CartoMobile User's Guide

CartoMobile Documentation

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1 Introduction to CartoMobile

CartoMobile® is a mobile GIS product for iOS®. It is part of the Cartographica family of products from ClueTrust and shares many attributes with its macOS sibling. However, due to its design as a mobile data entry and viewing system, we have simplified some aspects to reduce clutter and increase productivity.

When we set out to design CartoMobile, we had observed that many of the mobile GIS systems in existence today come in two categories: generalized GIS products that try to do everything that desktop GIS packages do, but on a small screen, and dedicated products single-built for a particular project in mind using expensive APIs.

At ClueTrust, we believe that the iOS platform has opened the opportunity for a powerful, easy to use, geospatial data device that fits in the palm of your hand (or the crook of your arm) and can be customized for each project without having to spend thousands of dollars on software development.

Enter CartoMobile, a powerful new entrant into the mobile GIS world that promises the ability to simplify field data entry, retrieval, and viewing.

The philosophy of CartoMobile is to concentrate on the individual at the location. Taking advantage of the touch interface and GPS capabilities of the iPhone® and iPad®, CartoMobile can use where you are to make finding and updating data that much simpler. But, it's more than just finding yourself on the map. For a tool such as this to be useful, it must be fast, flexible, and friendly. Further, because not all uses are the same, it must be capable of adapting to many different sources of data and many input capabilities.

1.1 CartoMobile Interface Overview

At the heart of CartoMobile is the Map. As such, it is the vast majority of the main display when you get the App running. The map functions as a control surface, a viewing area, and the primary context in which work is done.

Points on the map are shown as flags (by default small red flags), which can be tapped to expose the label for the point. Tap on the chevron (>) on the right of the label, and the display form will show up. Tap in a part of the map that doesn't have any points and the label will disappear.

> ⚠ Multiple labels can be showing on the screen at the same time so that you can compare the data.
>
> If you have very little empty space on the screen, all labels can be removed by slowly two-finger tapping on the display.

At the bottom of the screen is the toolbar, containing a number of common tools.

The Arrow (⬈) activates and deactivates GPS tracking. The button is filled when the GPS is tracking and CartoMobile will center the map on the current location. Once you move the map or once the GPS stabilizes, the indicator will go out and it will no longer track your location automatically.

Bookmarks (📖) provides a place to mark areas of interest on the map. For example, if you are performing a field survey and want to be able to quickly find your place when you head away for the night, it's easy to just add a bookmark and use it find the place you left off when you return the next day.

The Add button (✛) will add a new feature at the center of the map (or the current GPS location if the GPS is active). To add a new feature at any location on the map, tap and hold until the loupe comes up, then release it when it is in the location you desire.

The Gear (✳) will bring up the settings panel, which provides a way to turn layers on and off, change maps, and adjust other settings.

1.2 Maps, Data Layers, and Base Maps

Since the basic function of CartoMobile is centered around the Map, *Maps* are the highest-level unit of configuration. Maps group together parameters to keep your displays clean and easy to navigate, and they provide you with a way to separate projects, data sets, or clients. Maps are configured through the Change Map panel, accessible from the Settings panel, which is accessed by tapping the gear button in the lower right corner of the screen. Maps consist of two key kinds of data, Base Maps and Data Layers.

Base Maps are the graphical maps that underlie the display. The default map comes from MapBox (which uses OpenStreetMap and other data sources), but it can be replaced with maps from other sources, including WMS Servers or alternate OSM servers. For alternate services, you'll need the URL and optionally information that specifies which layers to use and possibly login or access information.

Additionally, CartoMobile provides the ability to import your own imagery from any source, using popular formats, including MrSID®, TIFF, GeoTIFF, GeoPNG or ECW format files. This imagery can then be used when you are not connected to the internet.

Data Layers are the vector-based elements that sit on top of the base map and provide geographic and attribute information. Data Layers contain features which can be points, lines, or polygons. Each of these features may contain attributes that describe something about them.

The particular layers that are available on the device are determined by the Settings panel, so to change them just tap on the gear button to bring up the Settings panel. Any number of Data Layers can be active at a time, but only one base map can be visible at a time.
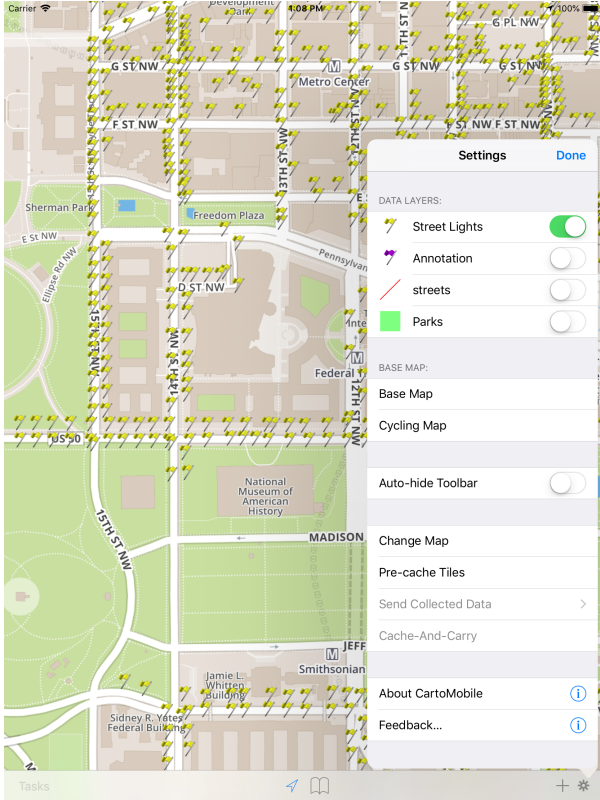
1.3 Forms

Because CartoMobile is designed for field data entry, it is built on a sophisticated form system. When adding or changing attributes for a feature, CartoMobile displays that feature's form. Each Data Layer may have its own individual form, allowing you to intermingle different types of data in the same Map.

Each form contains one or more fields that allow for the display and modification of data.

Forms connect data storage to data presentation, providing context and limits to the input by the user. CartoMobile's field types include:

Field Name	Description
TextBox	A long (up to 255 character when stored locally) text field
Single Text	A short (one line) text field
Check Box	A simple yes/no (1/0 or on/off) selection
Choice List	A choice list provides a map between a human-readable label and the value which is stored. The values represented by the choice may be either numeric or string values. Often, a choice list is preferable to open text selection, because it provides consistency in data entry.
Street Address	A text area to input street information. Street Address fields will call out to the Maps application for directions if you tap and hold on them. In advanced versions of CartoMobile, street address fields can be filtered based on street data.

Number	A field for entering Numbers (integers or floating-point).
TimeStamp	Combined date and time for things such as marking the time a feature was created.
Date	A simple date field.
Time	A simple time-of-day field.
Picture	Storage for a picture taken with the device or stored on the device. See later documentation on how to use these in other GIS applications.
GPSLocation	A field for presentation of the GPS Location represented by the object. This is valid only for point layers, as all other layers have more than one location.

2 Importing and Exporting Data

2.1 Importing Shape Files

Shape files are nearly ubiquitous in the world of GIS and CartoMobile is adept at working with them. There are two ways to import a shape file: as a new map, and as a layer in an existing map. We will cover both methods in this section.

In both cases, the shape file must be loaded onto the device prior to importing.

2.1.1 Copying a Shape File to your Device

1. Attach the device to your Mac or PC and open iTunes
   The device should show up at the top of the iTunes window
2. Click on the device button at the top of the iTunes window
   The screen should change to the device window with Summary selected
3. Select **File Sharing** in the source list (the side bar)
   The pane to the right (labeled CartoMobile Documents) will now be available
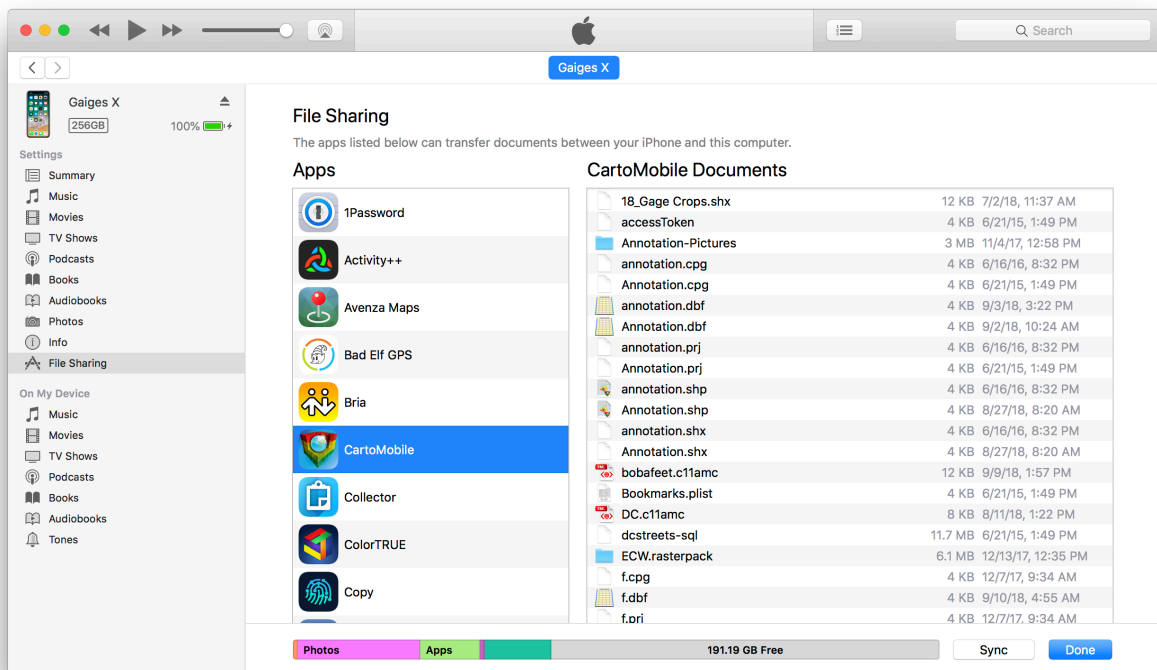
4. Do one of the following:
   - Drag all of the components of the shape file (the .shp, .shx, .dbf, .prj, and .cpg if it exists) to the CartoMobile Documents pane
   - Click on the Add... button and then select all of the components of the shape file as above

   The files should appear in the CartoMobile Documents pane

2.1.2 Importing a Shape File as a New Map

1. Tap on the `Gear` icon in the lower right of the screen on your device
   `Settings` panel should slide up
2. Tap on `Change Map`
   Map panel should slide in
3. Tap on `Import Map from Shapefile`
   A list of all shape files available on the device will be shown
4. Tap on the desired shape file name
   A new map will be created with the name of the shape file and you will be placed back at the Map panel

> ⚠ At this point, you may tap the name of the Map to make it the active map

2.1.3 Importing a Shape File into an existing Map

1. Tap on the `Gear` icon in the lower right of the screen on your device
   `Settings` panel should slide up.
2. Tap on `Change Map`
   Map panel should slide in.
3. Tap the `Edit` button at the top of the screen
   Blue disclosure buttons will appear on each local Map in your list
4. Tap the blue disclosure button on the Map that you want to edit
   The editing panel for your map will slide in, showing a list of overlay layers and base maps.
5. Tap `Import Shape File` in the `Overlays` list
   The shape file selection panel will slide in, showing a list of all shape files on the device
6. Tap on the desired shape file name
   A new layer will be added to your map with the name of the layer
7. When you are done changing the Map, tap the done button
   The Map panel will slide back in, showing a list of all maps (still in edit mode)
8. Tap the `Done` button to exit edit mode and return to selection mode
   The blue disclosure buttons will disappear and you can now select your map

2.2 Exporting Shape Files

Once you have created and modified data in CartoMobile, you will want to get it back to your computer. This process involves copying the data files back from your device to the computer using iTunes, and is basically the reverse of the process of getting data in to CartoMobile, and since the data is always kept up to date, you can do this at any time.

2.2.1 Copying a Shape File from your Device

1. Attach the device to your Mac or PC and open iTunes
   The device should show up at the top of the iTunes window

2. Click on the device button at the top of the iTunes window
   The screen should change to the device window with `Summary` selected
3. Select **File Sharing** in the source list (the side bar)
   The pane to the right (labeled `CartoMobile Documents`) will now be available
4. Now you may either:
   - Drag all of the components of the shape file (the .shp, .shx, .dbf, and .prj if it exists) from the `CartoMobile Documents` pane to your destination folder; or
   - Select the components of the shape file and then click `Save...` and select the destination folder

   The files should appear in your selected destination

2.3 Captured Pictures with CartoMobile

When you take pictures with the Picture field in a CartoMobile file, the App places the photos in a folder next to the layer shape files with a name of the shape file and `-Pictures` appended to it.

Inside of the shape files, CartoMobile uses a text field to store the partial path of the file relative to the shape file. Therefore, if you copy the shape file components and the folder to the same folder on your disk, the references to the picture files (stored as JPEGs) will be consistent.

The ability to display and manipulate the pictures will be dependent upon the software you are using. If you are using Cartographica for macOS X, the companion product to CartoMobile, here is how this would be done.

2.3.1 Displaying captured pictures in Cartographica Desktop

1. Follow the instructions above to copy the `-Pictures` folder and the corresponding shape files to your computer
2. Double-click on the .shp file to open it in Cartographica
   The file should open in an `Untitled` Mapset in Cartographica
3. Double-click on the layer in the layer stack
   The style window for your new layer should open
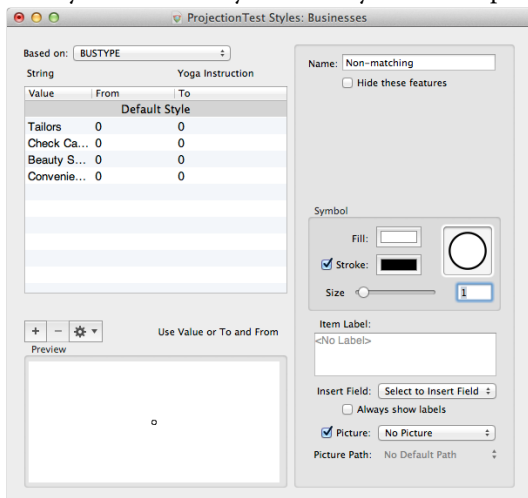
4. Select the name of the picture column from the **Picture** field on the right side
   As soon as you do this, the picture previews should show up on the map

2.4 Sending Updated Data via Email

CartoMobile can also send the contents of updated geospatial data via email. This process sends just the layers that are requested by the user, and will only send layers that the user has the ability to modify (for example: read-only layers that are used as backdrops or ancillary information for the field users will not be included).

The data will be sent as a single Zip-compressed archive containing the complete contents of all selected layers.

2.4.1 Sending Layers via Email

1. Make sure your device has a valid email account configured (see Apple's documentation for this)
2. From the Map, tap on the **Gear** icon
   The **Settings** view will appear
3. Tap on **Send Collected Data**
   The **Send Collected Data** view will appear
4. Select the layers you would like to send by enabling the switch next to each layer
5. Type the recipient's email address in the **via email to:** box
6. Tap **Send**

> ⚠ Emailed zip files containing layers contain all features, not just those added or changed. This is helpful in that deleted features will be obvious, but requires some care when assembling information from multiple users. As such, it is suggested that a empty layer be used for each user if they work in overlapping territories. When they work in distinct territories, editing the existing file is fine.

3 Adding Data

3.1 Overview of Adding Data

CartoMobile provides ways to input data using both the GPS and manually selecting points on the map. These same general processes follow for all types of spatial data: points, lines, and polygons. In general, creation with GPS involves using the + (Add) button on the main window, and manual selection of locations involves holding down your finger on the screen and using the loupe to position it precisely on the map. Once you have selected the initial location, you may enter attributes for the new feature using the form associated with the layer.

Because Cartographica can manage multiple layers at the same time, the process of adding geospatial data involves choosing your location, then choosing the layer to which you would like to add the location, and then entering attribute data.

3.2 Adding Point Data with CartoMobile

CartoMobile is designed for the field creation and maintenance of data. As such, we wanted to make it as easy as possible to create data on the device. For starters, all entry is done through easy-to-navigate forms which minimize inconsistent data.

There are two primary ways to add data in CartoMobile, tapping the + (Add) button at the bottom of the screen, and precisely placing a pin on the map. When using the Add button, the new point is placed at the center of the map, which is also where the GPS location will be if you use the GPS button.

3.2.1 Creating a new point using the loupe

1. Tap and hold on the screen until the loupe comes up.
2. Position the center of the cross-hairs on the location for the point
   The loupe will track your movements and provide a magnified view of the area close to the tip of your finger.
3. Lift your finger
   The Add panel will come up
4. If you have more than one writable overlay layer, select the target layer; or
   If you only have one layer, there won't be a selection, but if you have more than one kind of point that you are working with, this provides the ability to select among them.

   > ⚠ Layers that are not currently visible show up in the list as dimmed items, but are still selectable and may be added to.

5. Enter data as desired in the form fields.
6. When you are done, tap the Add to "layer".
   The point will be added to the map, although it will not be visible if the layer is not visible.

3.2.2 Creating a new point at the center of the screen

When using the GPS button, it is common to want to create a point where you are standing.

1. Tap the + (Add) button
   The Add panel will come up
2. If you have more than one writable overlay layer, select the target layer; or
   If you have only one layer, there won't be a selection, but if you have more than one kind of point that you are working with, this provides the ability to select among them.

   > ⚠ Layers that are not currently visible show up in the list as dimmed items, but are still selectable and may be added to.

3. Enter data as desired in the form fields
4. When you are finished, tap the Add to "layer".
   The point will be added to the map, although it will not be visible if the layer is not visible.

3.3 Adding Line or Polygon Data with CartoMobile

Entering Line and Polygon data is similar to entering point data into CartoMobile, with some special adaptations for dealing with possible long-term processes when adding line and polygon data. In particular, when doing field work, it is often desirable to pace out large areas or lines representing roads or other features. However, it's also commonplace to require that this data be complete before moving on to the next feature. CartoMobile has addressed this issue by allowing you to pause during data capture in order to add another feature (or more) and then resume the original process. Similarly, CartoMobile enables you to edit the attributes of a feature while in the middle of adding points, thus obviating the need to either enter everything up front or wait until the geospatial entry is complete before entering attribute data.

All spatial data entry begins with either the + (Add) button or using the loupe.

Once you have added the first point and entered preliminary attribute information, the line or polygon is in pending mode, which is shown by the display of the Feature Add toolbar.

3.3.1 Starting a New Line or Polygon Feature
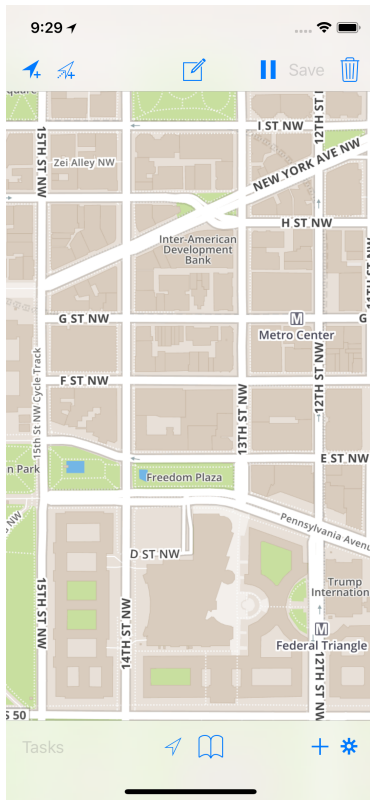
Start a new feature using the loupe

1. Tap and hold on the screen until the loupe comes up.
2. Position the center of the cross-hairs on the location for the point
    The loupe will track your movements and provide a magnified view of the area close to the tip of your finger.
3. Lift your finger
    The Add panel will come up
4. If you have more than one writable overlay layer, select the target layer; or
    If you only have one layer, there won't be a selection, but if you have more than one kind of point that you are working with, this provides the ability to select among them.

> ⚠ Layers that are not currently visible show up in the list as dimmed items, but are still selectable and may be added to.

5. Enter data as desired in the form fields. You will have the chance to add or change data later.
6. When you are done, tap the `Add to "layer"`.
    At this point, the feature is now pending completion. All lines require at least two points and polygons require at least three, so until those requirements are met, the feature will be in edit mode.

Start a new feature at the center of the screen

When using the GPS button, it is common to want to create a point where you are standing.

1. Tap the + (Add) button
   The Add panel will come up
2. If you have more than one writable overlay layer, select the target layer; or
   If you have only one layer, there won't be a selection, but if you have more than one kind of point that you are
   working with, this provides the ability to select among them.

> ⚠ Layers that are not currently visible show up in the list as dimmed items, but are still
> selectable and may be added to.

3. Enter data as desired in the form fields
4. When you are finished, tap the Add to "layer".
   At this point, the feature is now pending completion. All lines require at least two points and polygons require at
   least three, so until those requirements are met, the feature will be in edit mode.
   Once you have created the first point for a line or polygon feature, you can add more points until the feature is
   complete, edit the attribute data, pause and resume the taking of points, and undo and redo adding of the new
   points.

3.3.2 Completing a Line or Polygon Feature

Until you Save or Cancel the feature, a Pending Feature Toolbar will be shown on the screen. A picture
of the iPhone version of this toolbar is shown below in landscape mode. Because of space limitations on
the iPhone in portrait mode, the feature label field is not shown in portrait mode. However, by rotating
the phone, you will see the larger version, as shown here.

> ⚠ The iPad version is similar to the landscape mode iPhone toolbar, except that it also contains
> Undo and Redo items, which on the iPhone are handled through the standard shake
> mechanism.
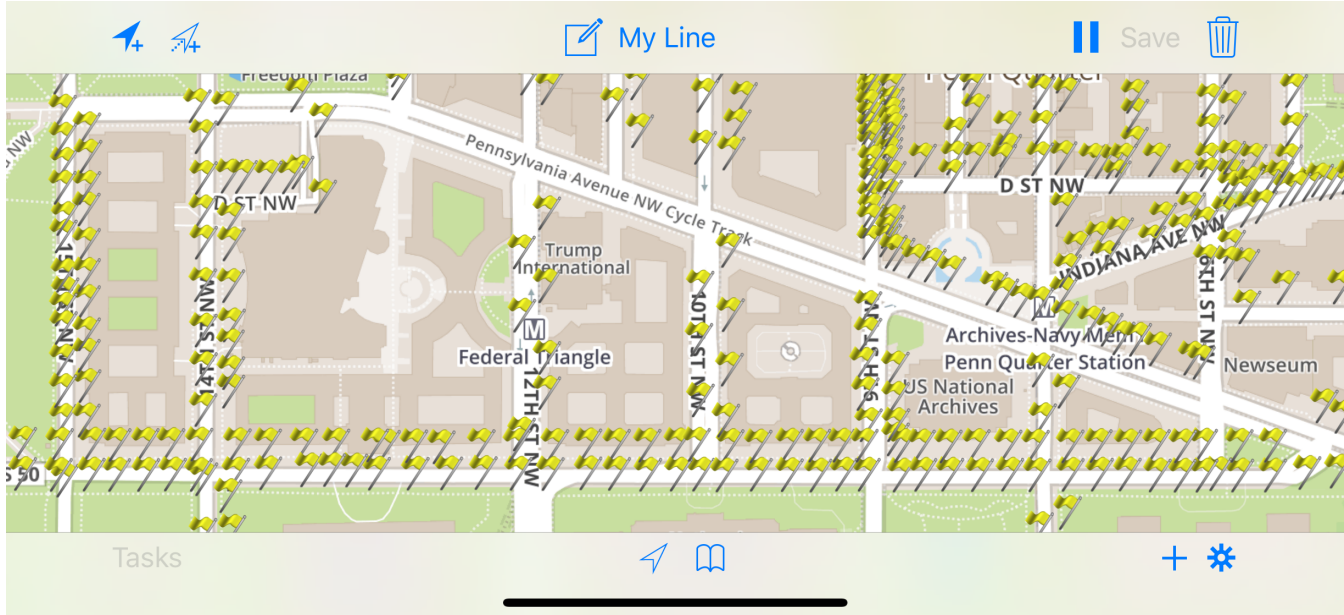
The Pending Feature Toolbar has two GPS buttons on the left, an attribute button in the middle, and the Pause, Save, and Delete buttons on the right. As depicted by the icons, the left GPS button adds the current location, while the right button adds locations continuously until it is stopped. The latter is useful if you want a large number of data points in your feature and you don't want to stop to add each one individually. Besides the two GPS buttons, it is also possible to add points using the loupe method by tapping and holding until the loupe comes up and letting go when you have positioned the next point appropriately.

Editing attributes in a Pending Feature

Attributes may be edited in any pending feature by tapping on the edit icon (the square with a pencil in it).

1. Tap the Edit button
   The Attribute panel will come up, providing the form-based editor for CartoMobile.
2. Adjust any attributes that you would like to change.
3. Tap the Save button (or the back button if don't want to save your changes).
   At this point, the data input resumes with the Pending Feature Toolbar still at the top of the device.

Pausing and Resuming a Pending Feature

When entering lengthy geospatial data, such as lines and polygons, you may find it desirable to pause the input so that you can perform another function, such as adding another feature. CartoMobile provides an easy way to do this, through the Pause command.

1. Tap the Pause button
   The Pending Feature Toolbar will flip out of the way, clearing space and showing a button with the feature label on it in order to resume later.

2. Perform whatever other operations you need to.
   Once you are ready, you may resume the previous operation.
3. Tap the labeled button on the left of the screen.
   The Pending Feature Toolbar will flip back in, allowing you to resume your data and point entry where you left off. CartoMobile can stack up quite a few pending features, and you can switch between them by tapping on any paused feature.

In addition, if you tap the + (Add) button in the main toolbar, the current feature will be paused if necessary to allow you to add a point, line, or polygon.

> ⚠ Since the loupe is used for the current feature, if you want to place a new feature using the loupe, you will need to first pause the pending feature.

4 Modifying Data

4.1 Viewing and Modifying data with CartoMobile

Pictorial maps are great, but GIS extends the model of a map to put much more data at your fingertips. With CartoMobile, that is literally true. As would be expected, the key way to examine data in CartoMobile is to tap on the feature you are curious about. For points, that means tapping on the flag. For polygons, that means tapping in the enclosed area. For lines, tap anywhere along the length.

Once you have tapped on the feature, the tap will be acknowledged by a label that pops up from the feature. This displays the first field on the form and remains visible until you either tap on an empty area of the map (no features) or two-finger tap anywhere on the map.

Clearly, that's not all the data that you can see, though. If you tap on the blue disclosure button in the label, the detail panel will slide in (on the iPhone and iPad touch) or pop up (on the iPad). From this panel, you can look at (and modify in the case of read/write data) values of the attributes for the feature.

To edit the feature, tap on the `Edit` button and then make changes as you see fit. Tapping the `Save` button will save the modified data.

> ⚠ When changing data in an existing feature, all modified fields will be displayed in green, signifying that they have been modified.

When editing data, you may clear out a field by sliding your finger across the field in the form. CartoMobile will present a `Clear` button, which will clear the data to an empty state.

4.1.1 Removing Data from a Layer

1. Select the feature by tapping on it to bring up the label
2. Tap the blue disclosure button to bring up the display form
3. Tap the `Edit` button to enter edit mode
4. Scroll to the bottom of the form and tap the `Delete` button
   A warning will appear to make sure you want to delete the item
5. Tap the `Delete` button to confirm the deletion

4.2 Using Favorites to reduce clutter

Since some layers contain many fields, it is not always important to see every one of them. Especially on the iPhone, where space is limited, it sometimes requires a lot of scrolling to move between interesting pieces of data.

To aid with this, CartoMobile has Form Favorites. Form Favorites reduce the number of visible fields in the panel temporarily without affecting the underlying data. It is a mechanism for reducing visual clutter during entry, viewing, and modification of data.

9:34				0			
Done				0			

Arm Length	0 ft
Fixture Count	3
Poly Type	Metal
First Date	
Modified Date	Jul 24, 2007
Modified By	Osmose
Comments	

Copy ☆

All Favorites

Editor without Favorites

9:34				0			
Done				0			

Arm Length	0 ft
Fixture Count	3
Modified Date	Jul 24, 2007

All Favorites

Editor With Favorites Selected

When a form is being displayed, a toggle at the bottom of the form provides a convenient way to switch between showing All fields or just your Favorites. Favorites are stored per-form and per-Map, so if you have multiple forms or layers in a Map or multiple Maps on your device, you don't have to worry about them interfering with each other.

4.2.1 Toggling Form Favorites

1. Tap and hold the field that you want to add to your Form Favorites
   A pop-up will appear with the copy command and a small star.
2. Tap the empty star to set the field as a Form Favorite
   Tap the solid star to remove the filed as a Form Favorite

> ⚠ Once the field is set as a favorite, the star will be solid

5 Getting Around in CartoMobile

5.1 Using the GPS

As you would expect, CartoMobile can use Location Services on the iOS device to find its current location. CartoMobile uses this to locate you on the map (showing the expected blue glowing dot) and, if you elect, to track your location with the map.

When you need to see where you are on the map, tap the GPS button, and CartoMobile will center the map on your current location according to available information, including:

- GPS
- Nearby WiFi Networks
- Cellular towers

When in the wilds, only the GPS will work for location, but in environments where they are available, the other two mechanisms can help maintain a more accurate location.

The blue dot signifies the current location and the circle around it (which may not be visible in high-accuracy situations) represents the expected error range of the current location. While the GPS button is active, CartoMobile will follow your movement by centering the map on your current location. If you zoom or move the map manually, the GPS button will turn off automatically. You can turn off tracking at any time by tapping the GPS button again.

5.2 Using Bookmarks

Although GPS is great for figuring out where you are, sometimes you would like to remember where you were. For example, after a long day of field work you may want to go back and look at the area in which you were working. The GPS isn't of much value there, unless you are staying in the area.

For times when you want to be able to remember previous locations, CartoMobile has Bookmarks. Bookmarks hold the location (latitude, longitude, and optionally the zoom level) of locations recorded earlier.

5.2.1 Adding a Bookmark

1. Center the map where you would like it to be when you recall the bookmark
2. Tap the Bookmark button
   The Bookmarks panel will come up, showing all existing bookmarks
3. Tap the Save Current Location button
   The new bookmarks panel will slide in, providing space to set the parameters of the bookmark
4. Enter a name into the Name field and toggle the Scale switch to On if you want to return to the same magnification level when you use the bookmark
5. Tap the Save button in the upper right to save the bookmark
   Tap the Cancel button in the upper left to abort

5.2.2 Using a Bookmark

1. Tap the `Bookmark` button
   The `Bookmarks` panel will come up, showing all existing bookmarks
2. Tap the bookmark you want to use
   The `Bookmarks` panel will disappear and the display will center on the bookmark

5.2.3 Removing a Bookmark

1. Tap the `Bookmark` button
   The `Bookmarks` panel will come up, showing all existing bookmarks
2. Tap the `Edit` button in the upper right
   The – (delete) button will be displayed to the left of each bookmark
3. Tap the – button next to the book mark you wan to delete
   The – button will rotate and the Delete button will activate
4. Tap the `Delete` button to delete the bookmark

5.2.4 Changing a Bookmark

1. Tap the `Bookmark` button
   The `Bookmarks` panel will come up, showing all existing bookmarks
2. Tap the blue disclosure button next to the name of the bookmark you want to edit
   The bookmark panel will slide in, showing all of the current data
3. Make changes to the data that as desired and tap the `Save` button in the upper right corner
   The `Bookmarks` panel will slide back in

5.2.5 Automatic zooming to map areas

In CartoMobile 2.0, Feature and World extent automatic bookmarks have been added for easily zooming out to these areas on the map. **Feature Extent** places all visible features on the screen. Note that if you have a large area and/or a lot of features, you may get a heat map instead of the individual feature. **World Extent** zooms to the area of the entire map. For our standard base map, this will be the whole world; if you have a custom raster map, you will see only the area covered by your base map.

5.3 Getting Directions

Although CartoMobile does not, itself, provide driving or walking directions or any kind of routing, it does know how to call other programs to provide directions to points that it knows about.

5.3.1 Getting Directions with a Street Address field

1. Select the feature by tapping on it to bring up the label
2. Tap the blue disclosure button to bring up the display form
3. Tap and hold on the address field
   After a couple of seconds, a menu will pop up
4. Select `More…` from the pop-up menu
5. Select `Directions in Maps` to start the Maps App with this address as the destination

5.3.2 Getting Directions with a GPS Field

Although you may not always have a street address, Cartographica provides another way to get directions to a location in its system, as long as it has a displayed GPS field.

1. Select the feature by tapping on it to bring up the label
2. Tap the blue disclosure button to bring up the display form
3. Tap and hold on the GPS field
   After a couple of seconds, a menu will pop up
4. Select `More…` from the pop-up menu
5. Select `Directions in Maps` to start the Maps App with the latitude and longitude of this feature as the destination
   Similar processes can be followed with the `Open in Maps` button to start the Maps App with the feature as the center point.

6 Base Maps

For CartoMobile, the Base Map is the portion of the map that is visible behind all of the layers. There can only be a single BaseMap active at a time, but a given Map may have any number of BaseMap options available to it, including server-based (WMS or OpenStreetMap-style) and stored on the device (using a wide variety of formats). Once added to a Map, CartoMobile displays the BaseMaps in the `gear` menu directly below the Overlays list and it can be toggled at any time.

CartoMobile contains a variety of different Base Maps that are available through our mapping partner at MapBox. These include:

- Default MapBox tiles
- Topographical
- Satellite Imagery

The Base Maps can be adjusted by editing the Default Base Map and changing the Variant.

6.1 Adjusting the Default Base Map

1. Choose `Change Map` from the `gear` menu to bring up the Change Map window
2. Tap the `Edit` button
   For all Local Maps, you will now see the blue chevron button (it looks like a greater-than symbol) on the right, providing the edit function for that map
3. Locate the Map you want to edit and tap the blue chevron.
   The Map Editor will slide into view
4. Scroll down to the `Base Maps` section and locate the default base map
5. Tap on the blue chevron or the circle-i button to reveal the settings
   The Base Map editor will slide into view
6. Adjust the tile source with the selector
7. Tap Done to finish your base map change
   The Map Editor will slide back into view
8. Tap Done to finish editing your Map
   The Change Map view will slide back into view
9. Tap Done to exit Map editing mode
10. Tap on your Map to resume work

6.2 OpenStreetMap Base Maps

CartoMobile's default Base Map is a server-based OpenStreetMap which is maintained by MapBox. More information can be found on MapBox.com. Every newly created map contains the standard base map, but if you need to add it again (in the event that you delete it or create a configuration file by hand and need to add it later), use `Add Open Street Map` in the Map editor.

Although the most common use in CartoMobile is to use the standard OpenStreetMap-style Base Map, it is also possible to use alternate servers that provide tiles in the same fashion. Examples of this are third-party maps such as OpenCycleMap and many of the maps available from MapBox.com.

6.2.1   Adding a Custom OpenStreetMap Base Map

1. Choose `Change Map` from the `gear` menu to bring up the Change Map window
2. Tap the `Edit` button
   For all Local Maps, you will now see the blue chevron button (it looks like a greater-than symbol) on the right, providing the edit function for that map
3. Locate the Map you want to edit and tap the blue chevron.
   The Map Editor will slide into view
4. Choose `Add Custom OSM Server` in the `Base Maps` area of the Map Editor
   A new OSM Server Editor will slide in providing space for the `Layer Label` and the URL
5. Type a name in the `Layer Label`
6. Put the Base URL into the `URL` field. This contains just the portion of the URL prior to the coordinate specifications.

> ⚠ As an example, if you visit OpenCycleMap.org, you will now need to sign up for an API key, but as a hobbyist, you can do so for free. Once you have signed up for that API key, the full URL for the requested map, including the API key. The form should be `https://tile.thunderforest.com/cycle/{z}/{x}/{y}.png?apikey=KEY`, where **KEY** is your personalized key.

7. Tap `Done` to add the Base Map to the list
   The OSM Server Editor will slide out, showing the Map Editor
8. Tap `Done` to commit your changes to the Map
   The Map Editor will slide out, showing the Map list in edit mode
9. Tap `Return` to return to the Map you were previously viewing, or `Done` to return to the Map list in map selection mode (you can always choose the same map you were using before by tapping it again from this list.

There are many different tile servers that use the same basic structure of OpenStreetMap in terms of being an hierarchy of tiles. However, the source that you are using may not use the same precise format, and in particular may put the tile address in a different order or use different separators. CartoMobile supports providing a template URL in these cases, so that you can describe more precisely the URL format. In this case, you'll need to use the full URL and replace the zoom level with {z}, and the X and Y coordinates with {x} and {y} respectively.

6.3   Raster Image Base Maps

Raster Image Base Maps provide for access to Base Map data when the device is not online. They can also be used to support custom data (such as high resolution satellite or aerial photo data) in scenarios where online map sources are insufficient.

CartoMobile supports a variety of different map formats to provide the maximum flexibility for users. Standard formats, such as MrSID, GeoTIFF, ECW, JPEG, and JPEG2000 provide for easy import from data libraries. CartoMobile also allows the use of pre-rendered data by using a special .sqlite database format which can be created by Cartographica, our macOS desktop GIS.

> ⚠ In order to work with CartoMobile, the data in use must be georeferenced to a known CRS (Coordinate Reference System, or Projection). For some file formats, such as GeoTIFF and MrSID, this data is sometimes included directly in the file itself. If it is not, it can often be added by using sidecar files, such as .tfw, .jpw, .sdw, and .prj files. If CartoMobile does not recognize this information, it will display a warning indicating the layer cannot be reliably used without adding it.

6.3.1 Adding Raster Imagery

1. Choose **Change Map** from the gear menu to bring up the Change Map window
2. Tap the **Edit** button
   For all Local Maps, you will now see the blue chevron button (it looks like a greater-than symbol) on the right, providing the edit function for that map
3. Locate the Map you want to edit and tap the blue chevron.
   The Map Editor will slide into view
4. Choose **Import Raster Image** in the **Base Maps** area of the Map Editor
   The Raster Image selection page will slide in, showing a list of every *raster image file* of any supported type.
5. Select each of the *raster images* you want to add to the imagery layer by turning the switch on
6. Once one is selected, tap **Import** to create the new raster layer
7. Tap **Done** to commit your changes to the Map
   The Map Editor will slide out, showing the Map list in edit mode
8. Tap **Return** to return to the Map you were previously viewing, or Done to return to the Map list in map selection mode (you can always choose the same map you were using before by tapping it again from this list.

6.3.2 Reducing clutter with RasterPacks

Due to the relatively limited file manipulation of the iTunes app and the small screen, it's sometimes useful to aggregate the raster images into a separate directory structure. To provide an easy way to select a group of images, CartoMobile supports what we call the .rasterpack, which is just a directory with the extension .rasterpack containing one or more image files and their auxiliary files. By putting your imagery into a .rasterpack, you will be able to select all the imagery as one element.

> ⚠ Take care when replacing RasterPacks. For best results, when you add files to, or remove files from, the RasterPack, you should remove and re-add the RasterPack to your Map.

6.4 WMS Server Base Maps

Along with OpenStreetMap and local Raster data, CartoMobile also supports the OGC standard WMS (Web Map Service) protocol for base maps. This can be useful if your organization has a WMS server or if data you are working with is available in this form from a public server. The process for working with WMS Servers is similar to that of the OpenStreetMap servers, but has some additional complexity due to the variety of data available from most servers.

6.4.1   Adding a WMS Server BaseMap

1. Choose **Change Map** from the `gear` menu to bring up the Change Map window
2. Tap the **Edit** button
   For all Local Maps, you will now see the blue chevron button (it looks like a greater-than symbol) on the right, providing the edit function for that map
3. Locate the Map you want to edit and tap the blue chevron.
   The Map Editor will slide into view
4. Choose **Add Custom WMS Server** in the **Base Maps** area of the Map Editor
   A new WMS Server editor will slide in
5. Type a name in the **Base Map Name** to identify it in the Base Map section of the gear menu
6. Put the URL for the WMS Server into the **WMS Server URL** field. This should contain all of the URL necessary for the specification of the service, without the service, request, version, size, or similar parameters.

> ⚠ It is often the case that WMS URLs are listed containing the Request=GetCapabilities and or service=WMS parameters. These will cause problems with CartoMobile. As an example, if you find a WMS URL that looks like this: `http://demo.cubewerx.com/demo/cubeserv/cubeserv.cgi?CONFIG=main&SERVICE=WMS&?VERSION=1.1.1&REQUEST=GetCapabilities`, which represents the base url, plus a number of parameters, you need to enter just the `http://demo.cubewerx.com/demo/cubeserv/cubeserv.cgi?CONFIG=main` portion, leaving off Service, Version, and Request, which CartoMobile will add by itself.

6.4.2   Adding a layer to a WMS Server BaseMap

For each layer from the WMS server that you want to include in the map, you will need to add the layer to the list. A single layer is required at minimum and you will often need to consult with the server documentation to get the layer names. If you want to combine more than one layer on the server, enter each layer as a separate line item in the list. Similarly, to remove a layer, use the − button to the left of the entry.

1. Tap **Done** to add the BaseMap to the list
   The OSM Server Editor will slide out, showing the Map Editor
2. Tap **Done** to commit your changes to the Map
   The Map Editor will slide out, showing the Map list in edit mode
3. Tap **Return** to return to the Map you were previously viewing, or `Done` to return to the Map list in map selection mode (you can always choose the same map you were using before by tapping it again from this list.