

Contour - Volume - Stakeout

Help Document

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Overview

I. Working with Features

[Job Data Management](#)

[Set up Map Defaults](#)

[Display Map and Turn GPS ON/OFF](#)

[Topic Menu](#)

[Topic View](#)

[Digitize Features](#)

[Move Node](#)

[Feature Properties](#)

[Create Grid](#)

[Measure Distance](#)

[Measure Area](#)

[Locate a Point by Address](#)

II. Contour & Volume

[Contour Settings](#)

[Generate Contours](#)

[Compute Volume](#)

[Contoured Map View](#)

III. Stakeout

Point Stakeout Line Stakeout

Overview

The Contour - Volume - Stakeout app is loaded with a multitude of functions that operate on Points, Lines and Areas that represent land features. You may use it to perform the following tasks:


- * Create Point, Line and Area Features by digitization or data import.
- * Contour elevations or the values of a variable (such as amount of fertilizer to apply)
- * Compute volumes (such as of amount of soil to move) based on the contoured region
- * Use the contour map as a guide in fertilizer application.
- * Use GPS to stake out Points (such as going to a grid point to take soil samples).
- * Use GPS to stake out nodes on a Line or Area Feature.

This app also provides a number of useful mapping functions. Please follow the examples provided in this document to learn how to use the functions in this software for your mapping application.

Map View

The **Map View** is the main screen that shows any spatial data (Features) and/or background map present in the currently active job.

You may select a displayed **Feature** by tapping on it in Map View. When you do so, the selected Feature will be highlighted in the **default orange color**. The Feature ID and the location coordinates will pop up in Map View.

After selecting a Point, Line or Area Feature, you may tap the **Feature Properties** tool icon  to assign a different symbol to represent it.

You may zoom into the map by double-tapping, or by pulling two fingers apart on the screen. You could zoom out of the map by tapping two fingers on the screen simultaneously, or by pinching two fingers on the screen.

The map scale is displayed at the lower-right corner of the Map View.

Displayed across the top of the **Map View** are the following tool icons.

Tap the **Main Menu** tool to see a menu of job management and setup functions:



The **Topic Menu** provides functions to create, edit, move or delete Feature Topics, to edit the Values of the Feature Attributes, and to import or export Features in text file format:



The **Map Tools Menu** lists the digitizing tools as well as the functions for creating a grid over an area. Tap the **pull-down arrow** to reveal the map tools. The icon for the currently active map tool is displayed. For example the **Add Point manually** icon is initially displayed by default:



The **Utilities Menu** provides access to the Contour and Volume functions as well as functions for measuring distances and areas and for locating a point by address. Initially, the Contour/Volume icon is shown:



Tap on the **Zoom Fit** icon on the Toolbar to display all map elements:



With a Feature selected, you will be able to view its coordinates as well as assign Attributes and Values to the Feature by using the **Feature Properties** tool:



The **GPS** Menu provides access to GPS position information and the **Stakeout** functions:



Tap the **Topic View** toggle to select an active Topic from the listed Topics:




Additional tool icons may be displayed when you work with a specific function. All of these functions will be covered in this document.

On-screen Keyboard

An on-screen keyboard will automatically pop up when the focus is on a data entry screen. After entering data, tap the **Return** button on the pop-up keyboard. If a **Next** button is displayed in the data entry dialog, then tap that button to go to the next step. To hide the keyboard, tap the **Hide Keyboard Key** on the pop-up keyboard.

When you tap on an existing value in a data entry field, if one character is highlighted, you may replace it by entering a different character. If the cursor is displayed, you may insert characters at that location. To replace the entire text or numeric value in the field, first swipe the field to highlight all the characters then enter the new data.

When entering numeric data, you will notice that there is a **Separator Key**  showing several symbols on it. This key will facilitate data entry in several ways.

To enter a distance value with a fractional part, tap this key to put in the decimal point.

To enter angles in **DMS** (Degrees- Minutes-Seconds), if your data value will not fill in all the places, then tap the separator key after entering the desired value. For example, to enter the longitude of 91°09'26.082"W, you could type in 0910926.082W. Or, you could type 91, tap the special key, type 9, tap the separator key, then enter 26.082W.

[Back to TOC](#)

Job Data Management

The application software requires a job file to be open for it to work with. The **Job Menu** under the **Main Menu** provides functions for opening a job, saving a job, importing a set of Shapefiles as well as importing/exporting a DXF file.

Opening or Creating a Job File

To open an existing job file, tap the **Main Menu** icon, select **Job** then select **Open Job** . Select a job file to open, such as **test.pmp**. (The job files for this app have the **.pmp** file name extension.)

To create a new job file, tap the **New** button. Accept the proposed file name or enter a unique file name then tap the **OK** button. (Yes, it's okay to type over the displayed file name.)

Once the proper files have been selected and any optional information has been entered, click on **OK**. If you have selected an existing job, your job data will be displayed.

If you are working with a job file and want to open another job file instead, select **Main Menu**, select **Job**, select **Open Job** then select the desired file name. This action will automatically close the previously opened file.

If you are not sure which job file you are working on, select **Main Menu**, select **Job** then select **Open Job** to view the File Dialog screen. The name in the **File Name** box is that for the currently open file.

To cancel out of the screen for opening a file, simply tap the **Cancel** button.

Saving the Job File

To save the data in the currently open file, tap the **Main Menu**, select **Job** then select **Save**. The file extension will be ***.pmp**.

To save the data under a different file name, tap the **Main Menu**, select **Job** then

select **Save As**. Enter the new file name.

Let's save the **test.pmp** example file that you have just opened under a different name, such as "mycorners". This way, you can work with **mytest.pmp** and keep the original test.pmp file intact for future reference.

If you need to make a change in the current job file that you are not sure about, you could save the job under a different name as a back-up before making the change. The newly saved file will be the active job file. Therefore, if you wish to work on the original file, then open that job file before proceeding.

Whenever you open another job, the program automatically saves the data in the current job and closes the current job.

Accessing the Documents Folder

The data files, such as the *.pmp job files, will reside in the **Documents** folder for the application. To access your data files outside of the application, first sync your device with the iTunes® program. Then you should see an **Apps** tab across the top of the screen. Click on that tab then scroll down to the **File Sharing** section. Click on the **Contour - Volume - Stakeout** app name. After a while, the data files associated with this app will show up on the right-hand side.

You may copy files between the Documents folder for the app and your desk-top computer. You can drag files into or out of this Documents folder. You may use the **Add** button on the iTunes® screen to select and add files from your computer to the Documents section. **Make sure the job file you are copying is not the working job file.** In other words, open a different job file to make it the working job file.

To delete a file, first highlight it then press the **Del** button on your computer.

Caution: A deleted file cannot be recovered. Always make sure you really want to delete a file before proceeding.

Please note:

Before updating to a new version of **iOS**, first back up all you apps and data files. Also, should you decide to remove an application software for some reason, beware that all the associated data files will be deleted. If you wish to save the data files, please save a copy to your desk-top computer before removing the app.

Import Shapefiles

You may import the data from Shapefiles for use within this app. As each Shapefile has several files associated with it (e.g. the .shp, the shx, the .dbf, and the .prj files), please make sure all these files are present in the **Documents folder** for the application.

To import a Shapefile, first open the desired Job file, or create a new Job file.

Choose **Job** then select **Import Shapefiles**, select the desired Shapefile then tap the **OK** button.

If the coordinate system in the .prj file for the Shapefiles is a commonly used coordinate system recognized by the app, the shapes will be imported promptly. Otherwise, you will be prompted to specify the Datum, Coordinate System, Unit and Region in which the data was saved in the Shapefiles. If the selected Datum and Coordinate System do not match those in the Shapefile, the data may fail to come in or it may not be properly displayed.

If a GSB file (Canadian grid file) is to be used, tap the **Load** button then select the appropriate file. Use the **Unload** button to remove the GSB file.

The imported data will be converted to WGS84(1150) ITRF00, METERS, and Epoch 01/01/2014.

Import DXF

You may import the shapes from a DXF file and work with them in this app.

To import a DXF file, first open the desired Job file, or create a new Job file. Choose **Job** then select **Import DXF**. The Import DXF screen will list all the DXF files present in the **Documents folder** for this app. Select the desired DXF file then tap the **OK** button.

Select the Datum, Coordinate System, Unit and Region in which the data was saved in the DXF file then tap the **OK** button. If the selected Datum and Coordinate System do not match those in the DXF file, the data may fail to come in or it may not be properly displayed.

If the imported DXF file contains Features for a Topic with the same name as an existing Topic in the currently active job, those Features will be added to the existing Topic in the job.

If a GSB file (Canadian grid file) is to be used, tap the **Load** button then select the appropriate file. Use the **Unload** button to remove the GSB file.

The imported data will be converted to WGS84(1150)ITRF00, METERS, and Epoch 01/01/2014.

Export to DXF

The Features in the working job file may be exported to a DXF file. The exported DXF file will reside in the **Documents folder** for this app.

To export the Feature data to a DXF file, choose **Job** from the **Main Menu** then select **Export DXF**. Mark the Topics that are to be exported and select the desired options then tap the **OK** button.

Mark the **3D** checkbox if the elevation values are also to be exported.

Select the **In Block** option if you wish to export the Features in block format into

the .DXF file. Then you may mark the **With Attributes** checkbox if you wish to have the Features exported along with their attribute values.

The app will create a DXF layer for each Topic marked for export. If you wish to export the selected Topics to the same layer, then mark the **Export to one layer** checkbox and enter the name of that layer in the **Layer name** box.

Data will be exported in LLA WGS84(1150) ITRF00 and Epoch 01/01/2014. The distances and angles will be exported in the active distance and angle units.

Exporting to PDF

To export the job data to a PDF file, tap the **Main Menu** icon select **Job** then select **Export to PDF**.


You may accept the displayed default name for the PDF output file, or you may type over it with the name you wish to assign to the PDF file.

Tap the **OK** button to complete the PDF export. The contents of the PDF file will be displayed. The first page will show the drawing of the Features as they are displayed on the screen. If you wish to have all Features included in the drawing then first zoom out sufficiently to have the Features displayed on the screen before exporting to PDF.

The additional page(s) will show the boundary coordinates and areas of the Area Features as well as the coordinates of the Point Features or the starting and ending nodes of the Line Features.

If you wish to overwrite an existing PDF file, then select that file from the list. **Beware that doing so will erase all the existing contents of the selected PDF file.**

To make sure you really want to overwrite an existing PDF file, tap on the **View File** check box then select the file you wish to view. In this mode, instead of the **OK** button, you will see a **View** button. Tap the **View** button to display the contents of the highlighted PDF file. Then tap the **Back** button to return to the File Dialog. When you are ready to overwrite the file, unmark the **View File** check box then tap on **OK** to overwrite the file.

If you have an AirPrint Printer, you may tap on the **Printer** icon  then confirm to print the contents of the PDF to that printer.

The exported PDF files will reside in the Documents folder for the application. To access the PDF files exported from the application, first connect to the iTunes® program then look in the Documents folder for the **Contour - Volume - Stakeout** app.

To delete a PDF file, use the iTunes® program to access the Documents folder for the app then select the file and hit the **Delete** button on your desk-top computer. **A deleted file cannot be recovered.**

[Back to TOC](#)

Email Files

You may email Job files (*.pmp), PDF files (*.pdf), CSV/Text files and DXF files (*.dxf). To do so, first tap the **Main Menu** icon, select **Job** then select **Email Files**.

Enter the destination email address and select the file type. The files listed in the displayed table depends on the file type selected. Mark the checkbox for the files you wish to send, then tap the **Send** button.

When the email is displayed with the attachments, tap the **Send** button at the top to send the email, or tap **Cancel** to cancel the action.

[Back to TOC](#)

Set up Map Defaults

Set up Units and Angle System

Select the **Unit and Angle System** under **Main Menu - Setup** to specify the desired length unit for displaying distances and line segments. The areas will be computed in the metric or British system accordingly.

Available choices for displaying angles are **Azimuth** and **Bearing**. If Azimuth is chosen, also specify the **Angle System**: North or South. Angles will be displayed in Degrees, Minutes and Seconds (DMS).

This Setup screen will also let you select the elevation system used for displaying, importing or exporting elevation values. Select **Orthometric(MSL)** when working with Mean-Sea-Level elevations. Select **Ellipsoidal(HAE)** when working with elevations based on the ellipsoid.

Set up Feature Labels

This app provides the option of labeling the line segments, areas and corner angles for the selected Feature when feasible. Please read the section on **Feature Properties** to see how to turn on these labels.

You can define the font color and size for the labels after selecting **Feature Labels** under **Main Menu - Setup**.

For line segments, if you would like the length label to be displayed above the line and the angle label below, then select "**Length is above**". Otherwise, select "**Angle is above**".

Mark the **Show white background** checkbox if you wish to have the labels displayed on a white background to make them stand out better over a satellite map.

Set up Default Grid


Use the **Default Grid** function under **Main Menu - Setup** to set up the default parameters for creating a grid over an Area Feature. These settings only apply to a newly created grid and will not affect any existing grids. Please read the section titled "**Create Grid**" to see how to create a grid over an Area Feature.

[Back to TOC](#)

Display Map and Turn GPS On/Off

Whenever you are connected to the Internet and your location can be determined, the default built-in Map for your device can be displayed as the background map for your job data.

You may select one of the following view modes after tapping the **Main Menu**

icon  then choosing **Map**:

Show Standard - Show a map of streets, landmarks, and bus stops.

Show Satellite - Show satellite photos.

Show Hybrid - Show street names on satellite photos.


To turn off the Map display, tap **Close Map** on the Map menu.

Where am I?

When you start a new job, the app does not know where you are.


1. With the Map turned on, you can find your continent then zoom in to your country, your city, hence your neighborhood. You may zoom into or zoom out of portions of the graphical view by using your fingers to pull or pinch on the display, respectively.

2. When Map is turned on, you could use the **Locate a Point by Address** function to enter your address or your coordinates to locate your position.

3. If your device is equipped with GPS or has Location Service, then you can tap the **GPS** icon  to turn on GPS. When prompted, confirm to allow the app to use Location Service to find your location. This will permit the app to immediately zoom to your location. (Make sure the **Location Service** is turned on for this application software under Settings on your device. Starting with iOS6, Location Service setting is placed under Settings - Privacy.)

To view your current position and GPS accuracies, select **Position Info** after turning on the **GPS**. Wait 5 - 10 minutes to let the GPS stabilize. If your device is set to Auto-lock after a number of minutes then when it turns off, GPS will also turn off. You will need to unlock your device to continue working.

To nail down your location, you will need to digitize at least one Point location.


In the section titled **Digitize Features**, we will show you how to digitize a Feature in the **mytest.pmp** job file. As the points in this job are located in Oregon, USA, you will want to tap on  to **turn GPS OFF for now**. Otherwise, the app will always zoom to your current location, which most likely is very far away from the sample job location.

Go ahead and turn on **Map** in the **Show Satellite** mode.

[Back to TOC](#)


Topic View

The Features in your map are organized into Feature Topics, or Topics for short. To see a list of all the Feature Topics you have in the currently active job file, tap

the **Topic View** icon . This icon is a toggle tool for turning the Topic View on or off.


When you tap on one of the Topics in the Topic View, that Topic becomes the **active Feature Topic**.

Also, when you **tap on one of the Features in Map View**, the Topic, to which that Feature belongs, becomes the active Topic.

For example, in the **mytest.pmp** job, there are two Topics. The "**TREE**" Topic contains a number of Point Features represented by the blue dots. When you tap on , you will see "TREE" listed in the Topic View panel on the left side of the screen. You can tap on "TREE" to highlight it and make it the active Topic. The "**BLK**" Topic contains one Area Feature representing a city block.


You can toggle the **display** of a Topic ON and OFF by clicking on the mark box to the left of each Topic name.

To change the **symbol** assignment for a Topic, simply double-tap the existing symbol displayed by the Topic name in Topic View then select the new symbol. Go ahead and change the symbol for the TREE Topic to a tree symbol and assign a light green color to it.

The **Topic Menu**, represented by the **Topic Menu icon** , provides the function to create a new Topic, as well as a number of other functions that operate on the currently active Topic.

[Back to TOC](#)


Topic Menu

The **Topic Menu** contains functions that operate on the Feature Topics. It is accessed by tapping the **Topic Menu icon** .

Creating a New Feature Topic in a Job

Before adding a Feature to the map by digitization, you will need to select the appropriate Feature Topic into which that Feature will be placed. If such a Feature Topic does not exist, then you will need to create it.

To create a new Feature Topic in a job file such as **mytest.pmp**, tap the **Topic**

 **Menu** icon then select **New Topic**. Enter a Topic Name and specify the Topic Type. Discrete objects, such as houses and trees, are assigned the **Point** type. Linear features, such as rivers and roads, are usually assigned the **Line** type. Area features, such as land plots, tree stands and lakes, are assigned the **Area** type.


If you wish to record a description or observation for the Features, you could add one or more **Attribute Names** for this Topic and specify the data type and parameter. This action will create a data entry field for entering data by using the Edit Value function on the Topic Menu.

Notice the little pull-down arrow in the **Field Name** cell after you tap the **Add** button? This app comes with a number of **Built-in Attributes** that you may incorporate into a Topic as an Attribute. To add such an Attribute, tap on the pull-down arrow then select the desired item. If you select the Elevation attribute, the MSL or HAE elevation will be used depending on what you've selected for the Unit and Angle System Setup. If you just want to add your own Attribute, then simply type your Attribute Name over "Name1".



When done adding one or more Attributes, tap the **OK** button to close the New Topic screen.

Editing a Feature Topic

To edit an existing Topic, first tap on  and select that Topic from the Topic

View panel. Tap the **Topic Menu** icon  then select **Edit Topic**. You may make changes to the **Topic Structure**, such as by adding more Attributes to the Topic.




Let's add a built-in Attribute to the **"BLK"** Topic in the **mytest.pmp** job. Tap on

 then tap on **"BLK"** in Topic View. Tap on  then select **Edit Topic** to display the Edit Topic screen.



Tap the **Add** button then tap on the pull-down arrow by the highlighted "Name1" to display the built-in Attributes. Select **"Area_Acres"** and enter "2" for Decimal Digits. Tap **OK** to confirm. This Attribute will automatically compute the acreage of an Area Feature you place in the BLK Topic.

Moving a Feature Topic

In general, you will want to have Point Feature Topics and Line Feature Topics placed above the Area Feature Topics so that the Area Feature layers won't block out the Points and Lines underneath.


You can **change the order** of the Topic layers. To do so, first tap on  then tap on  and select **Move Topic**. Now you can drag a Topic to a different location in the Feature Topic List. As soon as you release the hold on the Topic name, the Move Topic mode becomes inactive. To move another Topic, you must tap on  and select **Move Topic** again.

Deleting a Feature Topic

To delete an existing Topic, first tap on  and select that Topic. Then tap on  and select **Delete Topic**. This will delete the Topic definition as well as all the Features on that Topic layer.


Caution: A deleted Topic and the Features in that Topic cannot be recovered.

Edit Value

To enter or change the Attribute values for the Features on a Topic layer, first tap on the Feature to select it. Then tap the **Topic Menu** icon  and select **Edit Topic**. You will see a spreadsheet showing all the Features on the same Topic layer. Enter appropriate values into the Attribute fields for the selected Feature. You can scroll to another Feature record and make changes if you wish.

Export Text File



When a Point Topic is active, you may use the Export Text file function on the Topic Menu to export the coordinates and Attribute/Values to a text file.


After tapping on the **Topic Menu** icon , selecting **Export Text File** and entering the text file name, you are given a few options.

If you want the field names (column titles) exported along with the data records, then mark the check box for "First line contains field names".

If any data record contains a name that includes a comma, such as "Paul Burns, Jr", you should mark the **Wrap data in double quotes (")** option so that the data fields can be properly exported and the program importing the text file will be able to correctly interpret the data.

If you would like the Feature IDs to be exported, then mark the corresponding check box.

As an example, open the mytest.pmp file, tap on the **Topic View** icon  then select the Point Topic named "TREE". Tap the **Topic View** icon  to turn off Topic View.

Now tap the Topic Menu icon  then select **Export Text File**. Confirm the "mytest" file name. With all three check boxes marked, tap the **Preview** button. If

this is what you would like to export to the text file, then tap the **OK** button. The text file is exported.


Import Text File

This app will let you import GPS locations and the associated Attributes in the form of a text file into a Topic in the currently active Job. Use the Export Text File function to create a text file and follow the same format to prepare the text format you wish to import.

The data fields in the text file must be separated by commas. The Values may be enclosed in double quotes (") or not. Please note that if any of the Values contain a comma, such as "Paul Bryne, Jr.", then you must enclose all Values within double quotes to permit the app to correctly interpret the data.

As an example, let's import into a new file the **mytest.txt** file that we previous created.

First, select **Main Menu - Job - Open Job** then tap on **New** to create a new job.

Now tap the Topic Menu icon  then select **Import Text File**. Select "**mytest**" as the File Name.


With both of the displayed check boxes marked, tap the **Next Step** button and enter "tree" as the Topic Name.

Tap the **Next Step** button to see the **Data Format** of the information to be imported.

Tap the **Next Step** button, and accept the displayed **coordinate system** by tapping on the **Next Step** button on that page.

Tap **OK** on the **Preview** screen to complete the data import.

You will see that the trees have been automatically placed on the map.

Tap on  then select **Edit Value**. You will see the Attribute/Values for the "tree" Features.

[Back to TOC](#)


Digitize Features


You may manually add new Features to the current Job file. GPS is not needed, but if you wish, you could pick the GPS position for adding a Point Feature or for adding a node for a Line or Area Feature.

Let's open the sample job file named **test.pmp**, which contains a couple Feature Topics.

Adding a Point Feature


The first step in digitizing a Point Feature on the displayed Map is to create or activate a Point Topic.


In the **mytest.pmp** job map, tap the **Topic View** icon  then select the Point Topic named "TREE". Tap the Topic View icon again to toggle the list of Topics off.



Now, tap the pull-down arrow beside the **Map Tools** icon. Select **Add Point Manually** .


Now, each time you tap on the displayed map, a point will be added. If you have changed the point symbol to a tree symbols as previously instructed, you will see new tree symbols added to the map.

If you added an extra point that you don't need, you can go back to Map View, tap on that point, pselect the **Tools** menu then select **Delete Feature**.

The **Add** tool  **ADD** at the top is a toggle switch that you can use to halt the point digitization and reactivate the regular **touch-screen** mode so you may zoom or pan the screen. Tap on this toggle again when you are ready to add more points.


If there are existing Features on the map and you want a new point to snap to one of the existing Features, then tap the **SnapToNode tool** . When the SnapToNode toggle is on, the point you add will be dropped on top of the nearest Point or node.

If your device has GPS capability, you could add a point right at the current GPS position. To do so, first tap the **GPS** icon  to turn on GPS then tap the **Pick GPS** icon  to add the Point Feature. (Do this in another job file as we do not wish to add a very distant point to this sample job file.)

If you wish to place a point more precisely on the displayed satellite map, you could tap on the donut-shaped **Node tool** . A larger donut with crosshairs at its center will be displayed on the map. Touch on the purple area of this tool and drag the crosshairs to the desired location. Then tap once in the donut hole to drop the node. (You could also keep holding down on the purple donut and use another finger to touch outside of the donut area to drop the node.)

When done with the point digitization, tap the **Back** icon to go back to Map View.

Add Point by Coordinates

If you know the coordinates for the point you wish to add to the map, you may add the point by using this information. To do so, first create or activate a Point Topic. Then tap the pull-down arrow by the **Map Tools** icon and select **Add Point by Coordinates** .


Enter the known coordinates then confirm the screen. Make sure you specify the correct North or South Latitude, and the correct East or West Longitude.


You may tap on the **Pattern** button to select a different symbol and color for the Point Feature to be created.



The Orthometric height is the elevation based on mean-sea-level. The ellipsoidal height is based on the ellipsoid.


Adding a Line Feature

To digitize a Line Feature, first select an existing Line Topic or create a new Line Topic.

When a Line Topic is active and you tap the pull-down arrow for the **Map Tools** icon, you will see that the **Add Line manually** tool is active. Tap this selection, and the Add Line manually tool icon  will be displayed as the active Map Tool.


Now you can tap or drag on the map to draw a line. You may use the **Node** tool  to add nodes and make a line that closely follows a road or a boundary line on the Apple Map.

The **Add** tool , the **SnapToNode** tool , and the pick GPS position function work in the same way as for digitizing Point Features.

Turn on  **Snap to Line** when you wish to snap your new line to an existing Line or Area Feature. Then when you tap close to that Line or Area Feature, your new line will snap to the nearest node on the existing Line or Area Feature.



Include Boundary is a powerful tool that lets you incorporate all or part of a line or an area boundary in the new Line Feature you are digitizing. After turning this tool on, first tap on the line or area of interest then tap on the starting and ending nodes of the section you wish to include in your new line. Tap on the **Finish** button to finalize this action. Then you may select another boundary line to include, or continue to tap on the screen to drop nodes for the new line.

You may tap the **Undo** icon  to back-step and remove the last added node, if necessary.


When you have digitized the last node for the Line Feature, if you wish to add another Line Feature, then tap the **Next Line** button. Otherwise, tap the **Back** button to exit this screen.

When you tap on the Line Feature on the main screen, its Point ID and coordinate information will pop up briefly.

Adding an Area Feature


To digitize an Area Feature, first select an existing Area Topic or create a new

Area Topic. Digitizing an Area Feature works the same way as digitizing a Line Feature, except that the Area Feature forms a closed region.

When an Area Topic is active and you tap the **Map Tools** pull-down arrow, you will see that the **Add Area manually** tool is active. Tap this selection, and the Add Area manually tool icon  will be displayed as the active Map Tool.


In the screen for digitizing an Area Feature, you may tap on the **Area Pattern** button to select a different pattern and color for the Area Feature you digitize.

The BLK001 Feature was created by snapping to the Tree Features at the four corners of the block.

While digitizing an Area Feature, you may tap the **Undo** icon  to back-step and remove the last added node, if necessary.

When you have digitized the last node for the Area Feature, tap the **Back** button. The software will automatically close the gap between the first and the last digitized nodes and return to the main Map View. If you are digitizing several Area Features, tapping **Next Area** will get you ready to digitize a new Area Feature.

Adding Description for Digitized Features

To be able to enter descriptions to a Feature that you have digitized manually, you must have Attributes set up for the Feature Topic to which the Feature belongs. If you have not set up the Attribute Names while creating the Feature Topic, you can do so after tapping on  then selecting **Edit Topic**.

Once the Topic/Attribute structure is in place, the Attributes will be presented in a spread-sheet format when you use the **Edit Value** function from the Topic Menu. And you will be able to enter the corresponding Values into the cells.


Another way to add or change the description for a Feature is through the Feature Properties screen.


[Back to TOC](#)

Move Node

The **Move Node** tool on the Map Tools Menu will let you adjust the position of an existing Point Feature or a node on a Line or Area Feature.

The steps for moving a node of a Feature are as follows:

1. Tap on the Feature to select it then tap on the Digitizing Tool Menu and select **Move Node**. If the Move Node icon  is already displayed, then simply tap on that icon to get to the Move Node screen.


If you've tapped on the wrong location, you may tap the **Reset tool** icon  to


reset the selection then select the correct location.


2. Drag the **Crosshairs** to the node you wish to move then tap once in the center of the donut to mark the node. If you've selected a Line or Area Feature, then only the nodes on the selected Line or Area Feature can be moved.

3. Drag the **Crosshairs** to the new position and tap once in the center of the donut to affix the node there.

When you wish to snap to an existing Point or node by tapping in its vicinity,

remember to first tap on the **Snap to Node** icon  to turn it on. Turn this icon off when you do not need to snap to a node.


If the Crosshairs have moved off the screen, you could tap on the  icon to bring the Crosshairs back to the center of the screen.

You may turn off the instruction text by tapping the **View Hint** icon . This will free up more screen space for displaying the job data, especially when you are using your device in landscape mode.

Tap the **Back** button to exit this screen.

[Back to TOC](#)

Feature Properties

With a Feature selected in the Map View, you may tap the **Feature Properties** tool icon  to view the relevant information.

Three pages are provided for displaying the Feature properties.

Tap on the **Coordinates** button to see the Latitude-Longitude -Elevation information for the Feature. MSL is the Mean-Sea-Level value, and HAE is the elevation referenced to the ellipsoid.

Tap on the **Attribute** button to view or edit the Attribute/Value information for the Feature.

For a Line or Area Feature, tap on the **Area and Length** button to see the line length or the perimeter and acreage of the area in the currently active units of measurement.

Assigning a Feature Symbol or Pattern

By default, a Feature added to a Topic will assume the same symbol and color as those for the Topic. However, you may use a different symbol to represent an individual Feature if you choose to do so.

On the **Coordinates** page of the Feature Properties screen for the selected Feature, you may pick a symbol or pattern and a display color after clicking on the **Pattern**

button. You may also specify a line style as well as the color and size for the border of an Area Feature.

After making the desired changes, click on the **OK** button to accept the settings.

Area Transparency

You can adjust the transparency of an Area Feature within the Area Pattern Dialog.

To do so, simply enter a percentage value into the **Transparency** field, or tap the little arrows to scroll either way.


Show Segment, Area and Corner Angle Labels

For Line and Area Features, you may opt to have the segment, area and corner angle labels displayed on those Features when feasible. On the **Coordinates** page, mark the checkbox for the labels you wish to see:

Show Corner label

Show Segment label

Show Area label (for Area Features only)

For example, in **mytest.pmp** job, tap on the BLK001 Area Feature then tap on the **Feature Properties** tool icon  and mark on all three checkboxes.




You can change the size and color of these labels by using **Main Menu - Setup - Feature Labels**.



Edit Feature Attribution

If a Feature has Attributes associated with it, the Attributes and the corresponding

Values will be displayed when you tap the **Attribute** tab. To change the Value for an Attribute, double-tap that cell then type over any existing Value. Alternatively, place the cursor at the appropriate position then change a few characters as needed.

In the **View mode**, with the  icon displayed, the cells are not editable until you double-tap on them. To switch to the **Edit mode**, represented by a  icon, tap on the  icon. In the **Edit mode**, each cell is ready to receive input unless that Attribute is non-editable, such as a built-in Attribute or an Attribute with a Formula defined for it.

[Back to TOC](#)

Create Grid

Suppose you wish to take soil samples at fixed intervals in both directions on your vegetable farm. You could use the Create Grid function to create an array of **Grid Points** in the Area Feature that represents the vegetable farm. You could use the Point Stakeout function to help take you to each grid point. Then you could use the **Contour** function to get a visual representation of the variation of the recorded soil sampling results, such as pH values, across the land plot.

If you wish to have a set of parallel lines drawn over an Area Feature to represent the location of irrigation pipes, then you could use the Create Grid function to create such a set of **Grid Lines**.

The Grid you create for a selected Area Feature is placed in the **Non-Spatial Data** Topic layer. To place a grid over an Area Feature, first click in that Area Feature to highlight it then tap the pull-down arrow for the **Map Tools** menu and select **Create Grid**.

The **Grid Property** screen will show the default grid parameters, but you can change them as you please. The **Start Point** section lets you specify the reference location for the grid. You may enter the coordinates for that point or tap the **By Pick** button to select the location from Map View. If the reference point is a known point but you want to shift the grid a distance from it then tap the **Offset** checkbox to display the relevant data entry fields. The software will compute the new grid reference point.

You can change the default **grid spacing** and **grid orientation** to those appropriate for your application. You may define the grid orientation by using an existing line segment or two existing nodes.

Select the **Grid Nodes** option if you wish to see the grid nodes. If you wish to see the grid lines then select **Lines**. You will have the option to create Grid Lines in the X-direction, the Y-direction, or in Both directions.

In the **Boundary** section, you may specify the boundary line style and line width.



You may also dictate whether Point Features should be created from the grid nodes, or Line Features should be created from the grid lines.


If you selected the **Grid Nodes** mode, you have the option to mark the **Create Points from Grid** checkbox to have Point Features created at the grid nodes. Accept the default Grid Points Topic, or select another point topic in which to store the new Point Features.

If you selected the **Lines** mode, you have the option of marking the **Create Lines from Grid** checkbox to have Line Features created at the grid lines. Accept the default Grid Lines Topic, or select another line topic in which to store the new Line Features.

Tap the **Preview** tab to view the grid. When you confirm the **Grid Property** screen by tapping the **OK** button, you will see the grid points or the grid lines displayed in the map.


To avoid confusion, it's best to just keep one grid for an Area Feature.

To delete an unwanted grid, first tap the **Topic View** icon  and select **Non-spatial Data**. Then tap the **Topic Menu** icon , select **Edit Value** then tap on the unwanted grid record to select it. (The grid records are all named the same. Newer records are added at the end of the list by default.) Tap the **Back** button, select the **Tools** menu then select **Delete Feature**.



To edit an existing grid, first select it by tapping on it from Map View or by selecting the grid record from the Edit Value screen. Then when you tap on the Feature Properties icon , the Grid Property screen will be displayed.


[Back to TOC](#)


Measure Distance

If you would like to know the distance between two or more map locations, first tap on the **Measure Distance** icon  on the **Utilities** pull-down menu. Then tap on the map locations to have the distance calculated. The total distance as well as the length and direction of the last segment added will be displayed.

Whenever you need to place a node precisely, tap on the **Node tool** then use the crosshairs to zero-in on the desired location.

If your device has GPS capability, you could tap the **GPS** icon  to turn on GPS then tap the **Pick GPS** icon  to add a node for the line to be measured.

Tap on the **Snap to Node** icon  to turn it on when you wish to snap to an existing Point or node by tapping in its vicinity.

To back-step, tap the **Undo** icon . To delete all the nodes made in this measurement session, tap the **Reset** button.


Please note that the Measure Distance tool will not retain the **temporary** shape you

have delineated for computing the distance.


When you no longer need the displayed information, tap the **Back** button to close this screen and discard the temporary shape.


[Back to TOC](#)


Measure Area

The **Measure Area** tool  on the **Utilities** pull-down menu will compute the area enclosed within a boundary that you form by tapping on the map.

Whenever you need to place a node precisely, tap on the **Node tool** then use the crosshairs to zero-in on the desired location.

If your device has GPS capability, you could tap the **GPS** icon  to turn on GPS then tap the **Pick GPS** icon to add a node for the area to be measured.

Tap on the **Snap to Node** icon  to turn it on when you wish to snap to an existing Point or node by tapping in its vicinity.

To back-step, tap the **Undo** icon . To delete all the nodes made in this measurement session, tap the **Reset** button.

Please note that the Measure Area tool will not retain the **temporary** shape you have delineated for computing the area.

When you no longer need the displayed information, tap the **Back** button to close this screen and discard the temporary shape.

[Back to TOC](#)

Locate a Point by Address


To look for a location on the displayed built-in Map by address or coordinates, tap on the pull-down arrow of the **Utilities Menu** icon then select **Locate a Point by Address**. This function will only work when **Map** is turned on.

If you know the address of the location of interest, tap the **By Address** tab then enter the address.


If you know the coordinates of the location of interest, tap the **By Coordinate** tab then enter the coordinates. Make sure you have entered the correct N/S and E/W designations.

After tapping the **Go** button, you will see the target location marked on the screen. You may search additional locations by address or by coordinates. All the locations you searched for will stay marked before you exit this screen.

If you can recognize the desired location on the displayed Map, you could select

that location by tapping the **Pick** icon  then tapping on the target location. The relevant address information will pop up on the screen, and when you tap the **Go** button, that location will be marked. You can view its coordinates by tapping the **By Coordinate** tab.

When you tap on a marked location, the corresponding marker will turn orange. If you wish, you may save that location as a Point Feature by tapping on the **Save**

Result icon . You may change the Feature ID and the symbol used to represent the new point before tapping on **OK** to create the Point Feature.

When you no longer need the displayed information, tap the **Back** button to close this screen.

[Back to TOC](#)

Contour Settings


The Contour / Volume utility provides a way to help you visualize 3-dimensional data and compute amounts based on the 3-D data. The three dimensions are the X-Y coordinates in the horizontal plane and the Z-coordinate along the vertical axis. As you will mostly be interested in how certain data varies across a geographic area, the X-Y coordinates will always correspond to a spatial location. The Z-coordinate could represent the elevation in space or some other variable of interest, such as pH value or amount of fertilizer to apply.


The contour map will be generated for the region enclosed within a boundary area. Therefore, a contouring job will contain Point Features representing the data of interest as well as the Area Feature that serves as the boundary. As mentioned previously, these Features could be created by manual digitization within this app, or they could be imported in the form of Shapefiles, DXF files or text files (for Point Features).


We will use the sample job called **pile.pmp** to show you how to set up for a contouring task.

Let's tap on the Main Menu icon , select **Job**, select **Open Job** then select "pile" from the pull-down menu for File Name. Tap on OK.

1. In Map View select the relevant Area Feature as the **Boundary Feature** for the area of interest. This sample file provides an Area Feature in the Boundary Topic. If the boundary area is not already highlighted, then tap anywhere among the points to select it. If you find it difficult to get to a bare spot, you could first tap

on  and turn off the pilepond Topic off temporarily. After selecting and

highlighting the Boundary001 area, tap on  and turn the pilepond Topic back on.

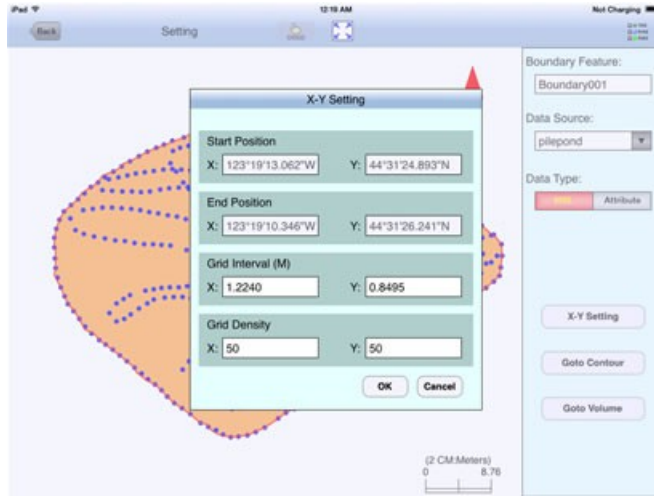
2. Tap on the  icon, or tap on the pull-down arrow for the Utilities Menu then select **Contour / Volume**. This will take you to the **Setting** screen. The selected

boundary area will be automatically displayed in the **Boundary Feature** field.

3. For **Data Source** select the Point Topic containing the X-Y-Z data of interest. For this example, it is the Point Topic named "pilepoint".

4. For **Data Type** you may select the elevation (MSL or HAE per the setup of Unit and Angle), or any **numeric** Attribute for the selected Point Topic.

5. Tap the X-Y Setting button to define the resolution of the contour grid. This app will automatically determine the X-Y extent of the Point Feature Topic you have selected for contouring. You can specify either the Grid Interval or the Grid Density, then the other parameter will be automatically computed.




Now you can tap on "**Goto Contour**" to go to the Contour screen to create colored contour regions and/or create contour lines. Or you can tap on "**Goto Volume**" to go to the Volume screen to view the calculated volumes. Or, you can tap the **Back** button to return to Map View.

[Back to TOC](#)

Generate Contours

We will continue to use the pile.pmp job file to illustrate the contouring procedure. Please open the **pile.pmp** job if it is not already open.

Tap on the  icon, or tap on the pull-down arrow for the Utilities Menu then select **Contour / Volume**. Suppose you have already completed the setup in the **Setting** screen as previously instructed.

Tap on the "**Goto Contour**" button to call up the Contour screen.

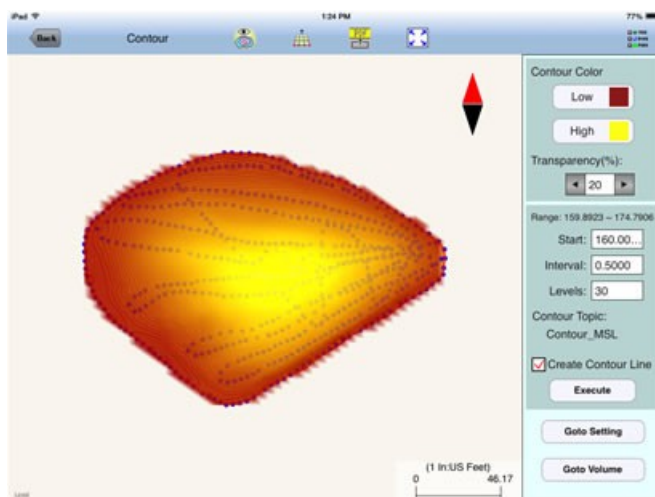
You may select a different range of colors to represent the contour regions.

The app shows the **Range** of the Z values. In this case, these are the elevations of the data points. If you were contouring a numeric Attribute (such as pH values), the range for those values will be displayed. The app will contour the entire range by


default, but you may specify a different starting value, if you wish. You may also change how many levels of contours to produce. A larger value corresponds to a finer contour resolution.

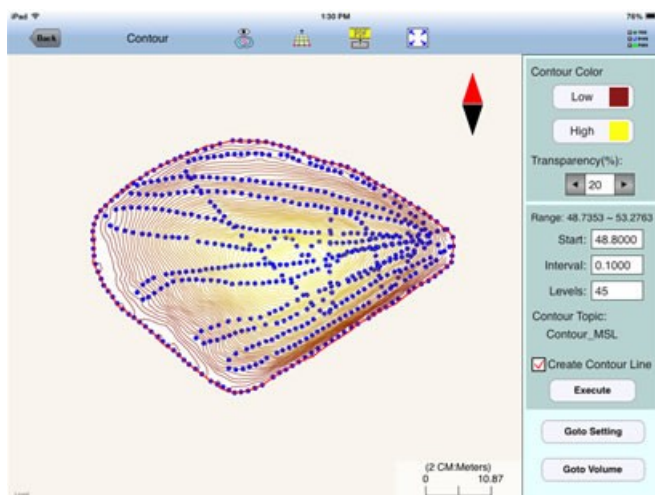
If you would like to have contour lines created, then mark the check box for "**Create Contour Line**" and tap the "**Execute**" button. The contoured variable has a constant value along each contour line. The larger the number of Levels, the more closely spaced the contour lines will be.

If you don't want the contour lines displayed, then unmark the check box for "**Create Contour Line**" and tap the "**Execute**" button.




In this example, the diagram indicates that the pile has one peak near the center. If you were contouring the amount of fertilizer to apply to your farm plot, then the colored contour map can serve as a guide in fertilizer application.

If you would like to turn off the display of the contour regions, you may do so by tapping on the **Show Contour Regions** icon . Use this icon to toggle the contour-regions display on or off. The following map is the result of having contour lines created and the Show Contour Regions option turned off.




You may tap on the **PDF** icon to send the screen to a PDF file along with the contour parameters.

To export the X-Y coordinates of the contour grid nodes and the computed (interpolated) values of the Z variable to a .csv file, tap the **Export Grid** icon .

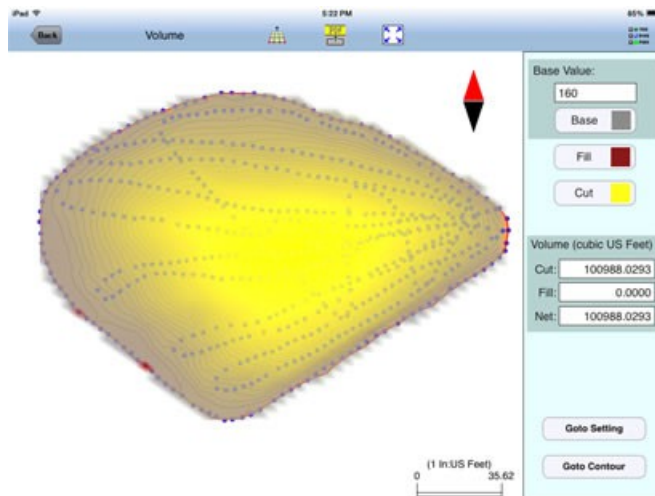
[Back to TOC](#)

Compute Volume

For the pile.pmp sample job, we would like to find out how big the pile actually is. Please open the **pile.pmp** job if it is not already open.

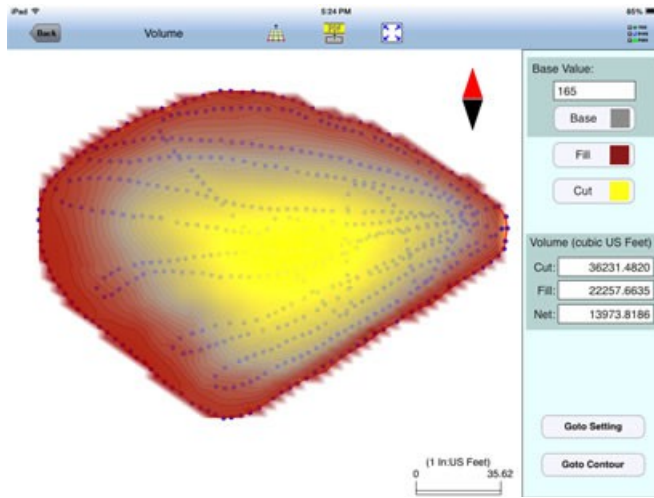
Tap on the  icon, or tap on the pull-down arrow for the Utilities Menu then select **Contour / Volume**. The setup in the **Setting** screen is the same as that described in the Section titled "Generate Contours".

Tap on the "**Goto Volume**" button to call up the Volume screen. (For this contour volume example, we have switched to using US Survey Feet as the distance/length unit.)




As you can see, with the **Base** set at the bottom of the pile, all of the volume is shown in the **Cut** field. This means that if you were to bring the pile to the ground level, this much of it needs to be removed (or cut).

Now, let's enter 165 (ft) as the Base Value. To create level ground within the boundary area at that height, we will need to remove the top of the pile and fill in around it. The net volume is the amount of extra material that you could use to fill holes somewhere else.




You may tap on the **PDF** icon to send the screen to a PDF file along with the contour parameters and the computed volumes.

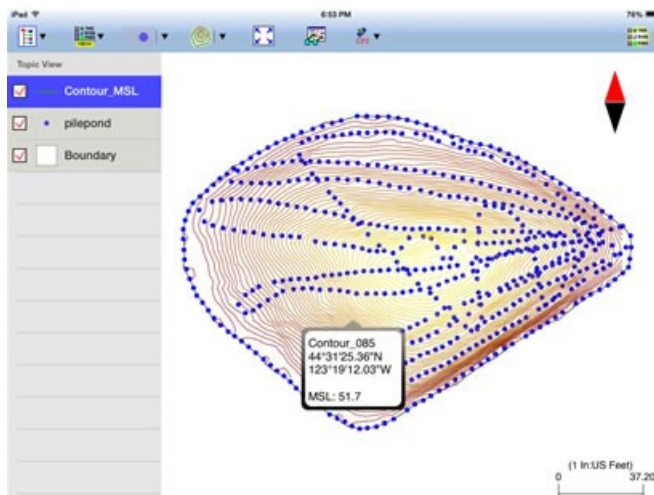
To export the X-Y coordinates of the contour grid nodes and the computed (interpolated) values of the Z variable to a .csv file, tap the **Export Grid** icon .

[Back to TOC](#)

Contour Region Map

If you have the colored contour regions displayed when you exit the Contour screen or the Volume screen, then these will also be displayed in Map View.

You may turn off the contour-region display by unmarking **Show Contour Regions** from the **Utilities Menu**. When the contour regions are displayed in Map View and **Show Contour Regions** icon  is active, you may use this icon to toggle the contour-regions display on or off.



While the contour-regions map is displayed, the bubble that pops up when you tap in the contoured area will contain some information relevant to the contour-regions map. For example, when the contour-regions map generated by the Volume function is displayed, the bubble will provide the cut or fill information for the spot


you tapped, and it will be referenced to the Base plane used in the Volume computation.


[Back to TOC](#)

Point Stakeout

The Point Stakeout function can help you locate a Point Feature or a node on a Line or Area Feature.

You may add the stakeout targets to your job map in one of the following ways:

1. Enter the coordinates to create each point. Please refer to **Add Point by Coordinates** under **Digitize Features**. If the elevations also matter to you, then include the correct elevation in the target coordinates.
2. Import a text file, a DXF file or Shapefiles containing the target Points, Lines or Areas. Please refer to the sections titled **Job Data Management** and **Topic Menu**.
3. Digitize a Point Feature, a Line Feature or an Area Feature.
4. Create Grid Points for an Area Feature.
5. Store GPS Features by using  in the screen for adding a Point, Line or Area Feature. Please refer to **Digitize Features**.
6. Create contour lines by using the **Contour / Volume** function. If you would like the colored contour regions to be displayed during stakeout, then get the colored regions displayed in the Contour screen and keep the Show Color Region icon turned on in Map View.
7. Open a .pmp job file created by using PC-GIS.

After finding a desired location, you may optionally stake it and store its coordinates. The Point Stakeout function can be used to stake out individual points, or points along a line or area. The Point Stakeout screen also provides the Feature Properties icon  that you could use to enter an observation for that location. Therefore, you could use this functionality to help you approach each grid point then record soil sample data at that point. The soil sample data can then be used to generate a contour region map to provide a quick view of the data distribution over the area of interest.

The accuracy of the stakeout will depend on the accuracy of the GPS receiver used. Keep in mind, though, that GPS elevation errors are usually twice or three times the horizontal position errors.

You must activate GPS before you can access the Point Stakeout function.

Tap the GPS Menu icon  then select **GPS On** to turn the GPS on. Then tap on




again and select **Point Stakeout**.

With the cursor in the Target Feature field, tap on the target **Point, Line** or **Area Feature** of interest. You may tap the **Browse** button to select a target Feature ID in the active Topic.


If the selected Feature is a Line or Area, you can select which Node you would like to stakeout by entering the desired Node #, or by tapping the little right arrow button to change the Node # to another node in the same Feature.

If there are a lot of closely spaced contour lines shown in the map, it may not be easy to select a neighboring Point Feature as the stakeout target. In that case, you could turn off the Contour Topic from the Topic View before calling up the Point Stakeout function.

If you have tapped the  icon to disable Feature selection (so as to return to the normal touch screen mode), make sure you tap this icon again to turn it on before selecting a Feature for a data field.

In the **Antenna Height** field, enter the height of your antenna above the ground.

Set up Stakeout

Any time you wish to change the stakeout settings, you may do so by tapping on the GPS Menu icon  then selecting **Stakeout Setup**.

From within the **Point Stakeout** screen, you may click the **Settings** button to set up or change the settings for stakeout.

On the **Stakeout Setup** screen you may turn off the **Navigation Beep**, if you wish. You may also specify the **Tolerance** range as well as the type of notification you wish to receive when you get within the tolerance range of the target.

If you mark the checkbox for **Display Message**, then when you are inside the target range, the "Target!" message will flash on the screen.

If you mark the checkbox for **Target Beep**, then when you are inside the target range, beeps will be sounded.

To use the tolerance range for checking only the horizontal distances, select **2D** for **Stakeout Mode**. If the the tolerance range is to be applied for checking the elevation, then select **3D**.

You can also specify how to keep the screen focused on your location by selecting an option for the **Stakeout Zoom Mode**. In the **Autoscroll** mode, the job map will scroll to keep your position displayed on the screen while you are moving along. The map scale will not change. In the **Autozoom** mode, when you hit the border of the screen, the app will automatically zoom out to let you see more of the job map.

Stakeout Information

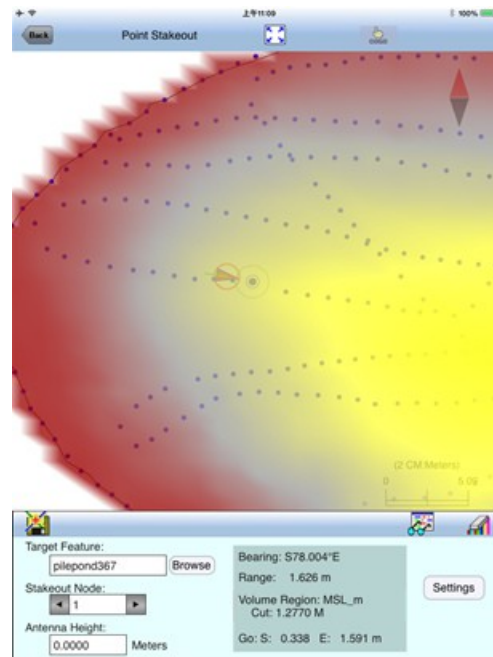
Your position is represented by the GPS marker on the screen. The app will report your GPS position in relation to the target location.

Bearing or **Azimuth** is the direction from your GPS location to the specified Target Stake Point or Node.


Range is the direct distance from the GPS location to the Target Stake Point or Node.

Cut or **Fill** is the difference in elevation from the current location to the Target Stake Point or Node. "Cut" indicates that your current position is higher than the Target. "Fill" indicates that your current position is lower than the Target.

When a contour regions map from the Volume function is active, the reference for the Cut/Fill field will be the Base plane specified for volume computation.



You may use the values displayed in the **Go** field to help you reach the target. On the GPS marker, the solid grey arrow points in the direction you are moving, and the hollow blue arrow points in the direction of the Target. When you are moving in the right direction, these two arrows will coincide.



After you have successfully reached your target location, you can drive a stake into the ground at this location. Tap the **Save Result** icon  to store the GPS position as a stake point.

[Back to TOC](#)


Line Stakeout

You may use **Line Stakeout** to find your position relative to a **Line Feature** (which could be a **contour** line) or the boundary of an **Area Feature**, and to

optionally stake and/or store the location. This function will be handy when you need to follow a contour line, to blaze a trail across thickets, or to layout pipelines where landmark references are lacking. The accuracy of the stakeout will depend on the accuracy of the GPS receiver used.

You must activate a GPS Receiver before you can access the Line Stakeout function. Tap the GPS Menu icon  then select **GPS On** to turn the GPS on. Then tap on  again and select **Line Stakeout**.

With the cursor in the Target Feature field tap on the target **Line** or **Area Feature** of interest. You may tap the **Browse** button to select a target Feature ID in the active Line or Area Topic.

If you have tapped the  icon to disable Feature selection (so as to return to the normal touch screen mode), make sure you tap this icon again to turn it on before selecting a Feature for a data field.

Select or enter the **From Node** and **To Node** on the target Line or Area Feature.


If you are interested in the direct line between the beginning and ending nodes, then select **Direct** for the **Mode** field. On the other hand, if you are interested in the line segment on the Line or Area Feature, then select **Path**.

Your position is represented by the GPS marker on the screen. The **Target** for Line Stakeout is the projection of your GPS position on the selected line segment. As you move along in the vicinity of the line or area feature, you will see information displayed about your position relative to the target line segment. Such information will not be displayed if your position cannot be projected onto the target line segment.

The first stakeout location on the target line segment is called the **Initial Station**. Enter the distance of this initial station from the **From Node**.

In the **Antenna Height** field, enter the height of your antenna above the ground.

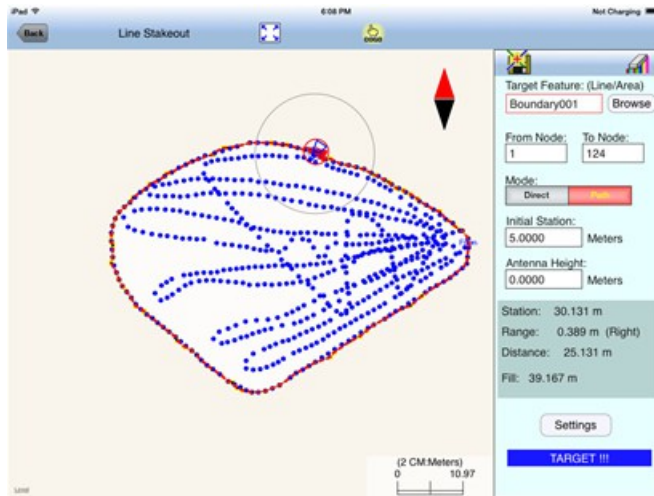
Set up Stakeout

Any time you wish to change the stakeout settings, you may do so by tapping on the GPS Menu icon  then selecting **Stakeout Setup**.

From within the **Line Stakeout** screen, you may click the **Settings** button to set up or change the settings for stakeout.

On the **Stakeout Setup** screen you may turn off the **Navigation Beep**, if you wish. You may also specify the **Tolerance** range as well as the type of notification you wish to receive when you get within the tolerance range of the target.

If you mark the checkbox for **Display Message**, then when you are inside the target range, the "Target!" message will flash on the screen.



If you mark the checkbox for **Target Beep**, then when you are inside the target range, beeps will be sounded.

To use the tolerance range for checking only the horizontal distances, select **2D** for **Stakeout Mode**. If the the tolerance range is to be applied for checking the elevation, then select **3D**.

You can also specify how to keep the screen focused on your location by selecting an option for the **Stakeout Zoom Mode**. In the **Autoscroll** mode, the job map will scroll to keep your position displayed on the screen while you are moving along. The map scale will not change. In the **Autozoom** mode, when you hit the border of the screen, the app will automatically zoom out to let you see more of the job map.

Stakeout Information


Your position is represented by the GPS marker on the screen. The app will report your GPS position in relation to its projection on the target Line or Area boundary. No information will be reported if the GPS position cannot be projected onto the target.

Station is the distance between the From Node and the Target.

The **Range** field shows your perpendicular distance from the line segment, ie. the distance between your GPS and the Target. Therefore, you could use the Line Stakeout function to help ensure that you are always moving parallel to a line or boundary at the desired distance.

Distance is the distance between the Initial Station and the Target.

Cut or **Fill** is the difference in elevation from the GPS location to the target. "Cut" indicates that your current position is higher than the target. "Fill" indicates that your current position is lower than the target.

To store the GPS position as a stake point, tap once on the **Save Result** icon .

[Back to TOC](#)

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