RTD MobileMap

Application

Version 1.0

idea Geospatial

Regional Transportation District

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Overview

MobileMap allows users to view, analyze and edit RTD data on mobile devices running Windows Mobile 5 such as GPS receivers, smart phones and PDAs. Units with GPS available further allow a user to view their position on the map, and if the user so chooses, automatically select features near their position. Users can edit attribute data for Park-n-Rides and post those changes back to the server. In addition, data can be downloaded at anytime if an internet connection is available, and edits posted.

Technology

MobileMap uses Environmental Systems Research Institute's (ESRI's) ArcGIS Server technology for Microsoft .Net. ArcGIS Server uses ArcObjects to process and deliver map data to web and non-web based clients. ArcGIS Server is used to serve map data to both mobile and traditional web based clients and can be used for both intranet and internet purposes.

MobileMap's server side consists of an ESRI ArcGIS Server service running continuously on a Stratus brand fail-safe server. The service uses an ArcMap document to define the map's layers, query-able fields and symbology. The map document in turn references Spatial Database Engine (SDE) layers stored in Oracle. The service is SSL encrypted such that only mobile devices with the proper key can access the service. In addition the service is password protected and requires a username and password to authenticate before access is granted.

MobileMap's client side consists of the MobileMap application installed on a handheld device. The application is built with C# .Net 2.0 compact framework for use with Windows Mobile 5. To use ArcGIS Server technology, the application incorporates ESRI's ArcGIS Server Mobile ADF to download, interact, analyze, edit and post data associated with the server side MobileMap ArcGIS Server service. The application is password protected and the user must know the password to use any part of the application. In addition, all data downloaded from the server stored locally is encrypted by the application, the data cannot be read by other applications. Application settings are stored locally with the application; however these too are encrypted and cannot be read outside of the application.

Using MobileMap

Starting MobileMap

To open mobile map, tap the windows flag icon>programs>mobilemap and wait for the application to begin.

Log in to MobileMap with the application password (not the network password). If you do not know the password, contact your MobileMap support specialist. Click the keyboard icon in the middle of the bottom toolbar and enter the password. Once finished, click 'OK' to log in to MobileMap.

Figure 1 – Log-In Screen

MobileMap Interface

The MobileMap interface consists of the map area and a toolbar along the bottom of the map.

The toolbar allows access to nearly all MobileMap functionality as is shown in the picture below. From here you can zoom, pan, id, select, edit and manage your application.   If you are unfamiliar with MobileMap toolbar, take a few minutes to play with the tools on the toolbar until you are comfortable panning and zooming around the map.

At the top left of the map is the scale bar. The scale bar will automatically update distances as you zoom in and out of the map. In addition, it will change units from miles

to yards and feet as you zoom in. The scale bar also acts as a 'working' indicator when the application is busy.

The map itself is composed of different 'layers' of information. Each layer such as roads, park-n-rides, etc is shown in different styles so that each is as easy as possible to recognize. The map and the layers cannot be customized or changed except by the administrator (and all devices would see the changes).
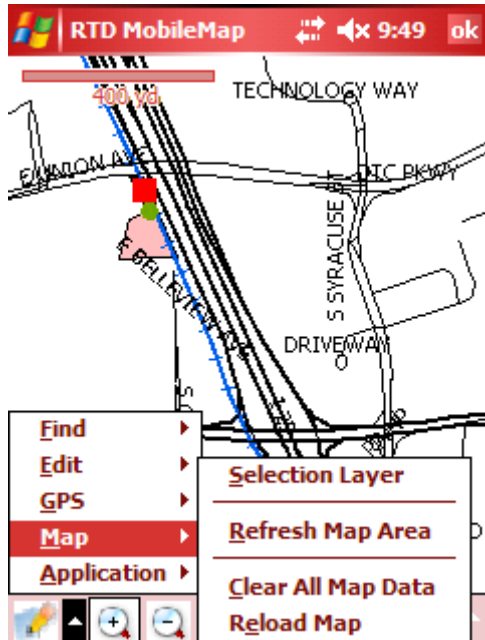

Figure 2 - Map Interface showing a menu.

Toolbar

The main toolbar consists of:
- Map Menu Tool: Access to editing, map properties and application properties
- Zoom In: Zoom in on map.
- Zoom Out: Zoom out on map.
- Pan: Pan on map (re-center map).
- Id: Identify all map features at click point.
- Full Extent: Zoom to the full extent of the map
- Select: Select a feature on the map.
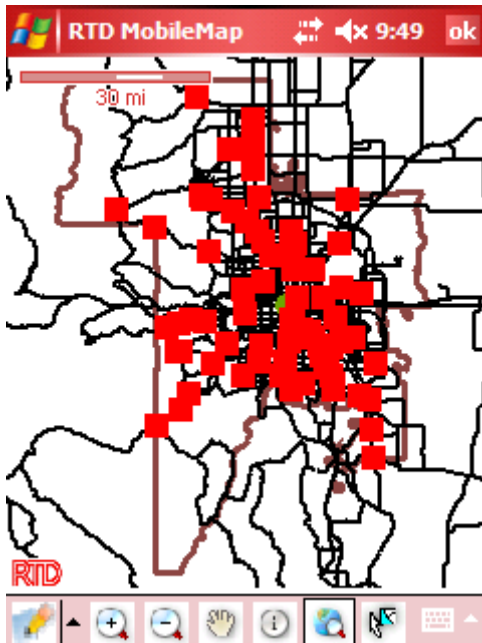- Keyboard: Access the soft keyboard.

Figure 3 – Map with toolbar at 'Full Extent' after click full extent button.

Using the Map Tools

- Zoom In: Click the zoom in tool. Take your stylus and touch the map and drag a box over the area in which you wish to zoom in. Release and the map will zoom in on the box that was drawn.
- Zoom Out: Click the zoom out tool. Take your stylus and touch the map, dragging a box over the area in wish you would like to zoom out. Release and the map will zoom out.
- Pan: Click the pan button. Using the stylus, click the map and drag the map to re-center the map at the new location.
- ID: Click the ID button. Touch the map briefly at the location in which you wish to identify any features on the map. The handheld will then access the data for this location and display the results on the screen. This may take some time, depending on the handhelds processor and RAM. *NOTE: On some models, you may run out of memory if you attempt to ID a location with many features.*
- Select: Click the select button. Using the stylus, drag a box around the feature you wish to select. The item will then highlight in cyan and a small [SF] in a box will appear on the upper-right. Clicking the [SF] button will display the raw attribute information for the selected feature. Clicking the [SF] button again will close the box displaying the selected information. To deselect all features, using the stylus, click anywhere there are no features. *NOTE: Only features in the current selection layer can be selected. Change the selection layer to select features from another layer.*
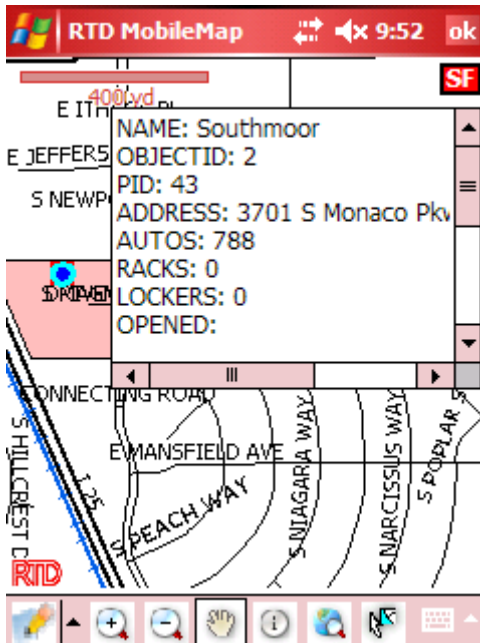
Figure 4 - Selected Park-n-Ride showing the [SF] attribute window.

Map Menu

The map menu consists of:

- Find
  - Park-n-Ride
  - LRT Station
  - Bus Route
- Edit
  - Park-n-Ride
  - Post Updates
  - Cancel Updates
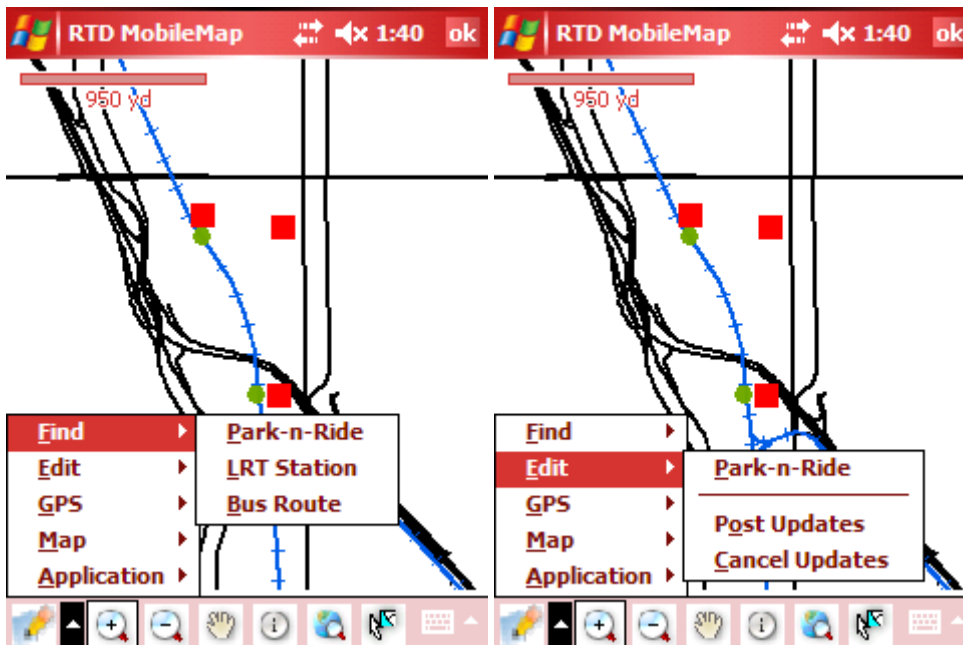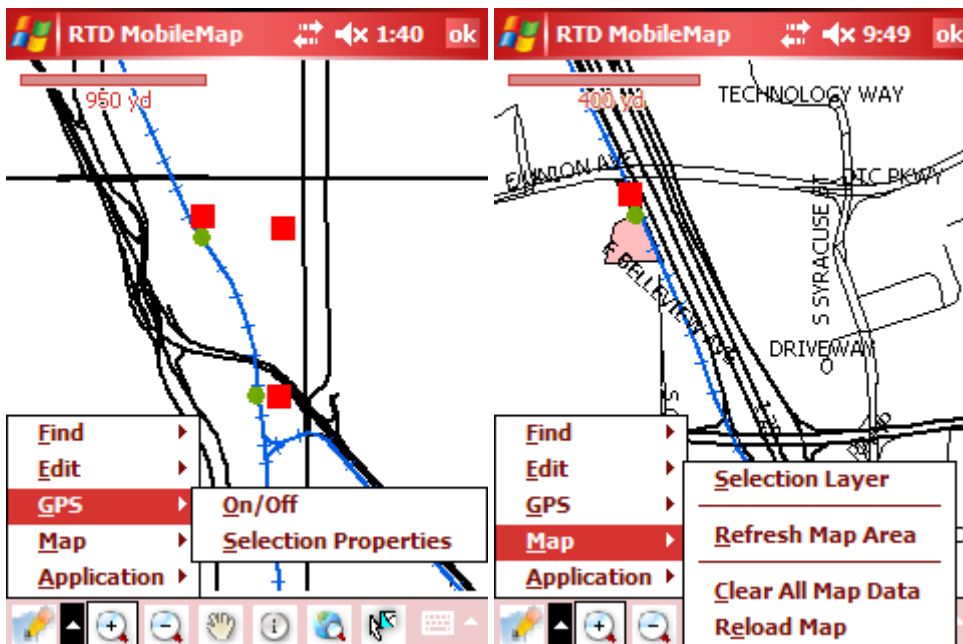- GPS
- Map
- Application

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Figure 5 - Find and Edit Menus

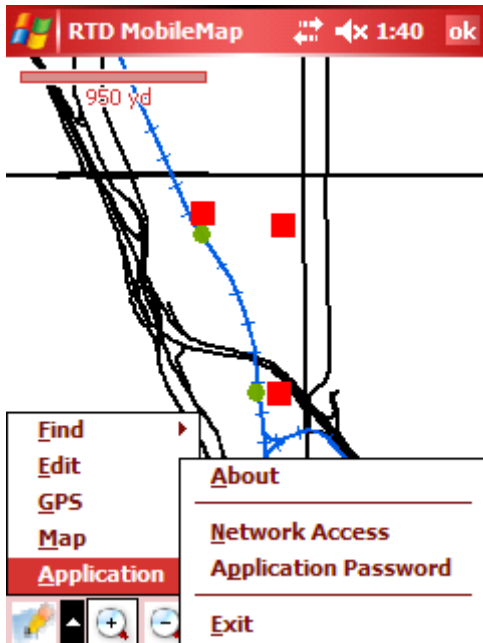**Figure 6 - GPS and Map Menus**

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Figure 7 - Application Menu

Application Properties

The application menu allows you to view the about menu and exit the application completely. More importantly however, the application allows you to update the network access properties and application password.

Updating the Network Access Username, Password and web service URL

Updating the network access properties is easy:

1. Tap the 'Application' sub-menu on the application menu. Select 'Network Access'. The Network Access Window will open.
2. Update the Username and Password as necessary. Remember that this is the username and password to access the MobileMap server only and is not related to any passwords used to open the application.
3. Update the Web service URL as necessary. This URL is the location of the server and service that MobileMap uses to both download data and post changes.
4. Make sure all values are correct and tap 'OK' to save. If the values are wrong, re-open the window and update them again.
5. After tapping 'Ok' the window will close and return to the map interface. It may be necessary to fully exit the application and restart the application to allow the changes to take effect.

Remember, the wrong username, password or web service URL will result in no communication between the handheld device and the server. If you are having trouble

connecting but you are certain your internet access is working correctly, double check your Network Access properties. If you are still having problems, contact your MobileMap Administrator for help.

Figure 8 - Updating the Username and web service URL for MobileMap
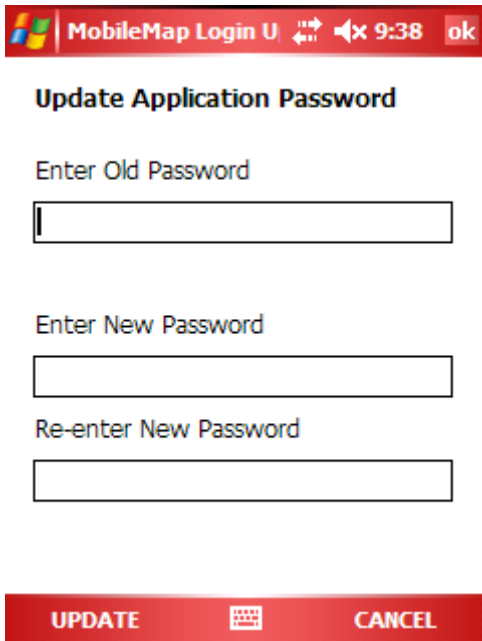

Updating the Application Password

The application password restricts access to the MobileMap application to help keep your local copy of data more secure. This is a local password and does not affect the server in any way.

To update the application password:
1. Tap the 'Application' sub-menu on the MobileMap menu, then click 'Application Password'. The Application Password window will open.
2. Enter the old password
3. Enter the new password
4. Re-enter the new password
5. Tap Update to confirm and save the new password.

Once updated, the new password will be required at login the next time the application is started.

Important Note: If you forget your password, there is no way to open the application and or update data to the server. Do not under any circumstances keep the password for the application with the mobile device. Only an administrator can reset the password and this requires returning the device to GIS temporarily (no data will be lost).

Figure 9 - Updating the Application Password

Updating the Selection Layer

The selection layer can be changed via the Selection Layer dialog. To update the layer simply:

1. Tap the 'Map' sub-menu from the MobileMap menu. Tap the 'Selection Layer' menu item.
2. Select the new selection layer from the list and tap 'OK'. The selection layer has been changed.

Note: If the GPS auto-selection is selected and the GPS is active, the layer selected in the auto-selection properties will over-ride the Selection Layer. In addition, searching for items automatically changed the Selection Layer to the layer in which the item searched for was found.
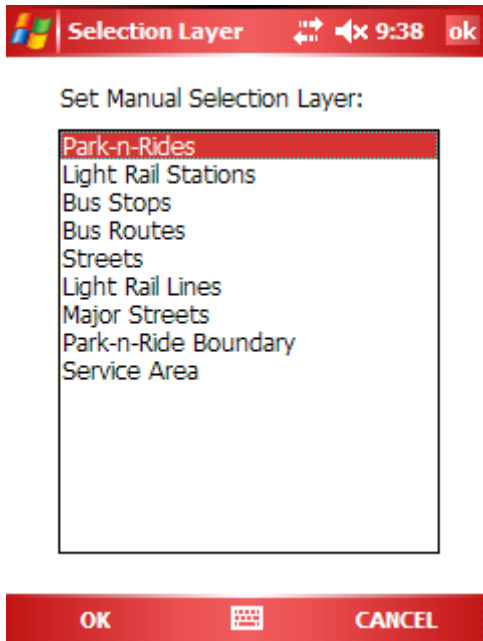
Figure 10 - Setting the selection layer

Reloading, Refreshing and Clearing Map Data

The data on your device does not automatically refresh from the server with any new changes made by others than yourself. At times it may be useful to update the map with new data via the internet. The easiest way is to simply update just the area of the map that is visible, however all data can be updated if so wished.

To update just the visible map area for those layers which are visible:
1. Tap the 'Map' sub-menu.
2. Tap the 'Refresh Map Area' menu item.
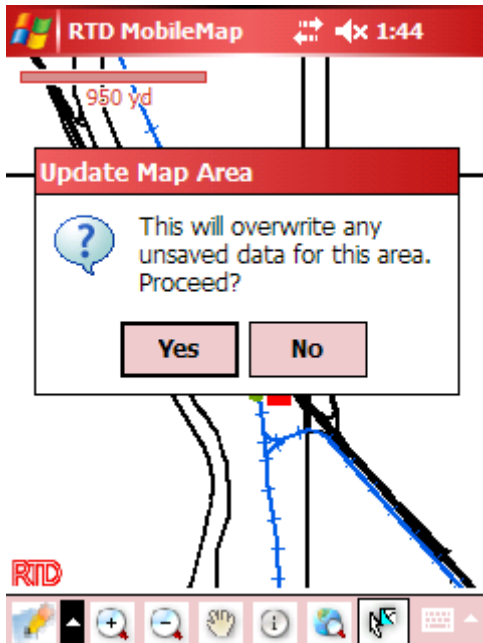3. The visible layers for the selected extent will update from the server.

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Figure 11 - Reloading the visible map area with new map data.

To clear all map data:
1. Tap the 'Map' sub-menu.
2. Tap the 'Clear All Map Data' menu item.
3. Confirm that you wish to clear (delete) all map data on your device.
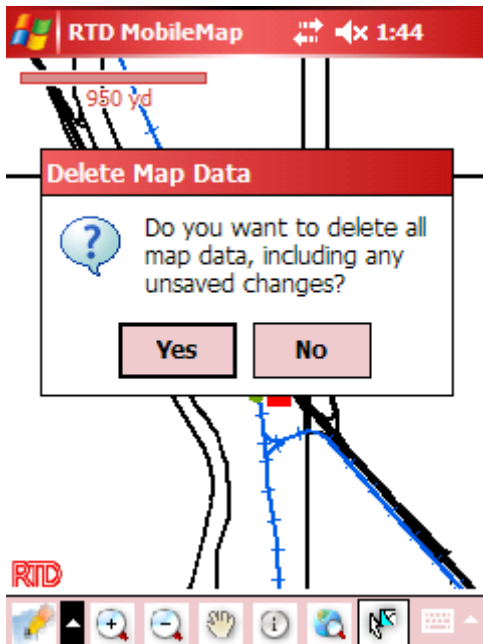4. Once the data has been deleted you will need to download new data.

Figure 12 - Clearing all existing map data.

To download all new map data:

1. Tap the 'Map' sub-menu.
2. Tap the 'Reload Map' sub-menu.
3. Confirm you wish to download new map data.
4. The new data will download from the server and draw on the map at full-extent. This may take a few minutes.
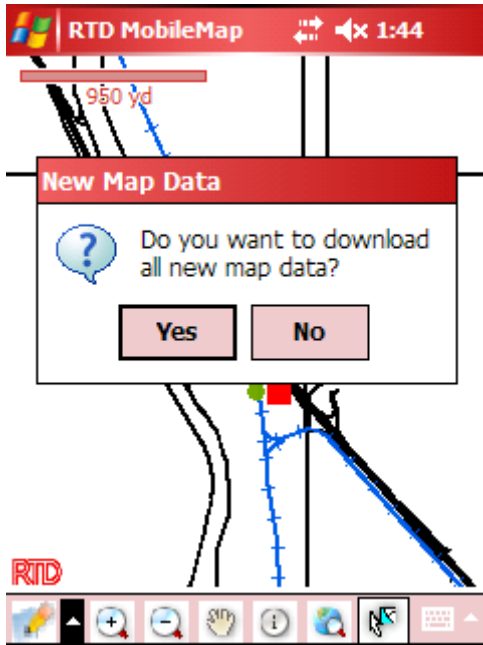

Figure 13 - Downloading all new map data.

Notes:
- Data is only downloaded for the current visible extent. Thus, if you download all new data, detailed data such as bus stops and detailed roads will not automatically be downloaded. These data will only be downloaded as necessary when you zoom in on an area. If you zoom in to an area in the field and do not have an internet connection, you will be un-able to download the new data. Thus updating all data should only be done when it is absolutely necessary.
- Updating data from the server will overwrite any changes you may have made when editing data. If you update data before you post your changes, your changes will be lost permanently.
- Updating data is not recommended unless you have a fast internet connection, as you will be download a substantial amount of data.
- You must have an active internet connection.

Searching/Finding Items on the Map

Finding items is easy with MobileMap. You can currently locate Park-n-Rides, LRT Stations and Bus Routes. When you find an item on the map, it is automatically selected

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for you and highlighted. You can also easily view its attributes via the [SF] button that appears.

Finding Park-n-Rides, LRT Stations and Bus Routes are the same.

1. Begin by tapping the 'Find' sub-menu on the MobileMap menu.
2. Tap the menu item for the type of feature you wish to locate (Park-n-Rides for Park-n-Rides and so on).
3. Select the item you want to find on the map.
4. Tap 'OK'.
5. The map will zoom to the items location, highlight the item on the map and enable the [SF] button to allow you to view the attributes of the selected item.

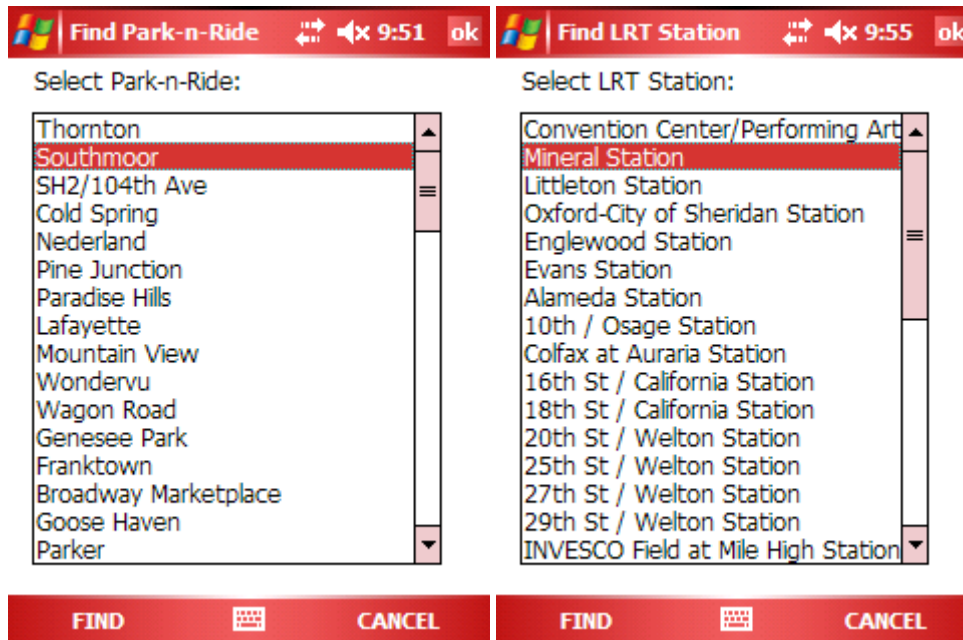*Note*: Searching for an item will over-ride the default selection layer.
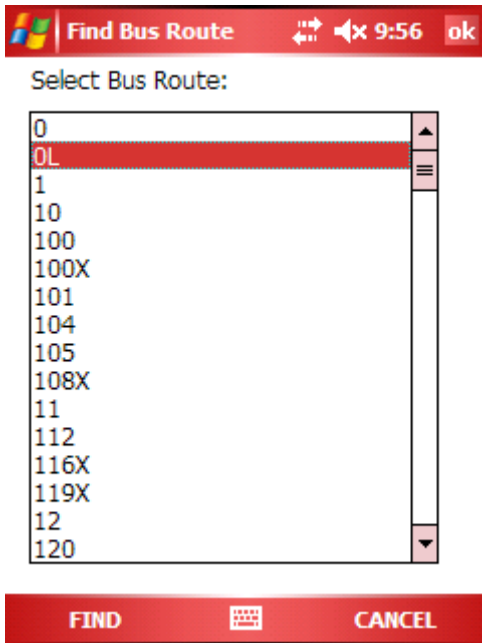

Figure 14 - Find Park-n-Rides and LRT Stations

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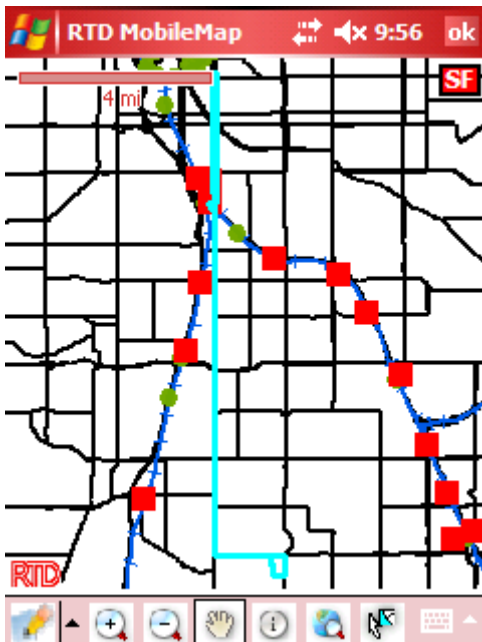
Figure 15 - Find Bus Routes

Figure 16 - Bus Route 0L selected after using 'Find > Bus Route' option.

Using the GPS

MobileMap, if installed on a device with an available GPS receiver, can both track the user's position on screen, but also automatically select nearby items on the map from any layer.

To enable/disable the GPS:

1. Tap the 'GPS' sub-menu on the MobileMap menu.
2. Tap the 'On/Off' menu item.

If the GPS was off, the GPS will be activated. If the GPS was already active, it will be deactivated. The GPS may take up to a few minutes to begin working properly. You will notice that at first a yellow indicator appears, this indicates that the GPS receiver can't 'see' enough satellites to calculate a location on the ground. When enough satellites are available the location indicator will change to green.

During normal use the GPS will indicate the position on the map and show a 'trail' of previous locations as you move. In addition the actual coordinates are displayed at the bottom of the map, along with the altitude and speed that you are moving.

Usage Notes:
- The GPS location may be inaccurate in areas where the 'view' to the satellites is obstructed or where the view can 'bounce' off of tall glass covered buildings. This is a known limitation of all GPS systems.
- The speed at which the GPS activates depends on the GPS receiver being used and is not dependant on MobileMap.
- The GPS will not work in most buildings, and will not work in tunnels or other locations which do not have a clear view of the sky.
- MobileMap cannot use many of the internal proprietary GPS receivers built in to many smart phones. The phones which support ESRI's ArcGIS Server Mobile can be found by contacting ESRI.

GPS Auto Selection Properties

MobileMap can auto-select items on the map based on proximity to the current GPS location.
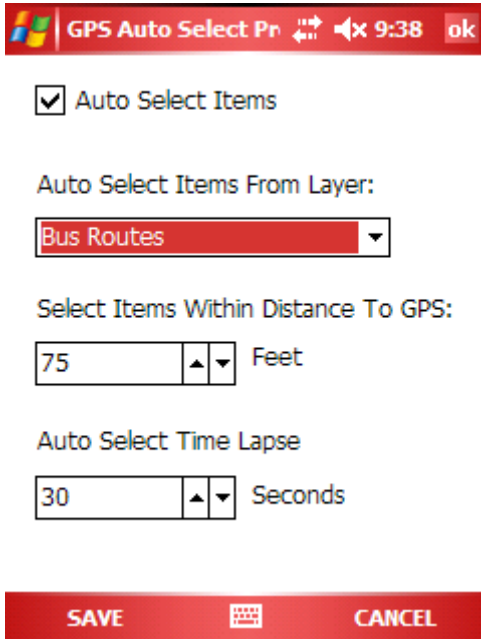To use Auto-Selection:
1. Tap the GPS sub-menu on the MobileMap Menu.
2. Tap the Selection Properties on the GPS menu (The GPS must be deactivated).
3. Check the 'Auto Select Items' checkbox.
4. Set the layer that items will be automatically selected from.
5. Set the maximum distance from the GPS position to the item that an item can be selected.
6. Set the time lapse between selection attempts.

When an item is selected, it will highlight cyan color, flash three times and the [SF] button will be available. The item will not be de-selected until another item is automatically selected or you select another item manually.

Notes:

- This process can, depending on data, be intensive and other interactions with the map can be delayed.
- Only one item will be selected at a time, even if multiple items are within the maximum selection distance. The closest item (straight line distance) to the GPS position will be selected.
- When the GPS is active and Auto Select Items is checked, the selection layer from the Auto Select Properties over-rides the map's Selection Layer.

Figure 17 – GPS Auto Selection Dialog

Editing Data

Currently MobileMap supports editing certain properties of Park-n-Rides.

You can currently edit Parking Status:
- Capacity Status (the amount of cars in the park-n-ride).

Maintenance Request:
- Status of Request
- Action Requested
- Problem Location
- Notes
- The date is automatically added when the edit is saved.

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To edit a park-n-ride:
1. Select a park-n-ride using the selection tool or other means.
2. Tap the 'Edit' sub-menu of the MobileMap menu.
3. Tap the 'Park-n-Ride' menu item.
4. Edit the items necessary.
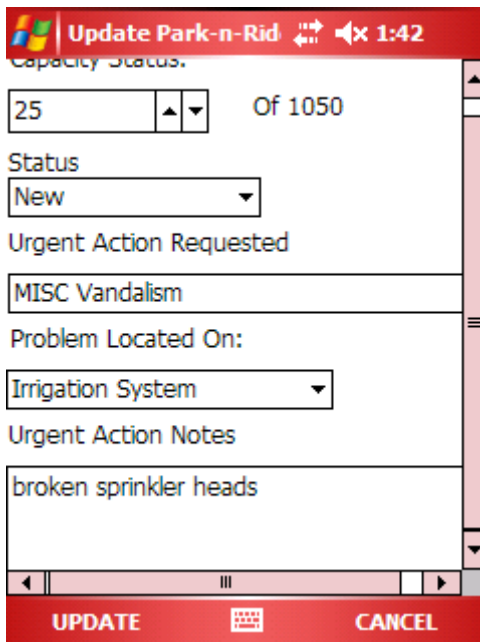5. Tap 'Update' to save the changes.

Figure 18 - Editing Park-n-Ride attributes.

Posting Data to the Server

Data is sent back to the server via posting. This safely enables you to send your data back, and if something should go wrong, neither your data nor the data on the server is damaged or destroyed. You must have an active internet connection to post your data changes.

To post your changes:
1. Tap the 'Edit' sub-menu on the MobileMap menu.
2. Tap the 'Post Updates' menu item.
3. The mobile device will connect with the server and attempt to push your changes to the server. This can take a minute or two.
4. You will receive a message indicating whether your 'version creation' was successful (or while it failed). This means that your data was moved to a temporary copy on the server and is ready to be integrated with the dataset as a whole.
5. The data is then 'posted and reconciled', which in effect moves the data from the temporary copy created in step 4 to the actual dataset. If this completes successfully the temporary copy is removed as it is no longer needed. If for any

reason a failure occurs, then the temporary copy remains for the administrator to manually move to the actual dataset.

Notes:

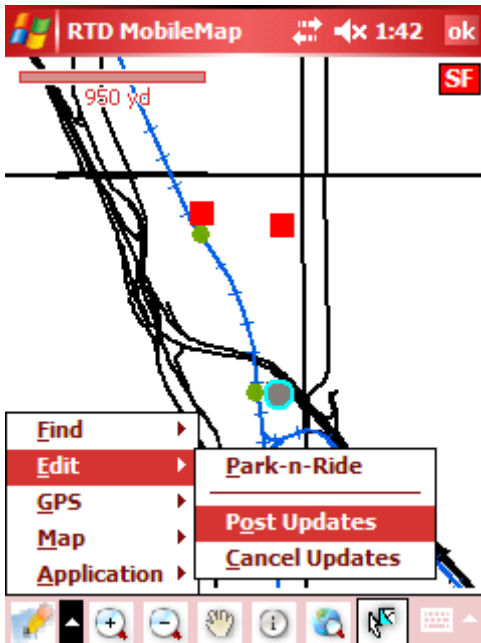- Your internet connection **MUST** be active to post data to the server.
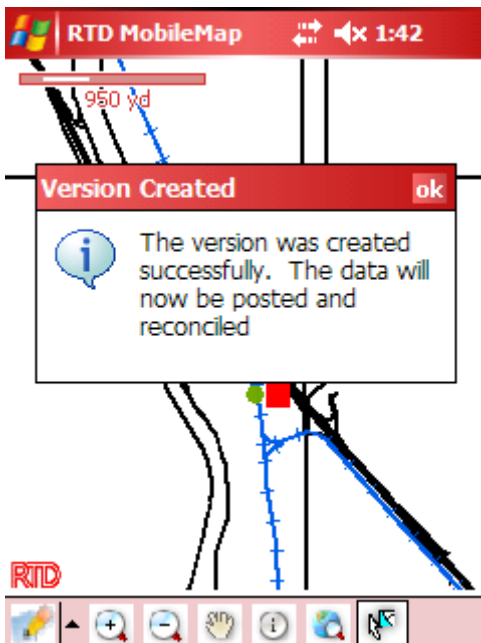

Figure 19 - Beginning to post data changes.

Figure 20 – Data moved to version on server successfully.
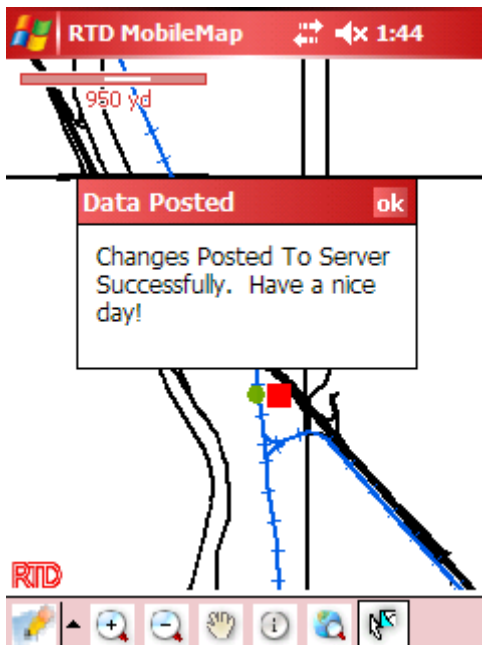
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Figure 21 - Data posting complete.

Canceling Edits

You can cancel any edits you have made since you last posted your data changes via the 'Cancel Updates' Menu item. This will remove all changes in the edit layer.

To cancel edits:
1. Tap the 'Edit' menu item.
2. Tap the 'Cancel Updates' menu item.
3. Confirm that you wish to undo any changes since you last posted your data.
4. Your changes are removed.

Notes:
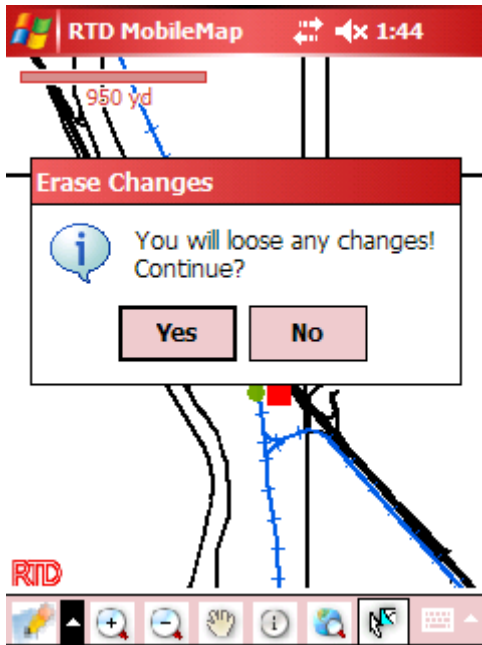- You can only undo your changes. There is no 'redo' edits. Be careful.

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Figure 22 - Editing, canceling all edits.