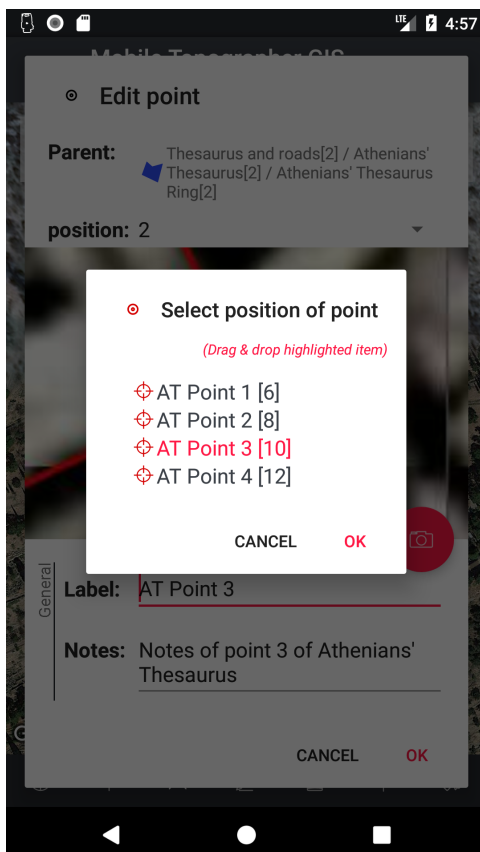


Whenever you are going to insert a new item into a group and you need to define the position in the group (for example inserting a point into a shape), or editing an item that has a “position into parent” property, you will be presented the “*Select position..*” dialog.

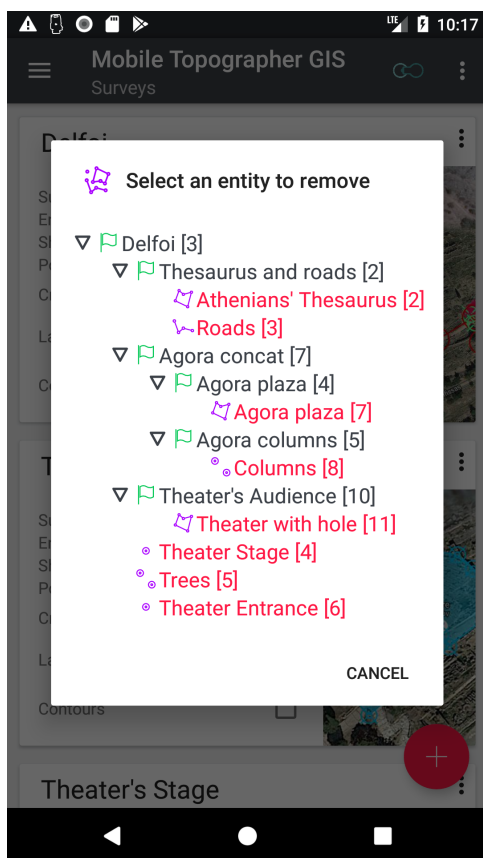
The selected item or the “+ Insert here” tag will be displayed into the accent color (red).

In order to change the position of the selected item just drag it and drop it into its new position.

Touch or click the [OK] button to accept changes and go on.



Remove Sub-survey – Entity – Shape – Point – Contours area



Use this option to remove an object (sub-survey, Entity, Shape, Point or Contours area) from a survey.

From the action menu of a survey card select:

- “**Remove** → ...**(object)**”

In the “**Select parent ...**” dialog select an existing object from the displayed hierarchy tree. Only objects of the kind you selected are selectable (red). Touch or click the object you want to remove.

If the object is a sub-survey or a contours area it will be removed immediately from the selected parent, but it will remain as an individual object (survey or contours area) in the corresponding lists.

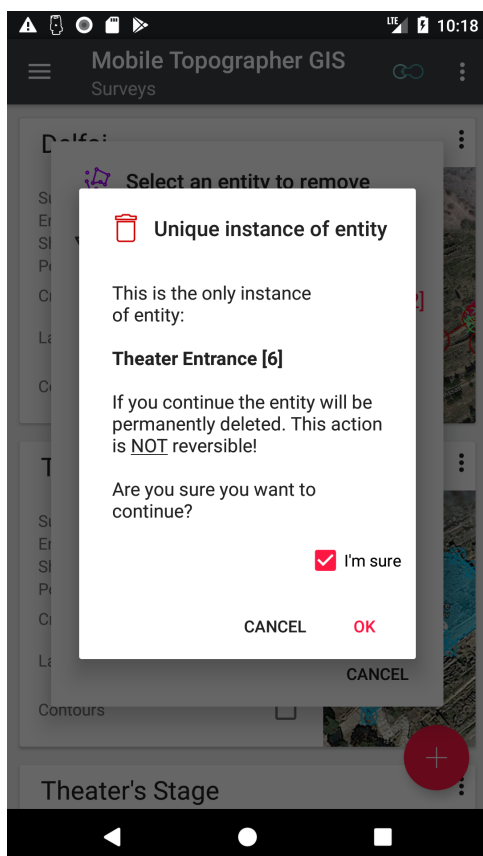
For entities, shapes and points:

If this is NOT the only instance of the object, the selected instance will be removed immediately. All other instances will remain untouched.

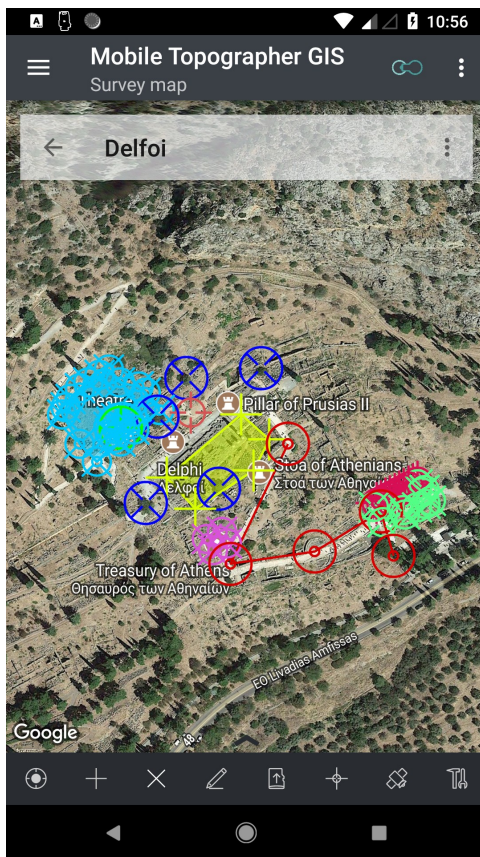
If this is the only instance of the object removing it from its parent will cause the permanent deletion of the object too, since there cannot exist orphaned entities, shapes or points.

In such a case, a confirmation dialog will inform you that this is the unique instance of the object so removing it from its parent will also cause the deletion of it. Since this action is irreversible, a confirmation is needed.

Check the “I’m sure” box in order to proceed removing and deleting the object.



Project on map



Project on map is the most important function of the application. From here you can perform almost any possible action.

Touch or click on a survey card from the list of surveys to invoke it, or select **“Project on map”** from the action menu of the survey card.

The whole survey will be projected on Google maps.

The map will automatically zoom to display the extends of the survey.

Let's take a look at this screen. The upper part of the screen is covered by a semitransparent action bar. This is the action bar of the projection.

At the left part of the action bar stands the “Back” arrow. Touch or click it at any time in order to leave this screen and return to the list of surveys.

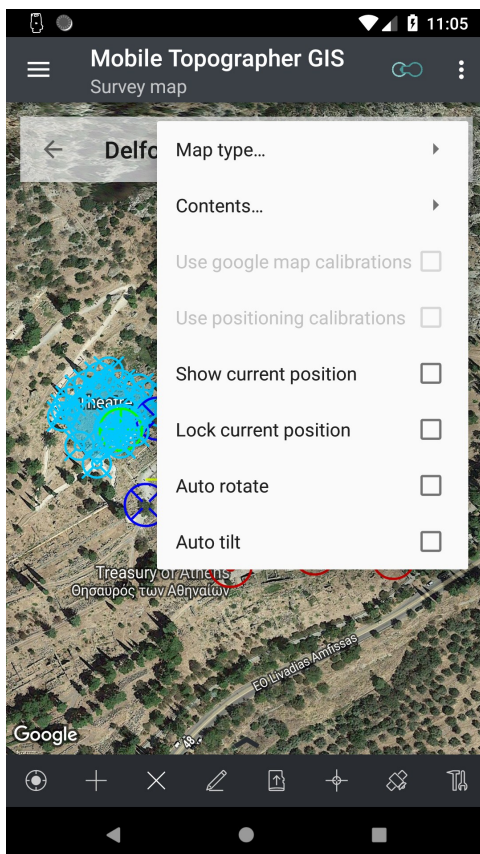
To the right of the “back” arrow, covering the center part of the action bar, the survey label is displayed.

Further to the right, a satellite icon and an indicator, is displayed when location services via the internal GNSS receiver are active. The color of the indicator informs us about the quality of the fix. “Red” color, indicates that the GNSS receiver has not obtained a fix yet. “Yellow” color indicates that there is a fix, but is not good. “Green” color indicated that the internal GNSS receiver has obtained a fix of good quality.

At the right end of the action bar, the action menu of the projection is available by touching or clicking the three dots.

The options are:

- **Map type:** Use this option to select between Map – Satellite – Hybrid – Terrain or None. This will be the type of the map. From here you can also temporarily enable or disable image and /or WMS server overlays.
- **Contents:** Use this option to enable or disable projection of contents categories. *(Later in this document you will find more info regarding which types of contents you can switch on and off).*



- **Use google map calibrations:** Enable or disable the use of google map calibrations while in this screen.
- **Use positioning calibrations:** Enable or disable the use of google map calibrations while collecting readings.

Calibration options will only be available if the corresponding type of calibration exists and is valid. (See “*Calibrations*” section for more info)

- **Show current position:** If selected the GNSS receiver is activated and the current position of your device is displayed on the map.
- **Lock current position:** Locks the projection so as to display you current position at the center of the screen. (Needs “*Show current position*” to be active).
- **Auto rotate:** The projection is rotated in real time to match the orientation of your device. (Needs “*Lock current position*” to be active).
- **Auto tilt:** The projection is 3D rotated in real time to match the inclination of your device. (Needs “*Auto rotate*” to be active).

The center part of the screen contains the survey projection. Use the well known gestures to *zoom*, *pan* or *tilt* the map.

Don’t hesitate to touch or click on anything displayed on the map. A useful info window will pop up providing information about this item. Also remember, that whenever an info window of an item is visible, the item is considered “selected”. All points, lines of polygons, areas of polygons, point labels, distance labels, contour reference points and contour lines are clickable, and so selectable. Points are also draggable. Later on this chapter we will examine in details the info windows of each type of selectable item. Touching or clicking a new clickable item, close the previous info window and reveals the info window of the newly selected item. Touching or clicking the map at any point with no items, closes open info windows and deselects the previously selected item.

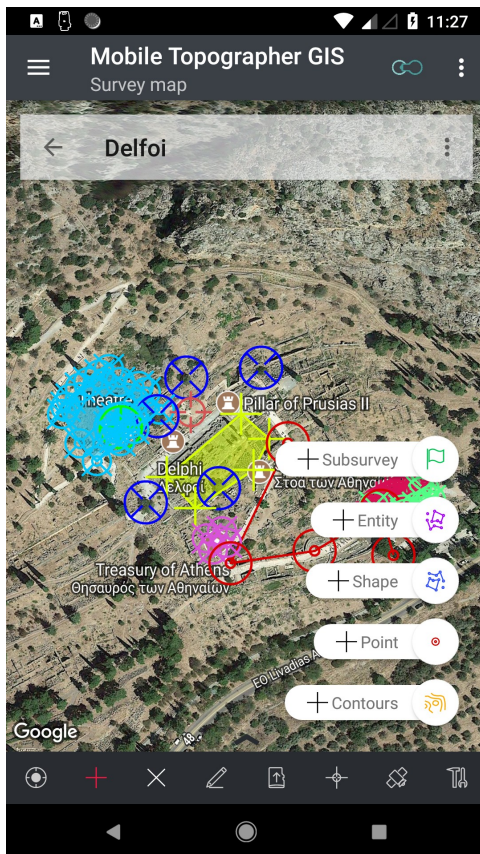
In the lower part of the screen you can find the bottom toolbar. The buttons of the toolbar are changing depending on the selected item. Long touch or long click each button to see a brief description of the functionality of each button.

The default bottom toolbar (when nothing is selected) contains the following buttons:



- **“Zoom extends”** Zooms the map projection to fit all contents.
- **“Add...”** invokes a sub-menu to select between adding a new *sub-survey*, *entity*, *shape*, *point* or *contours area*.
- **“Remove”** invokes a sub-menu to select between removing a sub-survey, entity, shape, point or contours area from the current survey.
- **“Edit”** invokes a sub-menu to select between editing the properties of a *sub-survey*, *entity*, *shape*, *point* or *contours area*.

- **“Import”** invokes a sub-menu to select between importing *Individual points*, *Collection of points*, *Polylines* or *Polygons*. (see *“Importing data”* for more details).
- **“Add point on map”** lets you define a new point by directly position it on the map. (see *“Add point on map for more details”*).
- **“Add GNSS point”** lets you collect data using the GNSS receiver. (see *“Add GNSS point”* for more details).
- **“Geodesy Tools”** lets you add new points indirectly by using various geodesy and geometry tools like, define a point from two or three points, divide or extend a line, find a parallel or perpendicular line etc.
- **“Undo”** revokes step by step all the changes made to the survey by dragging points.



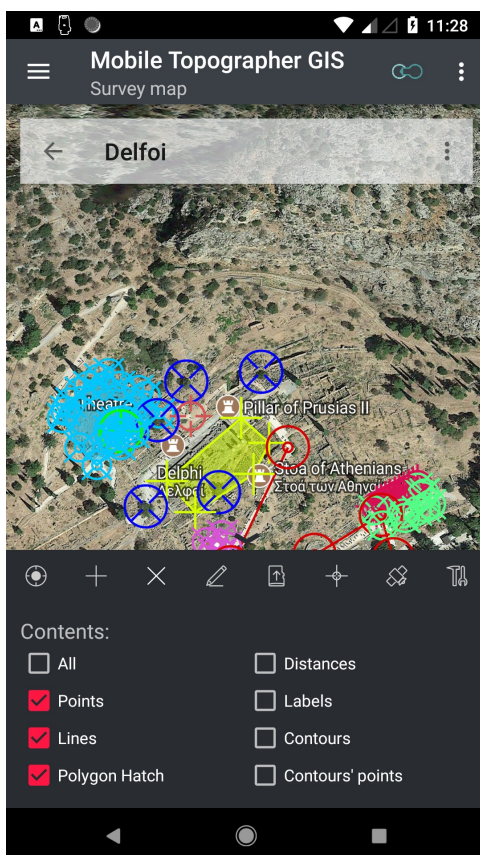
When the “Add”, “Remove”, or “Edit” buttons are pressed a group of floating action buttons is displayed. For example when you press the add button the group of “Add” buttons is revealed. Select the object you want to add by pressing the corresponding button. Touch or click anywhere outside the group of buttons to hide it without selecting anything.

Before selecting anything or closing the group take a look at the bottom toolbar. You can see that the selected button is displayed in the accent color (red) indicating that this is the selected button.

You can directly touch or click another button from the bottom toolbar to cancel the addition, and perform the action of the newly pressed button.

By touching or clicking on a selected (accented in red) button, the button is deselected and action of it is canceled.

Dragging the toolbar upwards, reveals a bottomsheet, containing a group of settings regarding the contents of the projection.

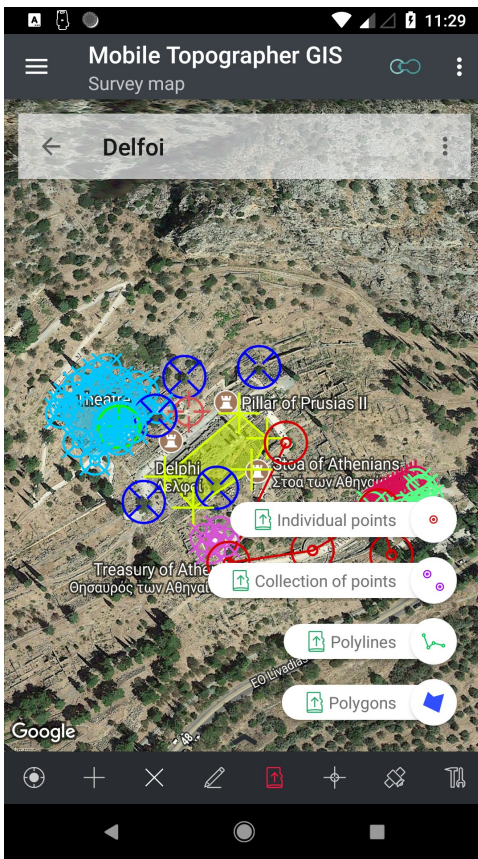


Now, let’s take a look at the “**Contents:**” settings provided by the action menu, and the bottomsheet.

- “**Points**” enables or disables projection of the points constructing any shape.
- “**Lines**” enables or disables projection of the lines constructing polylines or rings.
- “**Polygon Hatch**” enables or disables the shading of closed polygons.
- “**Distances**” enables or disables dimensioning of any line of polyline or ring.
- “**Labels**” enables or disables point labels.
- “**Contours**” enables or disables contour lines.
- “**Contours points**” enables or disables projection of the reference points used to generate a group of contours. (See contours chapter for more info).

While collecting GNSS readings, more configurations settings are available.

Importing data



Press the **“Import”** button from the bottom toolbar to start the import sequence. You can import data from .txt, .csv, .dxf or shape files.

At the **first step** you’re prompted to select what kind of data you want to import.

Select one from the following options:

- **“Individual points”** will let you import individual points from a file. Points are imported into a new entity of type “Single points” under the displayed survey of one of its sub-surveys. If you are importing from shape files, valid shape file types are: POINTS, POINTSM & POINTSZ. Each point will be imported into an individual shape of type “Individual point shape”. The new shapes will be created for you automatically.
- **“Collection of points”** will let you import groups of points from a file. Points are imported into a new entity of type “Collections of points” under the displayed survey of one of its sub-surveys. If you are importing from shape files, valid shape file types are: MULTIPOINTS, MULTIPOINTSM &

MULTIPOINTSZ. Each multipoints record (group of points) will be imported into an individual shape of type “Multiple points shape”. The new shapes will be created for you automatically.

- **“Polyline”** will let you import polylines from a file. Points are imported into a new entity of type “Polyline” under the displayed survey of one of its sub-surveys. If you are importing from shape files, valid shape file types are: POLYLINE, POLYLINEM & POLYLINEZ. Each polyline record (group of polyline parts) will be imported into a new entity of type “Polyline”. Each part of the polyline will be imported as an individual shape of type “Polyline shape”. The new entities and shapes will be created for you automatically.
- **“Polygons”** will let you import polygons from a file. Points are imported into a new entity of type “Polygon” under the displayed survey of one of its sub-surveys. If you are importing from shape files, valid shape file types are: POLYGON, POLYGONM & POLYGONZ. Each polygon record (group of polygon rings or holes) will be imported into a new entity of type “Polygon”. Each ring or hole of the polygon will be imported as an individual shape of type “Polyline shape” of type “Container” or “Hole”. The new entities and shapes will be created for you automatically.

At the **second step** you’ll be prompted to select the “Parent survey” from a list of the survey and its sub-surveys. Select the survey into which you want to import data, by touching or clicking one of the selectable (red) items of the list.

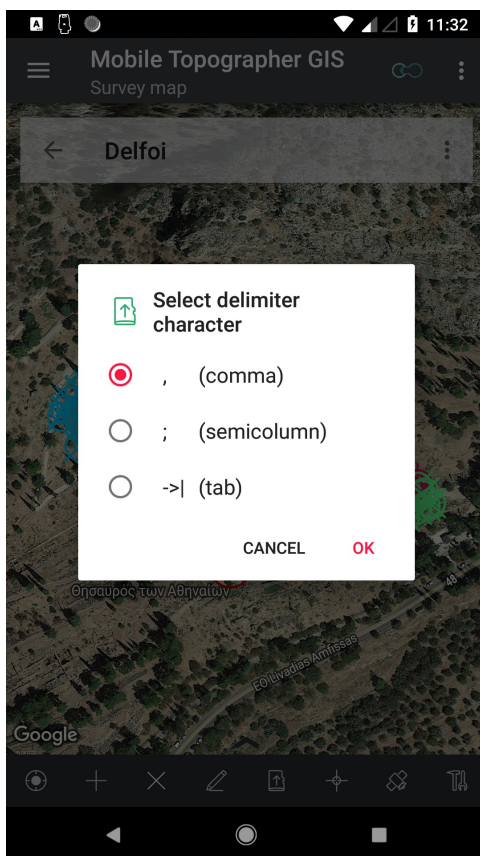
At the **third step** you’ll be prompted to define the properties of the entity which will hold the imported data. If there going to be created more than one entities (depending on the

type of import) all entities will share the properties that you define in here, and a counter value will be added to the label. The entity type is preselected for you. (See “Create an entity” for a detailed explanation of all properties).

At the **forth step** you’ll be prompted to select the file you want to import. The file manager dialog is visible, initially displaying the “Downloads” folder of the internal memory of your device. (See “The File manager” for details on how to use the file manager).

At this point please remember that if you want to import shape files these shape files must be provided into a single zip file which must contain a .shp, a .shx and .dbf file. The filename of the zip file and the filenames of the .shp, .shx and .dbf files contained must be exactly the same. In the other hand if you are importing from .txt or .csv files, these files must have at least three fields. Text files (.txt or .csv) can have a header line.

At the **fifth step** a preliminary check of the specified file, will be performed. If the file fails to pass this check an error message will inform you about the problem and the import process will be cancelled. Otherwise you’ll proceed to the next step.



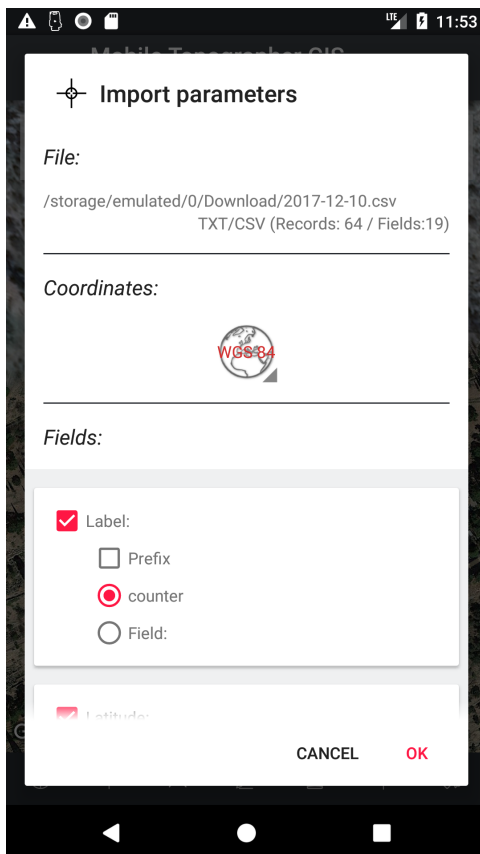
At the **sixth step** you’ll be prompted to select the delimiter character. This step is omitted if you are importing from shape files.

Valid delimiter characters are:

- , (comma),
- ; (semicolon) and
- →| (tab)

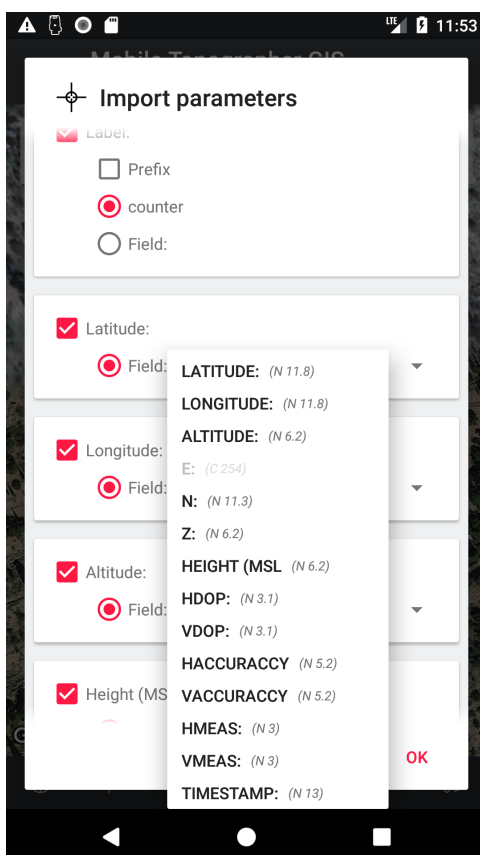
At the **seventh step** you’ll be prompted to specify the import parameters, thus to define which value of the import file will be imported into which field.

Depending on the type of file you’re importing the import parameters are different.



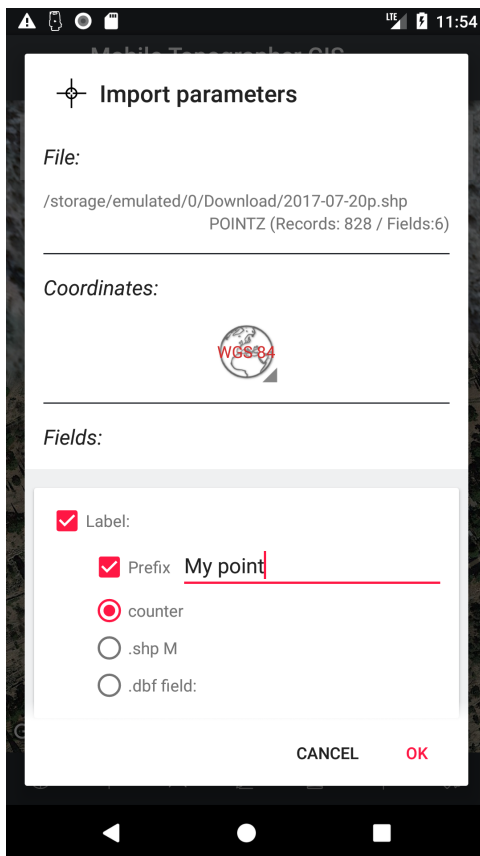
The import parameters dialog for text files (.txt, .csv) contains three parts:

- The “**File**” part is providing information regarding the selected file and its contents.
- The “**Coordinates**” part offers the option to select if the imported data are in WGS84 format or into the local CRS format. Touch or click the “Projection switcher” button (the globe) to switch between formats. The fields in the next part are changing following your selection.
- The “**Fields**” part offers various options regarding each field you will import. Check or uncheck each field to enable or disable importing of this field. Mandatory fields like “*Latitude*” cannot be unchecked.



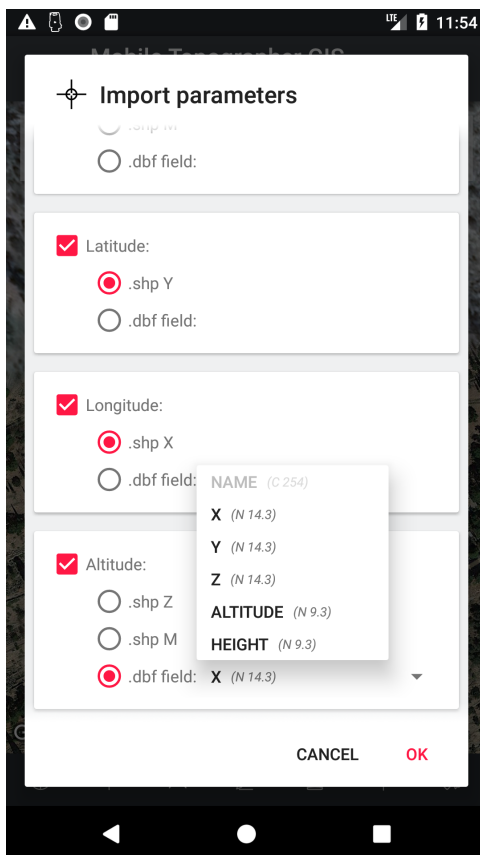
For each field select the corresponding input field of the file from the drop-down list. The list contains the fields of the import file found while preprocessing the file during the fifth step.

If the selected field is numeric, only numeric fields of the import file are selectable.



The import parameters dialog for shape files contains the same three parts:

- The **“File”** part is providing information regarding the selected file and its contents.
- The **“Coordinates”** part offers the option to select if the imported data are in WGS84 format or into the local CRS format. Touch or click the “Projection switcher” button (the globe) to switch between formats. The fields in the next part are changing following your selection.
- The **“Fields”** part offers various options regarding each field you will import. Check or uncheck each field to enable or disable importing of this field. Mandatory fields like *“Latitude”* cannot be unchecked.



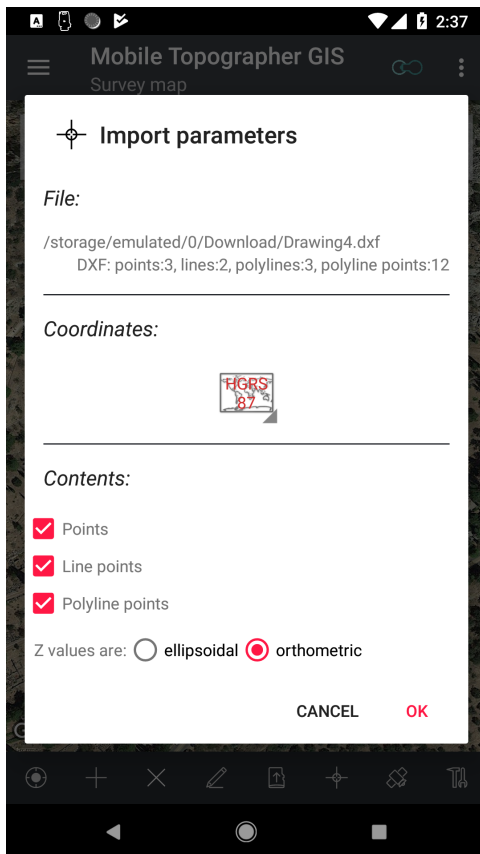
For each field select the corresponding input field of the file from the drop-down list. The list contains the fields of the import file found while preprocessing the file during the fifth step. The fields of the .dbf file are also available.

If the selected field is numeric, only numeric fields of the .dbf file are selectable.

Press **[OK]** to start the import procedure.

A message will inform you about successful completion or an error.

You can cancel the import procedure at any time by pressing the back key of your device.



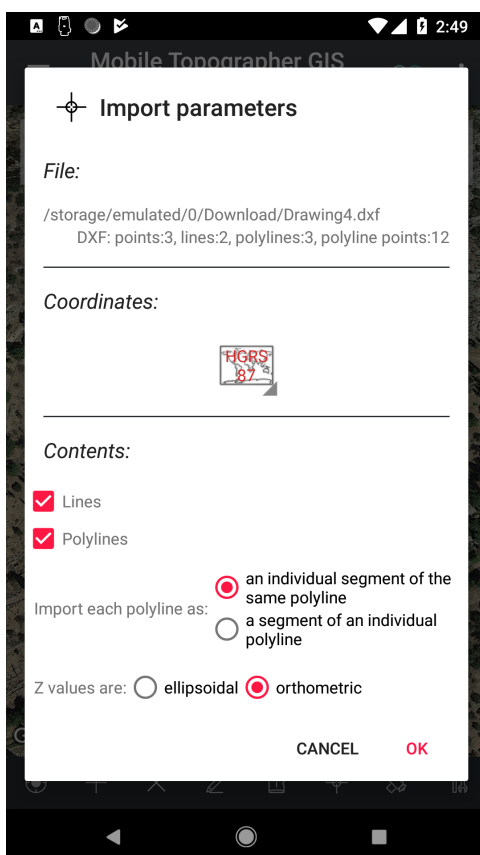
The import parameters for .DXF files are a little bit different.

Since .DXF files usually contains projected points the initial selection of coordinates is the local CRS.

You can import points, lines, LWPolylines or 3D polylines form a .DXF file.

If you have selected to import points, or multipoints, three check boxes will help you select what exactly to import. If the “Points” check box is checked, then all “point entities of the .DXF file will be imported. If the second check box named “Line points” is checked then the endpoints of the lines contained into the ,DXF file will be imported as points. If the the “Polyline points” check box is checked then the vertices of LWPolylines and 3DPolylines contained into the .DXF file will also imported as points. At least one of these three check boxes must be checked.

The final option to set is if the Z values contained into the .DXF file are representing ellipsoidal or othometric heights.



While importing polylines the available options are: A check box named “Lines” lets you choose whether you want to import the lines of the .DXF file.

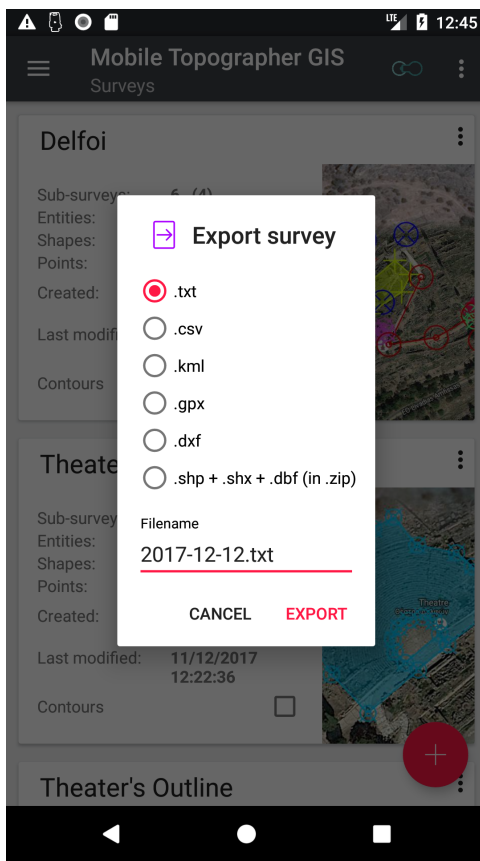
Check the “Polylines” check box, if you want to also import the LWPolylines and 3DPolylines from the .DXF files.

At the next step you have to selected if each line and polyline that will be imported from the .DXF file will become an individual segment of the same polyline entity, or each imported object will become an individual polyline entity.

Again, the final option to set is if the Z values contained into the .DXF file are representing ellipsoidal or othometric heights.

Note: Mobile Topographer GIS can import all versions of ASCII .DXF files.

Exporting data



You can export data in various file formats. Mobile Topographer GIS supports exporting data into .txt, .csv, .kml, .gpx, .dxf and shape files. Regarding the kind of data exported various files and folders may be created.

Into the first step select the file format you want to use and provide the filename.

The exported files are stored into:

[internalStorage]/MobileTopographerGIS/XXX_exports

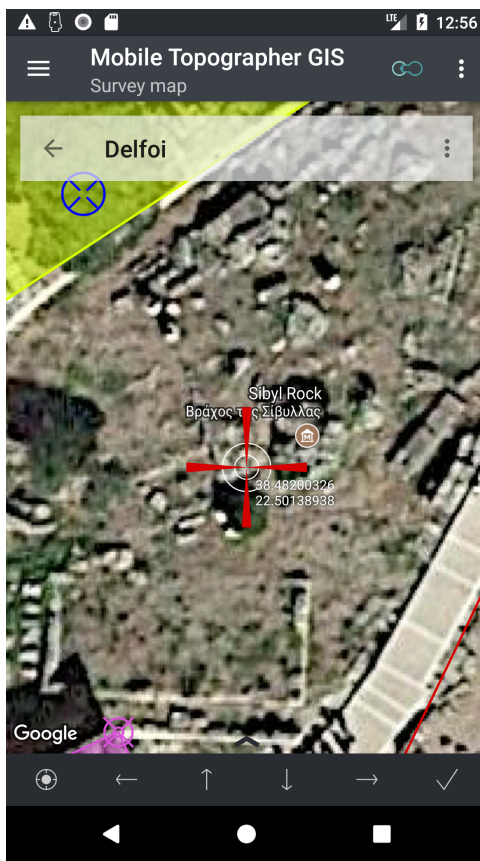
Depending on the contents that you're exporting, more than one files can be created. When more than one files will be created, a .zip file will be created containing all of them.

During the next step and if a .txt or .csv file has been selected you'll be asked to define the delimiter character. Valid delimiter characters are:

- , (comma),
- ; (semicolon) and
- → (tab)

If the file you've specified already exist an overwrite confirmation dialog will appear.

Add point on map



Touch or click the “**Add point on map**” button from the bottom toolbar.

A target crosshair will be displayed at the center of the screen and the projection will be zoomed to the maximum.

Pan the map by dragging it so as to place the crosshair exactly at the point you want to insert.

For fine movements you can use the “*move left*”, “*move up*”, “*move down*” and “*move right*” buttons of the bottom toolbar.

While moving you can see the coordinates of the targeted point near the crosshair.

You can cancel the “*Add point on map*” sequence by touching or clicking quickly, anywhere on the map.

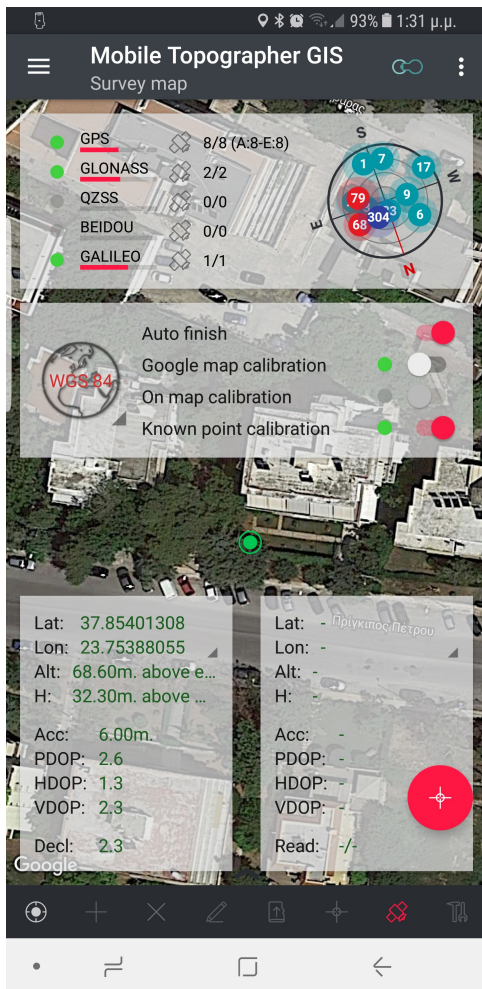
Touch or click the “*Accept changes*” button from the bottom toolbar. The “**Select parent shape**” dialog will be displayed, waiting for you to select one of the available candidate shapes to accept the new point. “Individual point shapes” that already have a member point will not be displayed as they can only have one member point.

After having selected the parent shape, the “**Select position**” dialog will be displayed letting you to change the position of the new point inside the shape. Drag and drop the “+ *Insert here*” accented item and press [OK].

In the next step the “*Edit point*” dialog appears, letting you input all points properties and even manually correct the coordinates of it. Don't forget that the label of the point cannot be empty.

Touch or click [OK] to complete the insertion of the point.

Add GNSS point



Touch or click the “Add GNSS point” button from the bottom toolbar in order to start. The GNSS receiver will be activated (if it is not already active). The **“Select parent shape”** dialog will be displayed, waiting for you to select one of the available candidate shapes to accept the new point. “Individual point shapes” that already have a member point will not be displayed as they can only have one member point.

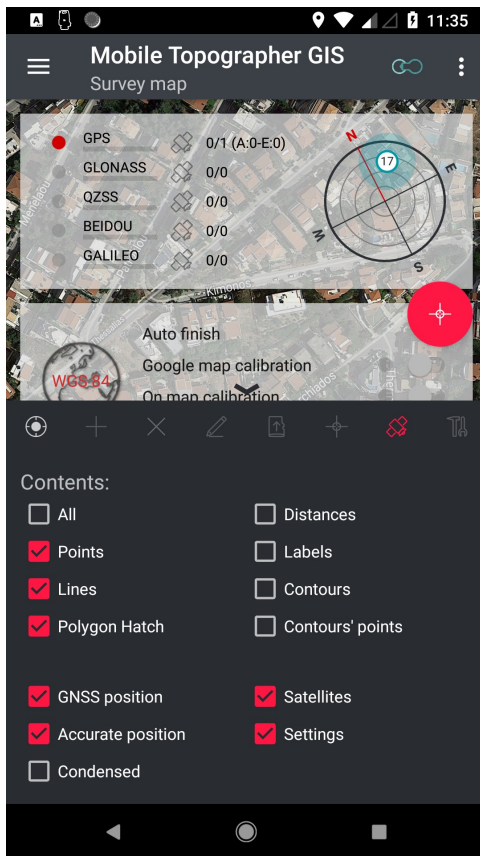
After having selected the parent shape, the **“Select position”** dialog will be displayed letting you to change the position of the new point inside the shape. Drag and drop the “+ Insert here” accented item and press [OK].

In the next step four semitransparent windows will cover the main screen and the action bar will be temporarily hidden

These four windows are:

- The **“Satellites”** window is located at the upper part of the screen. It contains info regarding the fix of the GNSS receiver. A compass view is displaying the available and used satellites.
- The **“Settings”** window is located at the mid part of the screen. It contains the *“Projection switcher”* button which switches the contents of the other windows from WGS84 format to local CRS format, the *“Auto-Finish”* switch which enables or disables the auto finish functionality while collecting readings, the *“Google map calibration”* indicator and switch, which enables or disables the use of google map calibration if there is one and if its quality is good, the *“On map calibration”* indicator and switch which enables or disables the use of On map calibration if there is one and if its quality is good, and the *“Known point calibration”* and switch which enables or disables the use of known point calibration if there is one and if its quality is good. (See *Calibrations for more info*). The states of the navigation switch can also be changed from the navigation menu.
- The **“GNSS position”** window is located at the lower left part of the screen. It contains the coordinates and accuracy values of the position that is provided by the GNSS receiver. Values are displayed in red color when there is no fix, in green color when there is a fix of good quality or in black when the whole procedure has finished. Touching or clicking on the latitude or longitude values while into WGS84 format will switch between decimal and sexadecimal representation of them.
- The **“Accurate position”** window is located at the lower right part of the screen. It contains the coordinates and accuracy values of the accurate position as it is calculated by the “increased accuracy algorithm” of Mobile Topographer GIS. Values are displayed in red color when there is no fix, in green color when there is a fix of

good quality or in black when the whole procedure has finished. Touching or clicking on the latitude or longitude values while into WGS84 format will switch between decimal and sexadecimal representation of them.



While in the “Add GNSS point” sequence, open the bottomsheet and check or uncheck the corresponding settings in order to you can hide or redisplay any of these windows.

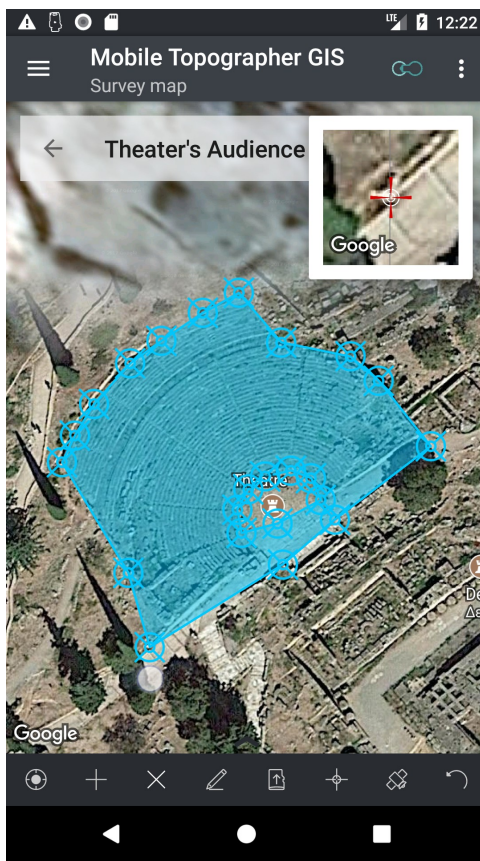
Apart from the above windows, the “**Start / Stop increasing accuracy**” floating action button resides at the lower right part of the screen. Place your device (or external receiver) at the position you want to measure and touch or click this button to start collecting readings. The button begins to “breathe” showing it is active, and both the collection of readings and the calculation of accurate position start. After having enough readings collected, touch or click the same button again to terminate both the collection of readings and the calculation of accurate position. If the auto finish switch is set to the on position the collection of readings will be automatically finished when the accuracy and the number of readings have both met the criteria settled into the “**Settings**” of the app (accuracy threshold and Readings threshold). Even in auto finish mode, you can always terminate the procedure by touching or clicking the “**Start / Stop increasing accuracy**” floating action button. While

collecting readings you may see that some of the readings are ignored and not used for the calculation of accurate position. This happens because the dropped readings hadn’t met the “*maximum accepted accuracy*” and “*maximum accepted DOP*” values that you have previously set in the settings of the app. If you see that too many readings are dropped, just go to the settings of the app and ease the “*maximum accepted accuracy*” and “*maximum accepted DOP*” settings.

When the “**increasing accuracy**” procedure has terminated, the “*Edit point*” dialog appears, letting you input all points properties and even manually correct the coordinates of it. Don’t forget that the label of the point cannot be empty.

Touch or click [OK] to complete the insertion of the point.

Drag an existing point

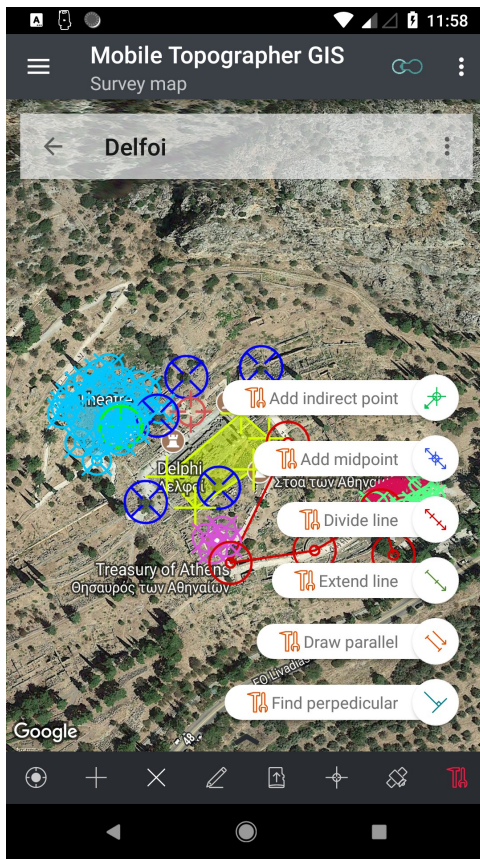


Drag any existing point to move it to a new location. Its coordinates will be automatically updated and stored into the database.

While dragging a point a lens view showing the new point into maximum zoom. This will help you to place the point exactly where you want to.

After having finished dragging one or more points the “**Undo**” button will appear at the rightmost part of the bottom toolbar. Touch or click the [Undo] button several times in order to undo all the point movements done, starting from the last one.

Geodesy tools



You can create a new point, or a new set of points by using this option. Mobile Topographer GIS supports the following functions:

- **Add indirect point - 1 point + Distance + Azimuth.** Define the new point by 1 existing point and the distance and the azimuth from it,
- **Add indirect point - 2 points + Distances + Select.** Define a new point by 2 existing points, the distances from them and select one of the two possible solutions.
- **Add indirect point - 2 points + Azimuths.** Define a new point by 2 existing points, and the azimuths from them.
- **Add indirect point - 3 points + Distances.** Define a new point by 3 existing points and the distances from them.
- **Add midpoint.** Define a new point as a midpoint between 2 existing points.
- **Divide line.** Define a set of new points as the divisors of the line between 2 existing points.

The number of line divisions (and so divisors) is also provided by you starting from a minimum of three divisions.

- **Extend line.** Define a new point or a pair of new points by 2 existing points and the distances from these points. Specify the distance from one or from each existing point, and a new point or set of points will be created at this distance or distances. The new point or set of points will be collinear with the 2 existing reference points.
- **Draw parallel - 2 points + Distance + Select.** Define a new point pair. The point pair is defining a line parallel to the line which is defined by the 2 given reference points at the given distance. You can select one of the two possible solutions.
- **Draw parallel - 3 points.** Define a new point by providing 3 existing points. The first 2 points are defining a line. The third is defining the start of the parallel line. The new point will be the end of a line parallel to the one defined by the first two points and starting from the third reference point.
- **Draw perpendicular.** Define a new point. The first 2 points are defining a line. The third is defining the start of the perpendicular line. The new point will be the end of a line perpendicular to the one defined by the first two points and starting from the third reference point. The reference line will be extended if it is needed.

Just touch the “Geodesy Tools” icon and select one of the presented options. Then select the shape into which the new point will be added and its position into it. The shapes displayed to select from are only the ones that can hold one point or a set of points depending on the previously made selection of Geodesy tool. For example if you have

selected “add indirect point”, only shapes that can hold one more point are presented. In the other hand, if you add selected “Divide line” only shapes that can hold at least two points will be presented.

Mobile Topographer GIS

Indirect point from:
1 point + Distance + Azimuth

Latitude: -
Longitude: -
Altitude: -
Height: -

WGS 84

above ellipsoid
above M.S.L.

Reference Point 1

Latitude: dd.dddddddd °
Longitude: ddd.dddddddd °
Altitude: hhhh.hh m. above ellipsoid
Height: hhhh.hh m. above M.S.L.
Distance: dddddd.ddd m.
Azimuth: aaa.aaaaaaa °

SELECT FROM LIST SELECT ON MAP

BACK CANCEL OK

Into the next step, the “**Indirect point**” window will appear.

Into the upper (black) part of the screen you can find (apart from your well known globe or map button to change the projection), the “*results area*” which displays the results of the calculation (one or more points). At the upper right part of the results area, resides the “Project points on map” button. Use this button to projects the reference points and the results (if they exist) on the map. Feel free to touch this action button whenever you want. The reference points or lines are displayed in green color, while the calculated, lines or points are displayed in red color.

In the lower part of the screen you will find a list of the reference points with their extra values, in order to calculate the results.

You can either key in the coordinates of the reference points, or select an existing map from the list of points, or by selecting it on the map.

Filling all the values into this list, will automatically generate the result or results. Just remember that all the reference points, and the calculated results must be inside the bounds of the selected Local Coordinates Reference System.

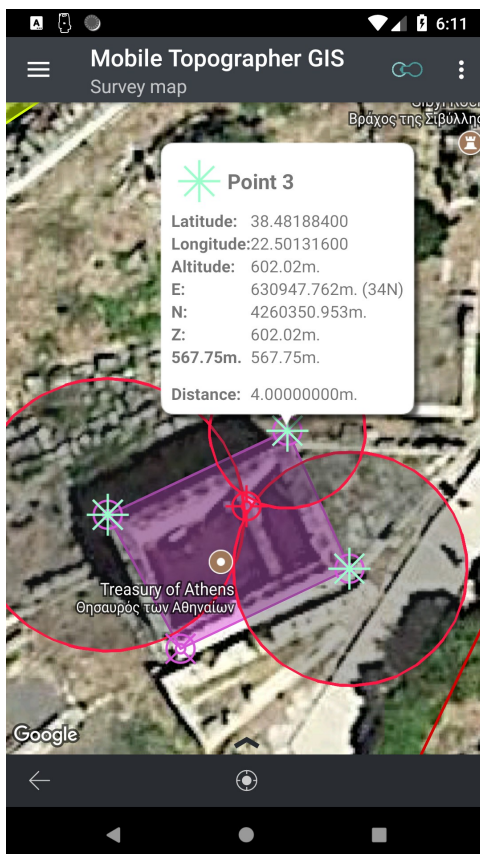
In some occasions you have to select between two possible solution. This can be done, either by selecting the solution you want from the tabs above the available solutions, or by clicking on the “Project on map” button, and then clicking on one of the projected solution, and then again on its info window.

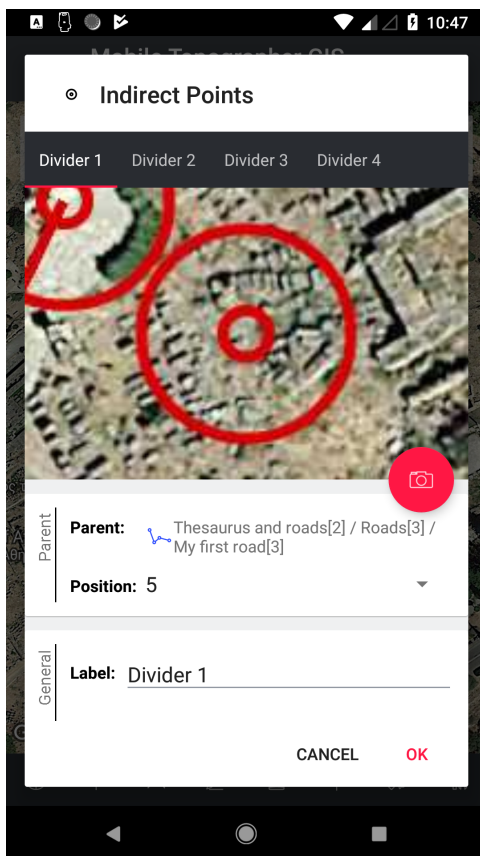
You can also touch any reference or solution point or line to get an info window about it.

Although all data of the map are also visible, only reference points and lines and results points and lines are clickable.

Press the back button at any time, to leave the map and return to the “Indirect point” window.

When you have a valid result calculated the “OK” button is enabled. Touch it in order to proceed with the addition of the result point or set of points.

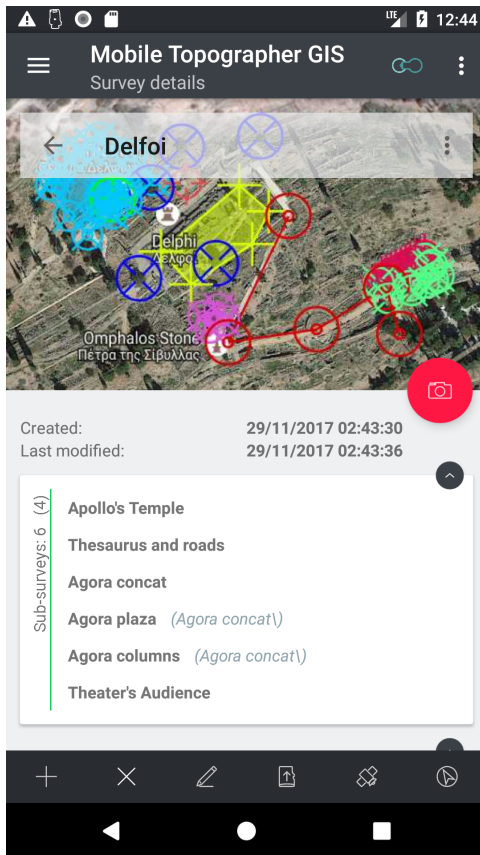




A new window with the details of the result point, or points, will appear. Here you can change its label, photo, notes, etc. When there are more than one results, they will be presented into tabs.

If all the values are correct the "OK" button is enabled. Just press it to save the values and return to the map.

Survey Details



While in the list of surveys select “Show details” from the action menu of a survey card, or long touch or click on a survey card. The “**Survey details**” screen is displayed.

Let’s take a look at this screen. The upper part of the screen is covered by a semitransparent action bar. This is the action bar of the details screen.

At the left part of the action bar stands the “Back” arrow. Touch or click it at any time in order to leave this screen and return to the list of surveys.

To the right of the “back” arrow, covering the center part of the action bar, the survey label is displayed.

Further to the right, a satellite icon and an indicator, is displayed when location services via the internal GNSS receiver are active. The color of the indicator informs us about the quality of the fix. “Red” color, indicates that the GNSS receiver has not obtained a fix yet. “Yellow” color indicates that there is a fix, but is not good. “Green” color indicated that the internal GNSS receiver has obtained a fix of good quality.

At the right end of the action bar, the action menu of the projection is available by touching or clicking the three dots.

The options are:

- **Expand all:** Use this option to expand all the data cards in the list of the main screen. *(Later in this document you will find more info regarding data cards).*
- **Collapse all:** Use this option to collapse all data cards.

The center part of the screen contains the list of the surveys details. The list starts with the icon of the survey. Use the [Camera] floating action button to change the icon. The icon view is collapsing when you scroll the list.

Right below the icon you can find the “Created” and “Last modified” time stamps of the survey.

Further below starts the list of data cards. Each “**data card**” shows a specific kind of contents of the survey. There is one card for sub-surveys, one card for entities, one card for shapes, one card for points and one card for contours areas.

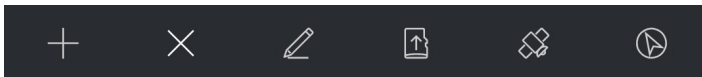
Data cards can be expanded or collapsed using the gray button at the upper right part of it. The title of the data card (vertical when the card is expanded, or horizontal when the card is collapsed) informs you about the total number of items and the number of primary items (inside a parenthesis) of this type that are contained into the survey.

Let’s have a look at the screen-shot above.

The sub-survey card has a title “Sub-surveys 6 (4)”. This means that “*Delfoi*” survey has 6 sub-surveys of which the 4 are primary ones while the rest 2 are sub-surveys of a sub-survey. The four primary sub-surveys are “*Appolo’s Temple*”, “*Thesaurus and roads*”, “*Agora concat*” and “*Theater’s Audience*” while “*Agora Plaza*” and “*Agora Columns*” are sub-surveys of “*Agora concat*”.

To the right of each item inside a parenthesis you can find the full path of the item inside the survey hierarchy.

In the lower part of the screen you can find the bottom toolbar containing the following buttons:



- “**Add...**” invokes a sub-menu to select between adding a new *sub-survey*, *entity*, *shape*, *point* or *contours area*.
- “**Remove**” invokes a sub-menu to select between removing a sub-survey, entity, shape, point or contours area from the current survey.
- “**Edit**” invokes a sub-menu to select between editing the properties of a *sub-survey*, *entity*, *shape*, *point* or *contours area*.
- “**Import**” invokes a sub-menu to select between importing *Individual points*, *Collection of points*, *Polylines* or *Polygons*. (see “*Importing data*” for more details).
- “**Add GNSS point**” lets you collect data using the GNSS receiver. (see “*Add GNSS point*” for more details).
- “**Drive me**” invokes the corresponding screen in order to locate a point into the real field. (See “*Drive me*” for more details).

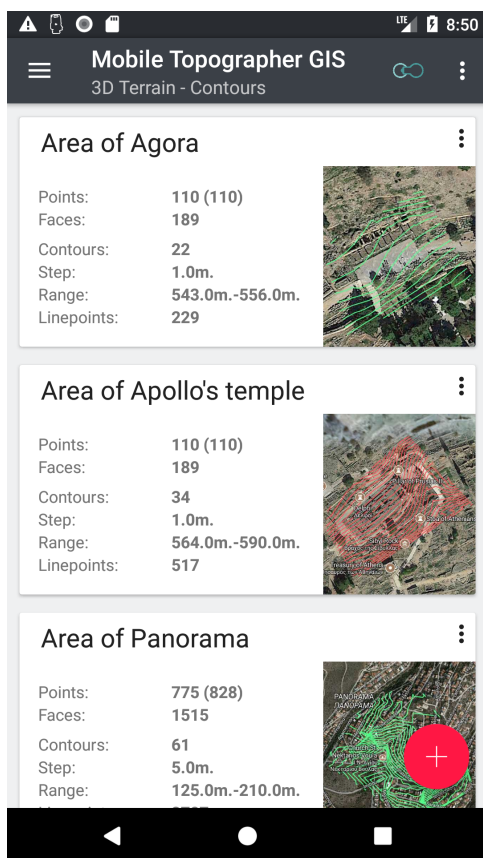
When the “Add”, “Remove”, or “Edit” buttons are pressed a group of floating action buttons is displayed. For example when you press the add button the group of “Add” buttons is revealed. Select the object you want to add by pressing the corresponding button. Touch or click anywhere outside the group of buttons to hide it without selecting anything.

Before selecting anything or closing the group take a look at the bottom toolbar. You can see that the selected button is displayed in the accent color (red) indicating that this is the selected button.

You can directly touch or click another button from the bottom toolbar to cancel the addition, and perform the action of the newly pressed button.

By touching or clicking on a selected (accented in red) button, the button is deselected and action of it is canceled.

3D Terrain Contours



From the navigation menu select **3D Terrain - Contours**. A list of all stored areas with 3D Terrain and contours will be displayed.

Each area is represented by an individual card containing statistics of its contents. Areas are ordered inside the list by their internal ID. Under normal circumstances this means that they are order by creation data, where the last modified area appears last.

Points indicates the number of reference points used to create the 3D terrain and calculate the contours. The second value inside the parenthesis represents the number of individual readings collected. This number is usually greater than the number of reference points, because readings may be rejected or grouped during the calculation process. If the first value is empty then the calculation process have not been run for this area, or there are not enough readings to process.

Faces indicates the number of triangle faces that are defining the 3D Terrain. This balue is filled after the calculation has been performed.

Contours indicates the number of individual contours calculated.

Step indicates the step between contours that have been used (or will be used) for the calculation process.

Range indicates the minimum and the maximum contour height.

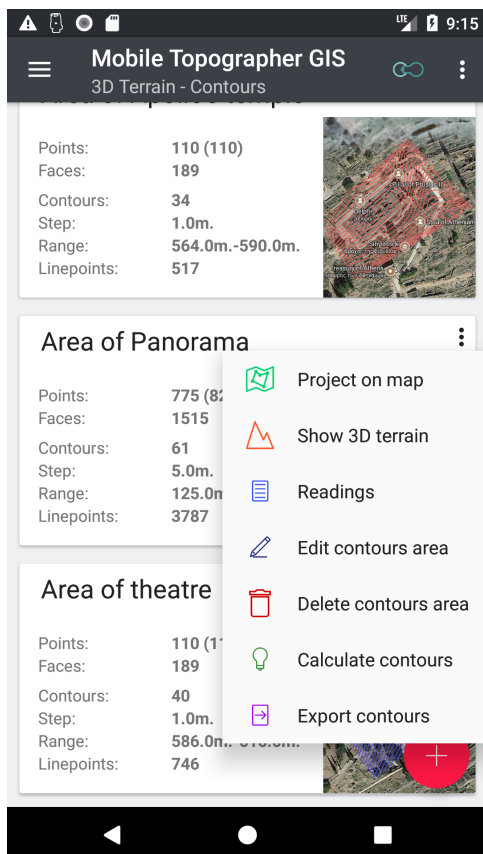
Linepoints indicates the number of vertexes that defining the contours.

Touching or clicking the card of an area opens the “Survey map” screen of the area where all reference points (contour’s points) and the contours of the area are displayed.

Long touching or long clicking the card of an area opens the “Show 3D terrain” screen which displays the 3D terrain of the area. (see “Survey details” section for more details)

Each area card actions menu. Touch or click the 3 dots to invoke this menu. From here, you can perform almost every possible action. Let’s take a look:

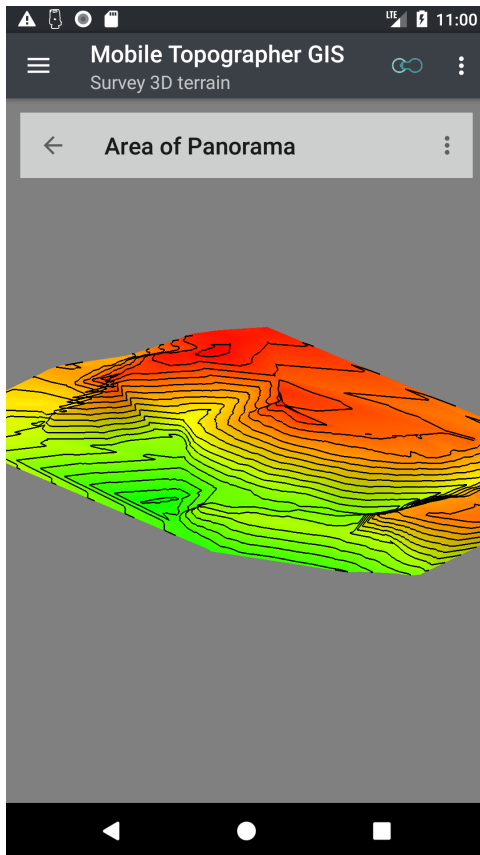
- **Project on map** (the same as touching or clicking the card).



- **Show 3D terrain**, shows the 3D terrain. (the same as long touching or long clicking the card).
- **Readings**, brings up the list of readings that have been used (or will be used) for the calculation of the 3D Terrain and the contours. (*See Area Readings for more info*).
- **Edit contours area**, opens a dialog window where you can review and edit the properties of the selected area.
- **Delete contours area**, deletes the selected area and all of its properties, readings, references points, faces and contours. Proceed with caution as this action is irreversible.
- **Calculate contours**, starts the calculation process for this area. A 3D terrain will be generated and contours will be calculated following the properties of the area.
- **Export contours**, starts the exporting sequence. The 3D Terrain, the contours, reference points and readings can be exported in .txt, .csv, .gpx, .kml, .dxf or .shp (shape files) file formats.

In the following paragraphs we will see in details how to perform each action.

3D Terrain



Select “Show 3D terrain” either from a survey card inside the list of surveys, or an area card from the list or areas.

The 3D terrain model of the survey or the area will be presented to you.

Use the well known gestures to pan, zoom, rotate and or tilt the view.

Lower heights are presented green while higher heights are presented into red color.

Use the action menu activated from the 3 dots button, in order to select the contents of the view. Enable or disable the presentation of:

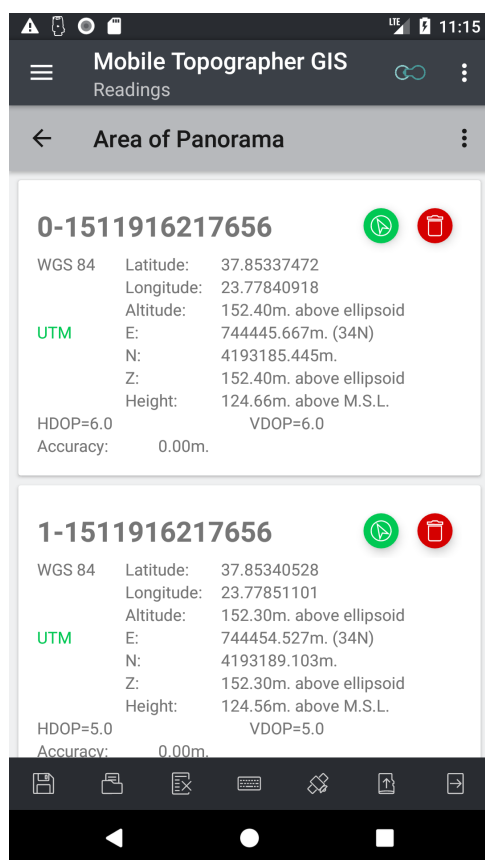
- 3D Terrain,
- Faces and or
- Contours.

From the action menu you can also activate the “Auto rotate” functionality. While auto rotate is enable roatate or tilt your device. The 3D terrain model will be auto rotated and tilted following the movement of your

device.

In order to see the 3D Terrain model of an individual area or the areas of a survey the calculation process of the area or areas must have been performed earlier.

List of Readings



From the action menu of an area card select **“Readings”**. A list will appear.

This list contains all the readings that have been previously collected. These readings are the ones used (or will be used) to perform the calculation of the 3D terrain model and the contours.

Each item of the list represents one reading with all of its data.

The contents of each list entry contains the following:

- The **“Label”** residing in the upper space of a point and displayed in bold. The label is combination of a counter and the time-stamp of the reading.
- The **“WGS84”** part including *Latitude*, *Longitude*, and *Altitude* of the point.
- The **“local CRS”** part including *E*, *N*, *Z*. (You can always change the selected local CRS from the settings of the application).
- The **“Orthometric Height”** representing the high of the point above MSL (Mean Sea Level).
- The **“HDOP, VDOP, Accuracy”** values of the reading.

At the upper right part of each reading entry there exist two buttons. The *“Drive me”* button activates drive me functionality which will guide you to the location of the reading at the field, and the *“Delete”* button which deletes the selected reading. Deleting a reading is irreversible.

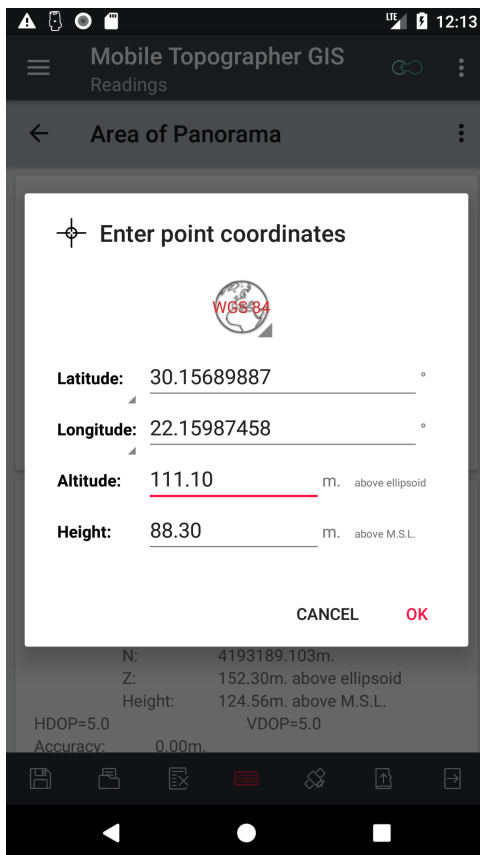


Use the bottom toolbar of the list of readings to perform one of the following actions: (The same option can also be found into the action menu of the list)

- **“Save list”** Saves the list of readings into a file. A saved list can be reloaded later to an area. Specify a filename and press [OK] in the presented dialog. The filename you specified will be given the extension .pts. The file will be saved into:
[internal storage]/MobileTopographerGIS/Area_saves
- **“Load list”** Loads a list of readings from a file. If the current list is not empty it will be overwritten by the loaded one. A confirmation dialog will ask you to verify the action. Tick the [I’m sure] box and press [OK]. Select the list you want to load via the

“File manager” dialog and press [OK]. (See “File Manager” section for more info regarding how to use the file manager).

- **“Clear list”** clears the contents of the current list. Clearing the list is irreversible so proceed with caution, providing confirmation to the next dialog.



- **“Add readings manually”**, a dialog appears letting you manually input the coordinates of a point you want to add as a reading. Use the “Projection switcher” button to switch between WGS84 format and local CRS format. While in WGS84 format touch or click the “Latitude” or “Longitude” labels in order to switch between decimal and sexadecimal formats. You can manually input either the ellipsoidal altitude or the orthometric height. The application automatically calculates the other using its embedded geoid models.

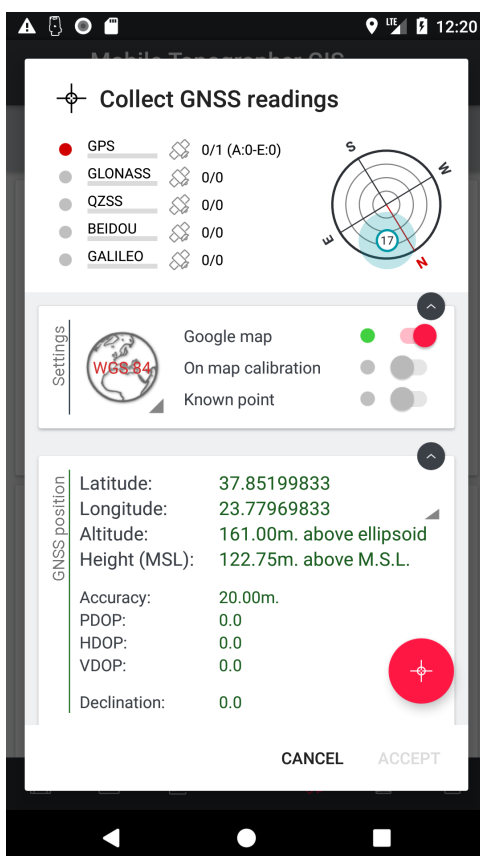
- **“Add readings via GNSS”**, the “Collect GNSS readings” dialog appears. Via this dialog you can collect a reading of increased accuracy. See the “Add GNSS point” section for more information regarding the contents of this dialog and how to use it.

- **“Import list”**, let’s you import readings from a .txt, .csv, .dxf file or shape files. See “Importing data” section for more info on how to successfully import some readings. The imported readings are added to the list and do NOT overwrite any existing data.

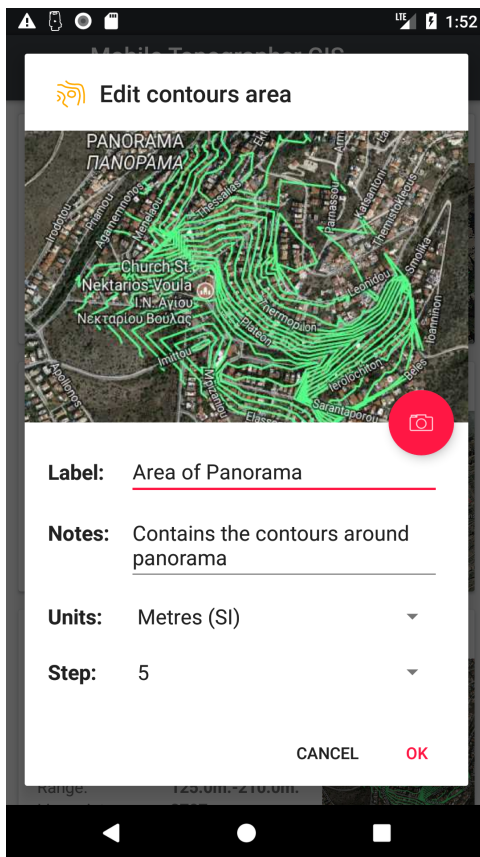
- **“Export list”** will guide you through the export procedure. All readings will be exported into a file which will be placed into:

- `[internalStorage]/MobileTopographerGIS/area_exports`

Please note, that changing the readings of an area in any way, will delete the calculation of the 3D terrain and contours, if they exist.



Edit contours area



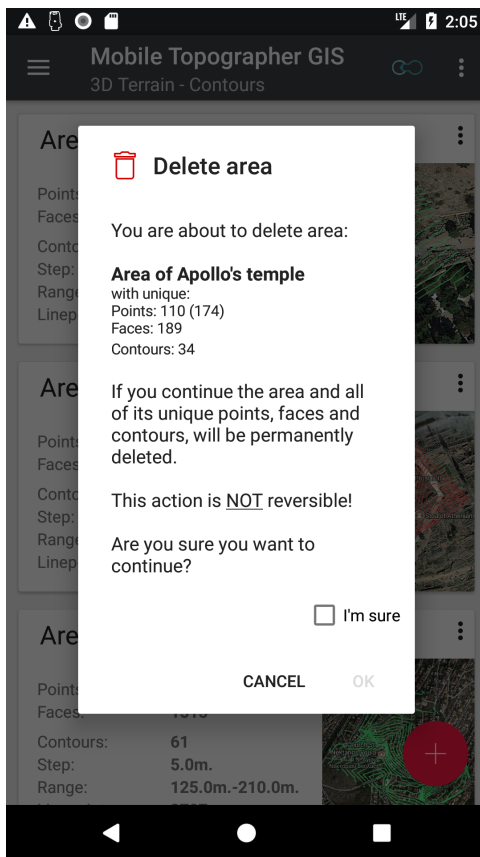
The “**Edit contours area**” dialog lets you edit the properties of an area of contours.

It contains the fields “*Label*”, “*Notes*”, “*Units*” and “*Step*”.

- “**Label**” field cannot left empty. Although it is not mandatory for the label to be unique it is highly recommended not to repeat existing labels.
- “**Notes**” field is offering the possibility to add free text notes regarding this area.
- “**Units**” field is letting you choose between “Metres”, “Feet” or “US Survey Feet” as the units to be used for contours calculation.
- “**Step**” is letting you define the step of the contours.

Please note, that changing the “Units” or the “Step” values of an area will delete the calculation of the 3D terrain and contours, if they exist.

Delete contours area

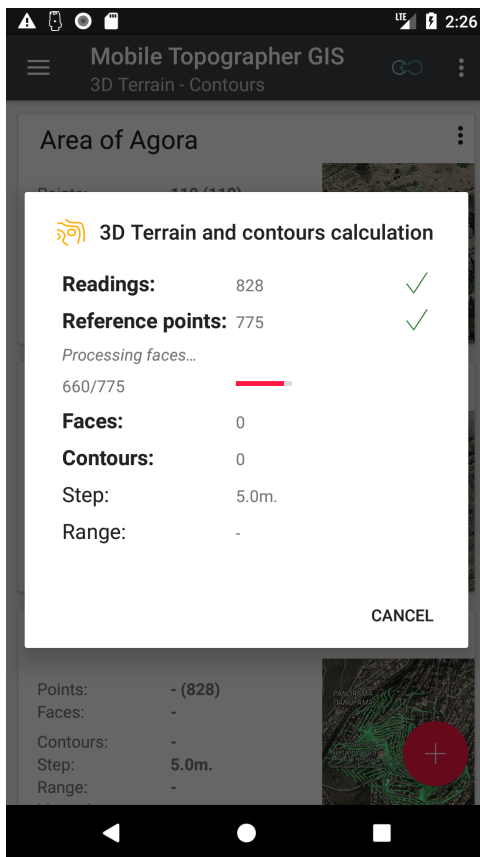


From the action menu of a card inside the list of contours areas, select “**Delete contours area**”.

A dialog will appear informing you about the contents of this area and asking for your confirmation before proceeding.

Proceed with caution. This action is irreversible and all the data of the area will be lost forever.

Calculate contours



From the action menu of a card inside the list of contours areas, select “**Calculate contours area**”.

If a calculation already exists. A dialog will appear informing you that about the contents of this area and asking for your confirmation before proceeding.

The calculation starts. You can cancel it at any time by touching or clicking the [CANCEL] button, or the back key of your device.

Please note, that this calculation is extremely complicated and may take a lot of time to be completed.

Export contours

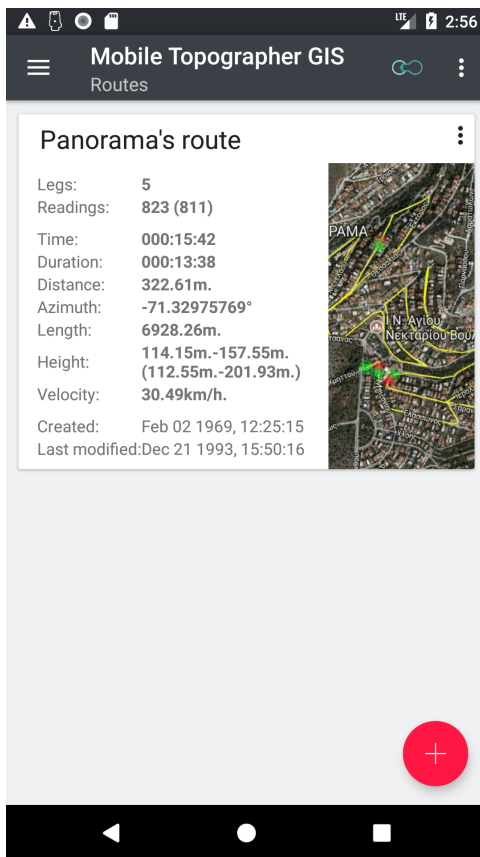
From the action menu of a card inside the list of contours areas, select “**Export contours area**”.

A dialog window will let you specify the file type and the filename to be used. You can select between .txt, .csv, .kml, .gpx, .dxf and shape files format. Depending on the file format chosen, some data may not be exported.

The export file will be placed into:

[internalStorage]/MobileTopographerGIS/area_exports

Routes



From the navigation menu select **Routes**. A list of all stored routes will be displayed.

A “Route” is a sequence of point readings stored with location and time information. Each route consists of one or more **legs**.

Each leg is a part of the route and consists of a sequence of points without any interruption.

Each route is represented into this list by an individual card containing statistics of its contents.

Routes are ordered inside the list by their internal ID. Under normal circumstances this means that they are order by creation data, where the last modified area appears last.

Legs indicates the number of legs of the route.

Points indicates the number of “*Reference points*” that are defining the route. The second value inside the parenthesis represents the number of readings. Reference points are calculated during the “*Calculate info*” procedure. The number of readings is usually greater than the number of reference points, because

readings may be rejected or grouped during the calculation process. If the first value is empty then the calculation process have not been run for this area, or there are not enough readings to process.

Time indicates the time passed between the first and the last reading. This value includes the pause between the legs.

Duration indicates the sum of the times of all the legs. This value does NOT includes the pause between the legs.

Distance indicates the distance between the start reference point of the first leg and the end reference point of the last leg.

Azimuth indicates the azimuth of the line connecting the start reference point of the first leg and the end reference point of the last leg.

Length is the total length of the route containing all the legs.

Height indicates the height difference of the the start reference point of the first leg and the end reference point of the last leg. The values inside the parenthesis are the lower and the higher high values recorded during collection of readings.

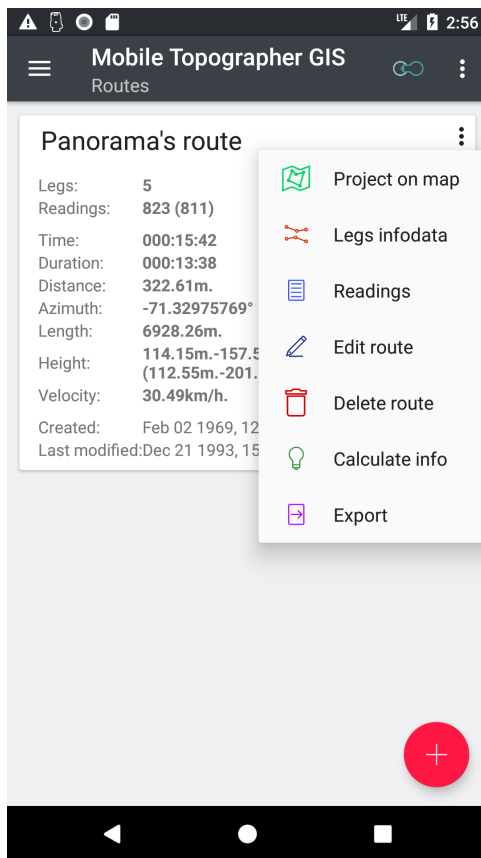
Velocity indicates the mean velocity recorded while moving from one point to another.

Created is the time-stamp of the creation to the route.

Last modified is the time-stamp of the last modification of the data of the route.

Touching or clicking the card of a route opens the “Survey map” screen of the route where all reference points and all of its legs are displayed as a polyline.

Long touching or long clicking the card of a root opens the “**Legs infodata**” screen which displays information of each leg of the route. (see “Legs infodata” section for more details)

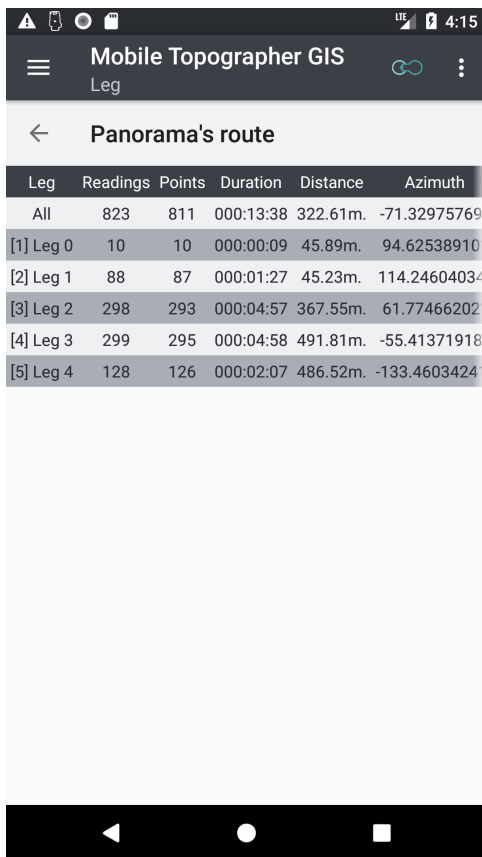


Each route card actions menu. Touch or click the 3 dots to invoke this menu. From here, you can perform almost every possible action. Let's take a look:

- **Project on map** (the same as touching or clicking the card).
- **Legs infodata**, shows the legs infodata. (the same as long touching or long clicking the card).
- **Readings**, brings up the list of readings that have been used (or will be used) for the calculation of the route and the legs. (*See Route Readings for more info*).
- **Edit route**, opens a dialog window where you can review and edit the properties of the selected route.
- **Delete route**, deletes the selected area and all of its properties, readings, references points, legs. Proceed with caution as this action is irreversible.
- **Calculate info**, starts the calculation process for this route. All data of its legs will be calculated.
- **Export route**, starts the exporting sequence. Legs infodata, reference points and readings can be exported in .txt, .csv, .gpx, .kml, .dxf or .shp (shape files) file formats.

In the following paragraphs we will see in details how to perform each action.

Legs infodata



The screenshot shows the 'Mobile Topographer GIS' app interface. At the top, there's a title bar with the app name and a 'Leg' label. Below it, a back arrow and the route name 'Panorama's route' are visible. The main content is a table with columns: Leg, Readings, Points, Duration, Distance, and Azimuth. The table lists data for the entire route ('All') and five individual legs (Leg 0 to Leg 4). The bottom of the screen shows the Android navigation bar.

Leg	Readings	Points	Duration	Distance	Azimuth
All	823	811	000:13:38	322.61m.	-71.32975769
[1] Leg 0	10	10	000:00:09	45.89m.	94.62538910
[2] Leg 1	88	87	000:01:27	45.23m.	114.24604034
[3] Leg 2	298	293	000:04:57	367.55m.	61.77466202
[4] Leg 3	299	295	000:04:58	491.81m.	-55.41371918
[5] Leg 4	128	126	000:02:07	486.52m.	-133.46034241

Select “**Legs infodata**” from a route card inside the list of routes.

The infodata of all the legs of the route will be presented to you.

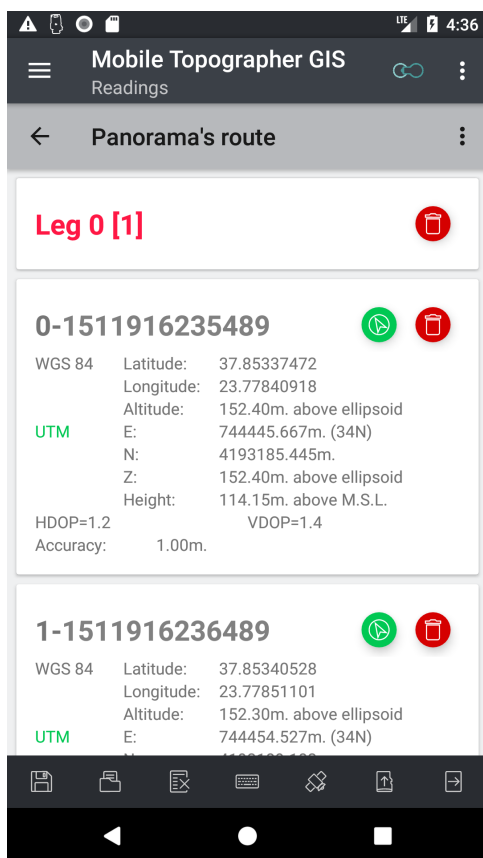
For each leg one line of data is presented. The first leg labeled “All” displays data for the whole route.

Each data line contains the following data values:

- “**Leg**” the label of the leg.
- “**Readings**” the number of readings of the leg.
- “**Points**” The number of reference points of the leg.
- “**Duration**” The time elapsed between the readings of the start point and the end point of the leg.
- “**Distance**” The distance (in straight line) between the start point and the end point of the leg.
- “**Azimuth**” The azimuth of the line connecting the start point and the end point of the leg.
- “**Height from**” the height of the start point of the leg.
- “**Height to**” the height of the end point of the leg.
- “**Height difference**” the height difference of the start point to end point.
- “**Height min**” the height of the lowest point of the leg.
- “**Height max**” the height of the highest point of the leg.
- “**Height average**” the average height of all points of the leg.
- “**Height range**” the height difference between the lowest and the highest points of the leg.
- “**Velocity min**” the minimum velocity recorder while moving from one point of a leg to another.
- “**Velocity max**” the maximum velocity recorder while moving from one point of a leg to another.
- “**Velocity average**” the average velocity recorder while moving from one point of a leg to another.

Velocity min” the minimum velocity recorder while moving from one point of a leg to another.

List of Readings



From the action menu of a route card select **“Readings”**. A list will appear.

This list contains all the readings that have been previously collected. These readings are the ones used (or will be used) to perform the calculation of the legs infodata.

Each item of the list represents one reading with all of its data.

Entries in red color represent the leg dividers.

The contents of each list entry contains the following:

- The **“Label”** residing in the upper space of a point and displayed in bold. The label is combination of a counter and the time-stamp of the reading.
- The **“WGS84”** part including *Latitude*, *Longitude*, and *Altitude* of the point.
- The **“local CRS”** part including *E*, *N*, *Z*. (You can always change the selected local CRS from the settings of the application).
- The **“Orthometric Height”** representing the high of the point above MSL (Mean Sea Level).
- The **“HDOP, VDOP, Accuracy”** values of the reading.

At the upper right part of each reading entry there exist two buttons. The *“Drive me”* button activates drive me functionality which will guide you to the location of the reading at the field, and the *“Delete”* button which deletes the selected reading. Deleting a reading is irreversible.

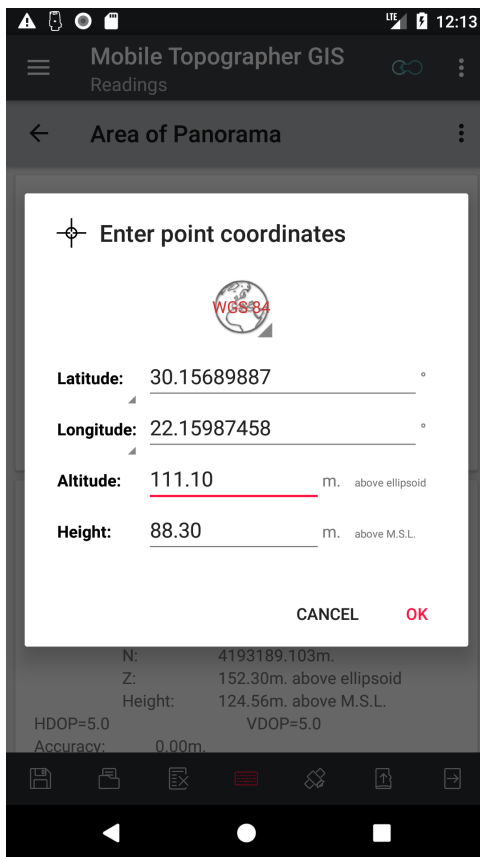


Use the bottom toolbar of the list of readings to perform one of the following actions: (The same option can also be found into the action menu of the list)

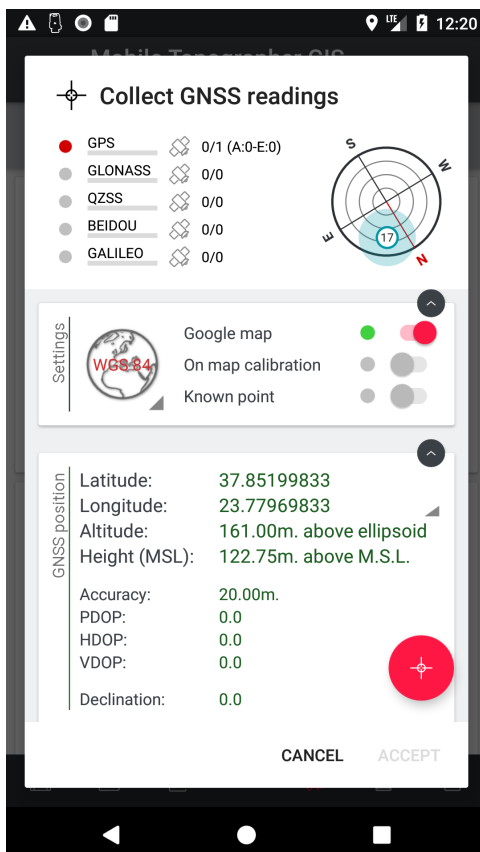
- **“Save list”** Saves the list of readings into a file. A saved list can be reloaded later to a route. Specify a filename and press [OK] in the presented dialog. The filename you specified will be given the extension .pts. The file will be saved into:
[internal storage]/MobileTopographerGIS/Route_saves
- **“Load list”** Loads a list of readings from a file. If the current list is not empty it will be overwritten by the loaded one. A confirmation dialog will ask you to verify the

action. Tick the [I'm sure] box and press [OK]. Select the list you want to load via the "File manager" dialog and press [OK].

- **"Clear list"** clears the contents of the current list. Clearing the list is irreversible so proceed with caution, providing confirmation to the next dialog.



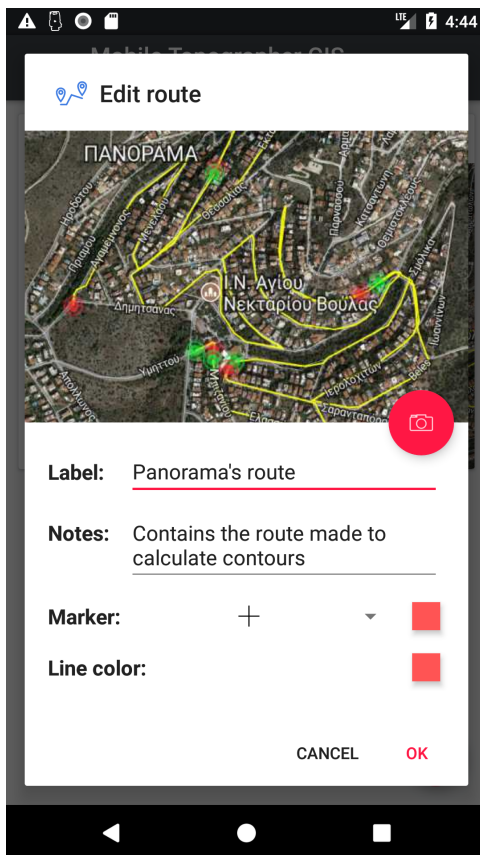
- **"Add readings manually"**, a dialog appears letting you manually input the coordinates of a point you want to add as a reading. Use the *"Projection switcher"* button to switch between WGS84 format and local CRS format. While in WGS84 format touch or click the "Latitude" or "Longitude" labels in order to switch between decimal and sexadecimal formats. You can manually input either the ellipsoidal altitude or the orthometric height. The application automatically calculates the other using its embedded geoid models.



- **"Add readings via GNSS"**, the "Collect GNSS readings" dialog appears. Via this dialog you can collect a reading of increased accuracy. See the "Add GNSS point" section for more information regarding the contents of this dialog and how to use it.
- **"Import list"**, let's you import readings from a .txt, .csv, .dxf file or shape files. See "Importing data" section for more info on how to successfully import some readings. The imported readings are added to the list and do NOT overwrite any existing data.
- **"Export list"** will guide you through the export procedure. All readings will be exported into a file which will be placed into:
- *[internalStorage]/MobileTopographerGIS/route_exports*

Please note, that changing the readings of a route in any way, will delete the calculation of the legs and their infodata, if they exist.

Edit route

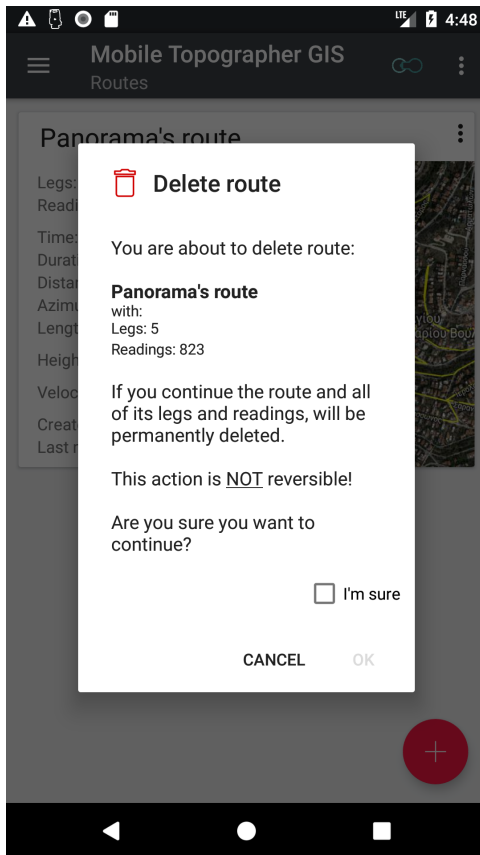


The “**Edit route**” dialog lets you edit the properties of a route.

It contains the fields “*Label*”, “*Notes*”, “*Marker*” and “*Linecolor*”.

- “**Label**” field cannot left empty. Although it is not mandatory for the label to be unique it is highly recommended not to repeat existing labels.
- “**Notes**” field is offering the possibility to add free text notes regarding this route.
- “**Marker**”, select the drawing to be used while projecting this route on the map. Touch or click the color sample to select the color of the marker.
- “**Linecolor**” Touch or click the color sample to select the color of the lines connecting the points of the route.

Delete route

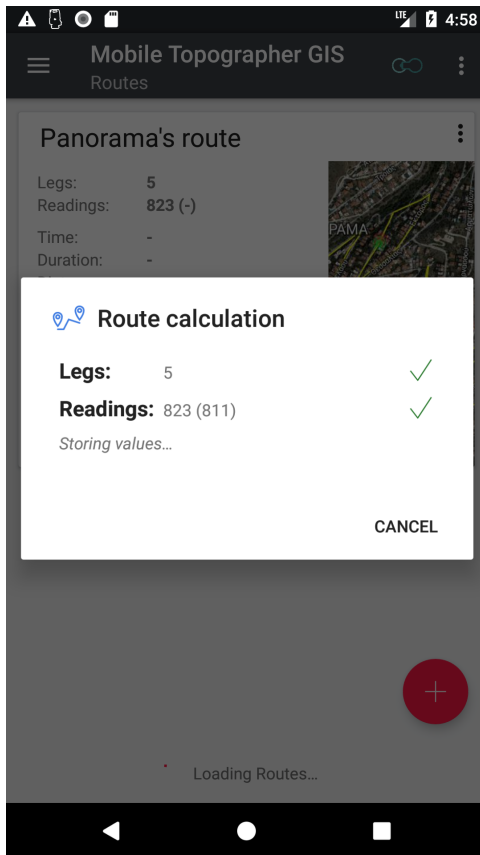


From the action menu of a card inside the list of routes, select “**Delete route**”.

A dialog will appear informing you about the contents of this route and asking for your confirmation before proceeding.

Proceed with caution. This action is irreversible and all the data of the route will be lost forever.

Calculate info



From the action menu of a card inside the list routes, select **"Calculate info"**.

If a calculation already exists. A dialog will appear informing you that about the contents of this route and asking for your confirmation before proceeding.

The calculation starts. You can cancel it at any time by touching or clicking the [CANCEL] button, or the back key of your device.

Please note, that this calculation may take a lot of time to be completed.

Export route

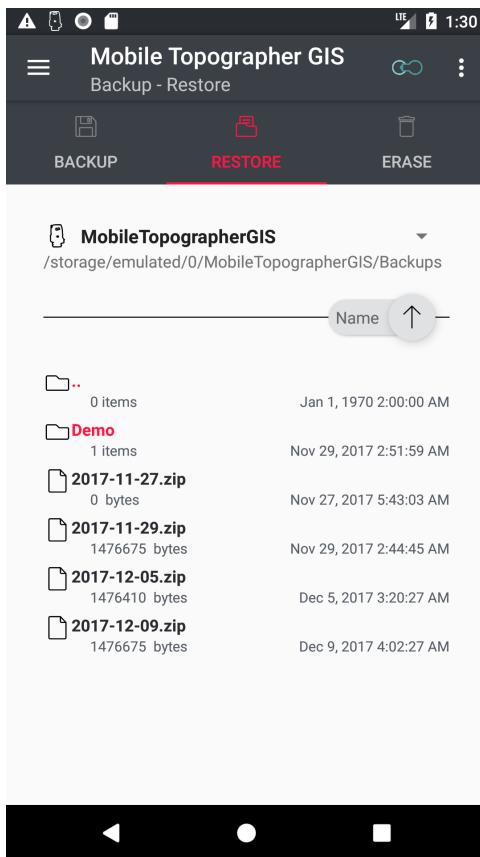
From the action menu of a card inside the list of routes, select **"Export route"**.

A dialog window will let you specify the file type and the filename to be used. You can select between .txt, .csv, .kml, .gpx, .dxf and shape files format. Depending on the file format chosen, some data may not be exported.

The export file will be placed into:

[internalStorage]/MobileTopographerGIS/route_exports

The file manager



There many times into Mobile Topographer that you will find yourself looking at the **“file manager”**. One example of such a case is when you want to restore a previously backed up image of the database.

The file manager view consists of two parts. The upper part is the *“storage media selector”*.

The **“storage media selector”** is a dropdown list of the available storage media of your device. These include the internal storage, the emulated SD card, the external SD card (if exists), and any other external storage devices such as a USB stick that may be connected.

Apart from these the “storage media selector” provides shortcuts to the *“MobileTopographerGIS”* folder, the *“Download”* folder and the *“Documents”* folders located into the emulated SD card. A link to the *“root”* of the file system of your device is also provided.

Right below the “storage media selector” the path of the selected folder is displayed.

At the lower part of the file manager view you can find the contents of the selected folder.

Sub-folders are displayed in accent color (red) and are always preceding the files. Touch or click on a folder entry to select it.

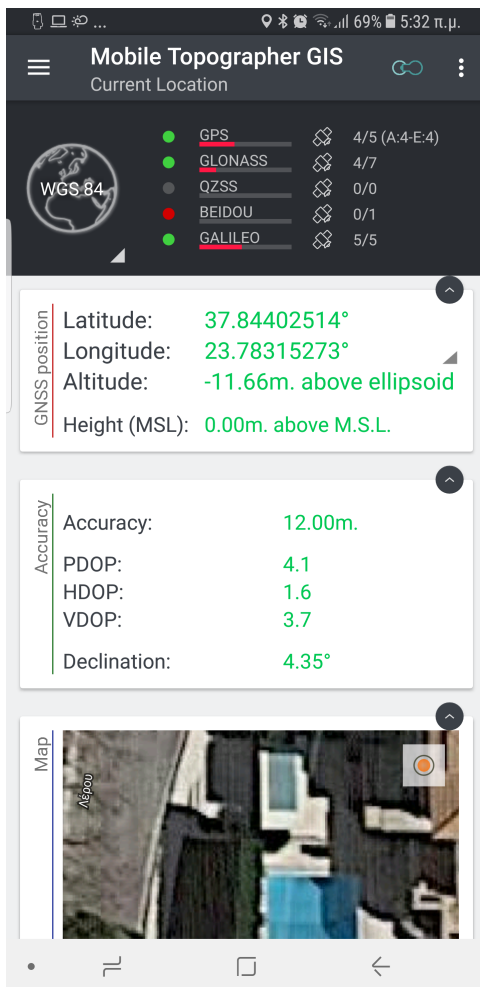
The first entry into the list is the parent folder entry (..).

Touch or click it to go to the parent folder of the displayed one.

You can change the sort order of the folder contents by touching or clicking on the “sort order buttons” located in between the “storage media selector” and the folder contents. The leftmost button lets you select by which property the items are sorted. Available options are *“Name”*, *“Contents”* and *“Date”*. Change the order from ascending to descending by touching or clicking the arrow button to the right.

Touching or clicking on a file entry, selects this files and ends the file manager.

Current Location



From the navigation menu choose “Current location” in order to display the current location info.

The screen is divided into two parts:

The upper part (or the leftmost in landscape mode) contains the “*Projection switcher*” button (the globe or map icon) letting you to switch between geodetic and cartesian coordinates. For geodetic coordinates the “*World Geodetic System 1984*” (WGS84) is used. For cartesian coordinates you can choose which system to use from the settings of the app.

To the right of the projection switcher resides the “satellites info” part. The satellites info part contains five lines, each one representing a GNSS satellites constellation. *(Some devices do not provide constellations information. In such a case there is only one line visible with the label GNSS) .*

Supported constellations are:

- **GPS,**
- **GLONASS,**
- **QZSS,**
- **BEIDOU** and
- **GALILEO**

The colored indicator determines the existence and quality of fix of the constellation. When it is “off”, it means no signal from any satellite of this constellation is received. When it is “red”, it means that the signal of the satellites of this constellation is very weak not providing positioning info. When it is “yellow”, it means that the signal of the satellites of this constellation is fairly good providing coarse positioning. When it is “green”, it means that the signal of the satellites of this constellation is good providing fine positioning.

Further to the right, the number of satellites used for positioning and the number of visible satellites of this constellation is displayed.

The constellation of GPS provides some extra info which are displayed inside the parenthesis. These are the number of satellites (from the ones used for positioning) that are providing Almanac and Ephemerides data.

The bar below each constellation label indicates the signal strength of this constellation.

The lower part of the screen (or the rightmost in landscape orientation) contains a list of three cards displaying the positioning information. Each of these cards can be collapsed by touching or clicking the small gray button on the upper right corner of it.

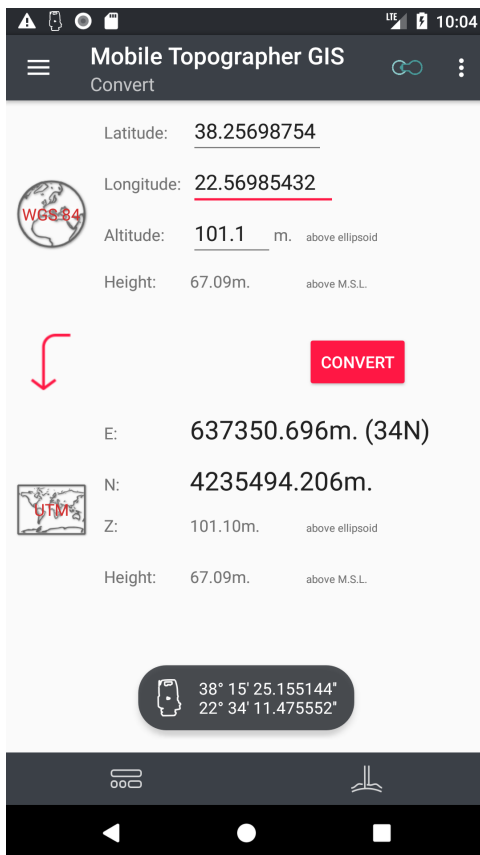
The first card, contains the coordinates of the current position. The coordinates are displayed into WGS84 or local CRS format. While in WGS84 format, touch the latitude and longitude values to switch from decimal to sexadecimal format.

The second card contains accuracy information together with the compass declination value. DOP and accuracy values are provided from the GNSS receiver.

The third card provides a map projection of the current location. The map is zoomed to the maximum available zoom level and is automatically paned as the location marker moves. You can enable an image or WMS server overlay on the map projection via the settings of the app.

The small button at the upper right corner of the map is the "Follow marker" button. When it is accented the "auto follow" position marker is enabled. Long touch it or click it to disable or re-enable auto follow. When "auto follow" is disable you can touch or click this button shortly to zoom once to the current position of the marker.

Convert



From the navigation menu choose “**Convert**” in order to invoke the coordinates converter.

In this screen you can manually input geodetic or cartesian coordinates of a point, and convert them to cartesian or geodetic respectively.

The screen is divided into two parts. The upper part contains the geodetic coordinates (WGS84 format) while the lower part contains the cartesian ones (local CRS format).

While in geodetic to cartesian mode, input the latitude, the longitude and optionally the altitude of a point in WGS84. Then press the [CONVERT] button. The cartesian coordinates of the point will be displayed on the lower part of the screen. In the other hand, while in cartesian to geodetic mode, key in the Northing and Easting values and optionally the altitude of a point in the current CRS. Then press [Convert] button. The geodetic coordinates of the point in WGS84 will be displayed on the upper part of the screen.

In order to switch between geodetic to cartesian and cartesian to geodetic conversion mode, touch or click arrow on the left of the [Convert]. The direction of the arrow indicates the direction of conversion.

The default input format in WGS84 mode is decimal ("dd.dddddddd"), but you can switch to degrees - minutes - seconds format (dd°mm'ss.sss') by pressing the corresponding button in the bottom toolbar.

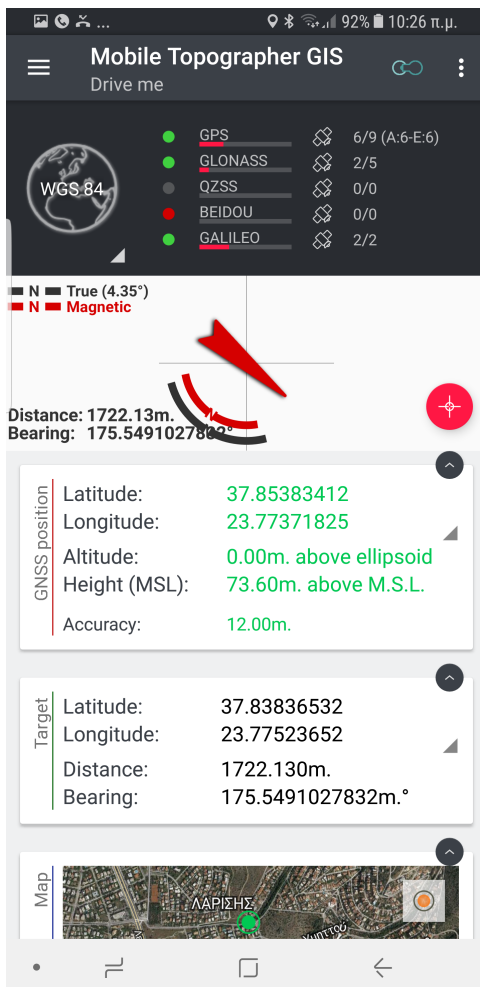
You can change the cartesian system of coordinates at any moment from the settings screen of the application.

At the lowest part of the screen resides the bottom toolbar (*Press and hold on an icon, to see a short help text*).

Starting from left to right:

- The "**Change format**" icon switches the input format of the geodetic coordinates between decimal ("dd.dddddddd") and degrees - minutes - seconds sexadecimal (dd°mm'ss.sss') format.n
- The "**Orthometric or Ellipsoidal height**" icon switches the altitude-height input between Orthometric height and Ellipsoidal altitude.

Drive me



From the navigation menu choose **“Drive me”**. Use this tool to locate a point at the surveying field, or just use it as a simple compass displaying both magnetic and true north.

The screen is divided into three parts:

The upper part (or the leftmost in landscape mode) contains the *“Projection switcher”* button and the *“satellites info”* part. (See *“Current location”* section for more info regarding this part).

The center part of the screen contains the compass view. In the compass view you can find:

- The *“Magnetic North”* in “red”.
- The *“True North”* in black.
- The *“Magnetic declination”* of the compass at your position.
- The *“Bearing pointer”* (the red arrow in the center of the compass view).
- The *“Distance”* and *“Bearing”* values.
- The *“Specify new target”* floating action button located at the bottom right corner of this part.

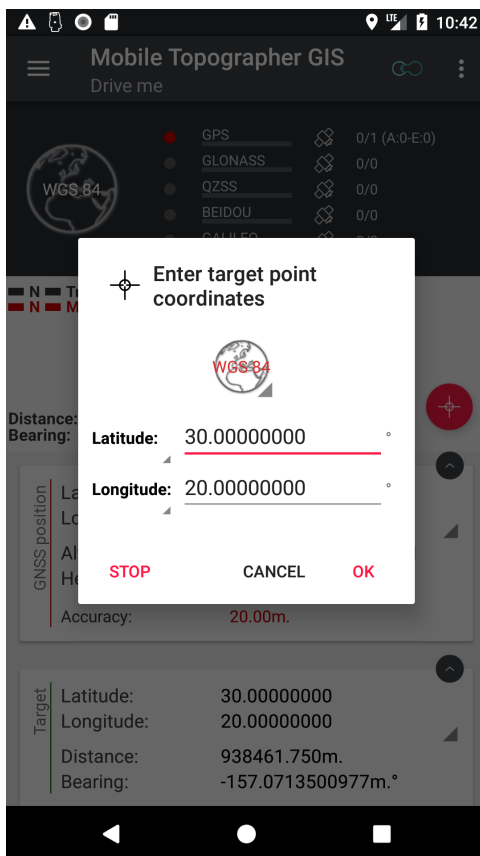
(Note, that the true North and declination values may need some time before been displayed. Also the bearing pointer is only visible when you've already specified a target point).

The lower part of the screen consists of a list of three card views. All card views are expandable / collapsible via the small gray floating action button at the upper right corner of it. The three cards are:

The *“GNSS position”* card is displaying information regarding the current position of the device. (see *“Current position”* for more info regarding this card).

The *“Target”* card is displaying the coordinates of the target point plus the distance and bearing from your position to the target.

The *“Map”* card projects both the current position (with a green marker) and the target point (with a red marker) on the map. The map is zoomed to the maximum possible zoom level and is automatically panned so as to contain both markers. The small button at the upper right corner of the map is the *“Follow markers”* button. When it is accented the *“auto follow”* markers is enabled. Long touch it or click it to disable or re-enable auto follow. When *“auto follow”* is disable you can touch or click this button shortly to zoom once to the current position and target markers. You can enable or display an image or WMS server overlay from the settings menu of the app.

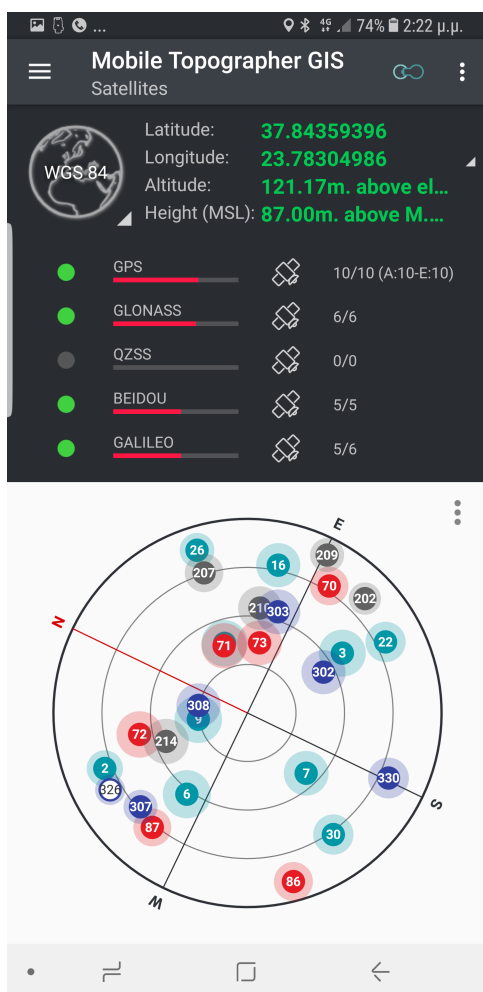


Just touch or click the “*Specify new target*” floating action button and enter the coordinates of the point you want to locate, wait for a GNSS fix, and follow the pointer.

If you want to change the target point just touch or click again the “*Specify new target*” button, and input the coordinates of a new target point. In the other hand you can touch or click the [STOP] button from the “*Input new target coordinates*” dialog, in order to stop targeting a point.

In order to cancel targeting a point, touch or click again the “*Specify new target*” button, and touch or click the [STOP] button in the “*Input new target coordinates*” dialog.

Satellites



From the navigation menu choose “**Satellites**”. Use this tool to see where all visible satellites are located in the sky and evaluate the quality of fix.

The screen is divided into two parts:

The upper part (or the leftmost in landscape mode) contains the “*Projection switcher*” button and the “satellites info” part. (See “*Current location*” section for more info regarding this part).

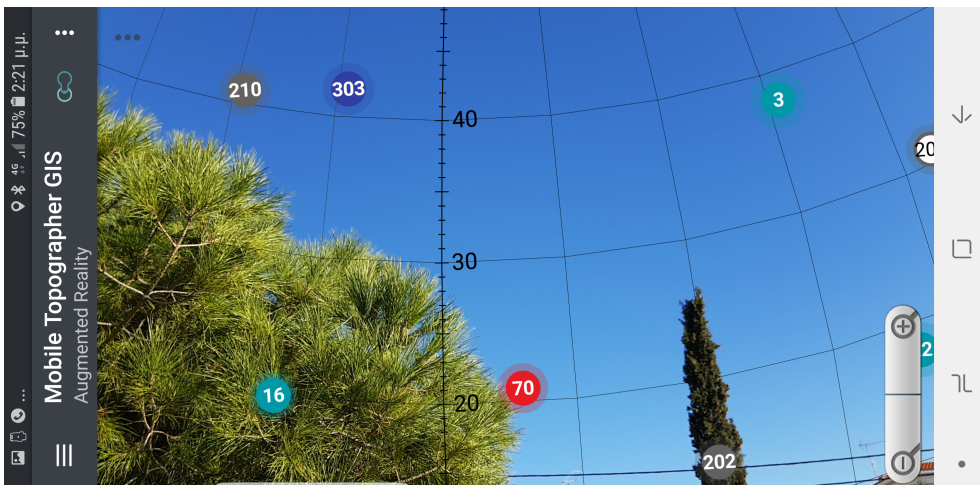
The lower part displays the sky view. In this view the sky dome is represented with four circles. The outer circle stands for the horizon when the other three are dividing the dome in four parts, each one representing a portion of the dome of 22.5 degrees. The center of the view is the zenith point of the sky which means the point which is exactly vertically above you. A satellite marker is drawn for every visible satellite. The color of the marker indicates the constellation of the satellite. Touch the “*Legend...*” icon (3 dots) to see a constellations color map. The number in the center of the marker is the unique ID of the satellite also called PRN. When the center of the marker is white it means that the satellite is visible but it is not used for position. A filled with color marker means that the satellite is been used for positioning. The colored glow around the marker is representing the signal strength.

Bigger glow means stronger signal.

(Note: Some devices hardware and or firmware don't provide all the data described before. In these cases some of these data may be not available or they may be inconsistent).

Augmented Reality

From the navigation menu choose “**Augmented reality**”.



In Augmented Reality mode the camera of your device is used in order to project the satellites on the real sky dome above you. Just move your device up, down, left or right and watch the position of each GNSS satellite.

Use the zoom buttons [- | +] on the lower part of the screen to calibrate your sky dome view following the steps below:\n

Hold your device in vertical position so as you can view the horizon. Rotate your device to the left or right until you have a clear mark (for example a tree) at the leftmost part of your screen. Mark the azimuth indication of the mark (for example 240°). Now move your device slowly to the left till your mark is now situated at the rightmost part of your screen. If the azimuth indication of the mark has now changed your device needs calibration. If the new azimuth value is greater than the one when the mark was on the left side, press the zoom in button. If it is lower, press the zoom out button. Repeat the procedure until you have calibrated the view perfectly. The new calibration is stored.

The screen orientation remains locked, while this view is active. So feel free to rotate freely your device and investigate the sky.

(Note: In some cases the camera background of the sky dome view may be distorted. The magnitude of the distortion depends on the hardware of your device (camera and screen resolution). A magnetic sensor is required for this view to function properly).

Subscriptions

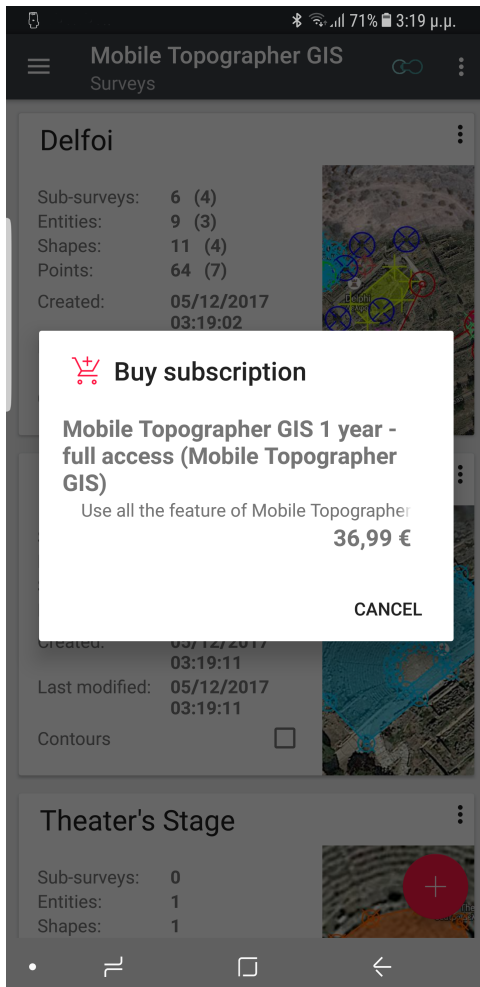
Mobile Topographer GIS works with subscriptions. You must have an active subscription in order to use the application. If you don't have an active subscription the application will exit. There are two available options into the Subscriptions group:

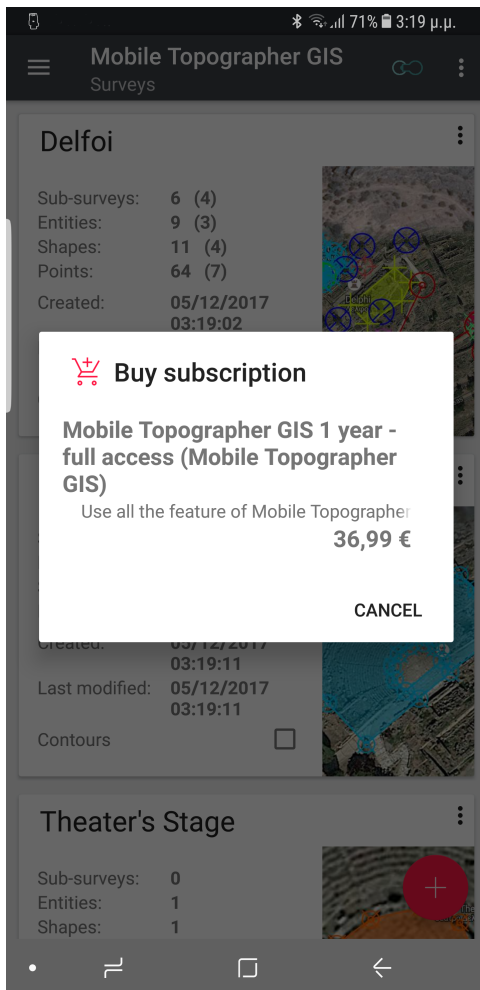
The **Show** option:

Select this option in order to see your active subscriptions.

An **active** subscription is one that you have already purchased and has not expired yet. As we've already seen, active subscriptions are auto renewable by default upon expiration.

Click on active subscription to see its details, cancel it, and/or manage its auto renewing setting.





The **Buy** option:

Select this option to see available for purchase subscriptions. Active subscriptions will not be presented.

Click on a subscription, in order to start the purchase procedure.

Purchases and subscriptions are managed exclusively by google play store. We do not have any access to your credit card data, nor any details regarding your financial transactions.

You can also manage your subscriptions directly via the play store application of your device, or play store's web page.

Calibrations

Mobile Topographer GIS is using two different types of calibrations:

“Display calibration” and *“Positioning calibration”*.

Use *“Display calibrations”* to correct inconsistencies of map data, and/or use *“Positioning calibrations”* to correct GNSS receiver errors.

The application supports **“Google map calibration”** as a display calibration.

From the navigation menu choose **“Google map calibration”**

The existing calibration will be projected on the map.

There are two markers the red one represents the coordinates of the calibration base, while the green one represents the corrected position.

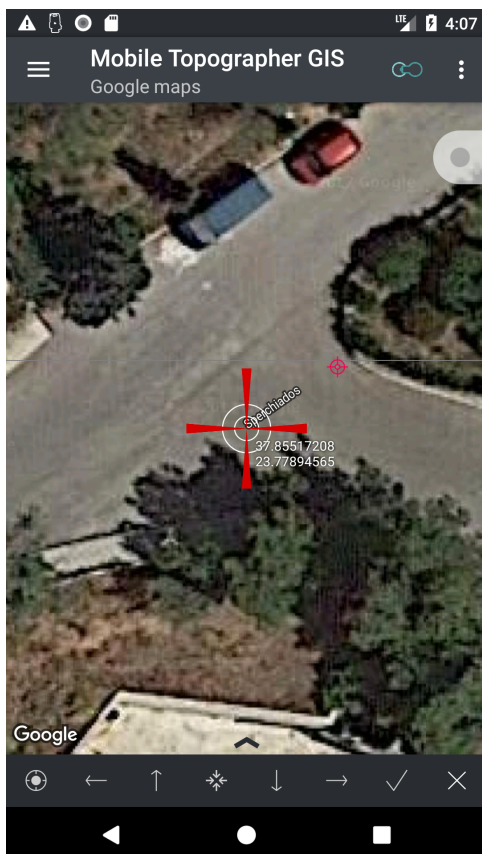
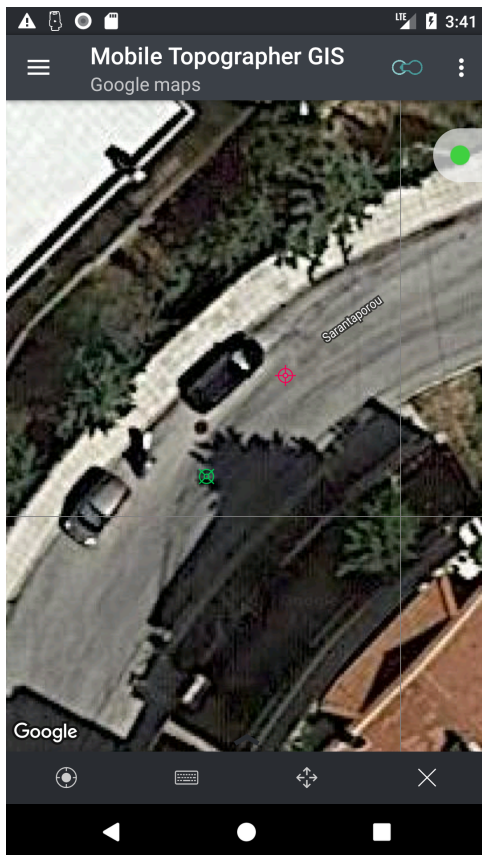
At the upper right part of the screen you can see the “Quality indicator”. When it is green, it means that a near calibration of this type exists. When it is yellow, it means that the stored calibration of this type have been performed relatively far from your location. When it is red, it means that the calibration of this type have been performed far away of where you are. When it is gray it means that a calibration of this type does not exist.

The use of a “red” calibration is prohibited and the app doesn’t take them into account. Use of a “yellow” calibration, although possible, it is not recommended. Feel free to use “green” calibrations and increase the accuracy of the projection on the map.

At the lower part of the screen you can find the bottom toolbar.

When there is no calibration only two buttons are visible. The “*Zoom extends*” button and the “*Enter coordinates*” button. Touch or click the “*Enter coordinates*” button and the corresponding dialog will appear prompting you to input the coordinates of the calibration base. The suggested coordinates are fetched from the location services of your device as these of the last location. Correct the coordinates and press [OK].

The red marker with these coordinates appears on the map. If the coordinates are placed correctly, you don’t need to store any display calibration. If it is



mispositioned. Touch or click the “*Move calibration target point*” button located at the bottom toolbar (the four arrows). A crosshair indicator will appear. Move the crosshair by panning the map so as to have the crosshair placed exactly on the position that really has the coordinates previously entered. Touch or click the [Accept changes] button (the check mark) to store the calibration or the “*Erase calibration*” (the X) to cancel the calibration procedure.

While the crosshair is visible use the “*Move left*”, “*Move up*”, “*Move down*” and/or “*Move right*” buttons to move the crosshair only one pixel and fine position it on the map.

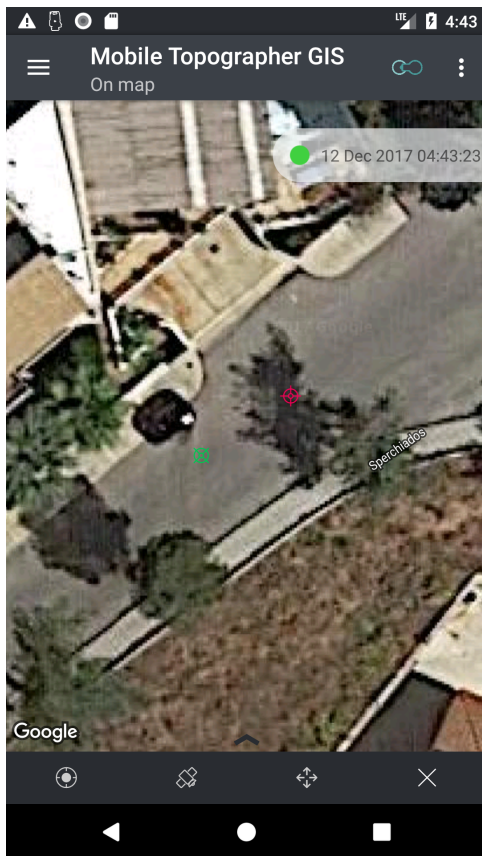
While a calibration exists, or the crosshair is visible drag the bottom toolbar upwards. The coordinates of both the calibration base and calibration target will be displayed.

Use the “*Erase calibration*” (the X) to erase an existing calibration.

Positioning calibrations

Mobile Topographer GIS supports two different types of positioning calibrations”:

“**On map calibration**” and “**Know point calibration**”



From the “**Calibrations**” section of the navigation menu choose “**On map**”.

The existing calibration will be projected on the map.

There are two markers the red one represents the coordinates of the calibration base, while the green one represents the corrected position.

At the upper right part of the screen you can see the “Quality indicator”. When it is green, it means that a near and recent calibration of this type exists. When it is yellow, it means that the stored calibration of this type have been performed relatively far from your location or is relatively old. When it is red, it means that the calibration of this type have been performed far away of where you are or long before. When it is gray it means that a calibration of this type does not exist. To the right of the color indicator you can see the time-stamp of the calibration.

The use of a “red” calibration is prohibited and the app doesn’t take them into account. Use of a “yellow” calibration, although possible, it is not recommended. Feel free to use “green” calibrations and increase the

accuracy of the projection on the map.

At the lower part of the screen you can find the bottom toolbar.

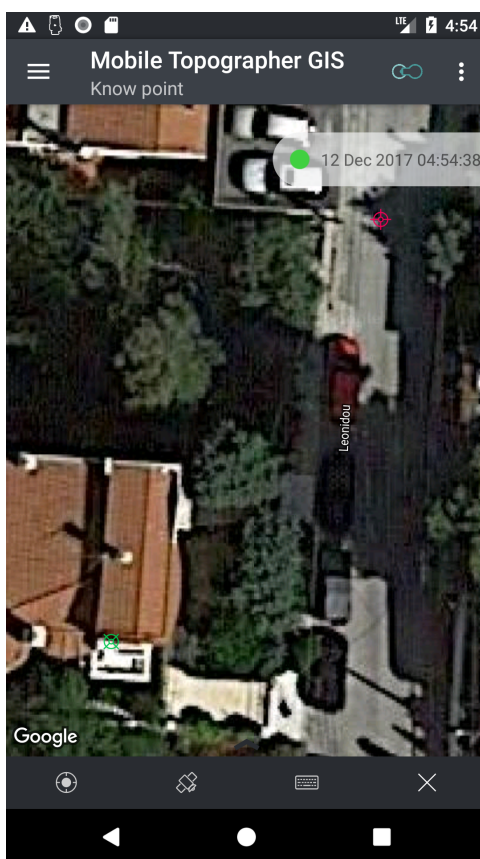
When there is no calibration only two buttons are visible. The “*Zoom extends*” button and the “*Get accurate GNSS point*” button. Touch or click the “*Get accurate GNSS point*” and the corresponding GNSS semitransparent windows will cover the screen. Now you can start the *collect GNSS readings procedure* as it is described earlier in this document.

After having finished with the increased accuracy base point the red marker appear on the map using these coordinates. If the coordinates are placed correctly, you don't need to store any position calibration. If it is mispositioned. Touch or click the "*Move calibration target point button*" located at the bottom toolbar (the four arrows). A crosshair indicator will appear. Move the crosshair by panning the map so as to have the crosshair placed exactly on the position that really has the coordinates previously entered. Touch or click the [*Accept changes*] button (the check mark) to store the calibration or the "*Erase calibration*" (the X) to cancel the calibration procedure.

While the crosshair is visible use the "*Move left*", "*Move up*", "*Move down*" and/or "*Move right*" buttons to move the crosshair only one pixel and fine position it on the map.

While a calibration exists, or the crosshair is visible drag the bottom toolbar upwards. The coordinates of both the calibration base and calibration target will be displayed.

Use the "*Erase calibration*" (the X) to ease an existing calibration.



From the "**Calibrations**" section of the navigation menu choose "**Known point**".

The existing calibration will be projected on the map.

There are two markers the red one represents the coordinates of the calibration base, while the green one represents the corrected position.

At the upper right part of the screen you can see the "Quality indicator". When it is green, it means that a near and recent calibration of this type exists. When it is yellow, it means that the stored calibration of this type have been performed relatively far from your location or is relatively old. When it is red, it means that the calibration of this type have been performed far away of where you are or long before. When it is gray it means that a calibration of this type does not exist. To the right of the color indicator you can see the time-stamp of the calibration.

The use of a "red" calibration is prohibited and the app doesn't take them into account. Use of a "yellow" calibration, although possible, it is not recommended. Feel free to use "green" calibrations and increase the

accuracy of the projection on the map.

At the lower part of the screen you can find the bottom toolbar.

When there is no calibration only two buttons are visible. The "*Zoom extends*" button and the "*Get accurate GNSS point*". Touch or click the "*Get accurate GNSS point*" and the corresponding GNSS semitransparent windows will cover the screen. Now you can start the *collect GNSS readings procedure* as it is described earlier in this document.

After having finished with the increased accuracy base point the red marker appear on the map using these coordinates. The "*Enter coordinates*" dialog appears waiting for you to correct the coordinates. If the coordinates are accurate enough, you don't need to store any position calibration. If they are not accurate, input the accurate coordinates. Touch or

click the [*Accept changes*] button (the check mark) to store the calibration or the "*Erase calibration*" (the X) to cancel the calibration procedure.

While a calibration exists, or the crosshair is visible drag the bottom toolbar upwards. The coordinates of both the calibration base and calibration target will be displayed.

Use the "*Erase calibration*" (the X) to erase an existing calibration.

Only one of the positioning calibrations can exist. Never try to perform both.

Use calibrations with caution. Wrong calibrations may lead to worst accuracy.

From the navigation menu use the switches of each available calibration to enable it. When active a calibration is used applicationwide.