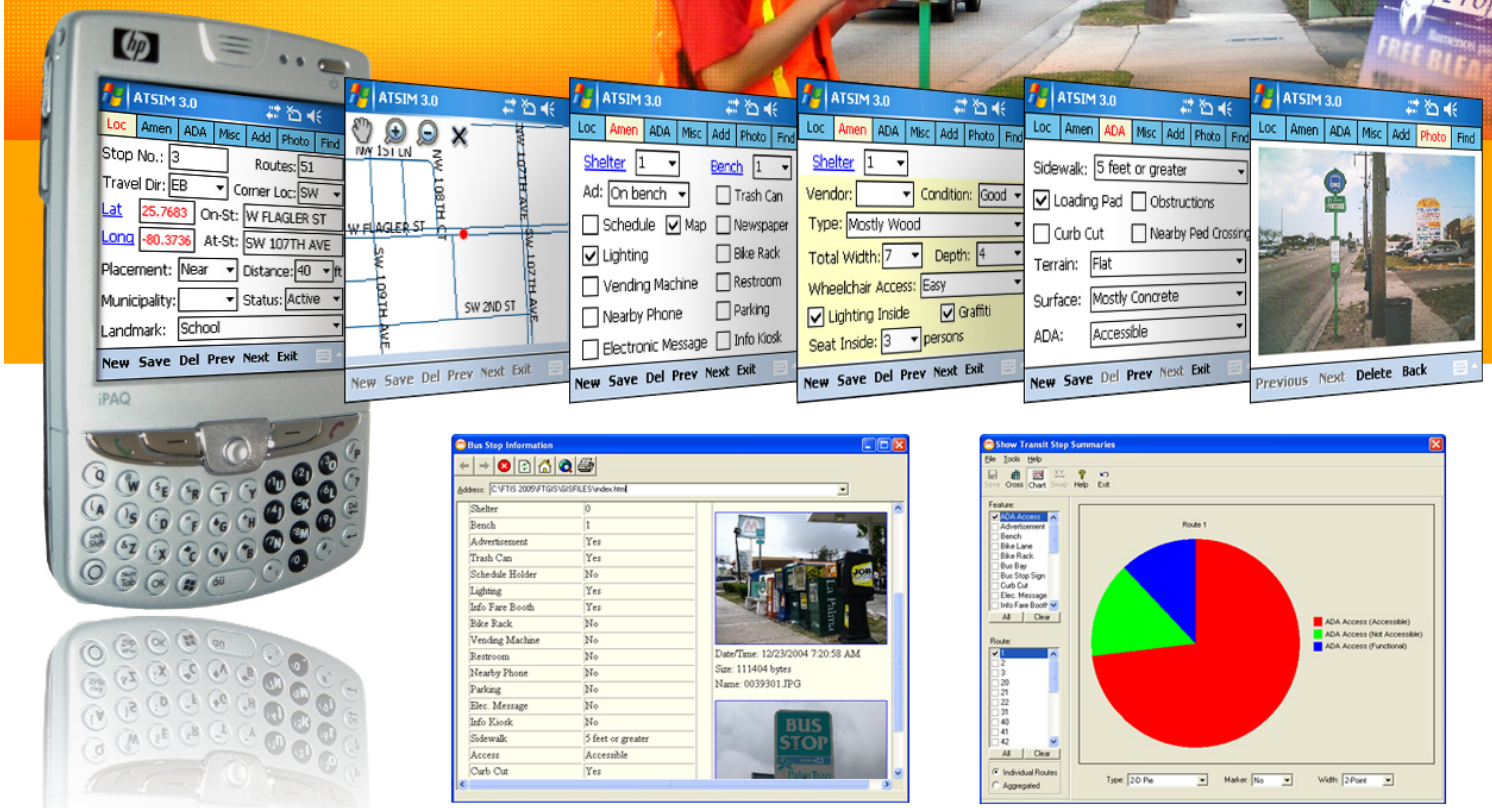
ATSIM
USER'S GUIDE

VERSION 3.0



Developed for:

Public Transit Office
Florida Department of Transportation

Developed by:

Lehman Center for Transportation Research
Florida International University

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ACKNOWLEDGEMENTS

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Mr. Ike Ubaka, AICP, of FDOT served as the project manager and has been closely involved in the software specifications and the overall development direction of the system. Dr. Albert Gan, Associate Professor of Civil Engineering at the Florida International University (FIU), served as the principal investigator and the chief system designer. Mr. Haifeng Wang and Mr. Kaiyu Liu, both senior computer programmers with the FIU Lehman Center for Transportation Research (LCTR), performed most of the software coding. Dr. Fabian Cevallos, Transit Program Director of LCTR, served as the expert consultant and tested the system for its usability and accuracy. Mr. Atiosis Blanco, a graphic designer with LCTR, designed the ATSIM main interface. This user's guide was written by Dr. Albert Gan and was proofread by Dr. Fabian Cevallos and Mr. Mark Mandell, a professional editor with LCTR. The following LCTR graduate assistants, both current and former, helped with various development tasks, including software testing, data collection, etc. (in alphabetical order): Mr. Xin Li, Mr. Wanyang Wu, Mr. Hunter Wei, Mr. Peng Zhu, and Mr. Xuesong Zhu. The assistance and feedback provided by many users from various transit agencies are gratefully acknowledged.

ATSIM is provided as an "as is" freeware to any agencies or individuals who wish to use it, courtesy of the FDOT and the LCTR at FIU.

DISCLAIMER

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Introduction

This guide provides detailed guidance on how to effectively use the Automated Transit Stop Inventory Model (ATSIM). It assumes that the user is familiar with the general operation of a PDA (Personal Digital Assistant) and the Microsoft Windows CE operating system.

What is ATSIM?

ATSIM is a user-friendly mobile-desktop system designed for the collection, update, and management of standard transit stop inventories for transit agencies in Florida, but that can also be easily adapted for agencies outside of Florida. The mobile component of ATSIM consists of a PDA application designed for easy entry of transit stop data in the field. It is specifically designed to run on the HP iPAQ model hw6945 (or hw6925), which comes with a fairly accurate Global Positioning System (GPS) and a 1.3 megapixel built-in digital camera. The system allows collection of 56 standard attributes, in addition to one general comment field, eight user-defined fields, and lat/long GPS locations. The system also has the capability to automatically link and store multiple pictures in the database.

The desktop component of ATSIM provides the following functions:

- **Customization**: It allows customization of selected items and user-defined attributes on the PDA interface.
- **Installation**: It allows the installation of the ATSIM field data collection component to the PDA.
- **Transfer**: It allows the transfer and synchronization of transit stop inventory files (in XML file format) between the desktop computer and the PDA.
- **Conversion**: It allows conversion of the XML transit stop inventory file used by the PDA and the shape files used by the ATSIM GIS component.
- **Application**: It allows the display, query, and update of the transit stop inventory using the ATSIM GIS component.

Why Transit Stop Inventory?

Transit stop inventories are needed for tracking the location of stops, identifying the type and conditions of amenities, determining how well areas of interest are served by transit service, assessing the accessibility for disabled persons and ADA compliance, upgrading the right-of-way appearance, etc. The advent of Advanced Public Transportation Systems (APTS) makes it even more important for transit agencies to keep an up-to-date inventory of transit stop data. To implement APTS projects such as automatic passenger counters (APC), automatic vehicle locators (AVL), computerized trip planners, and automatic voice annunciation systems, an accurate transit stop inventory is essential.

Why ATSIM?

The traditional methods of collecting transit stop inventory using a clipboard, pencil, and paper are time-consuming, inaccurate, and difficult to update. This often culminates in the reluctance of transit agencies to commit resources to such efforts. ATSIM replaces the traditional methods and provides an automated and affordable alternative to collecting, updating, and managing transit stop data. The availability of ATSIM also avoids duplication of development efforts by multiple agencies and contributes to the standardization of transit stop inventories in Florida.

Major ATSIM Features

ATSIM is a completely stand-alone system that does not require installation of any additional third-party software or data. Version 3.0 of ATSIM provides the following major features:

- Easy system installations.
- Collection of 56 Florida standard transit stop attributes, GPS locations (in latitude and longitude), digital photos, and additional user-defined fields.
- Customizable stop attributes and list-box selection items.
- Easy file transfer between a PDA and desktop computer.
- Automated synchronization of field data records from multiple data collection sessions.
- One-touch display of the current map location.
- Quick entry of street names in the field with pop-up lists.
- Easy updates of existing stop records in the field.
- Automated generation of shape files (in the Florida State Plane East NAD 1983 projection system) for GIS applications.
- Stand-alone GIS system with customized functions.
- Bundled Census and network layers.

Installing the ATSIM System to a Desktop Computer

Insert your ATSIM CD and wait for a few seconds for the setup program to automatically start. Follow the instructions on the screen to complete the installation.

Note: *If your computer is already installed with a version of ATSIM, the install program will ask if you want to remove it. To install the new version, you must choose to remove the existing install.*

Note: *The current version of ATSIM install comes with ActiveSync version 4.5. It will automatically install this version unless your desktop computer is already installed with ActiveSync version 4.5 or newer.*

Note: *You must choose a transit agency when prompted to do so during installation. This will direct the install to copy the correct street name file and bundled GIS files for your transit service areas. If your agency is not listed, you must still choose one of the existing agencies on the list. In this case, you will be able to use the ATSIM system, but you will need to enter the complete street names during data collection and you will not have the bundled GIS files.*

Once ATSIM is successfully installed, it can be accessed via either the desktop screen or Windows' **Start/All Programs** folder. Figure 1-1 shows the main ATSIM user interface, which provides a gateway to accessing the different functions as described previously.

Note: *The installation of ATSIM field data collection system component onto a PDA is a separate install and is described in Section 3 of this Guide.*

Technical Support

For technical support or additional information, please contact the developer through one of the following three channels:

- Email your request to gana@fiu.edu. This is the preferred method of contact.
- Call (305) 348-3116 for Albert Gan.
- Send to: Albert Gan
  Lehman Center for Transportation Research
  Florida International University
  10555 West Flagler Street, EC 3680
  Miami, Florida 33174

For the latest information on ATSIM, please visit http://www.ftis.org/ATSIM.

Figure 1-1. ATSIM Main Screen.

Standard Attributes and Customization

This section defines the standard attributes adopted in ATSIM and describes the process of customizing attributes with selectable items (i.e., attributes with a dropdown list) on the PDA.

Why Standard Attributes?

Currently, transit stop inventories are developed separately by individual transit agencies. As a result, they do not share the same data structure, attributes, accuracy, software platform, map projection, etc. A standard transit stop inventory allows the FDOT to effectively develop customized tools that can be used by all agencies.

What are the ATSIM Standard Attributes?

A majority of the standard attributes in ATSIM were identified based on both an agency survey and a review of existing transit stop databases from agencies in Florida. The agency survey was conducted during the first quarter of 2004 to obtain information on the state-of-the-practice in transit stop inventories. The survey was sent to all 25 Florida transit agencies with fixed route services. A total of 16 systems responded to the survey, yielding a 66% response rate. The survey included a total of 13 questions on inventory collection methods used, desirable transit stop attributes, transit stop data applications, transit stop data maintenance, and transit stop data utilization.

The standard transit stop inventory includes a total of 56 attributes in addition to eight general attributes that can be defined by the user for specific needs. The 56 standard attributes assure that Florida's transit systems will have, at a minimum, these attributes, and that it will have them with the same consistent definitions.

General Attributes

1. Assessor: The name of the person who performs the field data collection. The system will keep any name entered until another name is entered.

Location Attributes

1. Stop Number: A unique identifier assigned to a transit stop. It is common for agencies to put this number on the stop sign.

2. Routes: All route numbers served by the stop (enter each route number separated by a comma).

3. Travel Direction: The direction of the street on which the stop is found. They can be EB (eastbound), WB (westbound), NB (northbound), or SB (southbound).

4. Corner Location: The street corner where the bus stop is located. They can be NE (northeast), NW (northwest), SE (southeast), or SW (southwest).

5. On-Street: The name of the street along a transit route. ATSIM comes with a list of street names for individual transit agencies in Florida. When part of a street name is entered, the system will display up to six street names that match any part of the street name entered. The user can then identify and select the correct street name from the list. When a particular street name is not found on the list, the user must tab in the complete street name from the screen keyboard

6. At-Street: The name of the closest cross street to the stop location. As in the case of on-street name, a list of all possible street names is stored in the ATSIM system, and up to six street names that match the entered string characters will be listed for selection.

7. Placement: The stop location in relation to the cross-street. It can be “far” for far-side stop, “near” for near-side stop, “middle” for mid-block stop, or a “terminal.” The determination of whether a stop is on the far or near side is in reference to its nearest intersection. It is suggested that a stop be considered mid-block if it is located more than about 200 feet from its nearest intersection.

8. Distance to At-Street: Distance to the cross street in feet. If a measuring wheel is not used, this can be a distance approximated by the assessor (accurate to the nearest 5 or 10 feet should be sufficient).

9. Status: “Active” if the transit stop is currently being used or “inactive” if it is not.

10. Municipality: The name of the municipality in which the stop resides.

11. Landmark: The major landmark served by the transit stop, if one exists.

12. Latitude and Longitude: These are the real-time latitude and longitude locations. The numbers are automatically filled in from the built-in GPS receiver.

Amenity Attributes

ATSIM standard attributes include the following 15 transit stop amenities:

1. shelter
2. bench
3. advertisement
4. trash can
5. schedule
6. map
7. newspaper
8. lighting
9. bike rack
10. vending machine
11. restroom
12. nearby phone
13. parking
14. electronic message
15. info kiosk

For shelters and benches, the number of each is entered. For advertisement, one of the following options can be selected: on bench, on shelter, on each, and no advertisements. If there are no shelters or benches, "0" should be entered. For the other amenities, because they are less common and usually have only one unit (if one is present at all), only the presence of each is recorded with a check mark. This allows the attributes to be collected more quickly. The default is that the amenity is not present.

Because shelters and benches are important stop amenities, ATSIM provides additional attributes to record additional information for these facilities. For shelters, the following additional attributes are included:

1. Shelter Vendor: The name of the shelter vendor.

2. Shelter Condition: The condition of the shelter(s), which can be Good, Average, or Poor.

3. Shelter Type: The type of material the shelter(s) is made of. The standard selection options are Mostly Wood, Mostly Brick/Concrete, Mostly Metal, Mostly Plastic, or other.

4. Shelter Total Width: The total width of the shelter(s) in feet. If there is more than one shelter, add up the individual widths.

5. Shelter Depth: The depth of the shelter in feet.

6. Shelter Wheelchair Accessibility: Whether the shelter(s) is wheelchair accessible. The

standard selection items are Easy, Difficult, and Not Possible.

7. Lighting Inside Shelter: Whether there is lighting inside the shelter(s).

8. Graffiti on Shelter(s): Whether there is graffiti on the shelter(s).

9. Shelter's Inside Seating Capacity: The total seating capacity inside the shelter(s).

For benches, the following additional attributes are included:

1. Bench Vendor: The name of the bench vendor.

2. Bench Condition: The condition of the bench(es), which can be Good, Average, or Poor.

3. Bench Type: The type of material the bench(es) is made of. The standard selection options are Mostly Wood, Mostly Concrete, Mostly Metal, Mostly Plastic, and other.

4. Total Seating Capacity of Bench(es): The total seating capacity of all of the benches combined.

5. Graffiti: on Bench(es): Whether there is graffiti on the bench(es).

ADA-Related Attributes

1. Loading pad: Whether there is a loading pad to load people in wheelchairs.

2. Obstructions: Whether there are obstructions that will prevent people in wheelchairs from accessing the stop, including obstructions in any access direction.

3. Curb cut: Whether there are ramps to allow people with wheelchairs to get to the transit stop.

4. Nearby Pedestrian Crossing: Whether there is nearby pedestrian crossing that may be used by people in wheelchair.

5. Terrain: The general terrain where the stop is located. The standard selections include: Flat, Minor Slope, and Major Slope.

6. Surface: The immediate floor surface of the stop. The standard selection include: Mostly Concrete, Mostly Brick, Mostly Wood, Mostly Gravel, Mostly Grass, Mostly Soil/Sand, and other.

7. ADA: Three levels of ADA accessibility are used: accessible, functional, and not accessible. A transit stop is considered accessible when it can be accessed by persons in wheelchairs. A functional stop can be accessed by persons in wheelchairs, but they are not in full compliance with ADA regulations. A stop is considered inaccessible if it

cannot be reached by persons in wheelchairs.

Miscellaneous Other Attributes

1. Bike Lane: Whether there is a bike lane in front of the transit stop.

2. Time Point: Whether the stop is used as a time point.

3. Stop Sign: Whether there is a transit stop sign.

4. Stop Sign not Clear: Whether the information on the transit stop sign has become difficult to read.

5. Stop Sign Post Type: The type of post to hold the transit stop sign. It can be a dedicated post used exclusively for the stop sign, a utility pole, or any other type of pole.

6. Posted Speed: The posted speed limit on the street at which the transit stop is located.

7. Others: A "note" is included for the assessor to note any special conditions that exist at the stop. In addition, a total of eight user-defined attributes are included: two for entering specific information, two with a dropdown selection list, and two for recording if a feature is present. The agency can define what each variable represents. See the next section on how to rename these variables.

Customizing ATSIM Attributes

ATSIM allows the users to add additional selection items to all attributes that involve a dropdown selection menu. These attributes include:

- placement
- travel direction
- corner location
- distance (to nearest intersection)
- municipality
- landmark
- status
- advertisement
- post type
- sidewalk
- ADA (compliance assessment)
- terrain
- surface
- shelter vendor

- shelter condition
- shelter type
- shelter total width
- shelter depth
- shelter wheelchair access
- bench vendor
- bench condition
- bench type
- bench total seating capacity

To add items to an attribute, click the **Customize** button on the ATSIM main screen to bring up the screen shown in Figure 2-1. On this screen, first select an attribute from the dropdown list. The existing selection items for the selected attribute will be listed. For the purpose of standardizing the ATSIM attributes, the existing items are not editable. To add a new item to the list, simply click the last cell on the list and then enter a desired name for the item.

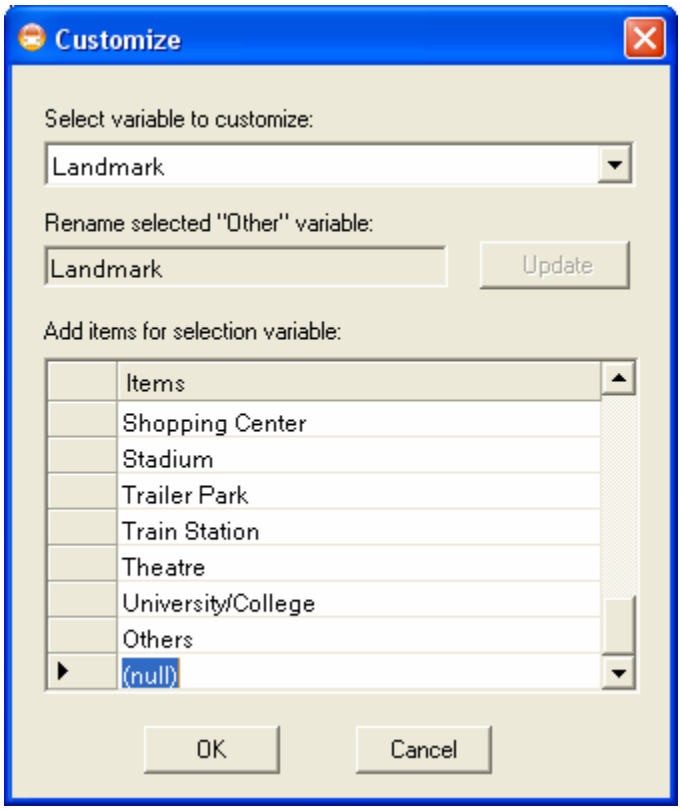

Figure 2-1. Screen for Customizing Attributes.

ATSIM allows individual agencies to include up to eight additional attributes to meet agency-specific needs. These attributes are given some generic names that can be renamed from the screen shown in Figure 2-1. They include four textbox attributes (i.e., Other 1, Other 2, Other 3, and Other 4), two dropdown-list selection attributes (i.e., Other 5 and Other

6), and two checkbox attributes (i.e., Other 7 and Other 8). When one of these attributes is selected, you can edit the attribute name, in addition to adding the corresponding selection items. Figure 2-2 shows an example for the **Other 5** attribute.

Important: For the customized items to reflect on the PDA, customization must be performed before applying the **Install** function on the ATSIM main screen.

Important: All customized items are saved to a Microsoft Access file called **system.mdb**. This file will be overwritten when you install a new version of ATSIM. To keep your old customization, you must either copy this file to another folder or rename it before reinstalling ATSIM. Once you have installed the new ATSIM, replace the new **system.mdb** file with the old file with the same name.

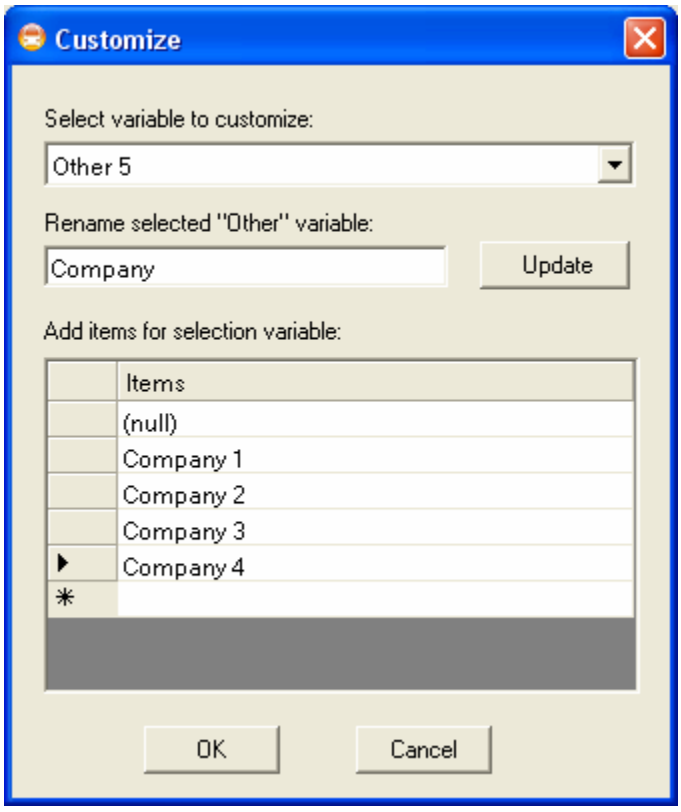

Figure 2-2. Customized Attribute Name and Selection Items for a Generic Attribute.

PDA Field Data Collection System

This section describes the process of installing the ATSIM field data collection system on a PDA as well as the use of the system after it is installed.

Installing Field Data Collection System on a PDA

To install the field data collection system on the PDA (must be HP iPAQ 6945/6925), first connect your PDA to your host computer and then click the **Install** button on the ATSIM main screen (see Figure 1-1). Follow the instructions on both your desktop and PDA to complete the installation. When prompted whether to install to the flash memory of the PDA or to the external mini-SD card, you may choose either options.

***Important**: A mini-SD card (of any storage size available) is required to properly install the field collection system to the PDA.*

***Note**: The ATSIM field data collection system requires version 2.0 of the .NET Compact Framework and will automatically install it to your PDA if one has not been installed.*

Getting Started with the Field Data Collection System

When the PDA is first turned on, you will be greeted with the screen shown in Figure 3-1. Tap the **Start** menu and select **Programs** to bring up the screen shown in Figure 3-2. Tap the **ATSIM 3.0** icon to enter the program.

Entering and Editing Field Data

After tapping the ATSIM icon, it will take a few seconds to enter the screen shown in Figure 3-3.

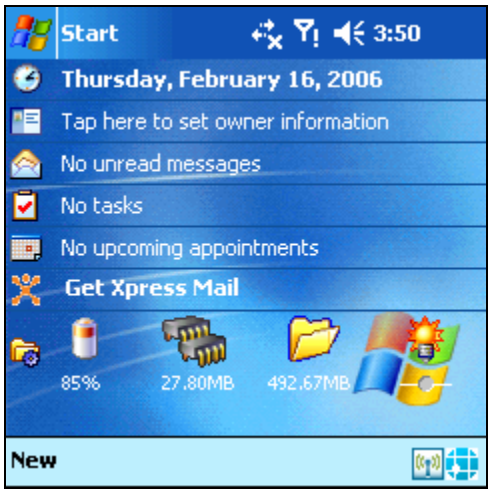

Figure 3-1. Windows CE "Today" Screen.

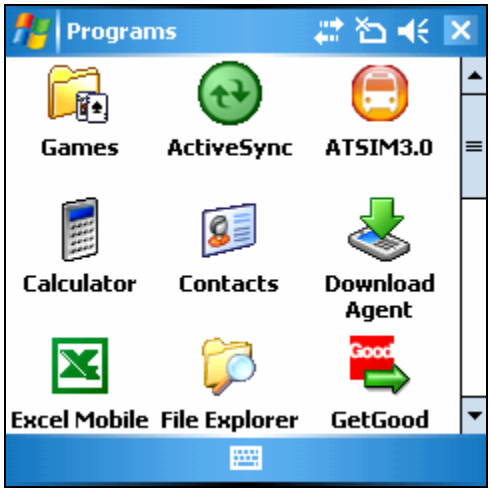

Figure 3-2. Start/Programs Screen.

Figure 3-3. ATSIM's First PDA Screen.

As shown in Figure 3-3, the screen allows you to specify the following input:

- The name of the assessor. This is a required field. As soon as the field is tapped, a screen keyboard will appear to let you to enter your name. You may remove the screen keyboard by tapping the keyboard icon located at the bottom-right corner of the screen. Once a name is entered, it will be automatically loaded until another name is entered.

- Select your transit system. This will tell the system to load the street names in your transit service area to facilitate the entry of street names in the field.

- The database file to store the transit stop attributes. You may choose to open a new database or an existing database from the dropdown list box.

- The **Folder for Photos** box lists the default folder in which the photo files will be stored. (This field is for information only and is not editable.) During data collection, the system will fetch the photo files from this folder to the external mini-SD card. Note that the system will not be able to find the photo files if this folder is set to another folder (which can be done when you are in the Photosmart program).

- The line at the bottom of the screen shows you the status of the GPS connection. When you are at a location that can be reached by GPS signal, the connection may take a few seconds to a few minutes to establish. If you tap the **Continue** button without waiting for the GPS connection to complete, you will get the warning message shown in Figure 3-4. The message simply informs you that your attribute records will not contain any GPS coordinates if you choose to proceed without the GPS connection.

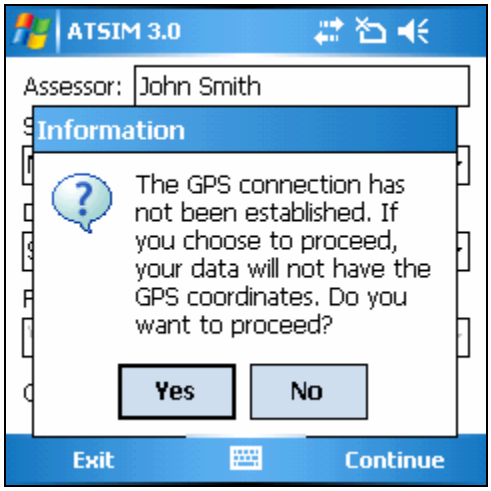

Figure 3-4. Warning Message When Proceeding without a GPS Connection.

When the GPS is connected, the screen will indicate "**GPS Connection is OK**." Tap the **Continue** button to enter the first ATSIM screen shown in Figure 3-5. There are a total of seven tabs on this screen and they are detailed below:

- By default, the system will display the first **Loc** tab. This tab allows you to enter the field data related to the location of a transit stop. For the **On-St**reet and **At-St**reet fields, a list of potential street names matching any part of the name you tap in (non-case sensitive) will be listed for your selection so that you will not have to tap in the complete names. On the same screen you may tap either the **Lat** or **Long** attribute name to display a map of the current location. Figure 3-6 shows an example screen of a map. On this map screen, you may tap the four buttons shown on top of the screen to pan, zoom in, zoom out, and exit from the map screen, respectively. By default, the map screen will display within about 1,000 feet of the area surrounding the current stop location, which is indicated by a large red dot. Other stops are shown in smaller blue dots.

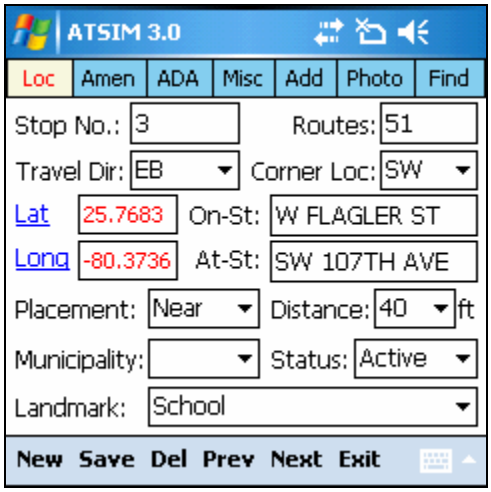

Figure 3-5. Data Entry Screen for Location Attributes.

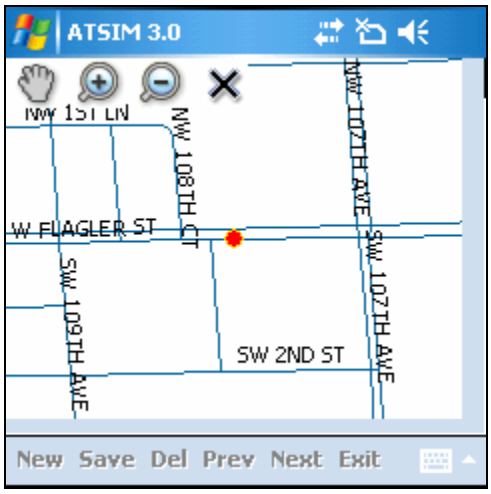

Figure 3-6. Map Showing Area Surrounding Current Stop Location.

- Tapping the **Amen** tab will display the screen shown in Figure 3-7. The screen includes attributes related to stop amenities. You may tap the **Shelter** attribute name to bring up the screen shown in Figure 3-8 in order to enter additional attribute information for a shelter. Similarly, you may tap the **Bench** attribute name to bring up the screen shown in Figure 3-9 to enter additional information for a bench.

Figure 3-7. Data Entry Screen for Amenity Attributes.

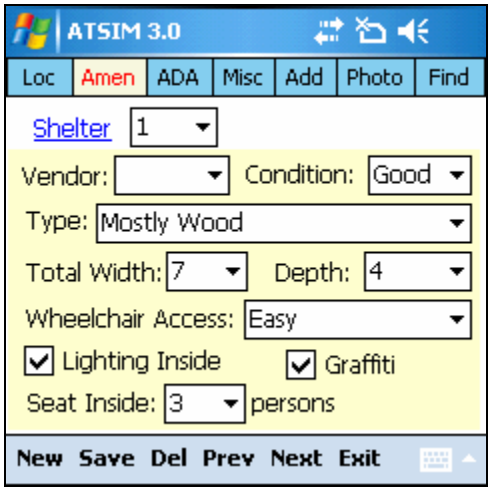

Figure 3-8. Data Entry Screen for Additional Information for Shelters.

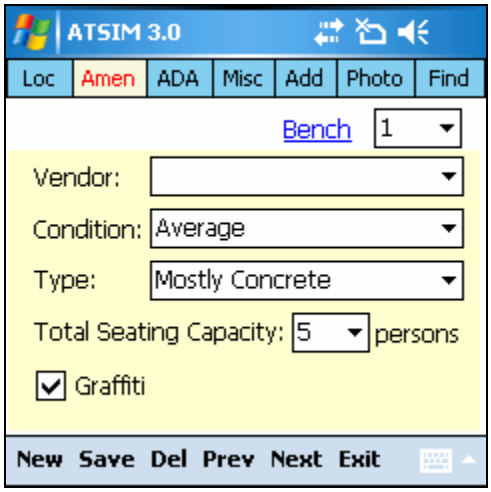

Figure 3-9. Data Entry Screen for Additional Information for Benches.

- Tapping the **ADA** tab will display the screen shown in Figure 3-10. The screen allows you to enter information on the ADA-related attributes.

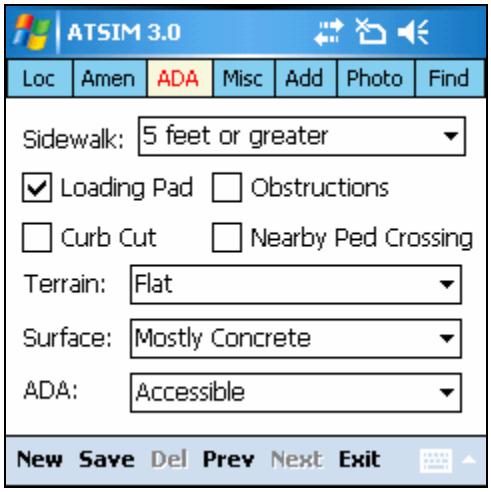

Figure 3-10. Data Entry Screen for ADA-related Amenities.

- Tapping the **Misc** tab will display the screen shown in Figure 3-11. This screen allows you to enter other miscellaneous attributes as shown.

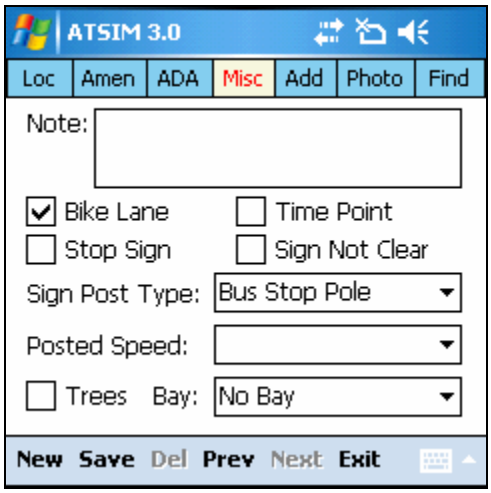

Figure 3-11. Data Entry Screen for Miscellaneous Other Attributes.

- Tapping the **Add** tab will display the screen shown in Figure 3-12. The screen allows you to enter information for up to eight user-defined attributes. See Section 2 for instructions on how to customize the names for these attributes.

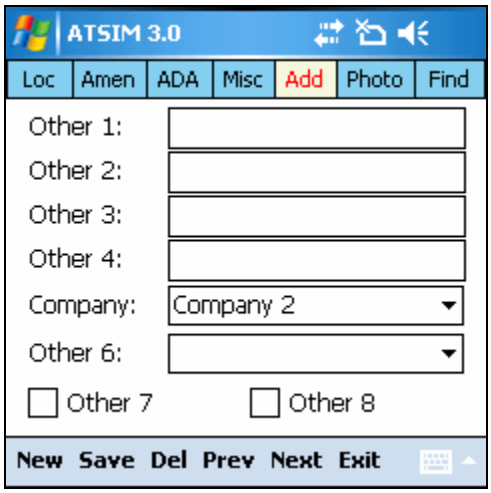

Figure 3-12. Data Entry Screen for User-Defined Attributes.

- Tapping the **Photo** tab will display the screen shown in Figure 3-13. The screen provides access to the **Photosmart** software. Tapping the **Start** menu will open the screen shown in Figure 3-14. The screen shows buttons that allow you to zoom in, zoom out, toggle the flash light, and shot a photo (i.e., the largest button on screen). After taking the photos for a stop, tap the "**X**" close button to exit from the Photosmart screen and return to the **Photo** tab. You can tap the **Preview** menu, which will bring up the screen shown in Figure 3-15. The screen allows you to preview one photo at a time. By default, it will display the last photo taken. Use the **Previous** and **Next** navigation menu at the bottom of the screen to select a specific photo to display. Tap the **Delete** menu to delete the photo on display. Tap the **Back** menu to exit the screen and return to the **Photo** tab.

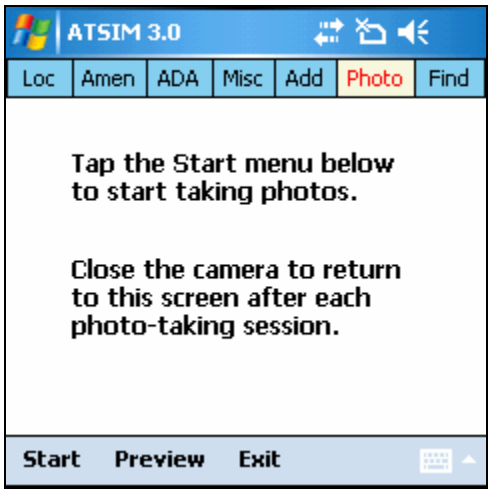

Figure 3-13. Screen for Access to Photosmart Software and Photo Preview.

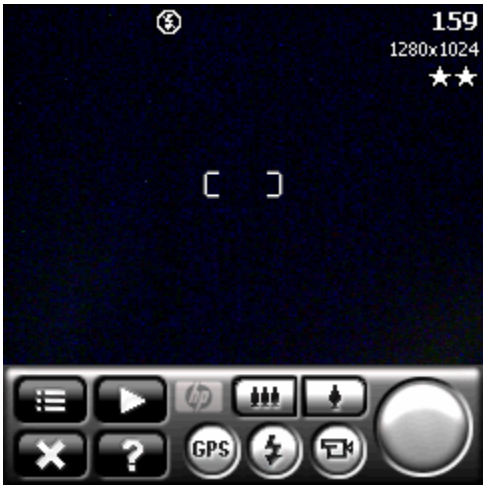

Figure 3-14. HP Photosmart Screen.

Figure 3-15. Photo Preview Screen.

- Tapping the **Find** tab will display the screen shown in Figure 3-16. The screen allows you to search for transit stops within a specified distance in feet. Enter the desired distance, and then click the **Search** menu. Figure 3-17 shows the resulting screen, which displays and sorts all of the stop records found. On this screen, you can quickly retrieve a record to edit by simply clicking any of the cells of a record. The **Find** tab also allows you to specify either to keep the existing GPS location (i.e., to update the attributes only) or replace it with the current (new) GPS location. You would choose the first option if you want to edit the stop attributes without being present at the stop. By default, the system will keep the existing stop location.

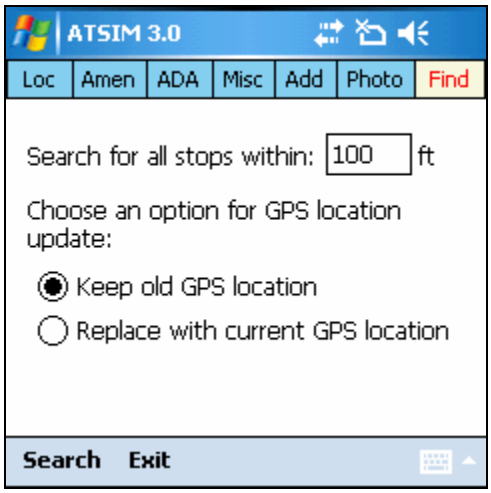

Figure 3-16. Record Searching Screen.

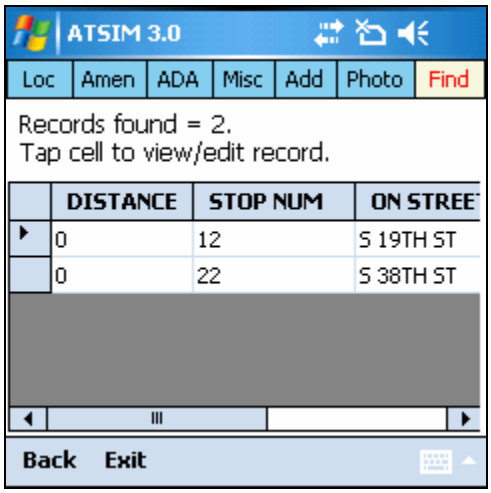

Figure 3-17. Searched Results.

After you have entered all of the attributes and taken all of the photos, tap the **Save** menu at the bottom of the screen (of Figures 3-5 to 3-12). To create a new record, tap the **New** menu. To delete a record, use the **Prev** or **Next** menu to go up or down one record to find the record and then tap the **Del** menu. Tap the **Exit** menu to exit the system.

Useful Tips

- To take better photos with the camera, try to focus the square bracket area at the center of the camera screen on the main object being photographed (for example, a transit stop sign). Also, to avoid having to re-orient your pictures, always take photos in the orientation shown in Figure 3-14.

- To establish a GPS connection more quickly while out in the field, it is recommended that you download the **Quick GPS Connection** file every other day from its server location. To do this, you must connect your PDA to a computer with an Internet connection, select **Start/Settings**, and then tap the **Connections** tab shown in Figure 3-18. Tap the **Quick GPS Connection** icon to open the screen shown in Figure 3-19. Tap the **Download Now** button to download the GPS file, which will be automatically installed.

Figure 3-18. Start/Settings Screen.

Figure 3-19. Screen for Downloading the Quick GPS Connection File.

Data Transfer and Conversion

This section describes the process of transferring data between the PDA and the desktop computer, and the conversion between the two types of files used by ATSIM.

ATSIM Files

ATSIM makes use of the following two types of files: an Extensible Markup Language (XML) file used by the PDA field collection system and shape files used by its GIS component. Figure 4-1 shows the system components and file exchanges among the components. For each project you work on, there will be an XML format residing on a hosting desktop computer that you would treat as the master database file. When field data are transferred from a PDA after each data collection session, they will be automatically merged and synchronized with this master file.

To view the stop data in a GIS system, ATSIM provides a conversion function that can convert between XML files and shape files. Converted shape files will be automatically saved to a predefined GIS folder together with other shape files that come with the ATSIM install.

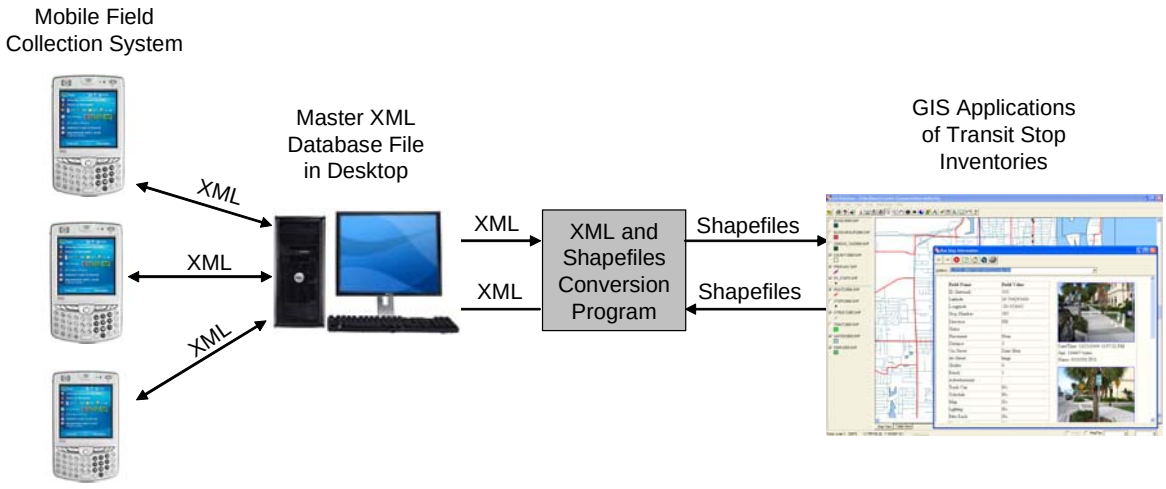

Figure 4-1. ATSIM System Components and Associated Files.

Transferring Data between a PDA and a Desktop Computer

To start transferring a stop inventory file, connect your PDA to your desktop and then click the **Transfer** button on the ATSIM main screen (see Figure 1-1). You will first be instructed to connect your PDA to the desktop (see Figure 4-2). Click the **Connect** button. Once the connection is successfully established, you will be prompted by the screen shown in Figure 4-3, which allows you to choose either to transfer a file from the PDA to the desktop (i.e., when you need to transfer new stop data collected from the field to merge with the master database), or from the desktop to the PDA (i.e., when you need to update existing stop data in the field).

Figure 4-2. Instructional Screen for PDA and Desktop Connection.

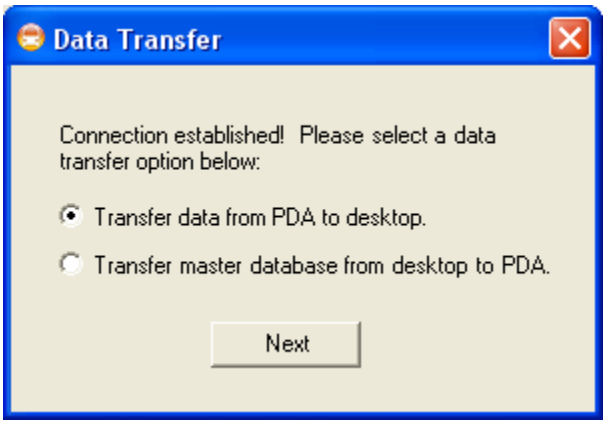

Figure 4-3. Screen for Specifying Data Transfer Options.

Transferring Data from a PDA to a Desktop Computer

If you choose to transfer a stop inventory file from the PDA to the desktop, you will be prompted by the screen shown in Figure 4-4. On this screen, you first select the file you want to transfer and then select the master file you want to merge the new data to. Note that, to simplify the process, ATSIM fixes the data file folder for both the PDA and the desktop. Click **Transfer** to start the file transfer process.

Data synchronization is automatically performed during the transfer process. If a record is new, it will be automatically added to the master file. If a record has been updated in the field, it will replace an existing record in the master file. After the transfer is completed, the system will display a screen (see Figure 4-5 for an example) to show the data transfer results, which include the number of new records transferred, number of records updated, and number of picture files added. Click **Finish** to exit and return to the ATSIM main screen.

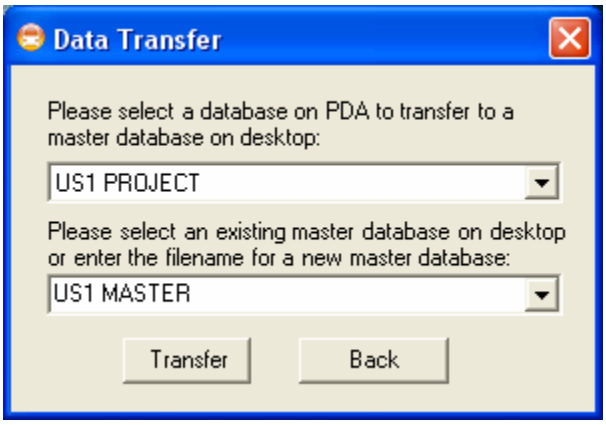

Figure 4-4. Screen for Specifying Transfer and Master Files.

Figure 4-5. Screen Showing File Transfer Results.

Transferring Data from a Desktop Computer to a PDA

If you choose to transfer a data file from the desktop to the PDA for data update in the field, you will only need to indicate the file you want to transfer to the PDA (see Figure 4-6). Once the file transfer is completed, you will be prompted the screen shown in Figure 4-7. Click **Finish** to exit and return to the ATSIM main screen.

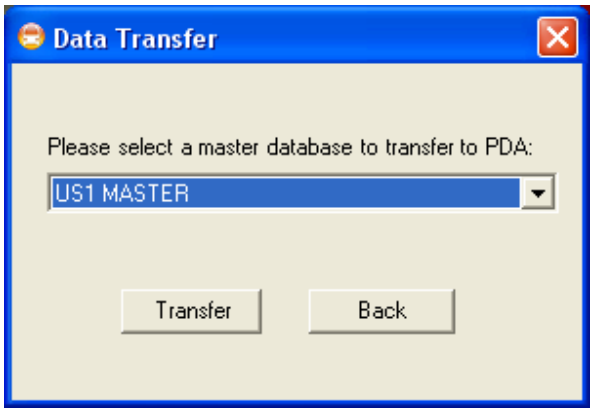

Figure 4-6. Screen for Specifying Master File to Transfer to PDA.

Figure 4-7. Screen Indicating Successful Transfer of Master File.

Converting between XML and Shape Files

ATSIM provides a function to allow you to convert between the XML file used by PDA and the shape files used by its GIS component. To apply this function, click the **Convert** button on the ATSIM main screen (see Figure 1-1) to bring up the screen shown in Figure 4-8. The default option is to convert from an XML file to its shape files counterpart. Select a XML file by clicking the file on the list box and enter a name for the shape files to be created. Click **Start** to begin conversion.

***Note**: All shape files in ATSIM are of the Florida State Plane East (NAD 1983) projection system.*

Figure 4-9 shows the input screen for converting shape files to an XML file. By default, it will list all of the shape files in the designated folder, which includes those for the socioeconomic and network data that come with the ATSIM install. Select a stop inventory file and then specify the output file name for the XML file to convert to. The conversion from shape files to the master XML file is needed only if changes are made to the shape files and additional changes are to be made in the field using the field data collection system.

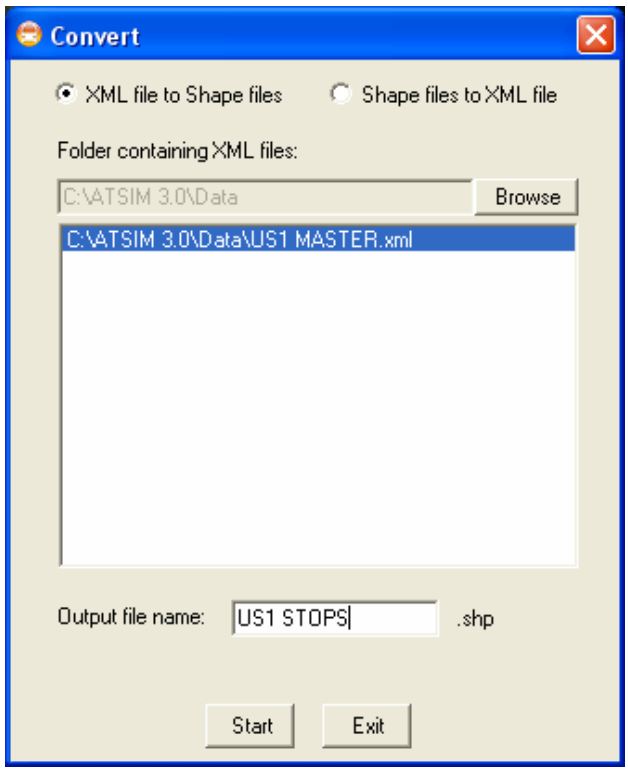

Figure 4-8. Input Screen for Converting an XML File to Shape Files.

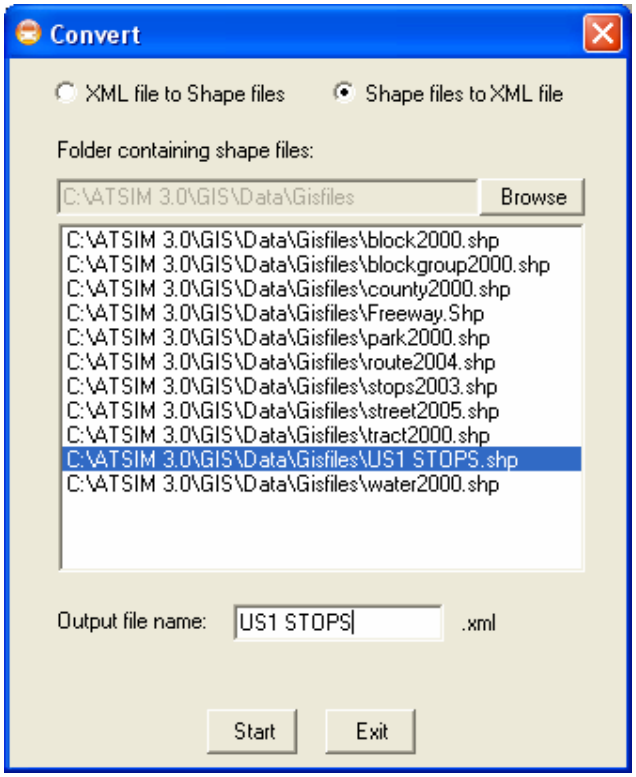

Figure 4-9. Input Screen for Converting to Shape Files to an XML File.

GIS Applications

This section presents some GIS application functions designed to apply the shape files created as described in the previous section.

Retrieving Transit Stop Attributes and Pictures

A basic need on the part of transit agencies for transit stop information is to be able to find out quickly the conditions at a transit stop and its surrounding area. ATSIM provides a function to allow you to quickly retrieve all of the attribute information of a transit stop. Click the **Apply** button on the ATSIM main screen (see Figure 1-1) to start accessing this function. *To apply this function, the transit stop layer must be made visible and be defined as the current layer.* This is done by checking the corresponding checkbox and clicking on the layer name in the map legend. An example is given in Figure 5-1 for the **R1_STOPS.SHP** map layer, which contains a transit stop inventory that was collected as part of a field test of the ATSIM system.

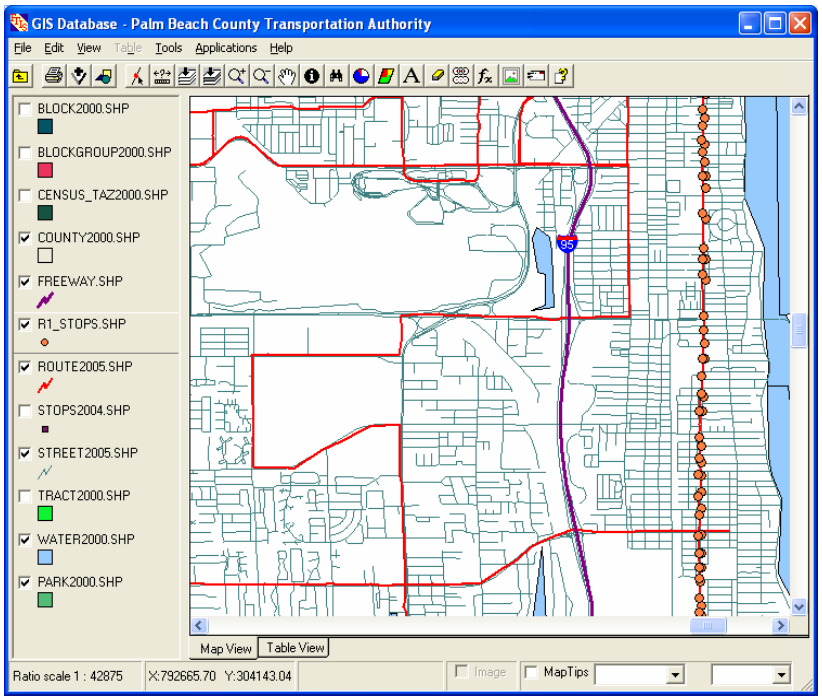

Figure 5-1. Map Screen and Legend.

To retrieve data for a specific transit stop, select the **ATSIM/View Transit Stop Attributes and Pictures** menu option. The system will detect if the current layer is based on the Florida standard transit stop data structure. If it is not, you will be reminded of this requirement. If the requirement is met, the mouse cursor will change to one that combines the standard mouse pointer with a question mark. Clicking on a transit stop feature (i.e., a dot) on the map will retrieve and display the transit stop data. A sample output of this function is shown in Figure 5-2, which lists transit stop attribute data side-by-side with pictures. When viewing this screen, you may:

- Scroll down the screen to reveal hidden output data.
- Click the  tool button to print the screen.
- Click a picture to get an enlarged version of the picture. A sample of an enlarged picture is shown in Figure 5-3.

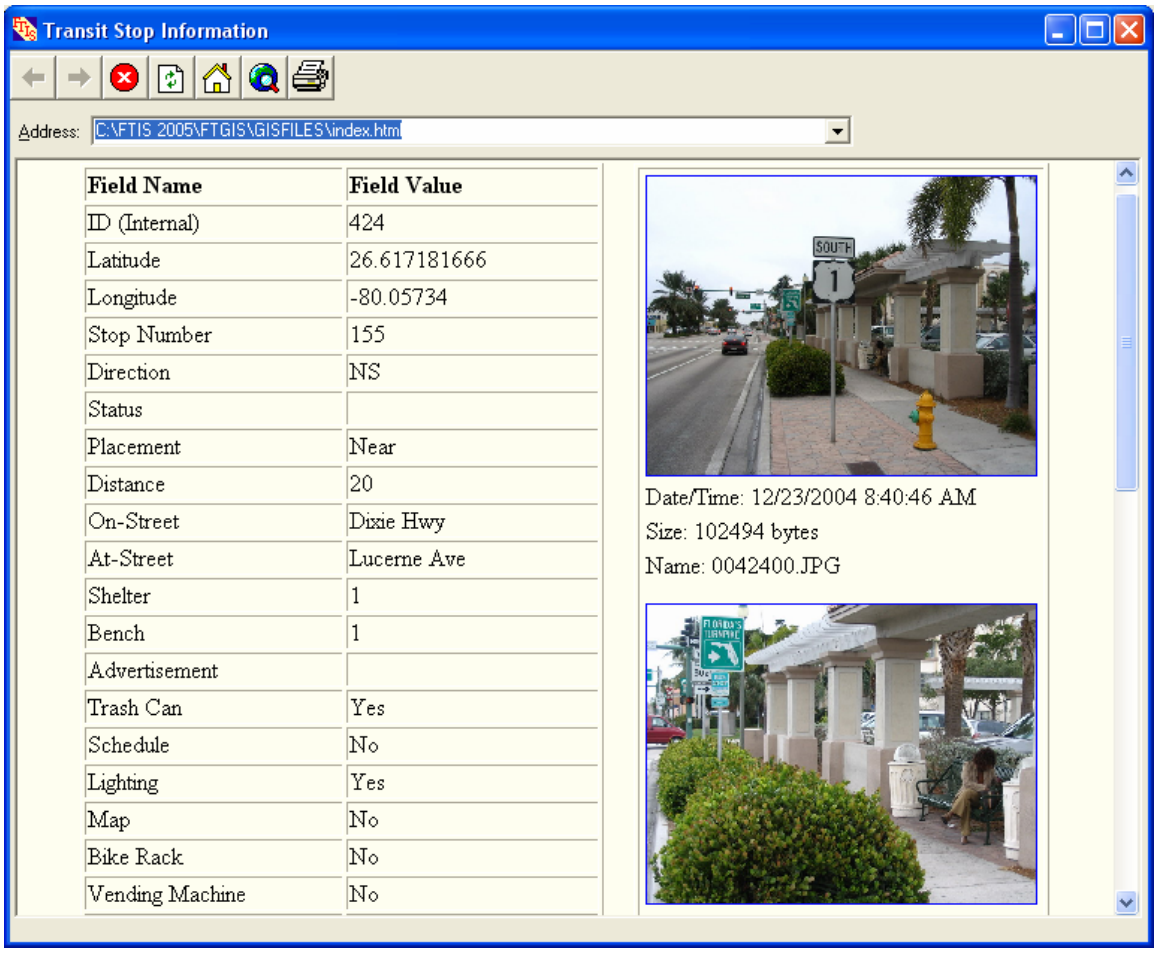

Figure 5-2. Retrieved Transit Stop Attribute Data and Pictures.

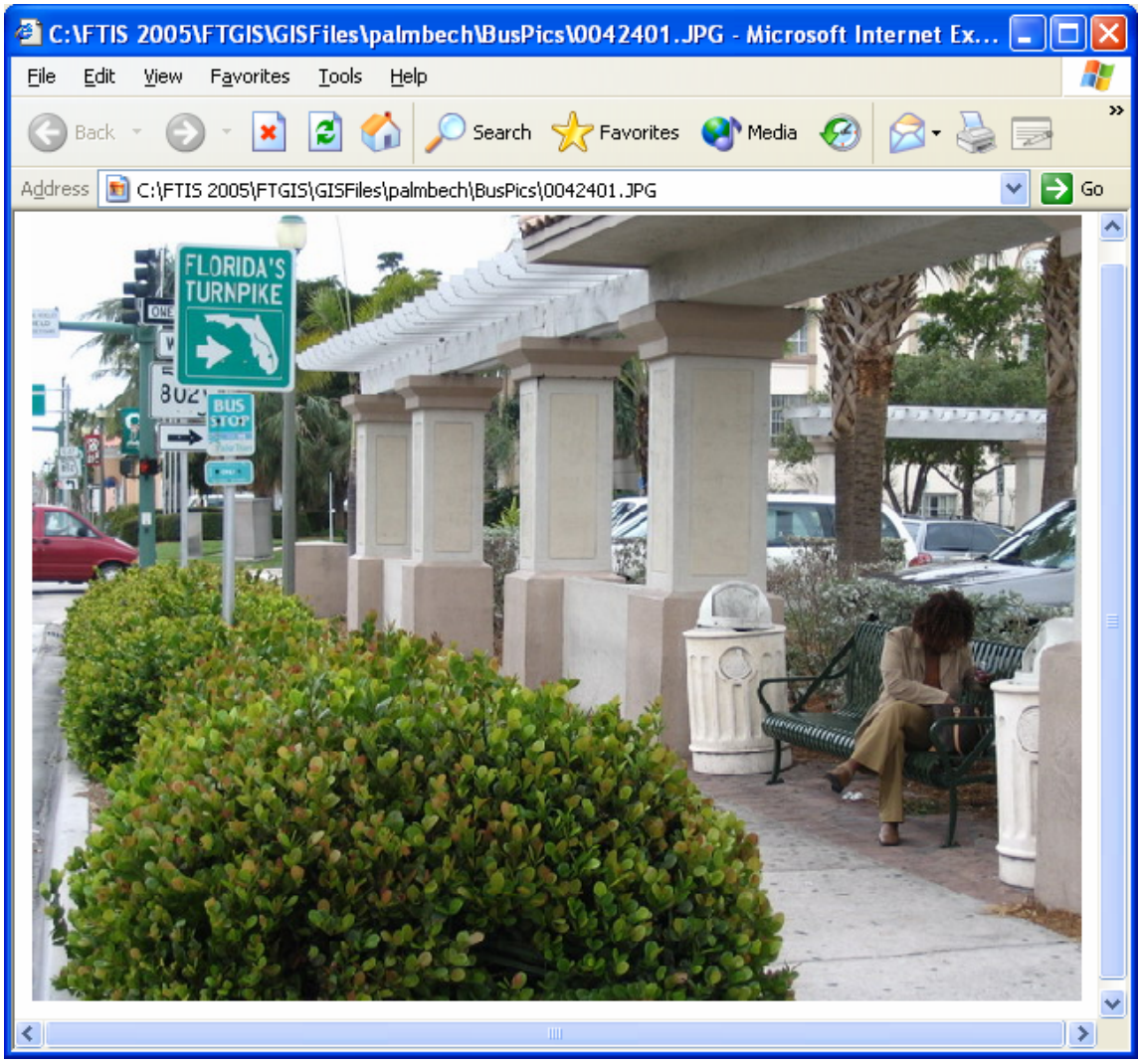

Figure 5-3. An Enlarged Picture.

Querying Transit Stop Inventory

ATSIM includes a query function to allow you to quickly identify transit stops that possess a specific set of features. The function is accessible by selecting the **ATSIM/Query Transit Stop Database** menu option. Selecting this menu option will bring up the screen shown in Figure 5-4, which by default will display query specifications for location attributes. Similarly, Figure 5-5 shows those attributes related to transit stop amenities, and Figure 5-6 includes ADA and miscellaneous other attributes.

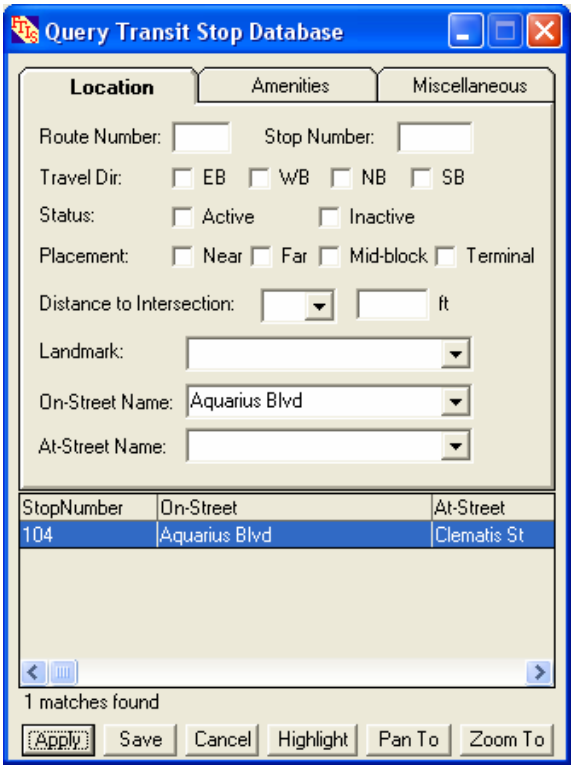

Figure 5-4. Query Filters for Location Attributes.

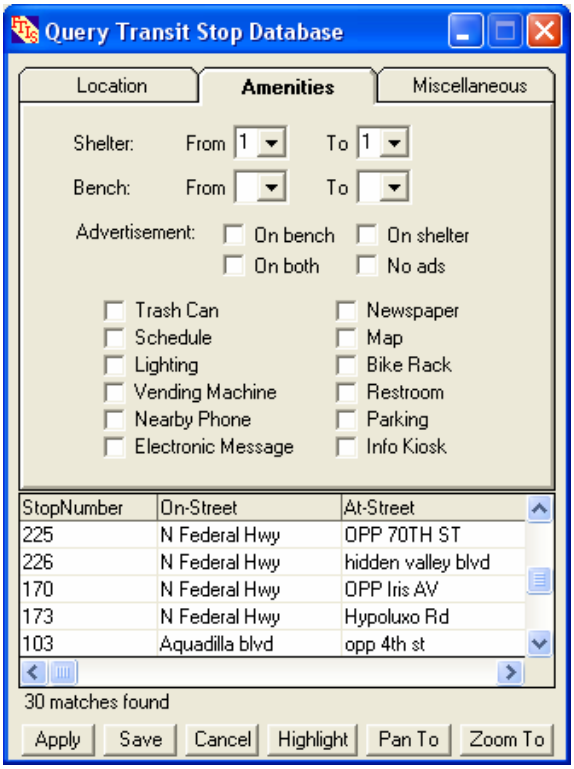

Figure 5-5. Query Filters for Amenity Attributes.

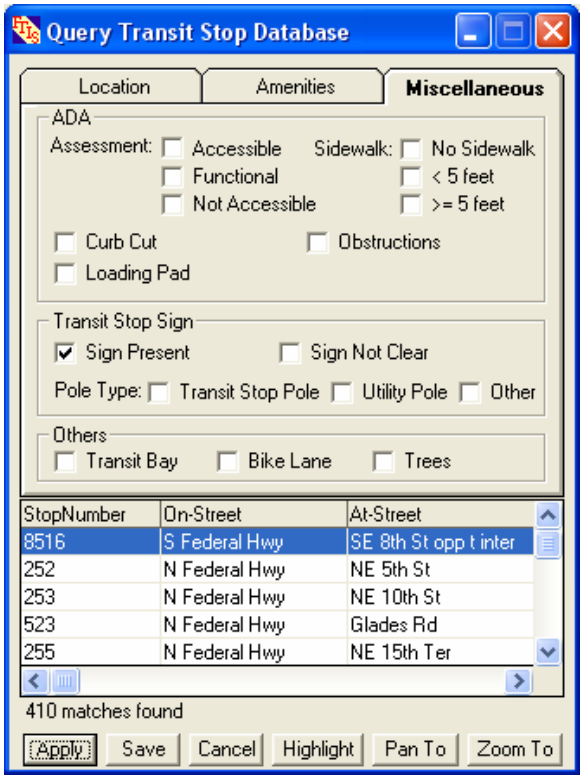

Figure 5-6. Query Filters for ADA and Miscellaneous Other Attributes.

Specifications for these attributes act as filters to retrieve only those transit stops that meet the specified attribute option(s). In applying these filters, the following rules apply:

- Specific query conditions are selected by keying in the specifications, selecting an option from the dropdown menu, or clicking on a check box.

- By default, the attributes are left unspecified (i.e., unused). No filters will be applied based on these attributes as a result.

- Multiple query conditions may be specified on one or more tabs.

- When multiple options are specified for an attribute, the "or" logical operator is applied. For example, when "SB" and "NB" are selected for route directions, the query will return transit stops in the southbound direction plus those in the northbound direction.

- When filter options are specified for more than one attribute, the "and" logical operator is applied. For example, checking **Advertisement** and **Trash Can** under the **Amenities** tab will cause the query to return only transit stops that have both an advertisement and a trash can.

- For query applications that require other combinations of "or" and "and" logical operators, the user should select the **Tools/Select Features/By Query** menu option, which allows one to construct general queries.

Once the query specifications are completed, you can click the **Apply** button to execute the query. All transit stops that satisfy the query conditions will be listed on the list box below the tabs. You may then select any one transit stop on the list by clicking on the appropriate list item and then apply one of the following functions:

1. Click the **Save** button to save the listed stops as either an Excel file or a Shape file. A newly created Shape file will automatically be listed on the legend, unless you have specified to save to another folder other than the default folder.

2. Click the **Highlight** button to blink the selected transit stop.

3. Click the **Pan To** button to position the selected transit stop at the center of the screen.

4. Click the **Zoom To** button to zoom into the selected transit stop.

Visualizing Transit Stop Summary

ATSIM includes a summary function to allow you to quickly obtain the number and percentage breakdowns of each attribute option. For example, one can quickly find out the percentage of transit stops that are ADA accessible. The statistics can be summarized for a specific route or any combinations of routes. This particular function is accessed by selecting the **ATSIM/Show Transit Stop Summaries** menu option.

Figure 5-7 shows a screen that has four attributes selected. Attributes are selected by clicking the checkboxes on the **Attributes** list on the top-left corner. One or more routes may be selected. This is done by clicking the checkboxes on the **Routes** list right below the **Attributes** list. When multiple routes are selected, the summaries may be based on individual routes or all routes combined. This option selection is given at the bottom left of the screen. Note that, because of missing values (i.e., null cells), the percentages may not add up to 100%.

By default, the system will display the tabulated summaries first. Summaries for different routes are displayed in different rows. Summaries for different attribute options for one or more attributes are displayed in different columns. When multiple attributes are selected, their attribute options will be displayed in sequence. The rows and columns may be swapped by clicking on the 

tool button. The tabulated summaries will give the number of transit stops under each attribute option. Each number is accompanied by a percentage value that is shown in parentheses.

The same information displayed in a table can be displayed by chart. Figure 5-8 shows such

an example. The chart option is accessed by clicking the tool button. In the chart view, the chart type, line marker, and line width can be changed using the dropdown lists at the bottom of the plot. To return to the cross table view, simply click the tool button. Tabulated values and charts can be exported to an Excel file by clicking the tool button.

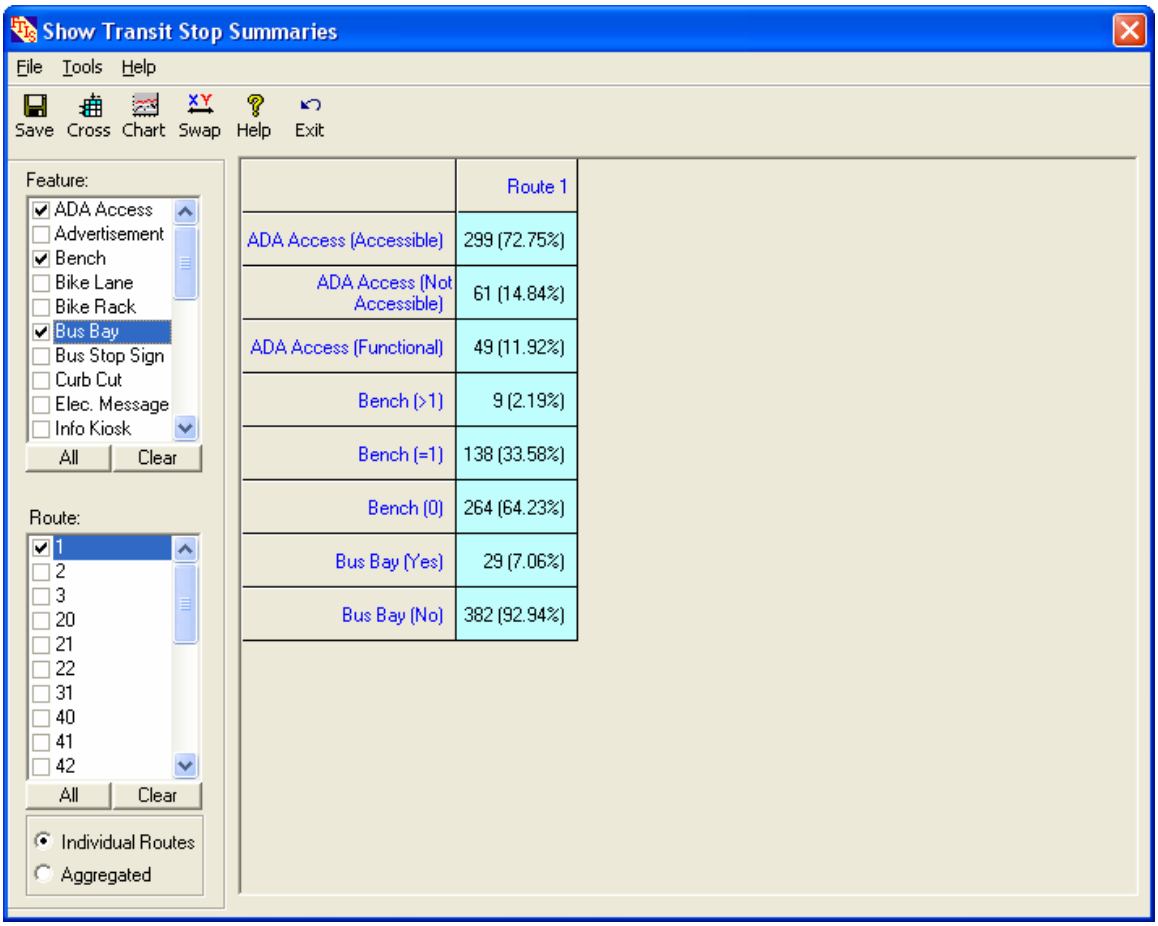

Figure 5-7. Output Transit Stop Summary Displayed by Cross Table.

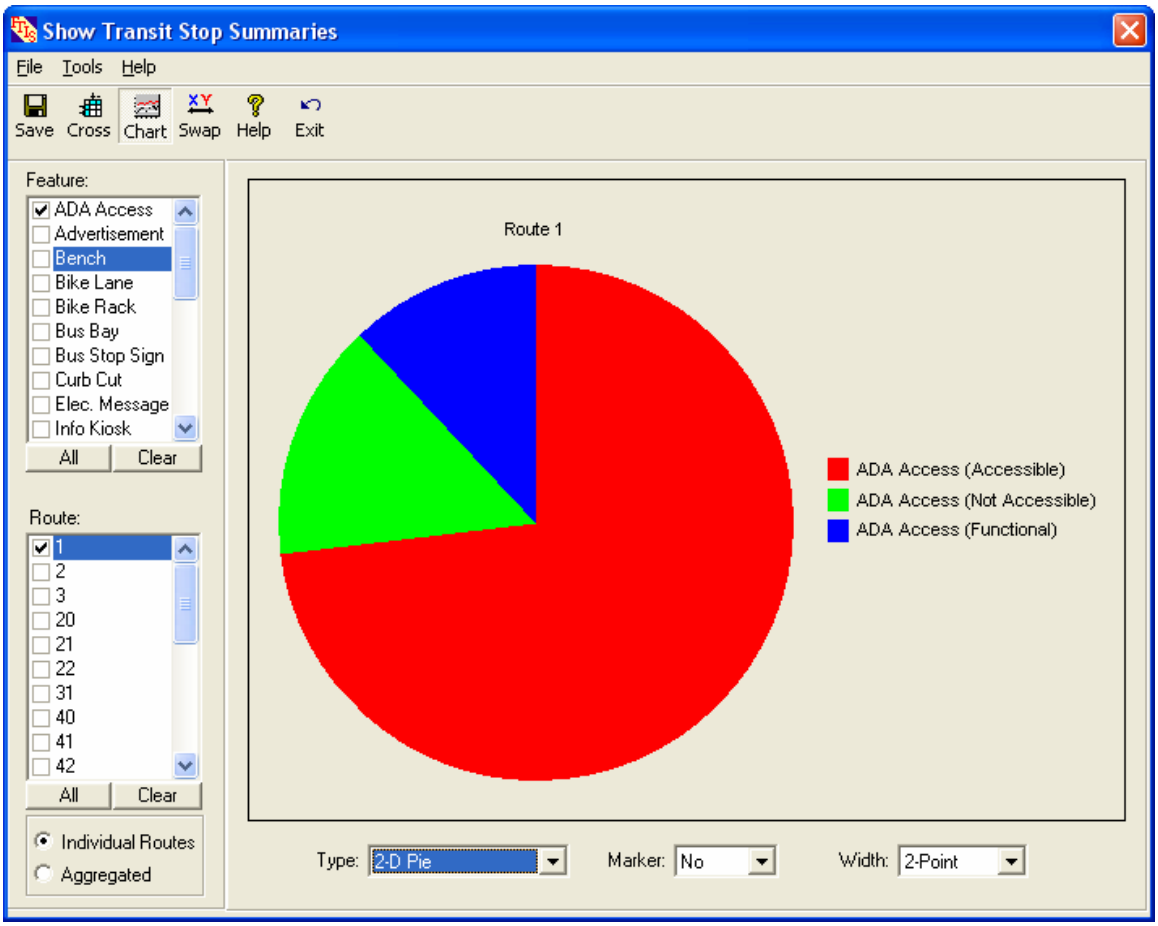

Figure 5-8. Output Transit Stop Summary Displayed by Chart.

Deployment Guidelines

This section provides procedural guidelines for field deployment of the automated transit stop data collection system developed in this project. A significant portion of the guidelines presented were based on lessons learned from a field test on transit stops on a major route for the Palm Tran transit system. Palm Tran was chosen mainly because of the high interest the agency expressed on this project as well as for its proximity to Florida International University. It is also the only transit agency in the Southeast Florida region that does not have GPS locations of transit stops. The major route selected for the field test was Route 1, which runs mainly along U.S. Highway 1 and had about 450 bus stops at the time of data collection. Palm Tran has planned for this to be a major corridor for implementation of Advanced Public Transportation Systems (APTS) technologies, which requires accurate bus stop data.

Data Collection Plan

Initial Field Survey

- Before the actual data are collected, it is important that an initial field survey be conducted to obtain field conditions and then design the data collection plan that best fits the field conditions.

- During this field survey, it is advisable that a digital camera be used to capture any special field conditions. These pictures can also be used for crew training, described later in this section.

Date and Time

- Transit stop inventories can be collected during the daylight hours on any day of the year.

- Data collection under rainy conditions should be avoided to avoid water damage to the PDA.

- Data collection on weekends generally offers the benefit of faster data collection and better safety due to lighter traffic, especially at the usually busy intersections.

- For transit stops on congested roadway sections, it is desirable to schedule assignments such that they avoid these sections during rush hours.

Crew Assignment

- The number of crew members to use depends on the available equipment and personnel. Larger agencies will obviously require more crew members so that the job can be completed within a reasonable time.

- Fewer crew members will take longer to complete the data collection, but the total cost of data collection may be reduced, and the quality of data may be improved, as it gives time for the survey crew to become experienced.

Mode of Travel

- A passenger vehicle is the most convenient mode of transportation for traveling from one stop to another as it offers good travel speed, provides the survey crew with a refuge from rain and heat, allows for recharging of equipment, shields the survey crew from other vehicles, and provides a place to store items such as a laptop, measuring wheel, food, water, garments, shoes, etc. A vehicle also allows the survey crew to quickly travel to a new survey location and to and from restaurants, restrooms, hotels, etc.

- For the safety of both the survey crew and the general traveling public, the survey vehicle should not block a travel lane during data collection, even if the blockage is only partial and/or for only a short period of time.

- A pick-up truck is the preferable type of vehicle, as it offers the height and power needed to go onto a curb when necessary. Agencies should check with the local jurisdictions to determine if temporary parking on the curb is allowed. Figure 6-1 shows a pick-up truck parked on a sidewalk area.

- A motorcycle offers the same speed as a car or pick-up truck, and it enjoys the convenience of easy parking. In areas where space for temporary parking is not available, a motorcycle could be a desirable alternative. Obviously, a motorcycle does not protect the survey crew from rain (which can ruin the collection system) or shield them from other vehicles.

- Bicycles and walking are two potential alternatives for areas with dense transit stop locations and/or with limited space for vehicle parking. They offer the same convenience as motorcycles and do not require the extra fuel cost. However, a major problem with these alternatives is that the survey crew will quickly become tired from prolonged pedaling or walking, thus, these modes of transportation may shorten the number of work hours and reduce work productivity.

Figure 6-1. Survey Vehicle Parked on Curb/Sidewalk.

Safety Accessories

- An emergency flashing light should be used to alert drivers and provide safety to the crew. The light should preferably be located on top of the vehicle and toward the side of the travel lane to increase visibility to other drivers. In addition, the emergency stop lights of the survey vehicle should be turned on at all times during data collection. Figure 6-2 shows one such example.

Figure 6-2. Use of Emergency Flashing Light and Emergency Stop Lights

- Due to the frequent stops that will be made by the survey vehicle, a large display sign mounted on the back of the survey vehicle is desirable to alert motorists that there is a survey in progress.

- Each member of the survey crew should wear an orange vest. This is not only for safety purposes, but also indicates to customers waiting at transit stops that data are being collected for official purposes, hence reducing the uneasiness of these customers when having their pictures taken together at a transit stop.

Miscellaneous Items

- Each survey crew should carry a letter issued by the transit agency. The letter should be in the agency letterhead and include the data collection period, the contact person at the agency, and the purpose of data collection effort.

- Bottled water, snacks, and other food items may be carried in the vehicle.

- Hats and sun glasses are desirable on sunny days.

- Unless it is desirable to obtain an accurate distance of stop location from the nearest intersection, a measuring wheel is not needed. Estimates based on "eye measurement" should generally be sufficient.

Crew Training

- Crew training is important to ensure that all crew members are familiar with both the operation of the equipment and the data collection procedure.

- The trainer should explain each attribute, preferably with examples and pictures of different actual transit stops, to illustrate specific attribute options.

- Potential problems that may be encountered in the field should be pointed out during the training session.

- The training session should include a field test to collect data from several bus stop locations. A follow-up session right after the field test should be conducted to share questions and answers among the survey crew.

Data Collection Procedure

Equipment Setup

- Refer to Section 3 on how to install and operate the transit stop data collection software

application.

- The survey crew must check all equipment to make sure it functions properly before each trip to the field.

Pictures

- Pictures of transit stops are optional data for a transit stop inventory.

- If an agency wishes to collect pictures of transit stops, it is recommended that three pictures be taken at each stop. The first includes a close-up view of the transit stop sign, which usually displays route information and sometimes transit stop number. A second can provide a clear view of the transit stop amenities that are easily identifiable. A third can provide a broader view of the transit stop surrounding area.

- Photographing front views of transit stops, which may require that the survey crew cross the street, is both time-consuming (waiting for traffic to clear) and a safety hazard and should be avoided.

Batteries

- The survey crew should make sure that the battery of the PDA is fully charged before going out in the field. On the PDA desktop, tap the "cylinder" shape icon near the bottom of the screen to bring up the screen shown in Figure 6-3 to check the level of the main battery.

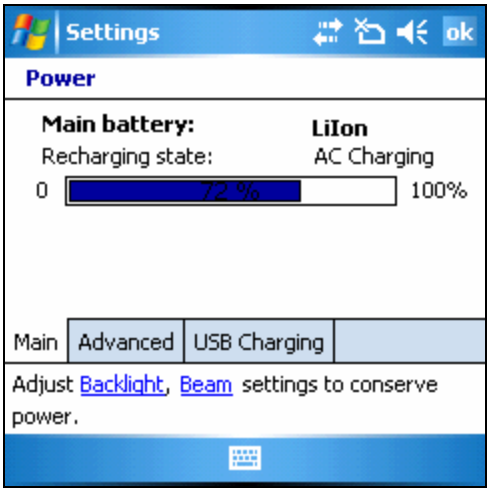

Figure 6-3. Screen for Checking the Battery Level.

- Depending on the battery charging capacity, a fully charged battery may last between four and eight hours of continuous/active usage. When a survey vehicle is not used and an extra battery is not available, it is preferable to have the battery recharged between shifts, such as over lunch break in a restaurant. It should take about 1 to 1.5 hours to

fully recharge an empty battery. The survey crew should make sure the restaurant they dine in allows for the recharging of equipment. Most fast-food places do not provide electrical outlets.

- A spare battery is desirable to avoid work interruptions due to a low battery.
- The PDA should be re-charged after each data collection

Data Quality Assurance

- To ensure quality of data, quality assurance (QA) needs to be performed. Field verification of a randomly selected set of transit stops from different survey crew members from different areas and different days should be conducted.
- The sample size can be reduced over the data collection period. Field verification for the first few days is especially important because it will help to correct any problems early on.
- Data quality deemed unacceptable should be redone.
- If pictures are collected, a final verification of random samples can be performed by matching what is observed in the pictures to what is recorded for particular stops.

Post Processing

- After each day of data collection, data should be transferred to a project folder on a desktop or laptop.
- Even if storage spaces on both PDA and camera are sufficient for another shift, it is advisable that data be downloaded after each shift to prevent any data loss.
- At least one backup copy of all data collected should be made and stored in a separate location outside of the office building that houses the computer.

Quick Reference Guide

Setting up ATSIM Programs on a Desktop Computer and a PDA

Step 1: Insert the **ATSIM** install CD and wait for a few minutes for the install program to start. (If not installing from a CD, click the **setup.exe** file.) Select your transit agency of interest to prompt ATSIM to install the street name file and the bundled GIS files for your transit service area. If your agency is not listed, you must select one of those listed to proceed with the installation. In this case, you will still be able to use the ATSIM system, but you will not have any pop-up street names on the PDA and you will not have the bundled GIS files for your service area.

Step 2: Click the **ATSIM 3.0** icon on the desktop to run the **ATSIM** main program.

Step 3: (Optional) Click the **Customize** button to add additional selection items to the existing list-box attributes and to customize the names of user-defined attributes.

Step 4: Connect your PDA (HP iPAQ model hw6945/6925) to a desktop computer installed with the ATSIM system and click the **Install** button to start installing the **ATSIM** field data collection system to the PDA. ***Make sure your PDA is inserted with a mini-SD card (of any capacity)***.

Using the PDA Field Collection System

Step 1: On the PDA, select **Start/Programs,** and then tap the **ATSIM 3.0** icon.

Step 2: Enter the name of the Assessor, select your transit agency, and then select to create a new inventory database file if you are beginning a new data collection session. Otherwise, select an existing database file.

Step 3: Wait for the GPS connection to establish automatically, and then click **Continue** to enter the data entry area.

Step 4: Click the tabs at the top to access different data attributes. Click **Lat** or **Long** on the **Loc** tab to view the current map location. Click **Shelter** and **Bench** on the **Amen** tab to enter additional details. Tap the **Start** menu on the **Photo** tab to start taking

photos, and tap the **X** close button to exit from the **Photosmart** screen completely after all of the photos for a stop have been taken. Tap **Save** to save a record.

Transferring Data from a PDA to a Desktop Computer

Step 1: Connect your PDA to the hosting desktop computer.

Step 2: Click **Transfer** on the **ATSIM** main screen.

Step 3: Select to transfer data from the PDA to the desktop computer and click **Next**.

Step 4: Select the file on the PDA you wish to transfer, and select an existing master file on the desktop computer or enter a new master file name.

Step 5: Click **Transfer** to start transferring data.

Creating and Applying GIS Shape Files

Step 1: Click **Convert** on the **ATSIM** main screen.

Step 2: Select to convert from an XML data file to shape files, and select an XML file from the list to convert.

Step 3: Click **Apply** on the **ATSIM** main screen to enter ATSIM's GIS interface. The layer for the converted shape files should show up on the map legend together with the other available GIS layers. To apply customized GIS functions for ATSIM (i.e., those under the **ATSIM** menu), click your transit stop layer on the map legend to make it the current layer.

Updating Existing Inventory in the PDA

Step 1: (Optional) If you have made changes such as changing the stop locations to shape files, click the **Convert** button on the **ATSIM** main screen to convert the shape files back to an XML file.

Step 2: Connect your PDA to your desktop computer and click the **Transfer** button on the **ATSIM** main screen.

Step 3: Select the option to convert from shape files to an XML file, and then select the shape files to convert. Click **Transfer**.

Step 4: Access the field data recording area on the PDA. (Refer to **Using the PDA Field Data Collection System** section above.)

Step 5: At a transit stop location, tap the **Find** tab and enter a search distance for the system. The system will find all records of transit stop locations within that distance. (Note that records are listed from the nearest stop, relative to your current GPS location, to the farthest stop.) Tap any cell on a record to retrieve the record for updating.

HP iPAQ hw 6945/6925 System Specifications

HP iPAQ hw6945/6925 Mobile Messenger
Intel® PXA270 Processor 416 MHz
64 MB SDRAM

Operating system	Microsoft® Windows Mobile™ 5.0 for Pocket PC, Premium Edition
Ports	1IrDA, 1 USB, 1 serial
Slots	1 mini secure digital
Input devices	Stylus, Alphanumeric keyboard with LED backlight 1.3 MP camera, SXGA resolution, CMOS
Wireless	GSM/GPRS/EDGE, Bluetooth, GPS, 802.11b
Software installed	Calendar; Contacts; Tasks; Voice Recorder; Notes; Word Mobile; Excel Mobile; PowerPoint Mobile; Internet Explorer Mobile; Windows Media Player 10 Mobile; Calculator; Solitaire; Bubble Breaker; Messaging; File Explorer; Terminal Services Client; VPN Client; Infrared Beaming; Clock; Align Screen; Memory
Software included, ROM	Microsoft Outlook 2002; Microsoft ActiveSync 4.1 (Desktop device synchronization); Windows Media Player 10 Desktop; Phone Data Manager for PC; HP Protect tools secured by CREDANT Technologies; HP Photosmart Premier Software; HP Image Transfer; HP iPAQ GPS Quick Connect Utility; Funk Odyssey; Real Player 10
Dimensions (w x d x h)	2.8 x 0.71 x 4.65 in (71 x 18 x 118 mm)
Weight	6.33 oz (179.45 g)
Battery	Removable/rechargeable 1200 mAh Lithium-ion
Power supply	AC Adapter
Warranty - year(s)	One-year parts and labor in most regions; 90 days technical support for software in most regions. Additional offers may vary by region.