Farming GPS GIS III

Help

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Overview

I. Working with Map Features

Set up a Job

Display Map and Turn GPS On/Off

Set up Feature List

Topic View

Topic Menu

Digitize Features

Classify a Feature Topic

Overview

The Farming GPS GIS III app for the iPad® is loaded with a multitude of functions for mapping geographic features, collecting GIS data, and using GPS to locate pints, lines and areas. You may use it to perform the following tasks:

* Import and export from/to Shapefiles, Excel files, DXF files and KML files.
* Export to GPX file.
* Import/Export Point Feature data via text file.
* Load a GeoTiff map image for off-line use.
* Use GPS to map land features as Points, Lines and Areas.
* Precisely digitize Points, Lines and Areas over the built-in Map.
* Draw a deed plot by entering angles and distances.
* Classify the Features on a Topic layer.
* Modify the Line and Area Feature shapes by adding or deleting nodes.
* Transform data to commonly used coordinate systems.
* Move existing nodes to fine-tune the map drawing.
* Tag the Features with pre-defined Attribute/Values.
* View position, length and area values for the Features.
* Sub-divide an Area by Direction Cut, Hinge Cut or a digitized Split-Line.
* Disconnect a Line Feature or an Area Feature.
* Join Features.
* Create buffer zones around a Line or Area Feature.
* Create grid points or grid lines over an Area Feature.
* Create a contour map and compute volumes.
* Label the Lines with segment lengths and directions as well as corner angles.
* Label the Areas with size in acres and square feet or hectares and square meters.
* Attach photos to the Features.
* Measure distances and areas.
* Create a Point from the entered address or coordinates.
* Create a Point or record a node by picking the GPS location.
* Use GPS to stake out Points or nodes on a Line or Area Feature.
* Use GPS to guide you along a specified Line or Area boundary.
* Save the data files on the device or iCloud.
* Output the drawing and the coordinates to PDF.
* Email the job data files and the PDF files to your colleagues.
* iCloud file storage support.

There are two main ways of adding Points, Lines and Polygon Features to your mapping job. After you have created the Features, you may use the stakeout functions under **GPS** to help you locate them at the actual work site.

1) Digitization

This app will let you add Points, Lines and Areas to the map by tapping or dragging on the screen. You will first need to create a new Topic layer on which to store these Features. Specify the correct topic type (Point, Line or Area) for the New Topic. (See the Topic Menu section for details.)

The Tools Menu provides the Add Point manually, Add Line manually and Add

Area manually functions. When a Point Topic is active, you can digitize points. When a Line Topic is active, you can digitize lines. And when an Area Topic is active, you can digitize areas.

Use the Edit Topic function to add Attribute fields to the Topic. After digitizing the Features, you can turn on Sheet View (the right-most icon at the top) and enter the values.

2) GPS Data Collection

With a Feature List defined and associated with a job, when you collect GPS data, you can record the attribute values at the same time.

The Feature List function is under GPS. You can pre-define the data collection parameters as well as the Attributes and Values for each Feature Topic. During data collection, you can simply select one of the pre-defined values instead of having to enter the data by hand.

Select Main Menu\Job\Current Job to get to the Job Set up screen. Here is where you can select the Feature List to be associated with the active Job. A couple of Feature Lists are built-in to serve as examples.

3) For creating points, there are also the **Traverse** method under data collection and the **Add Point by Coordinates** function.

Please follow the examples provided in this document to learn how to use the functions in this software for your mapping and data collection application.

<u>**Map View**</u>

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.

You may also select a Feature by tapping on the corresponding Feature record in the spread-sheet called the **Sheet 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 also enter a description for the Feature or assign a pre-defined description to it via Feature Properties or Sheet View.

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 functions:

The **Topic Menu** provides functions to create, edit, move, delete or set up automatic labeling for the Feature Topics:

The **Map Tools Menu** lists the digitizing tools as well as the functions for entering deed calls and 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 functions for measuring distances and areas, locating a point by address, subdividing or combining areas, as well as creating buffer regions. Initially, the Measure Distance utility is shown:

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

The **GPS** Menu provides access to GPS-related functions, such as Feature List setup, GPS/GIS data collection and Stakeout::

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

Tap the **Topic View** toggle to select an active Topic:

Tap the **Sheet View** toggle to display data in a spreadsheet:

Additional tool icons may be displayed when you work with a specific function. All of these functions will be covered in this document. To gain a good understanding of the basic mapping functions provided by this app, please read the first ten sections of this document in the order presented.

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 91º09'26.082"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

Set up a Job & Import Feature Data

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 or creating a job. After creating or opening a job, you will be able to specify the default settings for the coordinate system and units to be used for displaying the GPS/GIS Features, for labeling the Features and for GPS data collection.

If you have geographic features (points, lines or area shapes) in Shapefiles, KML, DXF or Excel .xls file format, you may import them into the active Job map.

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 **corners.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.)

You may select a Feature List to be associated with the job. Doing so will permit you to assign pre-defined Attribute/Values to a Feature that you have imported or digitized. The procedure for defining a Feature List is provided under **Set up Feature List**.

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.

<u>Saving the Job File</u>

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 **corners.pmp** example file that you have just opened under a different name, such as "mycorners". This way, you can work with **mycorners.pmp** and keep the original corners.pmp file intact for later use.

It's a good idea to save your job under a different name as a back-up before subdividing an Area Feature in case you need to use the original intact Area Feature for some other purpose. 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.

<u>Accessing the Documents Folder</u>

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 **Farming GPS GIS III** 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.

<u>**Set up Coordinate System**</u>

To change the coordinate system for displaying Feature data, first tap **Menu**, select **Setup** then select **Coordinate System**. Select the desired system and distance unit then confirm.

<u>Caution</u>: Make sure the **coordinate system** and **distance unit** are correct before tapping on **OK** to confirm. For UTM, make sure the UTM Zone is correct. For SPC, make sure the State, Region and Zone are correct. For a user-defined coordinate system or a local NEZ plane, be sure to select the name of the proper system to use.

Before loading a .pim file, make sure the correct coordinate system and distance unit have been selected under **Menu/Setup/Coordinate System**.

This app can work with a user-defined coordinate system that you have defined using the optional PC-GIS software. After defining the user-defined coordinate system, use iTunes to copy the **user_cor.sys** file (in lower-case letters) from the PC to the Documents folder for your app. From the Main Menu of the app, select **Setup** then select Coordinate System then select **User Defined** to access the new coordinate system.

This app will let you calibrate a local NEZ coordinate system. To do so, first select Setup from the Main Menu then select Coordinate System. Tap on **NEZ** then tap on OK.
Tap on **Edit** then enter a name for the coordinate system into the Plane Name field..
Mark the **Control Point** option. Select **Reference Point** and enter the corresponding GPS and NEZ coordinates. Then select **Control Point** and enter the corresponding GPS and NEZ coordinates. You may use the **Pick** button to select an existing GPS point as the Reference Point or the Control Point, and its coordinates will be automatically entered. The resultant calibration angle and scale will be displayed.

If you know the angle and scale for calibrating the local coordinate system against the LLA system, then unmark the **Control Point** option and enter these parameters directly.

The **Y-axis** of an NEZ plane will be displayed on the screen as pointing "up". This is generally different from the direction of the North Arrow in Map View. The

NEZ **X-axis** will point to the "right".

Set up Elevation and Angle

Select **Elevation and Angle** under **Main Menu - Setup** to specify the desired angle unit (**DMS**, **Degree**, **Mils**, **Grads**) and azimuth system (**Azimuth** or **Bearing**). If Azimuth is chosen, also specify **North** or **South**.

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 GPS

You may inform the app what datum the GPS receiver uses and what the antenna height is. To do so, select **GPS** under **Main Menu - Setup**.

Select the datum and epoch as well as the region in which you are working.

The antenna height is the distance of the GPS receiver (antenna) above the ground. If you are using a small GPS receiver (antenna), simply enter its distance from the ground into the Slant Height field.

If your antenna has a large base and you are unable to measure its height at the center, then you would measure the distance from the antenna's rim to the ground below the center of the antenna and enter it into the **Slant Height** field. And you enter the radius of the antenna into the **Radius** field. The app will compute the vertical distance to display it as the **Antenna Height**.

The Antenna Height value will be applied to all functions that use locations obtained from the GPS receiver, except for those functions that provide Antenna Height data entry field. In this app, the Point Stakeout and Line Stakeout screens provide an Antenna Height input field. Be sure to enter the actual antenna height in this field when using the Point Stakeout or the Line Stakeout function.

Set up GPS Data Collection

You may set up the **default data collection parameters** for Point, Line and Area Features by tapping the **Menu** button, selecting **Setup** then selecting **Data Collection**.

Set up Navigation

Under Setup/Navigation Settings, you can also specify how to keep the screen focused on your location by selecting an option for the **Navigation Zoom Mode**.

In the **Auto Scroll** 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 **Auto Zoom** mode, when you hit the border of the screen, the app will

automatically zoom out to let you see more of the job map.

The **Move Map** mode does not apply to the built-in Map, which is fixed in the UP direction. The Move Map mode will work with the ***.tif** geo-referenced map images and the ***.pim** map images prepared by using the PC-GIS software program. Such a background map will re-orient itself to align with your direction of motion in the Move Map mode.

Set up Color/Pattern

You can set up the default symbols and colors to be used for displaying the Point, Line and Area Features.

Selection Color is the color that will be used for displaying the currently selected Feature. The orange color makes the selected Point, Line or Area stand out from the other Features in the job map.

Default Point Pattern is the symbol/color that will be used by default for displaying newly added Point Features.

Default Line Pattern is the line style/color that will be used by default for displaying newly added Line Features.

Default Area Pattern is the pattern/color that will be used by default for displaying newly added Area Features.

Set up Feature Labels

This app gives you the option of labeling the line segments, areas and corner angles for the selected Feature when feasible. (See **Feature Properties**.)

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

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 Auto Label

You will also have the option of having the all Features in the selected Feature Topic labeled with their ID information and/or Attribute Values.

You can define the default font color and size as well as the placement of these labels with respect to the Features after selecting **Auto Label** under **Main Menu - Setup**.

These settings will be applied to newly created labels. They will not affect any existing labels.

Set up iCloud

To specify which types of files to enable iCloud® storage for, mark the check boxes for the corresponding file types:

Job: **.pmp** files and Shapefiles

Feature List: **.fbr** files

TXT: .txt files

Basemap/Registered Image: **.pbm** Basemap files and .pim registered images

PDF: **.pdf** files

Photo: **.png** photo files

When you mark one or more check boxes and tap on **OK**, the corresponding files will be **moved** to iCloud storage. They wil no longer be in the local Documents folder for the app.

When you unmark one or more check boxes and tap on **OK**, the corresponding files will be **copied** back from iCloud storage.

Importing 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.

Before importing Shapefiles, make sure you have used Menu/Setup/Coordinate System to select the correct Datum, Coordinate System, Unit and Region in which the data was saved.

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.

The imported data will be converted to WGS84(1150) ITRF00, METERS, and Epoch 01/01/2015.

Importing an Excel file

If you have exported the Feature data from a job to an Excel (.xls) file, you may import the .xls file into a new map job. To do so, select **Job\Import Excel file** then select the .xls file from the displayed list. Please make sure the Excel file you wish to import is present in the **Documents folder** for this app. If iCloud is activated for XLS files, then the app will look for the .xls files in iCloud storage.

Please open an exported .xls file (e.g. by using Excel or OpenOffice) to see how the data is organized in the various Sheets. To import Feature data from an Excel file into this app, the Feature data must be properly formatted in the same way.

Importing a DXF file

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.

The imported data will be converted to WGS84(1150) ITRF00, METERS, and Epoch 01/01/2015.

Importing a KML file

You may import Feature data from a .kml file into this app. To do so, select **Job\Import KML** then select the .kml file from the displayed list. If iCloud is activated for KML files, then the app will look for the .kml file in iCloud storage.

Please make sure the .kml file you wish to import is present in the **Documents folder** for this app.

Set up Stakeout

Select **Stakeout Settings** under **Main Menu - Setup** to setup how the stakeout will be graphically displayed. In 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.

Display Map and Turn GPS On/Off

Whenever you are connected to the Internet via wi-fi 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 [image] 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.

Registered Image

You may select **Menu/Background Map/Load Registered Image** to select a geo-referenced image in the **.tif** or **.pim** format to be loaded as the background for the job.

A sample DRG file named **squawcreek.pim** is included with this app. You could open the cvoarea.pmp Job file then load this registered image to view the Features displayed on top of this background map.

To load a .tif file, tap on the desired **.tif** file then tap on **Select**.

Select the Datum, Coordinate System, distance Unit and Region in which the raster image was prepared.

When you select a .tif file, the app will decompress the image file, load it, and list it under the **Cached Images** tab. If a cached image already exists for the tif file that you select, the app will load the cached image.

To clear a cached *.tif file to reclaim the file storage space used, select **Menu/Setup/Clear Cache**. After choosing the file name, tap on the **Delete** button.

Caution: Before loading a geo-referenced .tif file, make sure the correct coordinate system and distance unit have been selected under **Menu/Setup/Coordinate System**.
If the .tif file is displayed in the wrong location because the wrong coordinate system was used, you will need to remove it from the cache after selecting **Menu/Setup/Clear Cache**. Then you can select the correct coordinate system and unit and re-load the .tif file.

You may use **Menu/Basemap/Load BaseMap** to select a CMT BaseMap file to load into this app. Click on the desired **.pbm** file then click **OK**.

You can use PC-GIS to prepare the .pbm Basemap file.

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 the Partition - Distance - Area application software under Settings on your device. 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 **mycorners.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

Set up a Feature List

In this app a geographic feature is regarded as an object at a location. Such an object is called a Feature, which can be one of three types: **Point Feature**, **Line Feature**, **Area Feature**. For example, a barn could be represented by a Point Feature, a stream could be represented by a Line Feature, and a farm tract could be represented by an Area Feature. Besides recording the position information for a Feature, we usually also want to record a description and other relevant information for that Feature.

In this section, we will talk about seting up a Feature List for use with existing Features. Therefore, we will ignore the data collection parameter fields such as

Collect Mode, Intvl/Sess and Dist.[UFt].

Features, Attributes and Values

A good data organization practice is to place Features of the same type that share the same characteristics together into one group. Such a group of Features is called a **Feature Topic**, or simply a **Topic**. Each Feature Topic is placed on a separate GIS map layer. This will permit certain operations to be carried out on the entire map layer when so desired. For example, if there are three barns on a farm, we would put those three Point Features under the Feature Topic named "Barns". When we don't want those barns to show on the map, we could simply turn off the "Barns" Feature Topic.

A **Feature** can be described by a set of **Attributes** and **Values**. An Attribute is the name of a specific descriptor. The Value is the actual quantitative or qualitative description.

Example: A tree may be recorded as follows:
Feature: Tree
Attribute: Species
Value: Fir

The app will automatically record the position data.

You can set up one or more **Feature Lists** to pre-define the Feature/Attribute/Value database. When you assoicate a job with a Feature List, you will be able to add Feature Topics from that Feature List along with the pre-defined Attribute and Values. This will speed up the process of tagging the Features with descriptions. Instead of typing all the descriptions, you will simply pick and choose the appropriate description for each Feature.

A Feature List can be used by one or more jobs. Therefore, if you will be doing a number of similar jobs, you could define a Feature List containing Features, Attributes and Values that can be shared by all of these jobs.

The file name extension for Feature Lists is **.fbr**.

Viewing a Feature List

To use the Feature List function, tap on the **GPS** Menu icon then select Feature List. If there is a Feature List associated with the active Job, its contents will be displayed. Otherwise, the **Select Feature List** screen will pop up to display the existing Feature List files.

Your app comes with the sample Feature List named **farm.fbr**. Tap on farm.fbr then tap on the **OK** button to display the Feature List definition screen.

Tap the **Save As** button then enter "myfarm" to save the Feature List as **myfarm.fbr** to work with. This way the original farm.fbr will remain intact should you want to view it again as an example in the future. The **Save As** function is very useful if you need to create a new Feature List that has a similar setup as the currently active Feature List. Instead of adding all the Attributes and Values again,

you will only need to make the necessary changes.

The Feature List screen contains three main sections for entering data. The active section is colored greyish blue.

For the **myfarm.fbr** Feature List, the **Feature section** shows two Feature Topics . The "**Well**" Topic will contain Point Features. Therefore it is assigned a Point Type and a representative point symbol. The "**Fence**" Topic is assigned a Line Type and a representative line style.

Tap on "**Well**" to highlight this Topic. In the **Attribute section** below, you can see three Attributes that have been defined for this Topic.

Tap on "**Condition**" to see the three pre-defined Values for the well head in the **Value section**. Similarly, there are two pre-defined Values for "Contamination". Having pre-defined Values for an Attribute facilitates assigning descriptions to a Feature. Instead of having to enter the description for a Feature, you can simply select it from the displayed list. Feature attribution can be performed via the **Sheet View** or the **Feature Properties** function.

We did not define any Values for the "**Last checked**" Attribute because this could be any date.

In the same way, you can tap on the "**Fence**" Topic in the **Feature** section to view its Attributes and the corresponding pre-defined Values.

Below the Value section, there is a checkbox named **Activate Pattern**. When this checkbox is marked, a column titled **Pattern** is displayed in the **Value** section. This gives you the option of assigning a different symbol for each Value to help differentiate the Features in the Map View. In the farm.fbr example, we are making use of this capability to use symbols of different colors to represent the various conditions of the well heads and the different types of fences.

Please note that Activate Pattern can be active for one Attribute only. If you had this check box marked for an Attribute then decide to mark a different Attribute, the first Attribute will lose its Activate Pattern status. The currently active color/pattern scheme will apply automatically to newly added Features. However, you will need to take care of updateing the color/pattern assignment for any existing Features if they have been previously assigned a different set of color/patterns.

The **Type** box below the Value section is for specifying the data type of the Values. The "**Text**" type is for text descriptions. You may specify in the **Width** box the maximum number of characters that can be entered for the text description. For the "Last checked" Attribute, we set the width to "10" as we expect to enter dates in the mm/dd/yy format.

For numeric Values, you would select "**Integer**" if all the pre-defined Values for an Attribute will be whole-numbers. You could select "**Decimal**" if the pre-defined Values for an Attribute will be decimal values. You can specify the **Dec. Digits** box the number of decimal digits that can be entered.

Editing a Feature List

You may open an existing Feature List and change it as appropriate. The following commands are shared by the **Feature**, **Attribute** and **Value** sections:

Add: Add a new blank record at the end of the list.

Insert: Add a new blank record above the currently highlighted record.

Delete: Delete the selected record.

Let's add a new Feature Topic to the **myfarm.fbr** file that we saved in the previous subsection, and define its Attributes and Values. To do so, first open myfarm.fbr if it is not already open. Tap anywhere in the **Feature section** to activate it then tap the **Add** button.

The Feature Topic you will be adding is an Area Topic that represents farm plots. Enter "**Plot**" as the Feature name and select **Area** as the Feature Type. Double-click in the cell for **Pattern** then choose an area pattern to represent the farm plots on the map. The second pattern on the first row looks like a nice pattern to use.

With the "Plot" Feature Topic selected, tap anywhere in the **Attribute section** to activate it. Tap the **Add** button then enter "**Crop**". Tap the **Add** button again then enter "**Yield**". Tap the **Add** button again then enter "**Yield/acre**". If you need to edit a data field, first **double-tap** that cell then type over or change its contents. Leave the **Type** field as **List** for all of the Attributes in this example.

Tap the **Save** button from time to time to save what you have entered.

Now select "Crop" then tap anywhere in the **Value section**. To populate the List of pre-defined Vaues, tap the **Add** button then enter "**Beets**". Tap the **Add** button again then enter "**Cabbage**". Tap the **Add** button again then enter "**Carrots**".

Mark the **Activate Pattern** checkbox to see the **Pattern** column displayed in the **Value** section. Double-tap the pattern for Beets and assign a deep purple color to it. Assign a blue color to Cabbage, and assign a red color to Carrots.
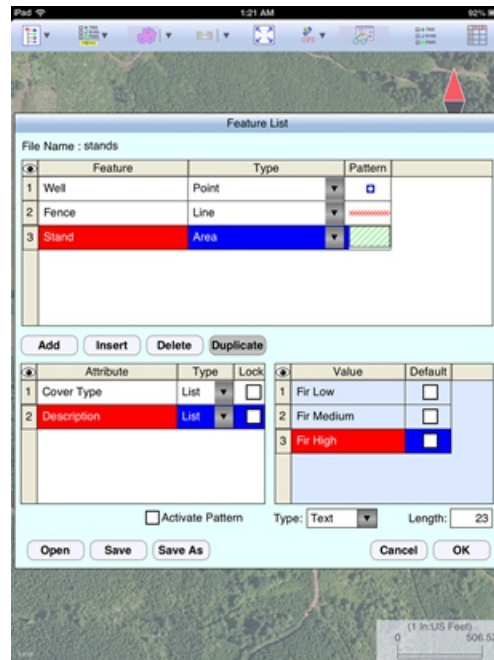
Leave the "Yield" and "Yield/acre" Attributes without pre-defined Values. You will be entering the yield value at harvest time, and we will let the app calculate the yield per acre based on the acreage of the plots.

As we will be entering numeric values for the "Yield" Attribute, such as 27630.5 (lbs.), tap on "Yield", select **Decimal** for the **Type** box, and enter "**1**" for **Dec. Digits**. As we expect the computed yield per acre to be a decimal value, tap on the "Yield/acre" Attribute, select **Decimal** for the **Type** box, and enter "**1**" for **Dec. Digits**.

Tap on **OK** to save any changes and close the Feature List function. If you tap the **Cancel** button, then the screen will close without saving the last changes to the data.

Creating a New Feature List

Now you can try and create a Feature List of your own after thinking about what types of Features you will be recording and what Attributes and Values might be useful to store with these Features.

Tap on the **GPS** Menu icon ![GPS icon] then select **Feature List**. If there is no Feature List associated with the active Job, the **Select Feature List** screen will pop up to display the existing Feature List files. If there is a Feature List associated with the active Job, its contents will be displayed. In that case, tap the **Open** button to display the **Select Feature List** screen.

Tap the **New** button then enter a meaningful name in the "FileName:" box, then press the **OK** button.

The **Feature** section will be active in your new Feature List. Tap the **Add** button to add the Feature Topics you wish to define. You may define the Attributes and Value for each Feature Topic imediately after adding the Feature Topic, or you

may add all the Feature Topics then define the the Attributes and Value for each.

In the **Attribute** section, tap the **Lock** checkbox for an Attribute if you wish to lock the Values associated with this Attribute. When this option is chosen, you may only select from the defined Values and not enter just any Value to tag the Feature.

For the **Type** column in the Attribute section, select **List** if the Values to be defined are a group of discrete numbers or names. Select **Range** if the Value entry will be a number between a lower limit and a upper limit. If you select **Range**, then the **Lock** checkbox will be automatically marked for the Attribute. This means that the Values entered will always be checked against the defined Range for data validity.

You will also be able to mark one of the Values as the **Default** Value. If most of the data you collect will have the same description, it will save time if you specify this as the default description for that Attribute in the Feature List.

If the Attribute is of **Range** type, enter the **Min** (lower bound) and **Max** (upper bound) Values. You will also be able to enter a **Default** Value to be displayed during data collection.

After defining the Attributes and Values for the Feature Topic that you have added, if you need to define another Feature Topic with a similar Attribute and Value setup, then you can save time by using the **Duplicate** function. You will need to change the duplicate Feature Name to a new unique name yourself. To do so, **double-click** on one of the duplicate Feature Topic Names then type over it.

Tap the **Save** button from time to time to save what you have entered so far.

After completing the Feature List, tap on **OK** to save any changes and close the screen. If you tap the **Cancel** button, then the screen will close without saving the last changes to the data.

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

For example, in the **mycorners.pmp** job, there is one Topic named "Corner" that contains three Point Features represented by the blue dots. When you tap on ,

you will see "Corner" listed in the Topic View panel on the left side of the screen. You can tap on "Corner" to highlight it and make it the active Topic.

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.

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, hold down on a Topic then drag it to the desired position. As an exercise, move the Tree and Corner Topics to be above the Plot Topic.

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 **mycorners.pmp**, tap the **Topic Menu** icon then select **New Topic**. Enter a Topic Name, such as **Tree**. Since trees are regarded as point objects, select **Point** for the **Type** field. You can add one or more **Attribute Names** (title of description) for this Topic and specify the data type and parameter. Let's tap the **Add** button and enter "Species" as the (Attribute) Field Name. This Attribute is a Text descriptor. We can leave the **Width** at 23 to accommodate certain long species names.

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 a **Feature List** is associated with the active job, you can tap on the down arrow for the Topic Name field and see a list of the pre-defined Feature Topics. You may select one of these pre-defined Topics to include in the active job.

We have previously created a Feature List named **myfarm.fbr**. We will associate this Feature List with our sample job. To do so, select **Job** from the Main Menu then select **Open Job**. For File Name select "**mycorners.pmp**". For Feature List select "**myfarm.fbr**". Tap the **OK** button to confirm and return to Map View.

Tap on then select **New Topic**. Tap on the pull-down arrow for the Topic Name field to see the available Topics to add from myfarm.fbr. Select "**Well**" then tap the **OK** button to confirm. In the same way, add the "**Fence**" Topic and the **"Plot"** Topic from myfarm.fbr.

When done, tap the **OK** button to close the Sheet Update 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. Or you may tap the **Sheet Setup** tab and change the order in which the Attributes will be displayed in **Sheet View**.

Let's add a built-in Attribute to the **"Plot"** Topic in the **mycorners.pmp** job. Tap on then tap on "**Plot**" in Topic View. Tap on then select **Edit Topic** to display the Sheet Update 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 Plot Topic.

Defining a Formula

While creating or editing a Feature Topic, you may enter a formula for an Attribute based on the Values of other Attributes for the same Feature Topic.

For example, if you have an Attribute defined for Unit Price, and an Attribute defined for Yield, you could define an Attribute for **Revenue** and enter for it the formula:

Unit Price * Yield

The reason we added the "**Area_Acres**" Attribute to the **"Plot"** Topic in **mycorners.pmp** job is so that we can compute the yield per acre for each vegetable crop. In other words, we want to define for the "**Yield/acre**" Attribute the following formula:

Yield / Area_Acres

To do so, first tap on then tap on "**Plot**" in Topic View. Tap on then select

Edit Topic to display the **Sheet Update** screen.

Highlight the **Yield/acre** Attribute then tap the **Formula** button.

Tap the **Select Attribute** button and select **"Yield"**. Enter the division operator "/" then tap the **Select Attribute** button and select "**Area_Acres**". The resultant formula will be displayed in the Formula box.

Tap on **OK** to save the formula.

Specifying a formula for an Attribute means that the Value for that Attribute will be automatically computed from the Values of the Attributes used in the formula .

<u>**Deleting a Feature Topic**</u>

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.

<u>**Auto Label**</u>

If you wish to have the Features displayed in Map View along with one or more of its identification labels or descriptions, first tap the **Topic Menu** icon then select **Auto Label**.

You may opt to show the Feature's **Topic Name**, **Sequence#** or **Feature ID**.

You may select one or more **Attributes** to be displayed.

Select **Delete Labels** if you wish to have the labels deleted.

Select **Hide Labels** if you only want to hide the labels but not delete them.

Tap on the **Font** tab to change the font size, font type face, or the **Freeze label size in zoom** setting.

You can set the default size, color and placement of these labels with respect to the Features by using **Main Menu - Setup - Auto Label**.

The settings under **Main Menu - Setup - Auto Label** will only be applied to newly created labels. They will not affect any existing labels. If you wish to have the new settings applied to all existing auto labels then you should use the **Delete Labels** button to remove all existing auto labels then create the auto labels again.

You may adjust the placement of an auto label by tapping on it to select it in **Map View** then dragging it to the desired location.

You may change the properties of an auto label by tapping on it to select it then

tapping on the **Feature Properties** icon.

Goto a Feature

The **Goto** function on the Topic Menu will let you search on the active Topic layer for a Feature that meets the specified search criterion. A successful search will result in the Feature being highlighted in Map View and the corresponding record being highlighted in Sheet View.

If you select **Feature ID** as the search criterion, you cannot select another criterion at the same time because the Feature ID is a unique entity.

To select some other Attribute as the search criterion, first tap on the checkbox for Feature ID to unmark it. Then select the desired Attribute Name and enter the Value you are looking for. You may use up to five Attrbiutes as search criteria. If you select multiple Attribute as search criteria, the app will take you to the Feature that meets **all** of the specified criteria. If there are several Features that satisfy the search conditions, then you can tap the **Find Next** button to go to the next one. You will also have the option to start the search from the Top (first record) or from a Start Number (record number).

Sort Features

This function will sort the Features by its Attributes. You may select a single Attribute as the basis for sorting the Feature records. If there are multiple records that share the same Attribute Value, you may wish to select an additional Attribute by which to sort each subbroup. The Index number denotes the sort level. If you wish to change the sort levels, tap on the Index button, then tap on the Attribute to be used for the highest sort level. When the Index button changes to Index (02), tap on the Attribute to be used for the second sort level, and so on.

By default, the Features are sorted in an ascending order. If you wish, mark the **Descend** checkbox for a descending sort order.

Statistics

To display the statistics for a numeric Attribute for a Feature Topic, first select that Topic to make it active then tap on the **Topic Menu** icon and select **Statistics**.

Export Text File

This function will export the data from the currently active **Point Feature Topic** to a text file that you might later import into a database management program. The exported file name will have the file name extension **.txt**.

To get an idea of how the text file export works, you could open the sample job file named cvoarea.pmp and select the Houses Point Topic to work with.

When you tap on the **Topic Menu** icon and select **Export Text File**, the text file name will default to the active Point Topic name. You may tap the **New** button

and enter a different file name, if you wish.

If you wish the first line in the exported text file to contain the field names (i.e. the Attribute names), the mark the checkbox for **First line contains field names**.

If you wish to include the Feature ID field in the exported text file, then mark the checkbox for **Export Feature ID field**. The Feature ID is a unique identifier for each Feature in a Topic and can serve as a key in sorting, earching and updating a Feature/Attribute/Value database.

If you wish to have the data in each field wrapped between double quotes in the text file, then mark the check box for **Wrap Text field in double quotes (")**. Please note that if any data value contains a comma (such as "Paul Burns, Jr") or a quotation mark, you must select this option. Otherwise, the data will not be correctly parsed by the importing software.

If your external software program expects data with fixed field lengths, then mark the check box for **Fixed field length**. In this case, the field length of the exported data will be based on the Topic structure. You can call up Topic\Edit Topic to change the length of the Attribute Value field. For an Attribute of **Decimal type,** the field length will be set to 15. In case the field name itself is longer than 15 characters, then the field length will be set to match the number of characters in the field name.

If you do not want to export all the Attribute data for the selected Feature Topic, tap on the "**Select Attribute**" tab, then mark the check boxes for the Attributes you wish to export. If there are lots of Attributes for the Topic, you can use the "**Select None**" button to deselect all of them, then select the few Attributes you wish to export.

When exporting angles in **degrees-minutes-seconds** format, the app will use the caret symbol (^) to represent degrees.

If you do not want to export all the Attribute data for the selected Feature Topic, tap on the "**Select Attribute**" tab, then mark the check boxes for the Attributes you wish to export. If there are lots of Attributes for the Topic, you can use the "**Select None**" button to deselect all of them, then select the few Attributes you wish to export.

Tap on **Export Preview** to see how the text file will look like.

<u>Import Text File</u>

This function will let you import **Point Feature** data into a Job from a text file. This is a very useful function for importing data into a Point Topic layer in the app. For example, you could use it to set up a meter reading route in this app if you already have the meter records set up on your desk-top computer and are able to export it as a text file. This function can also serve as a quick way to update the Attribute data for an existing Topic layer in the app.

Please Note:
Eeach Point Feature must have coordinate information in order for it to be placed

on the Map View. To generate new Point Features on a new Topic layer, the import text file should either include the coordinate fields or street address fields. If you just wish to update the Attribute Values of the existing Point Features on a particular Topic layer, then do not provide the coordinates in the import text file. Rather, select a **Relation Key** to correlate the incoming data with the existing data, as described later in this section.

To use this function, first tap on the Topic Menu icon then select **Import Text File**.

On the **Select File** page, select the text file you wish to import after selecting the file name extension **.txt** or **.csv**. (Suppose you have exported the Houses Features to a text file while going through the section titled "Export Text File". Then you could create a new Job and use the Import Text File function to import the Feture data from that text file.)

To have the location data fields interpreted as geographic coordinates (such as longitudes and latitudes), you must give them the field names **Position_X** and **Position_Y**, respectively.

If the text file contains **angles in degrees-minutes-seconds format**, the caret symbol (**^**) should be used to represent degrees. The minutes are to be represented by a single striaght quote (**'**), and the seconds are to be represented by a double straight quote (**"**).

Mark the checkbox for **First line contains field names** if the first line in the text file indeed contains the field names.

If the data for each field is wrapped between double quotes in the text file, then the app will mark the check box for **Text field is wrapped in double quotes (")**.

The app will use your settings as the default for future text file imports. Please select the proper options for your import text file so that the app can correctly interpret the data fields.

Tap on **Next Step** to continue to the **Set Topic** page..

You will need to name the **Topic** into which the data will be imported. The Topic name will default to the text file name. You may give the Topic some other name, or you may select a Topic from the drop-down list. All the Point Topics in the active Job and the associated Feature List are available for selection.

If you wish to make use of the Attribute assignments for a Topic in the Feature List associated with the active Job, make sure you select that Topic name from the drop-down list during the import process. If you import the data under a different Topic name and later rename it to be the same as the one in the Feature List, it won't be possible to relate that Topic to the Feature List.

Depending on the case (as discussed below), you may or may not be prompted to select a **Relation Key** and to specify whether or not to **Overwrite** the existing data.

If, on the previous page, the **First line contains field names** checkbox was not marked or the **Delimiter** is **None**, then the app will prompt you to specify the **Field Names**. In the case where the **Delimiter** is **None**, you will also need to specify the number of character spaces occupied by each field in the text file.

Tapping on **Next step** will take you to the **Data Format** page.

There are a number of cases to consider.

A. If the Topic name you specify for the imported data is a new one that does not exist in the active Job nor its associated Feature List, the app will create the new Topic, and the Data Format table will be populated with the field names, field types and field lengths based on the text file.

B. If you have selected the name of a Topic that exists in the active Job, but the Topic does not contain any Features, the app will import the data from the text file into the selected Topic.

C. If you've selected the name of an existing Topic that contains one or more Features, this indicates that you may wish to modify or add to the existing Topic. The app will prompt you to select a **Relation Key** to correlate the incoming data with the existing data. The relation key is an Attribute that exists in both databases and that has **unique values** (no duplicates). For example, if you have a list of people with their occupations, and the same list of people with their favorite hobbies, you will be able to use the peoples names as the relation key to find out both the occupation and hobby of a certain person on the list. By default the app will use the **Feature ID** as the relation key.

If you don't select a Relation Key, or if no field name is eligible to serve as a relation key, the app will ask you if you wish to add all new fields and data from the import text file. If you answer **No**, then the app will return to the screen for selecting the Relation Key. You can cancel out if you wish. If you answer **Yes**, then the app will display the fields and data to be imported.

If a **Relation Key** is selected, the app will let you choose whether or not to replace the existing data with the new data.

If you select **Overwrite**, the incoming data will replace the existing data for the records with matching relation key value. This will happen to the shared Attributes in the two databases. Any extra records in the incoming database will be added to the existing database. Any Attribute in the incoming database that is not in the existing database will be added to the Topic.

If you select **Leave intact**, the existing data will not be replaced. Any new Attributes will be added to the existing database.

If you are importing street address fields and would like the app to **convert the address information into coordinates**, then mark the check boxes for these fields in the **Address** column. Make sure the Street name, City name and State name are specified in this order. An example of the corresponding data record would be:

"375 SW Monroe Ave", "Corvallis", "OR"

Tap on **Next Step** to go to the **Coordinate Sys** screen. You will be asked to select the correct coordinate system for importing the points in the text file.

Tap on **Next Step** to go to the **Preview** screen that shows the data in the form it will be imported.

If the data to be imported does not look right, tap on **Cancel** to abort the import operation.

If everything looks OK, tap on **OK** to import the points into the active Job. The coordinates of the Point Features will automatically be converted to the active coordinate system.

Batch Delete by Text File

If there are many Feature records that you no longer need in a **Point Topic**, you can have them deleted all at once by preparing a text file containing the Relation Key field to be used as the basis for deleting the unwanted records. An Attribute must not have duplicate Values if it is to serve as a Relation Key.

To use this function, first select the **text file** containing the Values for the Attribute used as the Relation Key. For example, this might be a list of Feature that you wish to delete based on the Feature IDs.

"Feature_ID","TREE001","TREE003","TREE005"

You will need to inform the app whether the first line in the text file contains the field name(s). If it does (recommended), mark the checkbox for **First line contains field names**. If it does not, then you will need to specify the field names for the data fields. You may tap the little down arrow for each Field Name record to select the appropriate Attribute of the active Topic.

On the **Set Relation** page you will select the Attribute to be used as the key (such as Phone). For an Attribute field to be used as the key, it must not contain any duplicate Values. The app will display the valid Attribute fields from which you can make a selection.

Then the **Preview** page will show the records in the currently active Topic that will be deleted. For example, all the records that have phone numbers that match the phone numbers in the phone number list are subject to deletion.

You will be given a chance to confirm the deletion or to abort the action.

Warning:

If you answer Yes, all the listed records will be erased and cannot be recovered.

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 **mycorners.pmp** job, to which we have previously added a few Feature Topics.

<u>Adding a Point Feature</u>

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

In the **mycorners.pmp** job map, tap the **Topic View** icon then select the Point Topic named **"Well"**. 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** ⬤ .

Tap once on the satellite Map near the houses with red roof tops to drop a point. Tap on the Map again in the area between the triangular plots and the larger plot to their right.

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 GPS to turn on GPS then tap the **Pick GPS** icon Pick 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.)

Tap the **Back** button to return to the main Map View.

Now we wish to add a Point to the **"Corner"** Point Topic. First tap on then select **"Corner"** in the Topic View panel. Tap the Topic View icon again to toggle the list of Topics off.

On the Coner Topic layer there are already three Points marking three corners of a triangular plot of land. If you look carefully, you will notice that the right-most

corner of the plot is actually clipped off and is not represented by a single apex. Our task is to add another point at the fourth corner of this land plot.

To accomplish the daunting task of placing a dot precisely at the desired location, 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 fourth corner of the land plot. 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 dounut area to drop the node.)

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

If you wish, you could select the Tree Topic that you have added to this job previously and digitize a couple trees on this Topic layer.

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. Otherwise a point may be created very far away from your job site.

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.

Tap on **Cancel** if you decide not to create the new point.

Adding a Line Feature

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

In the **mycorners.pmp** job map, tap on ⊞ then select the Line Topic named "**Fence**". Tap the Topic View icon again to hide the list of Topics.

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, tap along the left border of the larger field to add a fence line. Use the **Node** tool ⊕ to add nodes and make a line that looks very close to the one shown

below:

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

Turn on ![Snap to Line icon] **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 icon] **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 ![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.

<u>Adding an Area Feature</u>

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.

In the **mycorners.pmp** job map, tap on then select the Area Topic named "**Plot**". Tap the Topic View icon again to hide the list of Topics.

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.

Let's create an Area Feature by joining the Point Features at the four corners of the nearly triangular land plot.

With the **Snap to Node** icon turned on, tap close to each of the four Point Features in the clockwise or counterclockwise direction. You don't need to tap on the first point again. Tap the **Next Area** button to close the **Plot001** area you have just formed.

Now let's digitize the larger plot by the fence. Since the fence lies along one side of this plot, we can save some time by making use of the **Include Boundary** tool. In the screen for digitizing an area, tap the **Include Boundary** icon . Tap on the Fence feature to display its nodes. Select the lowest node as the Start Node then select the uppermost node as the End Node. Tap on to turn it off. Then use the **Node** tool to help complete **Plot002**, which should look very close to the one shown below:

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.

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 can be presented in a spread-sheet format and you will be able to enter the corresponding Values into the cells. Please see **Sheet View** for details.

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

Labeling the Features

There are two ways to display labels for the Features in a job.

1. Label all the Features in a Topic by using **Topic Menu - Auto Label**. This function is described under **Topic Menu**. Try labeling the areas in the Plot Topic in **mycorners.pmp** with the name of the Crop.

2. Use **Feature Properties** to label a selected Feature with its corner angles, segment lengths and directions, and/or area with units. Some of these labels may not display because of the large map scale used or because there is not enough room to display them in the map.

Back to TOC

Classify a Feature Topic

The **Topic/Classify** function will let you classify the Features in a Topic into sub-groups based on the Values for a particular Attribute.

The steps for classifying the Features in a Topic are:

1. In Topic View select the Topic you wish to work with.

2. From the Topic Menu select the Topic/Classify function. The Classify Topic dialog box will be displayed.

3. Select the Attribute based on which to classify the Features.

4. Choose a Classify Method:

a) If you use the **Equal Interval**, **Quantile** or **Custom** method, specify the number of classes.

b) If you use the Custom method, tap the **Custom** button and define the range of classes in the Custom dialog box.

5. Choose a Color option.

a) If you use the **Ramp** option, select the **Beginning Color** and the **Ending Color**.

b) If you select the **Random** option, you can tap the **Assign Color** button to have random colors assigned to the various classes.

6. Tap the **Classify** button. The results of the Classification will be displayed in the Class Item field.

7. Click the **OK** button to exit the dialog box. The result of the Classification will be shown in Map View. In addition, you should see the sub-classes listed under the selected Topic Name In Topic View.

In Topic View you may toggle an individual class of Features on or off.

The various classification methods are described below:

<u>Unique Value Classification</u>

The Unique Value classification creates an individual class for each unique Attribute Value. This classification method can be used with all Value types: string, integer and real number. The number of classes equals the number of unique Attribute Values there are for the Features in the Topic.

Features with the same Values are assigned to the same unique-value class.

<u>Equal Interval Classification</u>

Features with Values that are integers or real numbers can be categorizes into classes of equal intervals of values. In other words, each class has an equal range of values. The number of classes is defined by the user.

The Value Interval is the difference between the Maximum Value and the Minimum Value divided by the Number of Classes.

Please note: The Equal Interval classification cannot be used with text Attributes. If you wish to use this method to classify numbers that are of text type, you must first change the Field Type of the Attribute to either integer or Decimal number. You can do so after selecting Edit Topic from the Topic Menu to call up the Sheet Update screen.

<u>Quantile Classification</u>

The Quantile classification is used for placing an equal number of Features into each class. The number of classes is defined by the user. Enter this value into the **"No:"** field. The number of Features per Class equals the total number of Features in the Topic divided by the number of classes.

Features are distributed between the established classes according to the range of numerical Attribute Values. Features are allocated in ascending order- Features with the lowest Values are assigned to the first class.

Custom Classification

The Custom classification option allows you to create user-defined classes. Enter the desired number of classes in the **"No:"** field. When you tap on **"Classify"**, a window will pop up to let you define the minimum and maximum values for each class.

For example, you might wish to define the following classes for grouping streets in different width ranges:

Width Class 1 30 - 40
Width Class 2 45 - 50
Width Class 3 60 - 65

If you wish to assign a code to each class, then mark the Show Prefix checkbox after tapping the Classify button. You may manually assign a prefix to each class, or you may specify a starting number or letter then click the **Assign Prefix** button to have consecutive prefixes automatically assigned to the classes.

The Prefix serves as an additional identifier. For example, you may use it to indicate the Zone to which a class of tree stands belong.

Tap the **OK** button after the prefixes have been assigned. (Do not tap the **Classify** button as **the prefix information will be erased when you reclassify the topic**.)

This app will let you reassign **colors/symbols** to the various classes . It also provides the Up and Down buttons to let you change the order of the topic classes.

Please note: Whenever you change the name of an Attribute, any classification based on that Attribute would be cancelled. In that case, simply reclassify by specifying the new Attribute name. If you made changes to any Attribute Values, you may also need to reclassify to correctly present the updated Values.

[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.

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

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 👓 HINT. 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.

Please open the job named **veggies.pmp** and use **Main Menu - Job - SAVE AS** to save it under the name **myveggies.pmp**. The data in this job looks similar to what you have in the **mycorners.pmp** job.

You will see that a corner on the right side of **Plot002** is cutting into the adjacent path. Go ahead and use the above procedure to adjust the position of a couple of the nodes to correct this problem.

Back to TOC

Insert or Delete a Node

As you know, this app will let you change the shape of a Line or Area Feature by moving one or more of the nodes on the line or the area boundary. In addition, this app will also let you add one or more nodes to the Feature to better delineate it or to serve as a handle for modifying the shape of the Feature.

To insert a node into a Line or Area Feature, select the Line or Area Feature then select **Insert Node** 🔺 from the Tools menu. Select the position of the new node with respect to an existing node that you will specify.

Tap the existing node to be used as the reference node.

Select **"After"** if you would like to place the new node after the reference node. The app will use a blue corss symbol to indicate the next node after the selected

node.

Select "**Before**" if you would like to place the new node after the reference node. The app will use a blue corss symbol to indicate the next node before the selected node.

Tap on the **Next Step** button.

Specify how you will be creating the new node. "**by tapping**" means you will define the position of the new node by tapping on a location on the screen. "**by point feature**" means you will be tapping on an existing Point feature to define the location of the reference node.

Now move the Node Tool to the location at which you wish to insert the new node. Tap once in the center of the Node Tool. Tap on the **Apply** button to complete the action.

Tap on the **Back** button to return to the main Map View.

Sometimes you may wish to remove a node from a Line or Area Feature. You can do so by selecting the Line or Area Feature then using the **Delete Node** function on the Tools menu. The app will let you select a single node or a range of consecutive nodes to delete.

Once a node has been removed, it cannot be recovered. To re-create the node, you could insert a new node then try to move it to the approximate position of the deleted node.

Back to TOC

Sheet View

After activating a Topic either by selecting it from the Topic View or by selecting one of the Features in that Topic, you may tap the **Sheet View** icon to list all the Feature records in that Topic. The Sheet View presents the Features and their Attributes in a tabular format based on the Feature Topic setup.

As an example, select **Main Menu - Job - Open Job**. For **File Name** select **myveggies.pmp.** For the **Feature List** box, select **myfarm.fbr** then tap on **OK**. (If you haven't added the **Plot** Topic to this Feature List per our previous instructions, then select **veggies.fbr** instead.)

Tap on then tap on the "**Well**" Topic name in Topic View. When you tap the **Sheet View** icon , you will see the spread sheet for this Topic.

Sheet View provides an alternative way for you to select the desired Feature for viewing or editing. Simply tap a record in Sheet View and watch the corresponding well get highlighted in the map.

Normally only a few records will be visible along with the map display. You may

click on the **Full Sheet View** icon to have the entire screen dedicated to Sheet View. To return to the normal view, tap on the icon.

You may change the order of Features in a Feature Topic by highlighting the Feature record in the Sheet View and then using the , , and icons.

To delete a Feature, first highlight it then tap the **Recycle Bin** icon .

Caution: Always make sure you really want to delete a Feature before confirming the deletion action. **A deleted Feature cannot be recovered.**

Feature Attribution

Sheet View provides a convenient way for you to add or change the description for each Feature record. You may edit the displayed Value if it is not a Value computed by using a Formula, or a Value for a built-in Attribute (such as ID and Area_Acres).

To change a Value displayed in a cell of the Sheet View, double-tap on the cell then type over the existing data. You may do so as soon as each Feature position has been recorded. Or, you could enter the descriptive data after all the Features in a Topic have been recorded.

If a Feature belongs to a Topic added from the Feature List currently associated with the job, then the pre-defined Values will be available for you to select. For an Attribute of the **List** type, you may click on the pull-down button in the cell to select the desired value. If the Attribute is not locked, then you may also enter any Value. For an Attribute of the **Range** type, you may only enter a Value within the allowed range.

In the Sheet View for the **myveggies.pmp** job, you will see that we have already entered the Value data for some of the Features. Go ahead and enter data in the empty cells for the Features in the **Well** and **Fence** Topics. Because we have associated this job with the **myfarm.fbr** Feature List, which contains pre-defined Values for some of the Attributes, you will see a pull-down arrow for the cells in those columns, and you will be able to select the appropiate Value instead of having to type in the data.

Notice how the "Corroded" well shows up in red color, and the "Wood" fence is displayed in brown? These are exactly the colors we have assigned in the Feature List to the symbols representing those Values. Similarly, a "Cabbage" plot will be colored blue, and a "Carrot" plot will be colored red.

For the **Plot** Topic, notice how the "Area_Acre" field is automatically populated with the acreage of the vegetable plots. Also, as soon as you have entered a value for the "Yield" Attribute, the yield per acre is automatically computed and displayed in the "Yield/acre" column.

Feature Properties

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

Four 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 see 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.

To attach one or more photos to the Feature, tap on the **Photos** button. You may
link photos from the Photo Library or a folder on your device. And, you may tap
the **Camera** button to snap a picture and have it automatically linked to the
Feature.

If you would like the app to show the file name of the attached photo in Sheet
view, you must add the built-in Attribute **Photos** in the Topic Structure page for
the Feature Topic. If you have not yet added this Attribute, you can use **Topic/Edit
Topic** to get to the Sheet Update screen to do so. The data field for displaying the
photo file name(s) is limited. If the string of file names is too long, it will be
truncated. Therefore, it is advisable to keep the photo file names short.

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 **myveggies.pmp** job, tap on one of the two vegetable plots then tap on and mark the **Show Area label** checkbox. Do the same for the other vegetable plot.

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 automatically 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.

If a Feature belongs to a Topic added from the Feature List currently associated with the job, then the pre-defined Values will be available for you to select. For an Attribute of the **List** type, you may click on the pull-down button to select the desired value. If the Attribute is not locked, then you may also enter any Value. For an Attribute of the **Range** type, you may only enter a Value within the allowed range.

On the **Photos** page, you can view any photos that have been attached to the currently selected Feature. You may also use the Link Photo function on this page to add one or more photos to the Feature.

Auto Label Text Setup

With an Auto Label selected in the Map View, you may tap the Feature Properties icon to view the relevant information.

You may change the label properties such as the font size and orientation. Specify the label orientation in degrees in the clockwise direction.

Create Deed Calls

The Farming GPS GIS III app will automatically generate a list of directions and distances describing a Line Feature or the boundaries of an Area Feature. This list is referred to as the deed calls.

In addition, this app will let you create a Line Feature or an Area Feature by entring the deed calls for that Feature. This means you will be able to get a drawing of a parcel of land by using the directions and distances provided in the legal description of that property.

Viewing the Deed Calls for a Line or Area Feature

Please open the sample job named **cvoarea.pmp** and save it as **cvoarea1.pmp**.

Use **Main Menu - Close Map** to turn off the map.

Tap on the purple SPRAY AREA1 to select it. Tap the down arrow for the **Map Tools** menu then select **View Deed Calls**. (If you did not select a Line or Area Feature before tapped the pull-down arrow for the **Map Tools** menu, you would have seen the Create Deed Calls function listed.)

The first node is highlighted in green color. Its coordinates are shown in the **Lat** and **Lon** boxes.

Tap on the **Calls** tab to view the deed calls for the selected area. You may scroll the deed call records up or down.

To view the details of the currently highlighted call record, double-tap on that record or tap the **Edit** button. In landscape mode, you will need to scroll to see the Edit button.

Tap the **Calls List** button from the editing screen to return to the list of deed call records.

Tap the **Back** button to return to the main Map View.

Entering Deed Calls to Create a Line or Area Feature

The following example illustrates the procedure for entering bearing and distance calls for each segment of a boundary to create the deed drawing.

First, let's create a new job named **mydc.pmp** and set **Map** to **Show Satellite**.

For this example, we will be using **US Feet** as the distance unit, and we will be entering **DMS** angles in the **BEARING** mode. Please call up **Menu - Setup - Unit and Angle System** and set up the system accordingly.

Now tap the pull-down arrow for the **Map Tools** menu then select **Create Deed Calls**. (If you had selected a Line or Area Feature then tapped the pull-down arrow

for the **Map Tools** menu, you would have seen View Deed Calls function listed.)

As we will be entering the deed calls for a closed Area Feature, leave the **Area** tab highlighted. If you were entering the deed calls for a Line Feature, then tap on the **Line** tab to select it.

We will use the default **Topic Name** "DeedCall". If you wish, you could tap on the **Pattern** button to change the line style for the line plot or the fill pattern for the area plot..

In the **First Node** section, enter **44º11'49.773"N** into the **Lat:** box, and enter **123º30'48.818"W** into the **Lon:** box. The node that shows up at the southwest corner of the plot will be our point of beginning.

We will leave the **Orientation** field at 0. If you enter an angle value into the Orientation field, the entire deed plot will be rotated by that amount. Therefore, this functionality could be used to re-orient a completed deed plot to line up with the background map. It will also be handy for entering deed calls that refer to the magnetic north.

Tap the **Calls** tab to go to the page that lists the existing deed calls records. Initially there are no records shown.

Tap the **Add** button to add a new call record and display the data entry screen.

First, specify the type of segment you will be adding. Choose between **Line Segment** for straight lines or **Arc Segment** to define an arc.

Our first call is a straight **Line Segment**. We enter the horizontal distance of 459 US Ft from the **green** starting point and also specify the bearing of N 10 E.

Tap the **Calls List** button to return to the listing of the Deed Calls records.

If you need to change the data entered for any record, simply tap the **Edit** button
for that record to call up the data entry screen then enter the correct data. In
landscape mode, you will need to scroll to see the Edit button.

Tap **Add** and enter an Arc Segment as shown below. Tap the pull-down arrow for
each field to select the appropriate option.

For an Arc Segment, specify the size and length of the arc by entering a
combination of the **Radius** and one of the following: **Arc Length**, **Chord Length**,
Central Angle. Also specify the orientation of the curve by entering the **Chord
Direction**, the **Tangent Direction** or the **Radial Direction** (from the first node of
arc to the center of the circle, of which the arc is a part). Select the **Continuous**
option if the curve is to continue in the direction of the last defined curve or line
segment. Finally, specify the **Curve Direction** to indicate whether the arc turns left

or right.

Tap the **Calls List** button to return to the listing of the Deed Calls records.
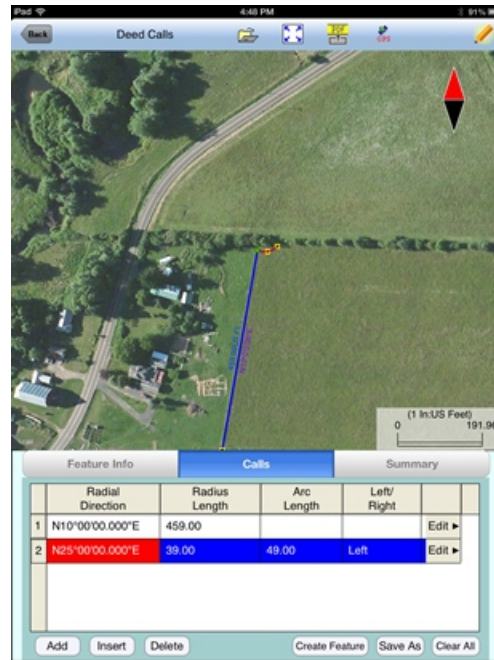
The last entered segment is highlighted in red in the graphical view.

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. To fit the drawing to the screen, simply tap the **Zoom-Fit** icon. When **Map** is turned on, you may not be able to zoom to a really small scale. In that case, turn off the Map then pull to zoom into the map.

As there could be line segments as well as curve segments in your deed drawing, please note that the column titles for the list of deed calls records will correspond to the highlighted record.

Now tap the **Add** button to add a Line Segment as shown below:

If you wish to add a new segment, you could as well tap the **Add** button on this screen. This button will permit you to quickly add one segment after another without having to go back to the previous screen.

We will tap the **Calls List** button to review all the records that we have stored so far:
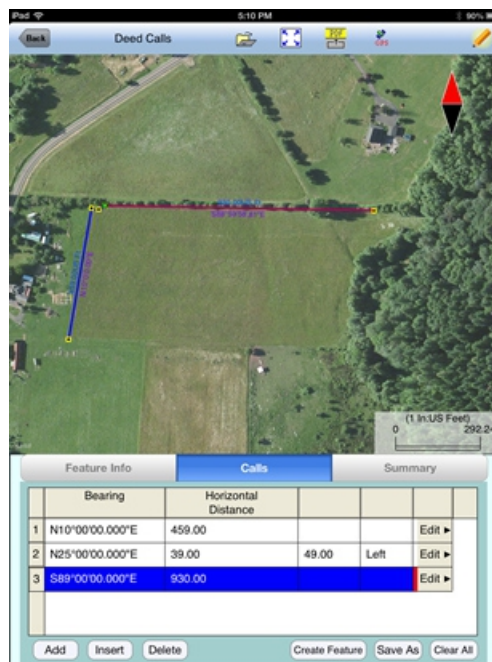
Whenever the Deed Calls records are displayed, you may tap the **Insert** button to insert a record before the highlighted record, tap the **Delete** button to delete the highlighted record, or tap the **Clear All** button to clear all existing deed calls from the list and start a new deed call drawing.

Caution: Make sure you really want to delete a record or clear all records before confirming to do so. Deleted records cannot be recovered.

When you tap the lit **Edit** icon to turn it off, any drawing you have made so far will be displayed in **full screen**.

Complete the drawing by entering the following data. Remember to tap the **Add** button before entering a new call, and pay attention to the N, S, E, W designation.

Line Segment
Horizontal Distance: 172
Horizontal Angle: S82º00'00.000"E

Line Segment
Horizontal Distance: 120
Horizontal Angle: S60º00'00.000"W

Arc Segment
Radius: 200
Arc Length: 170
Chord Direction: S58º00'00.000"W
Curve Direction: Left

Arc Segment
Radius: 170
Arc Length: 188
Continuous
Curve Direction: Left

Arc Segment
Radius: 90
Arc Length: 185
Continuous
Curve Direction: Right

Line Segment
Horizontal Distance: 900
Horizontal Angle: N87º23'00.000"W

Tap the **Summary** button to see the closure errors and the perimeter and area that you would get when the figure is closed.

If this is satisfatory, tap the **Back** button then confirm to create the Feature.

Editing the Deed Calls

To modify the deed calls for the Area Feature that you have just created, first tap on that Area Feature in Map View then tap the **Deed Calls** icon .

You may change the location of the Feature by changing the position of the First Node. If there are points or nodes in your job, you could tap the **Pick** button then select one of them as the first node.

You may re-orient the deed plot by changing the Orientation angle.

You may change the area pattern and color for the Area Feature represented by the deed calls.

On the Calls Page, you may **Add**, **Insert** or **Delete** a deed call record.

Be careful with the **Clear All** button as this will delete all the deed call records.

To edit a record, double-tap on it or tap the **Edit** button. (In landscape mode, you will need to scroll to see the Edit button.) Make sure you know what you are doing before changing the distance or angle values.

If the data viewed is not the first or the last deed calls record, the **UP** and/or **DOWN** arrows will be active. You may tap the appropriate button to view or change the previous or next data record, if you wish.

To return to the display of the deed call records, tap the **Calls List** button from the editing screen. From this page you may tap the **Save As** button to save the deed calls to a text file. Enter a names such as "mycvoarea". The app will automatically add the file name extension **.dcf** (deed calls file).

If you are at the last deed calls record, you may tap the **Add** button to add a new call.

To return to the list of deed calls records, tap the **Calls List** button.

If you intend to have the changes applied to the original Area Feature, then tap the **Update Feature** button. Otherwise, tap the **Back** button to return to the main Map View. (You will be given another chance to update the Feature if you have not updated the Feature based on the changes.)

<u>Saving the Deed Calls to a Text File</u>

To save the deed calls to a file, tap the **Save As** button on the page listing the Deed Calls records and specify the name of the file. The file extension is ***.dcf (deed call file)**. This is a text file that you will be able to read by using a text editor.

<u>Opening a Deed Calls Text File</u>

You may open a .dcf file that you have previously created by using this app or a text editor. To open the deed calls file, tap the **Open File** icon on the **Deed Calls** page.

Then you may view and edit the deed calls, re-save them to a .dcf file, or create a new Feature based on the deed calls.

Please note that the Deed Calls function in this app does not support re-orientation of the deed plot. Therefore, if the .dcf file you are opening contains a non-zero orientation parameter, it will have no effect on the deed plot displayed in this app. And if you open a .pmp job file containing a Feature with associated deed calls with non-zero orientation parameter, there will be a discrepancy between the displayed deed plot and the Feature. In this case, you may clear the deed calls then create new ones based on the displayed Feature.

Create Grid

Suppose you wish to install sprinkler heads at fixed intervals in both directions to irrigate 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. Grid points are also useful for recording soil sampling results such as the pH variation across the plot.

If you wish to have a set of parallel lines drawn over the 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

then tap the pull-down arrow for the **Map Tools** menu and select **Create Grid**.

You can try it out using the Area Feature that you created in the **mydc.pmp** job.

The Grid Property dialog will be displayed:

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 approprite for your application. You may define the grid orientation by using an existing line segment or two existing nodes. For the **mydc.pmp** job, you could select the line segment on the south side as the reference direction.

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 **Sheet View** icon , select the unwanted grid then tap the **Delete** button. The grid records are all named the same. Newer records are added at the end of the list by default.

You may edit an existing grid by tapping on it in Map View or by selecting it from Sheet View then tap on the Feature Properties icon .

Link Photo

The Tools menu provides the Link Photo function. With a Feature selected in Map View, when you select the Link Photo function, you will be taken to the Photos page in the Feature Properties screen.

You may link photos from the Photo Library or from the app's Documents Folder on your device.

To snap a photo on the spot, tap on the **Camera** button. When the photo you've just taken looks fine, tap the **Use** button to have it automatically linked to the Feature. If you decide not to use that photo, then tap the **Cancel** button.

Create Buffers

This app will allow you to create a buffer zone around a **Point Feature**, along a **Line Feature** or along the perimeter of an **Area Feature**. You may also create multiple buffers at a fixed interval, multiple buffers at different distances from the Feature, as well as **Area Strips** with specific starting and ending distances.

To use this function, tap on the **Utilities menu** icon then select **Create Buffer** . The Buffering dialog will be displayed.

Suppose we wish to map the area to be mowed between the fence in **myveggies.pmp**and the stand of trees on its left side. Instead of digitizing this strip

of land, we could create a 60 ft wide buffer zone for the **Fence001** Line Feature. Please set the distance unit to **Feet** for this example. (If you are working with meters then use 18.29 Meters for the buffer interval.)

With the cursor at the **Source** box, tap on the **Fence001** Line Feature to select it.

Enter 60 as the **Buffer Interval**. Tap on the button showing "**Left**". Leave the Resultant Topic as "Buffer".

We will keep the checkbox for **Entire Feature** marked because we want to create a buffer for the full lengh of our fence. If you wish to buffer just a part of a Line Feature, you could unmark the checkbox for **Entire Feature** then specify the starting and ending nodes.

When you tap the **Solve** icon , the buffer is created. Tap the **Back** button to return to the main Map View.

Tap on the buffer zone to highlight it then tap the Feature Properties icon to get to its **Area and Length** page and view its perimeter and area values.

You can use a similar procedure to create a single buffer or multiple buffers around an **Area Feature**.

For an Area Feature, you can create **Inside** buffers or **Outside** buffers. If you just wish to buffer a portion of the boundary of the area, then unmark **Entire Feature**, and specify the starting and ending nodes. As there are two possible routes to go from the starting node to the ending node on an Area Feature, a **Reverse** checkbox is provided.

The **Area Strip** option will let you create buffer strips with given starting and ending distances. For example, if you wish to create a 10 ft wide buffer strip that starts 20 ft from the Area Feature boundary, and another 20 ft wide buffer strip that

starts 50 ft from the Area Feature boundary, you would turn off the **Equal Intervals** checkbox then enter the following values into the table:

	Start	End
1	20	30
2	50	70

Tap on a buffer zone to highlight it then tap the Feature Properties icon to view its perimeter and area values. Please note that the net area for each outside buffer is the total area less the area of the Area Feature.

If you create overlapping buffers, the newly created buffer will lie below the one created earlier.

You may find that you are unable to select an inside buffer for an Area Feature and view its area by tapping on the buffer area. This is because the inside buffers are placed underneath the Area Feature. You can reveal an obscured Feature in the following ways:

1. Each Feature belongs to a Feature Topic layer. You can move a Topic upward by holding down on it in Topic View then dragging it above the one obscuring it.

2. You could turn off the Topic layers obscuring the desired Topic layer.

3. Within a Topic layer, you can change the order of the Features by turning on the Sheet View, selecting the record for a Feature and using the "To Front", "To Back", "Forward" and "Backward" buttons.

Here is another way to view the area for a buffer that is covered by an Area Feature or another buffer. Turn on Topic View and select the Buffer Topic. Then turn on **Sheet View** to display the buffer records. Select the desired buffer record, and it will be highlighted in Map View. Then you can tap the Feature Properties icon to get to its **Area and Length** page and view its perimeter and area values. Of course, you could also add the Area_Acres or the Area_Ha built-in Attribute to the Buffer Topic so that the buffer areas are automatically displayed in Sheet View.

Back to TOC

Subdivide Areas

If you have not yet done so, please open the sample job named **cvoarea.pmp** and save it as **mycvoarea.pmp**. We will use mycvoarea.pmp to illustrate the **Hinge Cut**, **Direction Cut** and **Split** methods for dividing up an area .

Select the **"Show Standard"** Map mode, and select **Meters** as the distance Unit for this job.

Division by Hinge Cut

In the center of the map is a spray area with the Feature ID SPRAY AREA1. Tap

on that Area Feature to highlight it.

From the **Utilities Menu** select **Hinge Cut** .

The Hinge Cut method will let you start the division line at any node on the Target Area Feature and specify the size of area to cut out.

Enter "8" into the **Hinge Node #** field then tap the **Enter** key on the pop-up keyboard. You will see the selected node indicated by a little green square. Enter "**63801.84**" into the **Cut Area** field.

In most cases, there will be two solutions that satisfy the specified conditions. To get the cut-out area that includes the node preceding the hinge node, select **Previous**. If it's the other solution that you desire, then select **Next**. You can use the displayed result to help you decide.

With the **Previous** tab highlighted, tap the **Solve** icon to compute the solution. The following screen will be displayed.

If you've made an error and wish to undo the Hinge Cut, tap the **Reset** icon .

If you are sure this is how the original area should be divided, then tap the **Save Result** icon .

The app will automatically assign the next available ID(s) to the newly created Feature(s). If you wish to assign a different set of IDs to the new Features, you may tap on the Starting ID field then enter the first ID number, such as "SEC1". The second newly created Area Feature will assume the ID "SEC2", and so on.

Let's enter "**SEC1**" as the Starting ID.

Tap on the OK button to finalize the hinge cut and store the newly created Features, or tap on the **Cancel** button to abort this action. Let's tap on **OK**.

Please note that **once the area partition has been finalized, the original area cannot be recovered.** Therefore, it is a good idea to save a copy of the original job file under a different name before splitting an area.

Tap the **Back** button to return to the main Map View. Here, you may tap on a newly created Area Feature and use the **Feature Properties** tool to rename it or to assign a different area pattern to it.

Division by Direction Cut

As described under Hinge Cut, we have cut SPRAY AREA1 in **mycvoarea.pmp** into two sections, SEC1 and SEC2. Suppose we wish to divide the section on the west side (**SEC1**) into **three equal parts** and have the division lines go parallel to the eastern border of this section. For this, we will use the Direction Cut method, which lets you sepcify the direction of the division line and the size of the area to be cut out.

First, tap on the target area, SEC1, to highlight it in the main Map View.

From the **Utilities Menu** select **Direction Cut** .

In the above screen, the ID of the Target Feature is SEC1. This area is highlighted in the displayed view. If it is not the correct one, you may tap on the intended target area to select it.

As we will be creating more than one sub-areas, select **Multiple** for the Mode field.

If you know the exact orientation of the division line, you may enter the known value.

For this exercise, use your finger to orient the **Direction Guideline** in the desired direction, i.e. parallel to the eastern border of the target area.

If you wish to zoom into the map, you must first turn off the Cogo mode by tapping on the icon.

Alternatively, you may specify the direction for the cut by tapping on then selecting two existing Points or nodes. For example, we could use this tool and select the two terminal nodes of the line segment representing the eastern boundary of our target area. If you selected an incorrect Point or node as the First Point, you may tap on it again to unselect it. Similarly, you may tap on the currently selected Second Point to unselect it. To disable this mode, tap on gain.

After aligning the Direction Guideline with the eastern border of the target area, enter "**21267.6**" into the **Cut Area** field. If you need to adjust the direction again, then tap on the Direction field to activate it.

In most cases, there will be two different solutions that satisfy the specified conditions. To get the cut-out area that starts from one side of the target area, select **Side 1**. To get the cut-out area that starts from the other side of the target area, select **Side 2**.

As the Cut Area we have specified for this example will divide the target area into nearly equal thirds, the remaining area after the cut is close to zero. Therefore, it is immaterial whether you select Side 1 or Side 2 for this example.

Tap the **Solve** icon ![icon] to compute the solution.

The following screen shows that the target area will be divided into three equal pieces.

If you've made an error and wish to undo the Direction Cut, tap the **Reset** icon ![icon] .

If you are sure this is how the original area should be divided, tap the **Save Result** icon ![icon].

The app will automatically assign the next available ID(s) to the newly created Feature(s). If you wish to assign a different set of IDs to the new Features, you may tap the Starting ID field then enter the first ID number, such as "PLOT1". The second newly created Area Feature will assume the ID "PLOT2", and so on.

Tap on the OK button to finalize the direction cut and store the newly created Features, or tap on the **Cancel** button to abort this action.

Please note that **once the area partition has been finalized, the original area cannot be recovered.** Therefore, it is a good idea to save a copy of the original job file under a different name before splitting an area.

Tap the **Back** button to return to the main Map View. Here, you may tap on a newly created Area Feature and use the **Feature Properties** tool to rename it or to assign a different area pattern to it.

Division by Splitting

You may split an Area Feature along a Split-Line. Let's continue to use **mycvoarea.pmp** as our sample file.

Tap on the area named **SEC2** to select it.

From the **Utilities Menu** select **Split** to display the Split Area screen.

Opt to **Digitize** a division line to split this area into two areas. The **Node tool** will be automatically activated to help with the digitization.

Tap on the **Snap to Node** tool to turn it on. Move the Node tool to the node close to where the road enters this area on the west side then tap in the center of the Node Tool.

Tap on to turn it off. Zoom into the map to get a better view of the road then move the Node tool along the northern border of the road. Tap at appropriate locations to create the division line.

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.

Make sure the division line ends on the border or extends beyond it.

Tap the **Split** button to view the result.

If you've made an error, you could tap the **Undo** button to erase the division line and start over in this screen.

If the division result is what you want, then **select the "heir" to finalize the split**. To do so, tap on one of the areas that is to assume the same Feature ID and area pattern as the original area. The other portion will be assigned a differerent ID and area pattern.

Please note that **once the area partition has been finalized, the original area cannot be recovered.** Therefore, it is a good idea to save a copy of the original job file under a different name before splitting an area.

If you wish to use an existing Line Feature as the division line for splitting an area, then tap on the **Existing Line** button in the Split Area screen. The selected Split-Line must pass through and extend beyond the perimeter of the area to be divided.

Tap the **Back** button to return to the main Map View. Here, you may tap on a newly created Area Feature and use the **Feature Properties** tool to rename it or to assign a different area pattern to it.

Back to TOC

Disconnect a Line or Area Feature

The **Disconnect** function on the **Utilities** menu will let you disconnect a Line Feature into points or smaller line segments. The options for disconnecting an Area Feature are: "to points", "to lines" and "to sub-areas". When you disconnect a Line or Area Feature "to points", the nodes turn into Point Feautres. Please remember to select the desried Topic from the **Result Topic** pull-down menu so the resultant Features will be placed on that map layer.

If you wish to have the original Feature deleted, then mark the check box for this option.

Tap the **Disconnect** button to complete the action of disintegrating the original Feature.

Join Features

If you have recorded or digitized points along a road or along the boundary of an area then realized that you should have created a Line or Area Feature instead, you could use the **Join Line/Area** function to connect the points into a Line or Area Feature. Another useful application of this function is for joining waypoints in a particular order then using the Point Stakeout function to visit each waypoint in the pre-defined sequence. This function can also be used for joining two Line Features together or for merging two Area Features that partially overlap.

To join a number of points into a Line or Area Feature, first select the **Join** function on the **Utilities** menu. Then tap once on each of the Point Features you wish to join together. The Points will be joined together in the order selected.

If you wish to join all the points in the active Topic into a Line or an Area Feature, then mark the checkbox for **All Points of current Topic**. In this case, you do not need to select the points individually.

Select the Feature type (Line or Area) from the **Type** pull-down menu then select the the Topic for the resultant Feature from the **Topic** pull-down menu .

To join two Line Features together, you would select the two lines and the app will automatically join the tail (last node) of the first line to the head (first node) of the second line.

Two adjacent Area Features can be merged together by using the **Areas** option if they share a common portion.

Another way to join two Line Features together is to use the **Two Features** option of the **Join** function. You would select the two lines and specify how they are to be connected - Head to Tail, Head to Head, Tail to Head or Tail to Tail. The app will label the head and tail ends of the two Line Features to be joined together.

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 ![GPS] 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 ![snap] 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 ![undo] . To delete all the nodes made in this measurement session, tap the **Reset** button ![reset].

If you wish to convert the shape you have delineated to a Feature, then click on the **Create Feature** button. Otherwise, the temporary shape will be discarded when you tap the **Back** button to close this screen.

Back to TOC

Measure Area

The **Measure Area** tool ![icon] 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 ![GPS] 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 ![snap] 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 ![undo] . To delete all the nodes made in this measurement session, tap the **Reset** button ![reset].

If you wish to convert the shape you have delineated to a Feature, then click on the **Create Feature** button. Otherwise, the temporary shape will be discarded when you tap the **Back** button to close this screen.

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 ![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

Export Job Data

You may export all the Feature data in a Job in a number of formats.

<u>Export Shapefiles</u>

To export the Features in the active Job to Shapefiles, tap the **Main Menu** icon, select **Job** then select **Export Shapefiles**.

Select one or more Topic layers to export. Each Feature Topic will be exported as a separate set of Shapefiles.

Each set of Shapefiles consists of several files (e.g. the .shp, the shx, the .dbf, and the .prj files). The exported data files will reside in the **Documents folder** for the application. To access your exported Shapefiles outside this app, first connect to the iTunes® program then look in the Documents folder for Farming GPS GIS III in the File Sharing section.

If you need to use the Shapefiles data with another GIS application, please copy the .shp, the .shx, the .dbf, and the .prj file by the same job name to your desktop computer.

As there is a limit of 10 characters in the field name for the DBF file, if an Attrbrite name exceeds 10 characters, it will be truncated.

Export Excel file

The Features in the working job file may be exported to an Excel file. The exported file will reside in the **Documents folder** for this app, unless you have setup the app to store files in iCloud.

To export the Feature data to an Excel file, choose **Job** then select **Export Excel file**. Mark the Topics that are to be exported and select the desired options then tap the **OK** button.

To unmark all the checkboxes, tap the **Select None** button.

Data will be exported in the working coordinate system. The distances and angles will be exported in the active distance and angle units.

Export KML

The Features in the working job file may be exported to a KML file. The exported KML file will reside in the **Documents folder** for this app, unless you have setup the app to store files in iCloud. .

To export the Feature data to a KML file, choose **Job** then select **Export KML** . Enter or select the destination file name. Mark the Topics that are to be exported then tap the **OK** button.

If you wish to also export the Attributes of the Features to the KML file, then mark the checkbox for "**With Attributes**".

Export 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** 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.

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 the working coordinate system. The distances and angles will be exported in the active distance and angle units.

Export GPX

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

To export the Feature data to a GPX file, choose **Job** then select **Export GPX**. Enter or select the destination file name. Mark the Topics that are to be exported then tap the **OK** button.

Please note that the Attributes of the Features will not be exported to the GPX file.

Export to PDF

To export the Feature data to a PDF file, tap the **Main Menu** icon then select **Export to PDF**. If you wish to include all the Features in the PDF file, then first tap the Zoom-Fit icon to fit the map elements to the screen,

To export to a new PDF file, tap on the **New** button. Rename the file, if you wish then tap on **OK** to confirm.

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.

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.

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.

The **View File** function is also useful for viewing any other PDF documents that you have placed in the Documents folder of this app. If you have a document or cheat sheet that you will need to refer to while working in the field, it is a good idea to save a copy of the file in the Documents folder of this app by using the iTunes® program.

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 **Farming GPS GIS III** 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.**

Email Files

You may email Job files (*.pmp), Feature Lists (*.fbr), PDF files (*.pdf), DXF files (*.dxf) and Deed Calls files (*.dcf). To do so, first tap the **Main Menu** icon and 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.

This app supports the capability to get attached .pmp and .fbr files from an email.

Suppose a colleague sent you an email with a .pmp job file attached.

When you open the email and hold down on the email attachment, you will be given the option to select the app for opening the attachment. For this example, you will select Farming GPS GIS III, and the app will start automatically and provide a preview of the .pmp job. You can then use Job\Save As to save the job file on your iPad device.

Collect GPS/GIS Data

This app will let you create a Job and select a **Feature List** to use, collect location data for Point, Line, and Area Features, and tag them with descriptions. Point Feature data may also be collected in the **Offset** or **Traverse** mode.

Within the data collection function, you will select a Feature Topic for which to collect data. You may select a Feature Topic from the Feature List associated with the Job. In this case, the **data collection parameters** are predefined in the Feature List, but you can overwrite them by entering new parameters if you wish. You could also select any existing Point, Line or Area Topic layer for which to collect GPS data. Or, you could have a new Feature Topic created on the go. In the latter two cases, you will need to specify the desired data collection parameters.

Defining Data Collection Parameters using a Feature List

Besides using a Feature List to assign the Feature Type and defining the Attributes and Values for a Feature Topic, you can also use it to pre-define the GPS data collection parameters.

Please tap on the GPS icon, select Feature List then select an existing Feature List

such as myfarm.fbr to see the data fields discussed in this section.

If you mark the **Feature Lock** checkbox, the user will be forced to select a Feature from the Feature list for tagging GPS data during data collection. This will be helpful for keeping the Feature Names consistent in the data file.

Following is a description of the **GPS data collection modes and parameters**.

Type: Select Point, Line or Area as appropriate.

Collect Mode: Select the mode of data collection.

Static Time: In this mode, you will log a stationary Feature for the specified time period. This is the default modefor Point Features. Enter into the **Intvl/ Session** field the amount of time in seconds that you will be staying at each point to log the GPS position data.

Lines and Area Features may be collected in Static mode. In this case, you would let the GPS receiver stay at each node of the Line or Area Feature for the duration of the Time Session. The software will join these nodes or vertices with straight lines.

Dynamic Time: In this mode, you will log a Line or Area Feature at the specified **Time Interval** in seconds.

Dynamic Distance: In this mode, you will log a Line or Area Feature based on the specified **Distance Interval** in the active distance unit. The result will be a Feature with equally spaced nodes.

When you select a Feature Topic from the Feature List associated with a Job to record GPS data, the app will automatically used the data collection parameters defined for that Feature Topic in the Feature List. For example, if for the Well Point Feature Topic theCollect Mode is static time and the Intvl/Sess is 30, then you should stay still at the point to be recorded for 30 seconds for the app to log the GPS fixes. If you wish to log certain points for only 15 seconds, there is a Stop button that you could use to end the session.

Please see the section titled **Set up Feature List** for details about defining the Attributes and Values for each Feature Topic.

<u>Job Setup</u>

After tapping the **Menu** button, select **Job** then select **Current Job**.

You can select an existing Job in your area to open it.

If this is a new job you are starting, tap the "**NEW**" button and accept the default Job name or enter the desired Job name, such as "myveggies".

You may select an existing **Feature List**, such as "myfarm" to be associated with the Job.

Press **OK** to confirm the screen.

Turn the GPS ON

Tap on the **GPS** icon then select **Turn GPS On**. To save power, turn the GPS off when you are not actively collecting GPS data.

Position Information

To view your current position, click on the **GPS** icon then select **Position Info**.

Navigation Setup

Under **Setup/Navigation Settings**, you can change the way the screen focuses on your location. Select **Auto Scroll** if you would like the job map to scroll to keep your position displayed on the screen while you are moving along. Select **Auto Zoom** if you would like the map to zoom out and let you see more of the job map whenever you reach the border of the currently displayed portion of the job map.

Select a Feature Topic

Tap the **GPS** icon then select **Collect**.

Tap the **New** button to call up the **Store Feature** screen.

Select the desired Feature Topic (such as **Well**) from a list of the predefined Feature Topics. Or enter a new **Feature Topic** name and specify the **Topic Type**.

The fields for **ID** (for the individual Feature to be logged, e.g. **Well003**), Feature **Type**, **Log Mode** and **Time Session** or **Time Interval** are automatically filled. You may override these default settings, if you wish.

When done specifying a Feature Topic for which to collect data, tap on **OK**.

If you need to define a new Attribute for the Feature Topic, tap the **Attribute tab** at the bottom of the screen.

Feature Attribution

If a **Feature List** is active for the Job, the Attributes associated with the Feature will be automatically displayed.

For an Attribute of the **List** type, click on the pull-down button to select the desired value.
For an Attribute of the **Range** type, enter a Value within the allowed range. If the Attribute is not locked, then you may enter any Value.

If the Feature Topic is not from a Feature List, you may manually enter the Values for the Attributes created in the Topic Editor to characterize it.

If you wish to assign a specific symbol or color for the Feature, then click on the

Pattern button and make the desired choices.

Data Logging

To log GPS data, press the **Store** button from the **Collect** screen. Data will be recorded per the Feature type and the data logging parameters specified for the Feature.

To halt data logging temporarily, tap the **Pause** button. When ready to continue, tap the **Continue** button.

Plotting Position Data on Screen

The Map View is always "North" oriented. If the position moves off the screen, the screen will automatically scroll to show the current position.

Storing Static Points

Each Static Point is a stand-alone Feature.

> 1. Stay at the feature location and **do not move around** while you are logging data for a Point Feature.
>
> 2. Select or enter the description for the Feature.
>
> 3. Press the **Store** button to log GPS data.
>
> 4. When the time is up, the Point Feature is recorded and the Feature ID advances by 1.
>
> If necessary, you may press the **Stop** button to stop the data logging process at any time. The point will be recorded with fewer coordinate fixes to compute the average position.
>
> 5. Go to the next point of interest then select the description, and press the **Store** button to log a second Point for the same Feature Topic.
>
> 6. Repeat Step 5 for any additional static points you wish to log.
>
> To start collecting data for a different Point Topic, first tap the **New** button then go to Step 1 above.

If you incorrectly logged a Point Feature and wish to correct it, first select the Point Feature in question from Map View or from Sheet View. Tap the **Feature Properties** icon then tap the **Update** button. Specify the desired time session then tap the **Start** button to record the correct position.

Storing Static Line or Area

For a Static Line or Area Feature, you would occupy each vertex (node) for the duration of the Time Session to record its location. And nothing will be recorded while you walk or drive from one vertex to the next. The nodes for the Static Line

or Area will be automatically connected by the software.

Go to the beginning node of the Static Line or Static Area Feature. Stay there and **do not move around** while logging data for this node.

Press **Store** from the **Collect** screen to record the Feature descriptions and GPS data for the Feature. The steps are identical to the Static Point data logging procedure described above, except that pressing the **Stop** button will just stop the data logging process for the current node, and will not end the data logging for the Static Line/Area Feature.

When the first node has been collected, move to the next node of the Static Line/Area Feature, then press **Store** again to log data for that point.

Repeat Step 3 until you have finished logging data for all nodes of the Static Line/Area Feature.

Tap **New** if you wish to collect data for another Topic.

Storing Dynamic Line or Area

For a Line or Area feature logged in Dynamic mode, data will be collected while you are moving along the Line feature or the perimeter of the Area Feature. There are two options for the dynamic mode.

Dynamic Time: Log a position based on the specified time interval.

Dynamic Distance: Log a position based on the specified distance interval.

1. Go to the beginning node of the Line or Area Feature for which you wish to collect data. Assign Feature information to the new Feature (Feature name and description).

2. Press **Store** from the **Collect** screen.

3. Start moving (i.e. walking, driving) along the Line Feature or the perimeter of the Area Feature.

4. Press the **Stop** button when you have reached the ending point of the Line feature or the beginning point of the area feature. You may also use this button to abort the data logging process at any other time.

Tap **New** if you wish to collect data for another Feature Topic

To end the GPS data collection, tap the **Exit** button. Tap the **Zoom Fit** icon at the top to see all the Features displayed on the same screen.

Nested Points

This app allows you to interrupt a Line or Area Feature (without terminating it) to record a nearby Point Feature. This kind of Point Feature is called a **Nested Point**.

The procedure for logging a Nested Point is similar to that for logging a regular Point Feature.

1. Begin logging a Dynamic Line or Area Feature.

2. From the **Collect** screen, press the **Nested** button. A list of Point Topics in your Feature List will be displayed.

3. Highlight the appropriate Point Topic or create a new one. When done, press **OK**.

4. Optionally select or enter descriptions for the selected Nested Point Feature.

5. Press the **Store** button. Stay at the Point location and do not move around while you are logging data.

If necessary, you may press **Stop** to stop the data logging process for the Nested Point Feature.

6. When data has been logged for the Nested Point Feature, you may choose to log another Nested Point or to continue logging the original Line or Area.

If you need to log another nested point, press the **Nested Point** button.

To continue with logging the Line or Area, depress the **Continue** button and start moving again along that Feature.

Offset Mode

For a Feature that is not directly accessible, you can log data for one that is accessible and record the offset information along with the Feature data.

To access the **Offset** function and enter an offset for a Feature, press the **No Offset** button from the **Collect** screen. ("No Offset" indicates that there is currently no offset associated with the Feature.)

This app provides for two types of offset computations.

Left/Right Offset

You can offset a **Line** or **Area** Feature to the left or to the right.

Slope Distance:
Enter the horizontal distance from where you are collecting GPS data to the target. This distance should be parallel to the ground, perpendicular to the direction of motion.

Direction:
Select "Left" or "Right" to indicate whether the target is to the left or right,

respectively, of where you are collecting GPS data.

Point Offset

You can offset a **Point Feature** to another point location.

Slope Distance:
Enter the slope distance from where you are collecting GPS data to the corresponding point on the target.

Azimuth:
Enter the azimuth of the target.

Slope:
Enter the slope angle to the target.

After specifying the offset information, tap on **OK** then log the GPS data as described above.

Append Coordinates

If you wish to add GPS data to an existing Line or Area Feature, press the **Existing Line/Area** button from the **Store Feature** screen.

Then click on the pull-down menu under "Name" and choose the Feature Topic that contains the Line or Area Feature to which you want to append coordinates. Next, click on the pull-down menu for the "ID" field then select the ID for the specific Line or Area Feature to which you want to append coordinates.

After you press the **OK** button, proceed to collect data as described above.

Traverse Mode

The **Traverse** function lets you continue mapping **several** Point Features when GPS signal is not available. The application will record the following information that you enter for each traverse leg:

SLOPE DIST: The slope distance from the reference position to the location of the new traverse point.

AZIMUTH: The direction from the reference position to the new traverse point (0 to 359 degrees).

SLOPE: The slope from the reference position to the new traverse point (-90 to 90 degrees).

You may record traverse points in two different modes, as described below.

Side mode: Use this method to perform a radial traverse by taking multiple "side shots" from the same reference point. The following diagram refers to a known GPS reference point.

Traverse mode: Use this method to traverse to a new point that will then be used as the reference point for the next traverse point. This method can be used for storing lines or area boundaries.

This app will permit you to take multiple side shots from each point on a traverse.

The general steps for using the Traverse function are as follows:

1. Click on the **Traverse** button from the **Collect** screen.

2. In the **Traverse New Feature** screen, select an existing Point Feature as the **Reference Point Feature**.

3. In the **Name** box, enter or select the name of the Point Topic into which the new Point Feature will be stored. The ID will automatically be entered for you. Click **OK**.

4. Choose the method for defining the new point by tapping on **Side (mode)** or **Traverse (mode)** button below the ID field.

5. Optionally enter the descriptions for the newly defined Traverse Point Feature. Optionally assign a symbol for the new Point Feature to be stored.

6. Click the **Store** button to display the traverse data entry fields.

7. Enter the Slope Distance, Azimuth, and Slope for the point to be created with respect to the reference point. The reference point is shown with a **circle** around its symbol. The target point will be

displayed with the temporary symbol .

Click the **OK** button to record the new point.

8. If you are working in the **Traverse mode**, the newly stored Traverse Point will automatically become the next Reference Feature.

If you are working in the **Side mode**, the Reference Feature will stay the same.

To continue working in the same traverse or side-shot mode, repeat the above steps 5 through 7.

To switch to the other mode, first tap on **Side (mode)** or **Traverse (mode)** button below the ID field then repeat the above steps 5 through 7.

Please note: If you would like to store the new point to a different Feature Topic, tap the **New** button to call up the **Traverse New Feature** screen then enter or select the new Topic name. Click **OK** then continue with the above steps 5 through 7.

When GPS signal can be received again, you may return to normal GPS data collection mode by clicking the **GPS** button in the data collection screen.

When done with data collection, tap **Exit**.

The GPS Track

If you wish to record your GPS track in the background while performing other tasks in this app, turn on the GPS then select **GPS/Tracklog On**. A dialog will be displayed for you to set the desired **time interval**.

The recorded track will be stored in the **Tracklog Topic**.

To stop recording the track log, select **GPS/Tracklog Off** or turn off the GPS by using **GPS/GPS Off**.

You may record one or more tracks in this manner.

The Tracklog function is available only while GPS is turned on. Also, the logged track becomes a Feature that you can select or zoom (into or out of) only after the data logging has been completed by selecting **GPS/GPS Off** or **GPS/Tracklog Off**.

If you don't see the new Tracklog record in **Sheet View**, please turn the Sheet View off then on. Then the new Tracklog record will display.

Point Stakeout

Suppose there is an old survey marker that you need to locate on your farm. You could use the **Point Stakeout** function in conjunction with GPS to help you find it. You could use the same method to locate an old well overgrown by brushes if you have a record of its coordinates. For this reason, it is helpful to use GPS to record the coordinates of important locations or structures for future reference. The Point Stakeout function could also be used to stake out a fence or a boundary line if you are using an accurate GPS device.

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** section under **Digitize Features**. If the elevations also matter to you, then include the correct elevation in the target coordinates.

2. Import a DXF file or Shapefiles containing the target shapes. Please refer to **Set up a Job**.

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**.

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 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. Select the the desired Point Feature. Or, for a Line or Area Feature, type in the desired Node #, or tap the little right arrow button to change the Node # to another node in the same Feature.

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.

Click the **Settings** button to set up or change the settings for stakeout. The **Stakeout Setting** screen is described in the sub-section titled **Set up Stakeout** under **Set up a Job**.

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

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

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.

You may use the values displayed in the **Go** field to help ou 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.

Line Stakeout

You may use **Line Stakeout** to find your position relative to a **Line Feature** or the boundary of an **Area Feature**, and to optionally stake and/or store the location. This function will come handy when you need 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.

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

Click the **Settings** button to set up or change the settings for stakeout. The **Stakeout Setting** screen is described in the sub-section titled **Set up Stakeout** under **Set up a Job**.

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

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

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.

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.

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

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 .

Following are our answers to some commonly asked questions about walking a property line to find the stakes:

I. How can this up help me find my property line if I am walking alongside of it.

If you have the deed calls from your property deed document and can determine the coordinates of the point of beginning and the local magnetic declination, you could use the **Create Deed Calls** function to plot the property boundary then use the **Line Stakeout** function in the app to help you walk along the boundary.

If you are able to identify the property boundary when you call up the Map in the app, then you could use the **Add Area manually** function to digitize the boundary line, then use the **Line Stakeout** function in the app to help you walk along the boundary. If you can identify the corners of the property on the Map and digitize those points, then you could use the **Point Stakeout** function in this app to help you walk from one point to another.

That said, if you are not using a high-precision GPS receiver, the app will not be able to help you walk really close to the actual boundary line or corner points. The app in conjunction with the iPhone GPS could help you walk in the vicinity of the boundary to find the existing stakes or markers.

If you need to determine the actual location of the property line, then you will need to use a survey-grade GPS (such as EOS Arrow Gold or SXBlue Platinum) with this app.

II. I put my boundaries in. How do I go about setting up the app so it can help me walk along the boundaries and the app can guide me?

1. Tap on the **GPS** icon and select **"Turn GPS on"**.

2. Tap on the GPS icon and select **"Stakeout Setup"**. You can set up the app to beep and/or display a message when you are within the **Tolerance Distance**. So, if Tolerance is "32" US Feet and you are walking a line, then the app will beep as long as you are with 32 ft from the line. If you are using an external GPS receiver that claims 2-5 m accuracy, then you could enter a smaller value, such as 10 ft.

3. Tap on the GPS icon and select **"Line Stakeout"**. With the Target Feature box highlighted, tap on your boundary line. You want to have the "Path" tab in red (selected).

4. Look at the path on the screen and walk so that the GPS marker follows the path. Also read the information in the shaded area near the bottom. You want to walk close to the path so that the **Range** value is small. If this Range value is smaller than the Tolerance you set up in Step 2, then you should hear the app's beeps.

5. While walking along the path, look for any existing stakes.

III. The boundary of my property consists of straight line segments. How to find the corne stakes?

In this case you could use the **Point Stakeout** function to help you get to the corner points. Turn on GPS and set up the Target Tolerance shown above. In the Point Stakeout screen, select the first corner node as the **Target Feature**. The information in the shaded area will tell you to go a certain distance in a certain direction to get closer to the target. The app will beep when the **Range** value is within the Tolerance distance of the selected corner node.

Contour - Settings

The Contour / Volume utility provides a way to help you visualize 3-diemsional 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 Utilites 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.
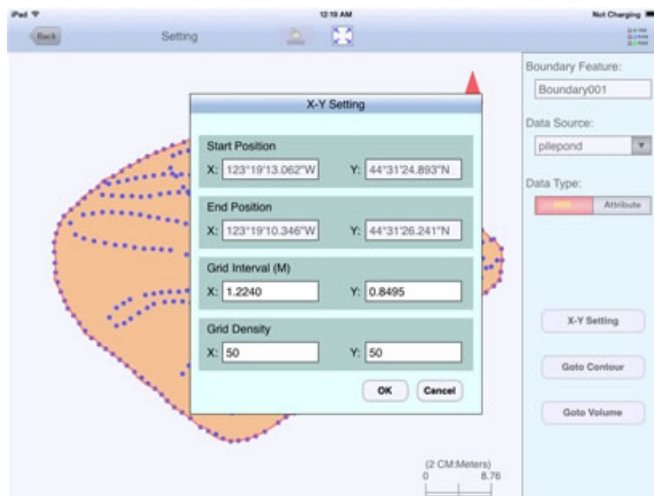
Now you can tap on "**Goto Contour**" to go to the Contour screen to create colored contour regions and/or create contour lines. Or you can tap on "**Goto Volume**" to go to the Volume screen to view the calculated volumes. Or, you can tap the **Back** button to return to Map View.

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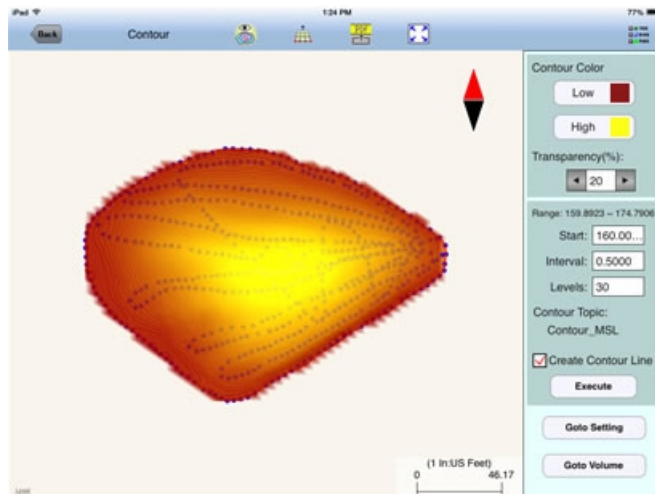
In this example, the diagram indicates that the pile has one peak near the center. If you were contouring the amount of fertilizer to apply to your farm plot, then the colored contour map can serve as a guide in fertilizer application.

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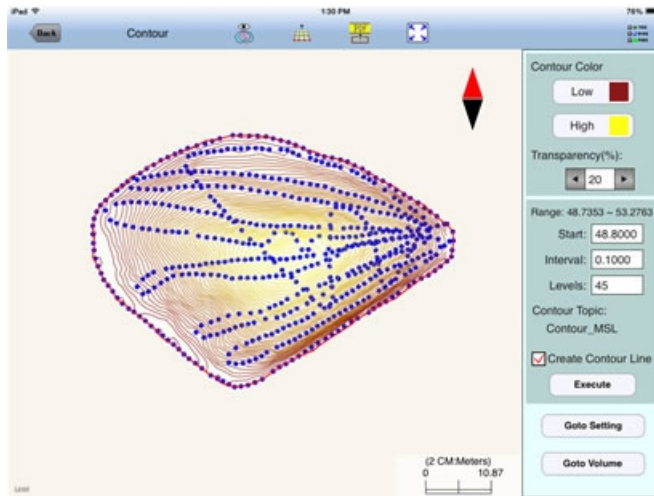
You may tap on the **PDF** icon to send the screen to a PDF file along with the contour parameters.

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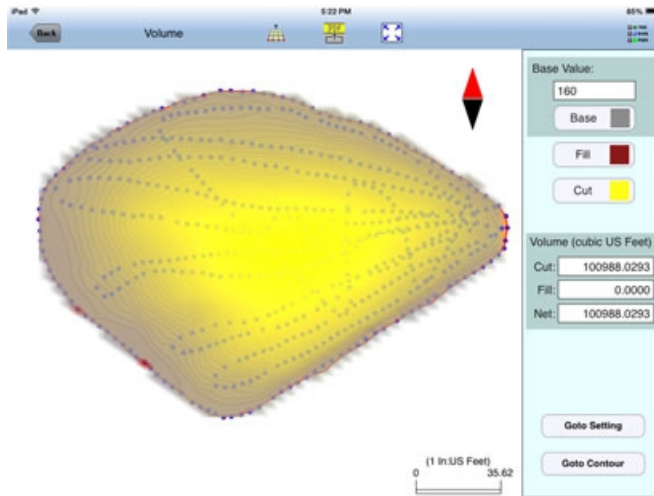
As you can see, with the **Base** set at the bottom of the pile, all of the volume is shown in the **Cut** field. This means that if you were to bring the pile to the ground level, this much of it needs to be removed (or cut).

Now, let's enter 165 (ft) as the Base Value. Tto 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.
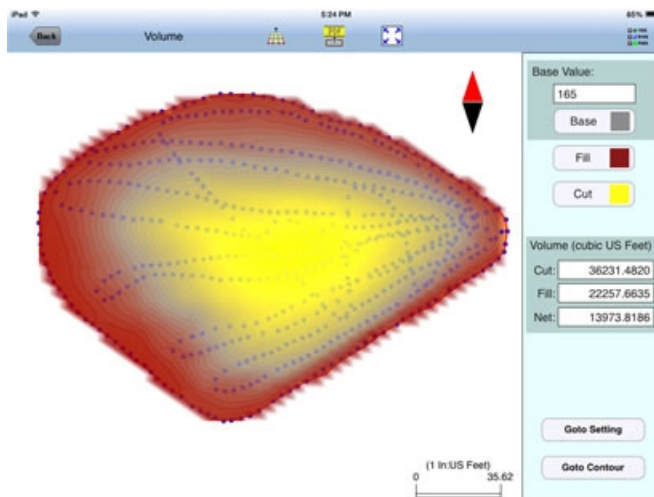
You may tap on the **PDF** icon to send the screen to a PDF file along with the contour parameters and the computed volumes.

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 Contourr**

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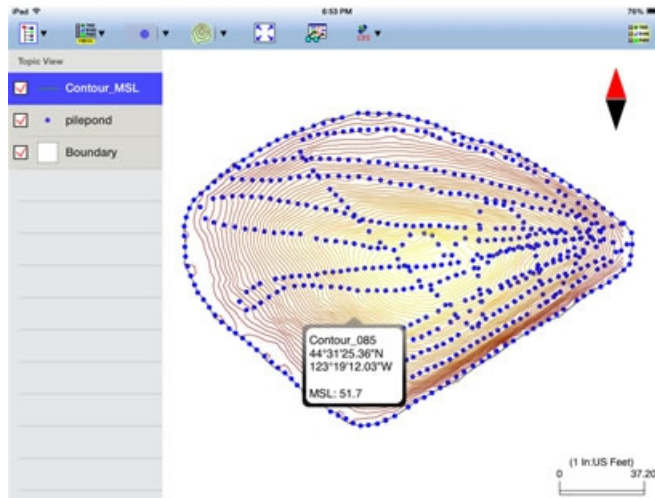
While the contour-regions map is displayed, the bubble that pops up when you tap in the contoured area will contain some information relevant to the contour-regions map. For example, when the contour-regions map generated by the Volume function is displayed, the bubble will provide the cut or fill information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

Back to TOC

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