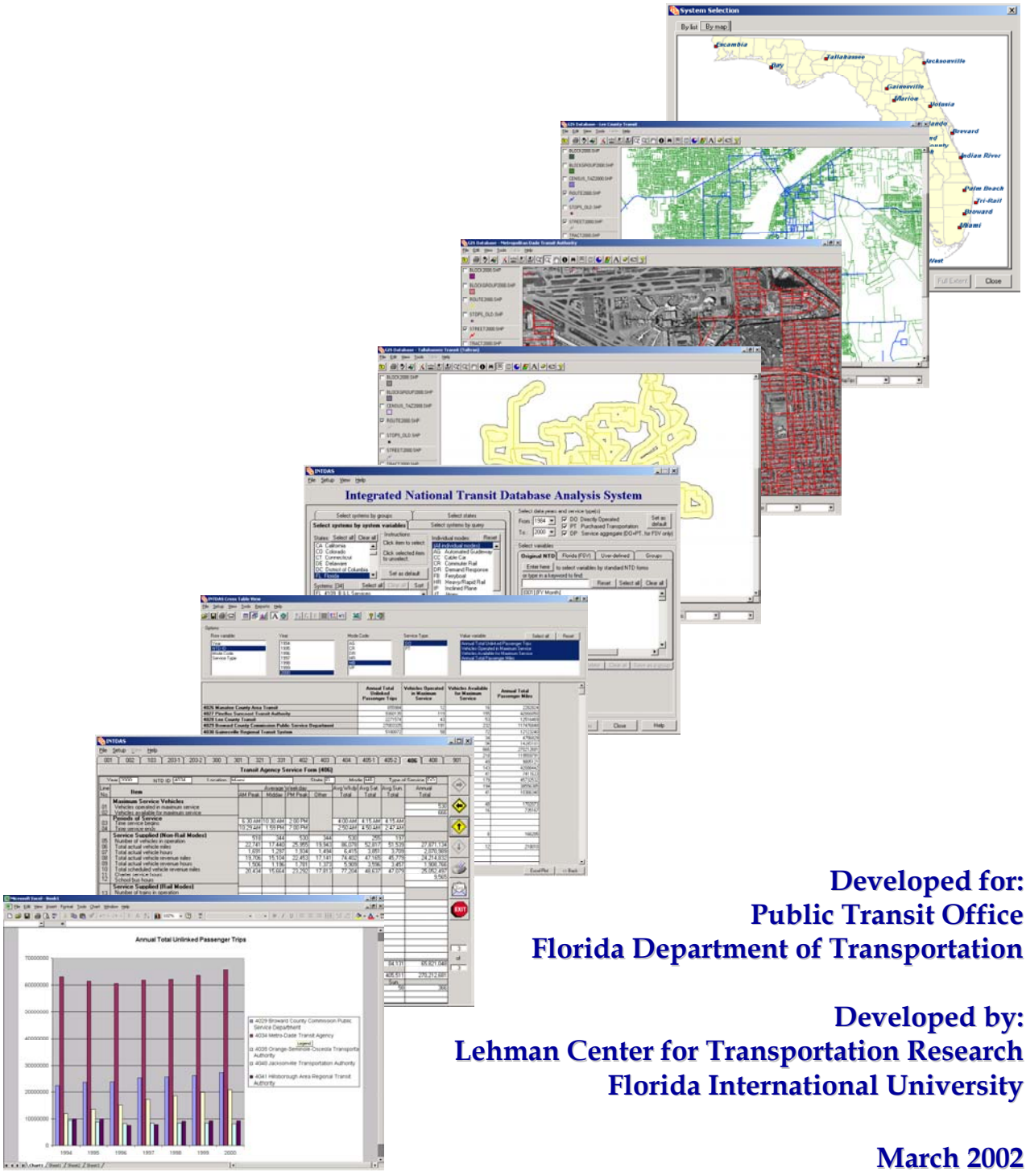
FTIS 2001

Florida Transit Information System User's Guide



Developed for:
Public Transit Office
Florida Department of Transportation

Developed by:
Lehman Center for Transportation Research
Florida International University

March 2002

ACKNOWLEDGEMENTS

The development of FTIS is supported by the Public Transit Office (PTO) of the Florida Department of Transportation (FDOT). Ike Ubaka, AICP, of the PTO serves as the project manager and was closely involved in the FTIS software specification and verification. Albert Gan, Assistant Professor of Civil Engineering at the Florida International University (FIU), integrated the multiple-year NTD database and serves as the software designer. Jun Zheng and Kaiyu Liu, both computer specialists with the FIU Lehman Center for Transportation Research (LCTR), performed most of the software coding. The following graduate students at the LCTR helped with various development tasks: Sijong Jo, Emani Saraswathi, Joan Shen, Yifei Wu, and Allan Yue. The assistance of many individuals who reviewed the software and provided the data and feedback is gratefully acknowledged.

TABLE OF CONTENTS

INTRODUCTION

This guide provides detailed guidance on how to use the various component programs in the **F**lorida **T**ransit **I**nformation **S**ystem (FTIS) effectively. It assumes that the user is familiar with the general operation of Microsoft Windows. For general help on using Windows such as managing the environment, the file system and printing, refer to the Microsoft Windows User's Guide.

What is FTIS?

FTIS is a user-friendly software tool that contains two major program components:

- A database system for the retrieval and analysis of the 1984-2000 National Transit Database (NTD) for all U.S. transit systems that reported data to the Federal Transit Administration (FTA).

- A stand-alone GIS system customized for transit planning for Florida transit systems.

Why FTIS?

Transit agencies rely on various sources of data to help plan, manage, and improve transit facilities and services. Examples of these data include the NTD data from the FTA, socioeconomic data from the Census Bureau and planning agencies, transit route and stops data from transit agencies, land use data from county tax appraisal offices, etc. Although these data are available for use by transit agencies, they are not easily accessible to the general users. FTIS greatly improves the accessibility of these data by integrating the different data components into a common data depository and developing user-friendly, customized functions for easy data retrieval and analysis.

FTIS Components and Data

FTIS consists of the following system components and data:

- **Integrated National Transit Database Analysis System (INTDAS)**. This component contains the 1984-2000 NTD data for all U.S. transit systems reported data to the FTA for the National Transit Database.

- **Florida Transit Planning Geographic Information System (FTGIS).** This component contains the GIS shape files, including streets, routes, stops, TAZ, and census tract, for all Florida transit systems.

- **Transit Asset Management System (TAMS).** This component allows users to enter and submit transit asset data to FDOT.

- **Florida Transit Planning Library (FTPLib).** This planned component provides quick access to electronic publications related to transit planning. Only a small number of publications are included in this initial version. It will be greatly expanded in the 2002 version in terms of the number of publications, interface, and functionalities.

- **Florida Transit Planning Links (FTPLinks).** This planned component provides a gateway to transit planning related websites. It will be expanded in the 2002 version.

- **Contact.** This component provides direct email links to various agencies.

- **Report Problem.** This component provides a convenient means for users to report problems and provide suggestions and comments to the FTIS developer (FIU) and the sponsor (FDOT).

- **Help.** This component provides access to various FTIS help documents.

Figure 1-1 shows the **FTIS Main Menu** that provides icons for access to each of these components. The icons are arranged in the order listed above, from the top right to the bottom left. To open a component, simply single-click the appropriate icon. The next three chapters provide details on each of these components.

Minimum System Requirements

FTIS is a typical Windows installation designed to run on all Microsoft Windows operating systems. For successful installation and application of FTIS, your system must have:

- A monitor capable of at least 800x600 display resolution.
- A minimum of 1.3 GB hard disk storage space for a full installation.
- A minimum of 50 MB storage space on the system drive (usually the C: drive).

Figure 1-1: FTIS Main Menu

Installing FTIS

Insert your FTIS CD and wait for a few seconds for the FTIS install to automatically start the FTIS setup program. Follow the instructions on the screen to complete the installation. The FTIS install includes the following three install options:

- **Typical.** This option installs the complete FTIS system, including all NTD, GIS, and aerial image data for all transit systems. The aerial image data are included only for the following four transit systems: Broward County Transit, Miami Dade Transit, Tallahassee Transit, and Palm Beach County Transportation Authority. This option requires a minimum of 1.3 GB of disk storage space.

- **Minimum.** This option is similar to the **Typical** install, except that it does not include the aerial image data. This option requires a minimum of 800 MB of disk storage space.

- **Custom**. This option lets you choose the transit systems for which you want to install the GIS and aerial image data. This minimum required disk storage space ranges from 400 MB to 1.3 GB, depending on the number of transit systems you selected.

Note: *If your computer is already installed with a version of FTIS, the install will ask if you want to remove or modify the existing version before installing another version of FTIS. It is advisable that you choose to remove the previous version.*

Technical Support and Problem Report

If you need technical support or additional information, please contact the developer through one of the following four channels:

- Email your request to gan@eng.fiu.edu.
- Call (305) 348-3116 for Albert Gan.
- Fax your request to 305 348-2802 (attention: Albert Gan).
- Send to: Albert Gan
  Lehman Center for Transportation Research
  Florida International University
  UP Campus, EAS 3685
  Miami, Florida 33199

Note: *Please report to the FTIS developer any problems you encountered while using FTIS. You may do so using the* ***Report Problem*** *button on the FTIS main screen. Your comments and suggestions are also welcome.*

User-Interface Conventions

The following general conventions are used in FTIS:

- If a button or a menu item is grayed out, it may be due to one of the following two reasons: (1) the needed input to execute the function has not been completely specified, and (2) the function is not applicable (e.g., the up arrow button in the NTD's **View Forms** screen is not selectable when the first record is displayed).
- A single click on an item on the list box selects the item. Clicking a selected item will deselect the item.
- In the GIS system component, a right click will return to the **arrow** mouse pointer from any other mouse pointers.

INTDAS

INTDAS (**I**ntegrated **N**ational **T**ransit **D**atabase **A**nalysis **S**ystem) is a major FTIS system component designed to facilitate the retrieval and analysis of multi-year, multi-system data from the National Transit Database (NTD).

What is NTD?

Each year, more than 500 of the nation's transit agencies report data to the FTA for inclusion in the NTD—a uniform data set required by the Urban Mass Transportation (UMT) Act as a prerequisite for the nation's transit systems to receive the FTA grant funds. Known formerly as the Section 15 database, NTD includes data on transit organization characteristics, vehicle fleet size and characteristics, revenues and subsidies, operating and maintenance costs, safety and security, vehicle fleet reliability and inventory, and services consumed and supplied. These data have been used extensively to derive values for transit performance measures and have become the sole source of standardized and comprehensive data for use by all constituencies of the transit industry.

Why INTDAS?

As a major source of performance data for the transit industry, an important application of NTD has been for use in trend analyses that require multiple years of NTD data. However, accessing multiple years of NTD data is currently a very tedious process. One major reason is because NTD data are collected and distributed annually on separate files. To perform a trend analysis, for example, one must learn about the file structures that may vary from year to year, identify the specific variables of interest from the vast number of potential NTD variables, and then extract the corresponding data values from the specific files for the specific transit systems. For a ten-year trend analysis, for example, this process must be repeated ten times, one for each data year. After the trend values are separately extracted for each of the ten years, they must be entered manually into a spreadsheet or a statistical program for analysis. This process is very cumbersome and is prone to errors. Clearly, a solution to the data accessibility problem is to develop an integrated database system, such as INTDAS, that (1) combines the individual NTD data files from multiple years into a single, standardized database, and (2) provides customized tools for quick and easy data retrieval, visualization, and analysis.

INTDAS Features

INTDAS is useful for both the practitioners and researchers who use the NTD data to improve transit performance and services. Although INTDAS was developed mainly for Florida, it is fully applicable to users from the other states. Major INTDAS features include:

- ✓ Original NTD data for all transit systems reported to the NTD program for the 1984-2000 data years.
- ✓ Statewide and systemwide NTD data for over 60 Florida standard performance variables.
- ✓ Quick and easy retrieval of data for multiple transit systems of multiple years for trend analyses, peer comparisons, and general data inquiries.
- ✓ SQL query editor for identifying transit systems that meet a certain profile.
- ✓ An automated Florida peer selection process for identifying comparable transit systems for peer analyses.
- ✓ Easy selection of NTD variables via NTD forms and list boxes.
- ✓ Create new variables from original NTD variables through user-defined formulas.
- ✓ Display retrieved data in tables and forms.
- ✓ Automated VB and Excel plots.
- ✓ Interactive cross tables to display two variables at a time.
- ✓ Adjustment of financial variables to constant dollars.
- ✓ Create Excel reports.
- ✓ Perform data sorting and data summation.
- ✓ Generate table statistics.
- ✓ Convenient data transfer, etc.

INTDAS Data Variables

INTDAS includes the following three basic groups of variables in its database:

- **Original NTD Variables.** These are the variables for which data are submitted each year by transit agencies. Each variable corresponds to one data entry in a NTD form. In FTIS, the names for the original NTD variables are preceded by the respective NTD form numbers in brackets. For example, all variables from NTD Form 001 will be preceded by [001].

- **Florida Standard Performance Variables.** These are the variables used in the FDOT's annual transit performance analysis. Each of these performance variables was pre-computed based on a formula involving one or more original NTD variables. All **F**lorida **S**tandard **V**ariables are preceded by [**FSV**].

- **User-defined variables.** These are variables created by users using FTIS' formula setup function. All user-defined variables are preceded by [USER].

Important: *Data for the original NTD variables are available at only the (transit) system level. Data for the Florida standard and user-defined variables are available at both the system and statewide levels.*

The following subsections introduce the three groups of variables in more detail.

Original NTD Variables

NTD data were reported on a total of 16 different forms for various characteristics associated with individual transit agencies. Two of the forms are further divided into two sub-forms, called pages. The total number of data entries on these forms totals over 1000. In general, data for most of the variables are available for data years that trace back to the 1984. However, because of major changes to NTD forms and some data from different years cannot be converted to fit the latest NTD form format and are thus excluded from the INTDAS database. Table 2-1 lists all the NTD forms and the associated data years for which data are accessible in the current version of FTIS.

The original NTD variables can be divided into two categories. The first category involves variables that are used to identify transit agencies and systems. These are referred to as the system variables. They include:

- A unique four-digit ID (i.e., NTD ID) that is used to identify a transit agency. *For statewide data, this variable is replaced by the standard two-digit state codes (e.g., "FL" for Florida).*

- A mode code to identify the transit systems (motorbus, high-speed rail, etc.) operated by the transit agency.

- A service type to identify whether the transit service is operated directly by the transit agency or is purchased from another company.

- Because INTDAS includes NTD data from multiple years, the data must also be indexed by the NTD data year, which is considered another system variable.

Table 2-1: NTD Forms and Available Data Years

NTD Form Number	NTD Form Name	Available Data Years (in FTIS)
001	Transit Agency Identification	1984-2000
002	Contractual Relationship Identification	1993-2000
005	Supplemental Information	*
103	Capital Funding	1984-2000
203	Operating Funding	1984-2000
300**	Operating Expenses Summary	1984-2000
301	Operating Expenses	1984-2000
321	Operators' Wages	1984-2000
331	Fringe Benefits	1984-2000
402	Revenue Vehicle Maintenance and Energy	1984-2000
403	Transit Way Mileage	1985-2000
404	Transit Agency Employee	1992-2000
405 Page 1	Transit Safety and Security Form: Safety Items	1995-2000
405 Page 2	Transit Safety and Security Form: Security Items	1995-2000***
406	Transit Agency Service	1984-2000
408	Revenue Vehicle Inventory	1984-2000
901	Federal Funding Allocation Statistics	1984-2000

* Data not available from FTA.
** NTD reporting manuals treats this as part of Form 301 and names it as Form 301.
*** Form 405 Page 2 did not exist before 1995.

Table 2-2 lists the system variables for each NTD form. This information is important for the users to understand the level of data availability. **For example, the data (except total passenger fare revenue) reported in Form 203 are available at the systemwide level only.**

The second category of variables consists of over 1000 data attributes that are used to record the various characteristics associated with each transit agency. Examples of these variables include service area population, unlinked passenger trips, etc.

Note: *For detailed information on NTD forms and variables, refer to the NTD reporting manuals, which are accessible from the* ***Help|NTD Report Manuals*** *menu item in the INTDAS main menu.*

Table 2-2: NTD Forms and Stratifying System Variables

NTD Form	Stratifying System Variables
001	Data year, NTD ID
002	Data year, NTD ID
103*	Data year, NTD ID, service type
203**	Data year, NTD ID
300	Data year, NTD ID
301	Data year, NTD ID, mode code, service type
321	Data year, NTD ID, mode code
331	Data year, NTD ID
402	Data year, NTD ID, mode code, service type
403	Data year, NTD ID, mode code, service type
404	Data year, NTD ID, mode code, service type
405 Page 1	Data year, NTD ID, mode code, service type
405 Page 2	Data year, NTD ID, mode code, service type
406	Data year, NTD ID, mode code, service type
408	Data year, NTD ID, mode code, service type
901	Data year, NTD ID, mode code, service type

* Only "Uses of Capital Funds" is reported by mode code.
** Only directly-operated passenger fare revenue is reported by mode code. The reporting of this information is optional.

Florida Standard Performance Variables

Table 2-3 includes a complete list of the Florida standard performance variables. The variables are divided into three groups: general performance indicators, effectiveness measures, and efficiency measures. The FDOT has been using these variables in its annual performance analysis for the Florida transit systems since 1988. These variables are defined based on one or more original NTD variables. For example, the average headway is computed based on the following NTD variables: directional route miles, revenue miles, revenue hours, and the number of vehicles operated in maximum service. See the section on **Defining or Modifying a Formula** to learn how to create a new performance variable or edit an existing one.

Note: *Since the Florida standard variables (FSV) are computed from the original variables, the available data years for these variables are limited by the available data years shown in Table 2-1. If a formula involves two variables, one is from Form 406 and another from Form 405 Page 2, then the resulting available data years for the formula will be 1995-2000. Refer to Table 2-1 for available data years. In some cases, a particular data item is added to an existing form in a certain data year, in which case the available data years will be based on the data year the item is added, rather than the data years shown in Table 2-1 for an entire form.*

Table 2-3: Florida Standard Performance Variables

General Performance Indicators	Effectiveness Measures	Efficiency Measures
• Service area population • Service area size • Passenger trips • Passenger miles • Vehicle miles • Revenue miles • Vehicle hours • Revenue hours • Route miles • Total operating expense • Total maintenance expense • Total capital expense • Federal revenue • State revenue • Local revenue • Total employees • Transportation operating employee • Administrative employees • Vehicle available in maximum service • Vehicle operated in maximum service • Spare ratio • Total gallons consumed • Total energy consumed	SERVICE SUPPLY • Vehicle miles per capita SERVICE CONSUMPTION • Passenger trips per capita • Passenger trips per revenue mile • Passenger trips per revenue hour QUALITY OF SERVICE • Average speed • Average headway • Average age of fleet • Number of incidents • Number of vehicle system failures • Revenue miles between failures AVAILABILITY • Revenue miles per route miles • Weekday span of service • Route miles per square mile of service area	COST EFFICIENCY • Operating expense per capita • Operating expense per peak vehicle • Operating expense per passenger trip • Operating expense per passenger mile • Operating expense per revenue mile • Operating expense per revenue hour • Maintenance expense per revenue mile • Maintenance expense per operating expense OPERATING RATIOS • Farebox recovery • Local revenue per operating expense • Operating revenue per operating expense VEHICLE UTILIZATION • Vehicle miles per peak vehicle • Vehicle hours per peak vehicle • Revenue miles per vehicle mile • Revenue miles per (total) vehicle • Revenue hours per (total) vehicle LABOR PRODUCTIVITY • Revenue hours per employee • Passenger trips per employee ENERGY UTILIZATION • Vehicle miles per gallon • Vehicle miles per kilowatt-hour FARE • Average fare

The following section provides the definition of each of the variables listed in Table 2-3. Most of these definitions are taken directly from the annual transit performance analysis reports produced by the Center for Urban Transportation Research (CUTR) of the University of South Florida.

General Performance Indicators:

- **Service Area Population.** The population in the service area as defined in the Americans with Disabilities Act (ADA), the U. S. Department of Transportation Federal Register, Vol. 56, No. 173, Rules and Regulations. FTA began requiring transit systems to provide service area population as part of Form 001 in 1992.

- **Service Area Size.** The size of the area as defined in the Americans with Disabilities Act (ADA), the U. S. Department of Transportation Federal Register, Vol. 56, No. 173, Rules and Regulations. FTA began requiring transit systems to provide service area size as part of Form 001 in 1992.

- **Passenger Trips.** Annual number of passenger boardings on the transit vehicles. A trip is counted each time a passenger boards a transit vehicle. Thus, if a passenger has to make one transfer to reach a destination, he/she is counted as making two passenger trips.

- **Passenger Miles.** Number of annual passenger trips multiplied by the system's average trip length (in miles). This number provides a measure of the total number of passenger miles of transportation service consumed.

- **Vehicle Miles.** Total distance traveled annually by revenue service vehicles, including both revenue miles and deadhead miles.

- **Revenue Miles.** Number of annual miles of vehicle operation while in active service (available to pick up revenue passengers). This number is smaller than vehicle miles because of the exclusion of deadhead miles such as vehicle miles from the garage to the start of service, vehicle miles from the end of service to the garage, driver training, and other miscellaneous miles that are not considered to be in direct revenue service.

- **Vehicle Hours.** Total hours of operation by revenue service vehicles including hours consumed in passenger service and deadhead travel.

- **Revenue Hours.** Total hours of operation by revenue service vehicles in active revenue service.

- **Route Miles.** Number of directional route miles as reported in NTD data; defined as the mileage that service operates in each direction over routes traveled by public transportation vehicles in revenue service.

- **Total Operating Expense.** Reported total spending on operations, including administration, maintenance, and operation of service vehicles.

- **Total Maintenance Expense.** Sum of all expenses categorized as maintenance expenses; a subset of total operating expense.

- **Total Capital Expense.** Dollar amount of spending related to the purchase of tangible property or other items eligible to be capitalized. Property includes tangible assets with an expected life of more than one year at the time of their installation, and a unit cost greater than $1,000.

- **Federal Contribution.** Financial assistance obtained from the Federal government to assist in paying the operating costs of providing transit service. Such assistance is available from the Urbanized Area Formula Programs of 49 U.S.C. (Formerly Section 9), other transportation grant programs administered by the U.S. Department of Transportation, as well as other Federal agency programs.

- **State Contribution.** Financial assistance obtained from a State government or agency to assist in paying the operating costs of providing transit service.

- **Total Local Revenue.** All revenues originating at the local level (excluding state and federal assistance). This represents the sum of local contribution, directly-generated non-fare revenue, and passenger fare revenue.

- **Local Contribution.** Any financial assistance obtained from a local government or agency (below the State level) to assist in paying the operating costs of providing transit service.

- **Operating Revenue.** All revenues, except passenger fares, generated through the operation of the transit agency. Includes special transit fares, school bus service revenues, freight tariffs, charter service revenues, auxiliary transportation revenues, subsidy from other sectors of operations, and non-transportation revenues.

- **Passenger Fare Revenue.** Revenue generated annually from carrying passengers in regularly scheduled service.

- **Total Employee FTEs.** Total number of payroll employees of the transit agency in terms of full-time equivalents (FTEs). It is useful to note that the increasing tendency to contract out for services may result in some significant differences in this measure between otherwise similar properties. It is important to understand which services are contracted before drawing conclusions based on employee levels. All employees classified as capital are not included.

- **Transportation Operating Employee FTEs.** All employees, in terms of FTEs, classified as operating employees: vehicle drivers, supervisory personnel, direct personnel.

- **Maintenance Employee FTEs.** All employees, in terms of FTEs, classified as maintenance employees who are directly or indirectly responsible for vehicle maintenance.

- **Administrative Employee FTEs.** All personnel positions, in terms of FTEs, classified as administrative in nature. It includes all general administration, ticketing/fare collection, and system security employees as classified by FTA in Form 404.

- **Vehicles Available for Maximum Service.** Number of vehicles available for use by the transit agency to meet the annual maximum service requirement. Vehicles available for maximum service include spares, out-of-service vehicles, and vehicles in or awaiting maintenance, but exclude vehicles awaiting sale and emergency contingency vehicles.

- **Vehicles Operated in Maximum Service.** Number of revenue vehicles operated to meet the annual maximum service requirement, i.e., the revenue vehicle count during the peak hours of the peak days/weeks of the peak season (typically the rush period). Vehicles operated in maximum service exclude atypical days or one-time special events.

- **Spare Ratio.** Vehicles operated in maximum service subtracted from vehicles available for maximum service divided by vehicles operated in maximum service. This measure is an indicator of the number of spare vehicles available for service. A spare ratio of approximately 20 percent is considered appropriate in the industry. However, this varies depending on the size and age of fleet as well as the condition of equipment.

- **Total Gallons Consumed.** Total gallons of fuel consumed by the vehicle fleet.

- **Total Energy Consumed.** Kilowatt-hours of propulsion power consumed by a transit system (rail and automated guideway).

- **Average Age of Fleet.** The number of active vehicles of each fleet of the same mode and service type multiplied by their years of manufacture, divided by the total active vehicles.

- **Number of Incidents.** Total number of unforeseen occurrences resulting in casualty (injury/fatality), collision, or property damage in excess of $1,000. For an incident to be reportable, it must involve a transit vehicle or occur on transit property.

- **Number of Vehicle System Failures.** Total number of failures that occur during revenue service, deadheading, and layovers. A failure is classified as the breakdown of either a major or minor element of the revenue vehicle's mechanical system. Failures are tabulated regardless of whether they result in a vehicle completing or not completing its trip.

- **Weekday Span of Service.** The number of hours that transit service is provided on a representative weekday in the operation of the transit agency. This indicator is determined by computing the number of hours between the values reported for average weekday *time service begins* and *time service ends* on Form 406. For transit agencies with more than one mode, the system total span of service takes into account the hours of operation for all modes and reports the span of hours that any transit service is provided on a typical weekday.

Effectiveness Measures:

- **Vehicle Miles Per Capita.** Total number of annual vehicle miles divided by the service area's population. This can be characterized as the number of miles of service provided for each man, woman, and child in the service area and is a measure of the extensiveness of service provided in the service area.

- **Passenger Trips Per Capita.** Average number of transit boardings per person per year. This number is larger in areas where public transportation is emphasized and in areas where there are more transit dependents, and is a measure of the extent to which the public utilizes transit in a given service area.

- **Passenger Trips Per Revenue Mile.** The ratio of passenger trips to revenue miles of service; a key indicator of service effectiveness that is influenced by the levels of demand and the supply of service provided.

- **Passenger Trips Per Revenue Hour.** The ratio of passenger trips to revenue hours of operation; reports on the effectiveness of the service since hours are a better representation of the resources consumed in providing service.

- **Average Speed.** Average speed of vehicles in revenue service operation (i.e., not including travel to and from the garage or any other deadhead) calculated by dividing total revenue miles by total revenue hours.

- **Average Headway.** Average headway, in minutes, for the system as a whole that is computed utilizing the following performance indicators: directional route miles, revenue miles, revenue hours, and the number of vehicles operated in maximum service. The equation used to determine this measure first doubles the directional route mileage to produce an estimate of system size in terms of total (non-directional) route miles. The resulting mileage figure is then divided by the system's calculated average speed (revenue miles per revenue hour) to produce an estimate of the time it would take, in hours, to traverse all of the system's total route miles. Finally, this time

figure is divided by the system's number of peak vehicles (then multiplied by 60 to convert time in hours to minutes) to determine the number of minutes it takes for a vehicle to complete its portion of the total route miles one time.

- **Revenue Miles Between Incidents.** Number of revenue miles divided by the number of incidents; reports the average interval, in miles, between incidents.

- **Revenue Miles Between Failures.** Number of revenue miles divided by the number of vehicle system failures; an indicator of the average frequency of delays because of a problem with the equipment.

- **Revenue Miles Per Route Mile.** Number of revenue miles divided by the number of directional route miles of service; an indicator of the availability of transit service.

- **Route Miles Per Square Mile of Service Area.** Number of directional route miles of service divided by the service area size (in square miles); another indicator of the availability of transit service within the service area.

Efficiency Measures:

- **Operating Expense Per Capita.** Annual operating budget divided by the service area population; a measure of the resource commitment to transit by the community.

- **Operating Expense Per Peak Vehicle.** Total operating expense per vehicle operated in maximum service (peak vehicle); provides a measure of the resources required per vehicle to have a coach in operation for a year.

- **Operating Expense Per Passenger Trip.** Operating expenditures divided by the total annual ridership; a measure of the efficiency of transporting riders; one of the key indicators of comparative performance of transit properties since it reflects both the efficiency with which service is delivered and the market demands for the service.

- **Operating Expense Per Passenger Mile.** Operating expense divided by the number of passenger miles; takes into account the impact of trip length on performance since some operators provide lengthy trips while others provide short trips.

- **Operating Expense Per Revenue Mile.** Operating expense divided by the number of revenue miles of service; a measure of the efficiency with which service is delivered and is another key comparative indicator.

- **Operating Expense Per Revenue Hour.** Operating expense divided by revenue hours of operation; a key comparative measure which differs from operating expense per vehicle mile in that the vehicle speed is factored out. This is often important since vehicle speed is strongly influenced by local traffic conditions.

- **Maintenance Expense Per Revenue Mile.** Maintenance cost divided by the revenue miles.

- **Maintenance Expense Per Operating Expense.** Calculated by dividing maintenance expense by operating expense; expressed as a percent of total operating expense.

- **Farebox Recovery.** Ratio of passenger fare revenues to total operating expenses; an indicator of the share of total operating costs that is covered by the passengers' fares.

- **Local Revenue Per Operating Expense.** Ratio of total local commitment with respect to total operating expense.

- **Operating Revenue Per Operating Expense.** Ratio of revenue generated through operation of the transit agency (directly - generated non-fare revenue plus passenger fare revenue) with respect to total operating expense. Operating revenue includes passenger fares, special transit fares, school bus service revenues, freight tariffs, charter service revenues, auxiliary transportation revenues, subsidy from other sectors of operations, and non-transportation revenues.

- **Vehicle Miles Per Peak Vehicle.** Vehicle miles divided by the number of vehicles operated in maximum service. It is an indicator of how intensively the equipment is used and is influenced by the bus travel speeds as well as by the levels of service in the off-peak time periods. A more uniform demand for service over the day would result in a higher number.

- **Vehicle Hours Per Peak Vehicle.** Substitutes vehicle hours for vehicle miles and again reflects how intensively equipment is utilized.

- **Revenue Miles Per Vehicle Mile.** Reflects how much of the total vehicle operation is in passenger service. Higher ratios are favorable, but garage location, training needs, and other considerations may influence the ratio.

- **Revenue Miles Per Total Vehicles.** Total revenue miles of service that are provided by each vehicle available for maximum service.

- **Revenue Hours Per Total Vehicles.** Total revenue hours of service that are provided by each vehicle available for maximum service.

- **Revenue Hours Per Employee FTE.** Ratio of total revenue hours of service to system total FTEs; reflects overall labor productivity.

- **Passenger Trips Per Employee FTE.** Ratio of total passenger trips to system total FTEs. Another measure of overall labor productivity.

- **Vehicle Miles Per Gallon.** Vehicle miles of service divided by total gallons consumed and is a measure of energy utilization.

- **Vehicle Miles Per Kilowatt-Hour.** Vehicle miles of service divided by total kilowatt-hours consumed and is another measure of energy utilization.

- **Average Fare.** Passenger fare revenues divided by the total number of passenger trips.

User-Defined Variables

INTDAS allows you to define a new variable based on two or more original NTD variables through a user-defined formula. See the section on **Defining or Modifying a Formula** to learn about how to create a new user-defined variable or edit an existing one.

Creating, Modifying, or Deleting a Variable

INTDAS allows you to create a variable by setting up a formula that consists of one or more original NTD variables. Existing formulas can be modified or deleted. To do these:

- Select **Setup|Derived variables...** from the INTDAS dropdown menu. The **Formula Setup** screen shown in Figure 2-1 will pop up. Two tabs are provided, one for the Florida standard variables (FSV) and another for any other user-defined variables.

- Select the appropriate tab. The tab you select here will determine the tab that the variable will be listed in the **Select Variables** tab in the main INTDAS screen.

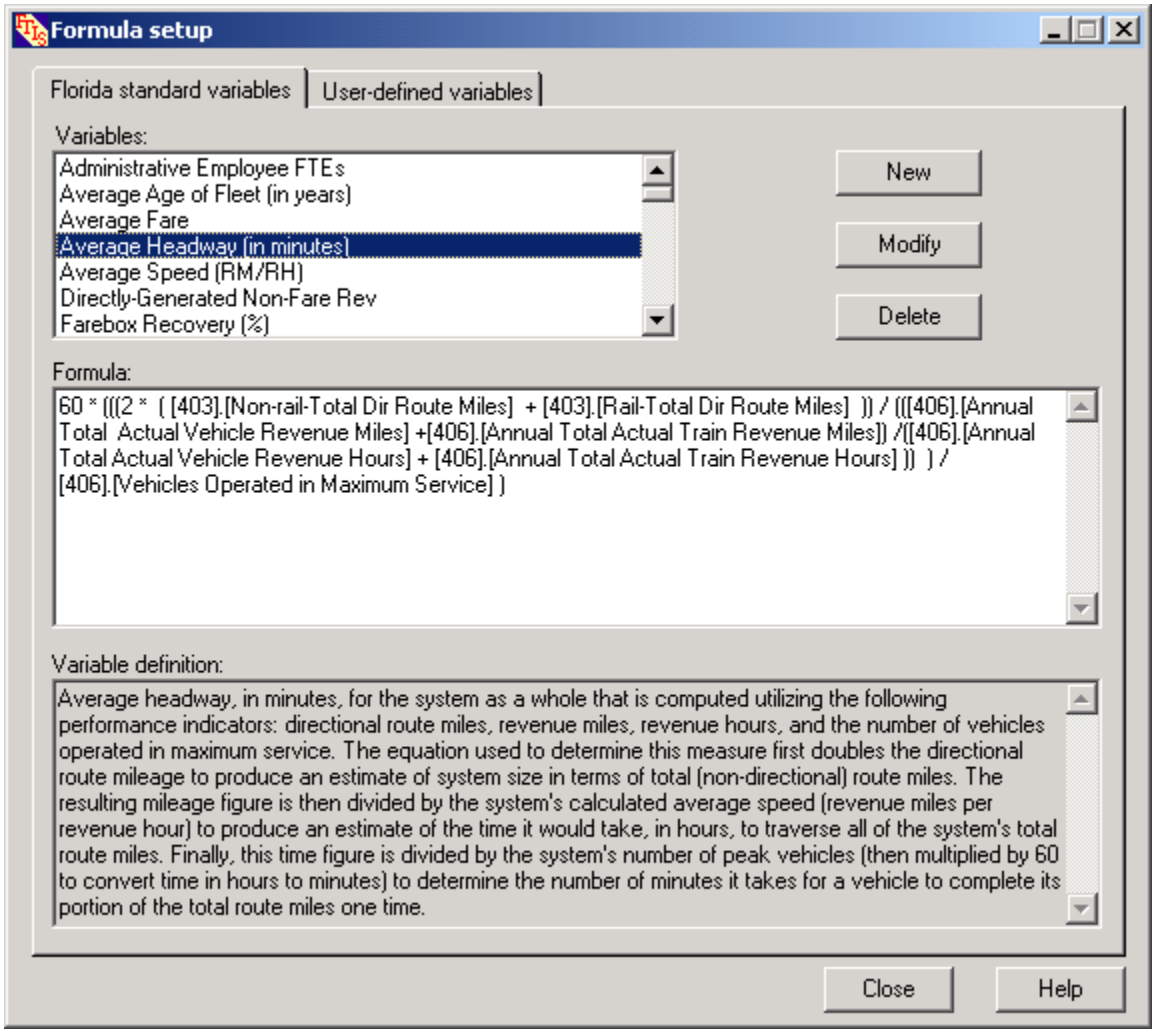
- In either the **Florida standard** or the **User-defined** tab, you can select any variable on the **Variables** list by clicking the variable name. The corresponding formula and the variable definition will be displayed, as shown in Figure 2-1.

- To create a new variable, simply click the **New** button.

- To modify an existing variable, click the variable in the **Variables** list box. The variable is highlighted. The existing formula is shown in the **Formula** box. The definition description for the variable is shown in the **Definition** box. Click the **Modify** button.

- To delete an existing variable, click the variable in the **Variables** list box. The variable is highlighted. Click the **Delete** button and answer *Yes* when prompted to confirm the deletion.

Figure 2-1: Main Screen for Formula Setup



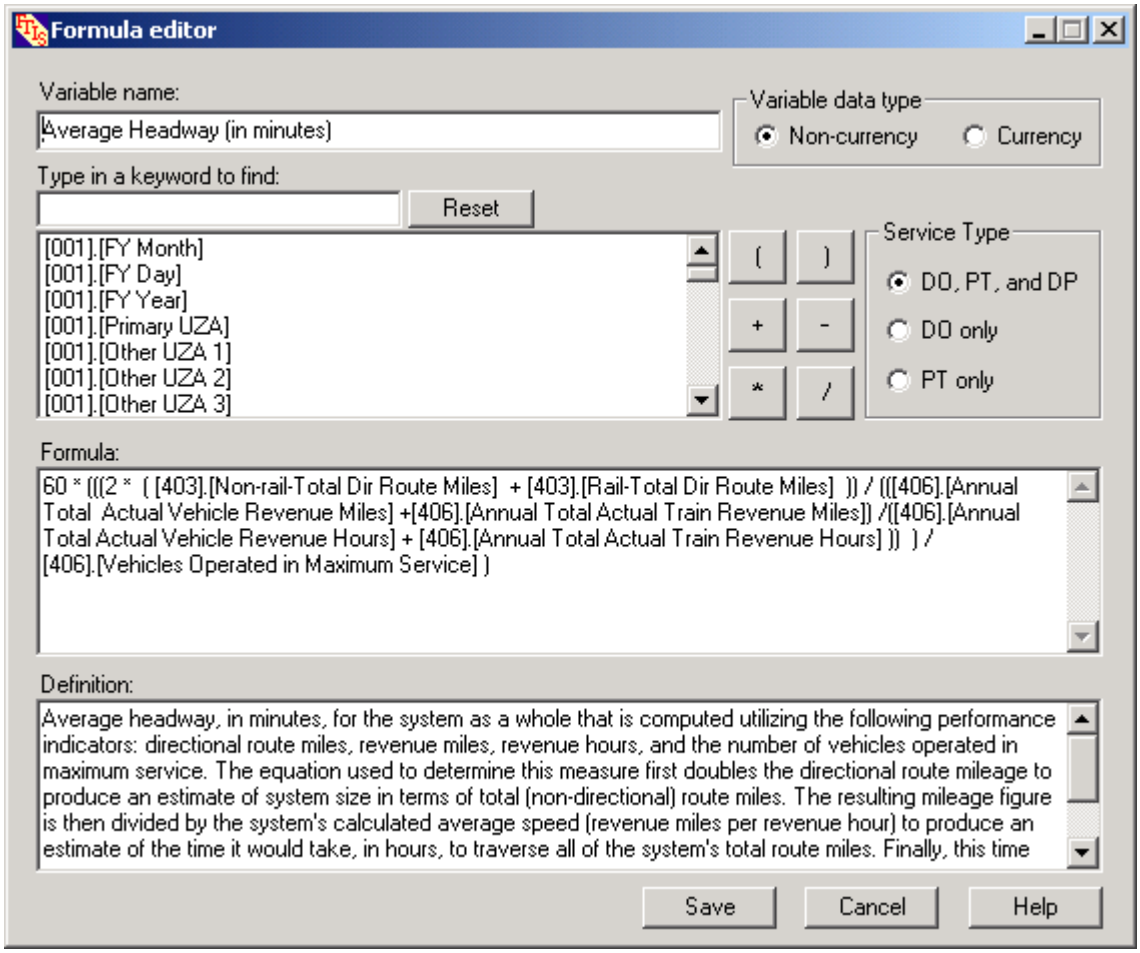
When the **New** or the **Modify** button is clicked, the **Formula Editor** screen shown in Figure 2-2 will pop up. To start creating a new variable:

1. Enter the name of the formula to be created.

2. Specify the data type for the resulting values from the formula.

3. Specify whether the values are to be calculated for directly operated (DO) only, purchased transportation (PT) only, or both, plus the aggregate values of both (i.e., "DP"). The default is to compute values for DO, PT, and DP. If a variable applies to only purchased transportation, then you should select "PT". Failing to do so will result in values being calculated for "DO" and "DP", which is incorrect.

Figure 2-2: Screen for Formula Editor



4. Enter a search string to find the target original NTD variable(s).

5. Construct a formula by clicking variables and math operators. The clicked items will be sent to the **Formula** box.

   Note: *Instead of using the mouse, the keyboard may be used to edit the formula. However, keyboard input for inserting a variable name is not recommended because of potential typos.*

6. (Optional) Enter the definition of the new variable.

7. Click the **Save** button to execute the formula or the **Cancel** button to exit without changes. If the formula is valid, INTDAS will compute the values for the new variable according to the formula(s) you entered.

Note: *The execution of the **Save** function may take up to several minutes, depending on the complexity of the formula and, of course, the speed of your computer.*

The steps for modifying an existing variable are similar. In this case, all the specifications involved in the above steps will be automatically loaded and available for changes.

Minimum User Input Needed to Retrieve NTD Data

INTDAS provides several alternatives for quick and easy data retrieval. To retrieve NTD data, four basic selections based on the system variables must be made:

- ✓ Select the range of NTD data years of interest.
- ✓ Select the type(s) of service.
- ✓ Select the transit systems of interest. In the case of statewide data (available for Florida standard and user-defined variables only), select the states of interest.
- ✓ Select the data variables for which data are to be retrieved.

Note: *All four basic selections may be performed in any sequences.*

Figure 2-3 shows the INTDAS main screen that allows you to make these selections. The left side of the screen allows you to identify the transit systems (or states, in the case of statewide data) of interest. The right side of the screen allows you to select the data years, the service types, and the NTD data variables.

Note: *The selection of data variables is not needed when you want to display retrieved data on NTD forms. This display option will display all data for all variables on all NTD forms, regardless of which variables you have selected, or whether you have selected a variable.*

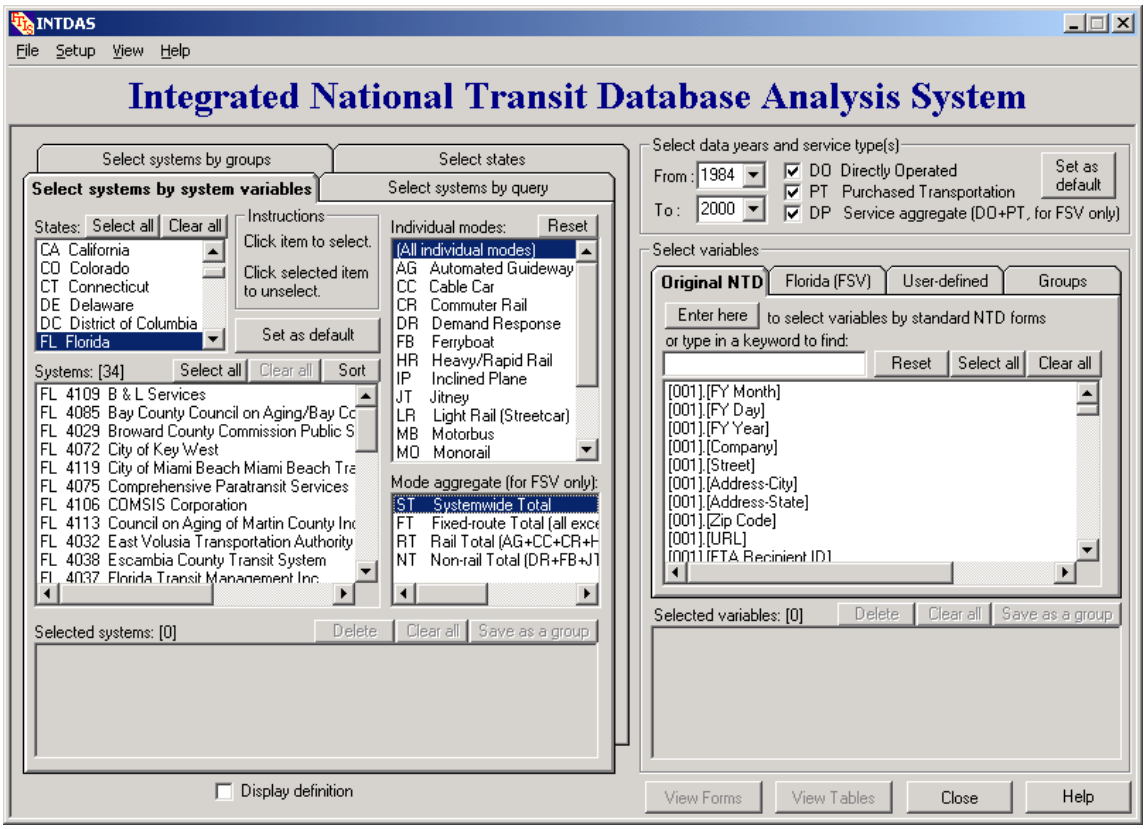
As soon as a transit system is selected and is listed in the **Selected systems** list box, the **View Forms** button at the bottom of the screen will be turned on.

Note: *The number in the brackets next to the list box name indicates the number of systems selected.*

Important: *To activate the **View Tables** button, at least one transit system and one variable must have been selected.*

The following three sections describe the process of selecting the four basic variables in detail.

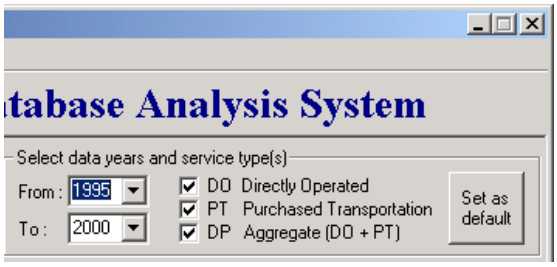
Figure 2-3: INTDAS Main Screen



Selecting Data Years and Service Types

The selections of NTD data years and service types are straightforward. Both selections are done at the top-right corner of the INTDAS main screen, as shown in Figure 2-4.

Figure 2-4: Data Years and Service Types



- For data years, enter the range of data years for which the data are to be retrieved. The **From** year must be greater than the **To** year.

- Three check boxes are provided for each of the three service type options: directly operated (DO), purchased transportation (PT), or service aggregate (DP or DO+PT). The service aggregate option is for retrieving records that aggregate the DO and PT values of each transit mode option. *At least one service type must be selected.*

  Note: *The "DP" option is available for only the Florida standard and user-defined variables.*

- You may set your selections for data years and service types as the default by clicking the **Save as Default** button. When you enter INTDAS the next time, the selections will be automatically loaded.

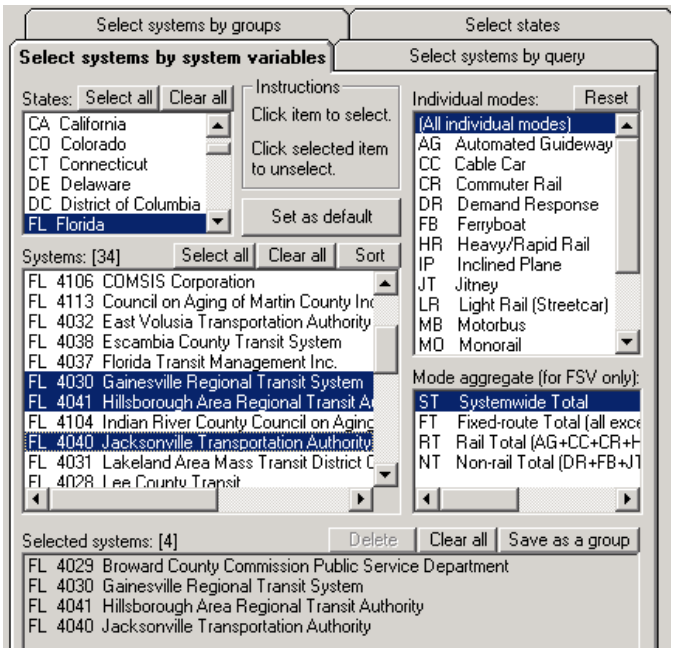
Selecting Transit Systems

INTDAS provides the following three options to facilitate the selection of transit systems to meet different application needs.

Selecting Transit Systems by System Variables

This option allows you to use the system variables to quickly identify transit systems from a set of list boxes. It is best suited if you already know the specific transit systems you are interested in. Figure 2-5 shows the interface for this option.

Figure 2-5: Screen Area for Selecting Transit Systems by System Variables



To select transit systems:

1. Select the **Select systems by system variables** tab on the INTDAS main screen. It is the default tab when you first enter INTDAS.

2. Select state(s) from the **States** list box. Select the desired mode codes from the **Individual modes** list box and the desired mode aggregates from the **Mode aggregate** list box. The default state is Florida and the default for transit modes is to select "all modes".

   Note: ***Mode aggregate*** *output records that represent the aggregate values of all modes operated by a transit system. Mode aggregate output is only available for the Florida standard and user-defined variables. The following four aggregate options are available:*

   - *Systemwide Total (ST): This aggregate option provides aggregated values of all modes of a transit system.*

   - *Fixed-Route Total (FT): This aggregate option provides aggregated values of all fixed-route modes of a transit system (i.e., all except demand response).*

   - *Rail Total (RT): This aggregate option provides aggregated values of all rail modes (i.e., AG, CC. LR. HR, IP, LR, MO) of a transit system.*

   - *Non-Rail Total (NT): This aggregate option provides aggregated values of all none-rail modes (i.e., DR, FB, JT, MB, PB, TB, TR, VP, OR) of a transit system.*

3. On each list box, clicking a list item once will select the item. Selected items are highlighted. Clicking a selected item again will unselect the item. All transit systems matching the selected states and have at least one mode matching the selected modes will be listed on the **Systems** list box.

   Note: *Items on the* ***Systems*** *list box may be re-ordered by clicking the* ***Sort*** *button, which allows you to sort the list by State, NTD ID, or transit agency name.*

4. Select final systems by clicking the transit systems listed on the **Systems** list box. Selected transit systems will be listed on the **Selected systems** list box.

To unselect a system:

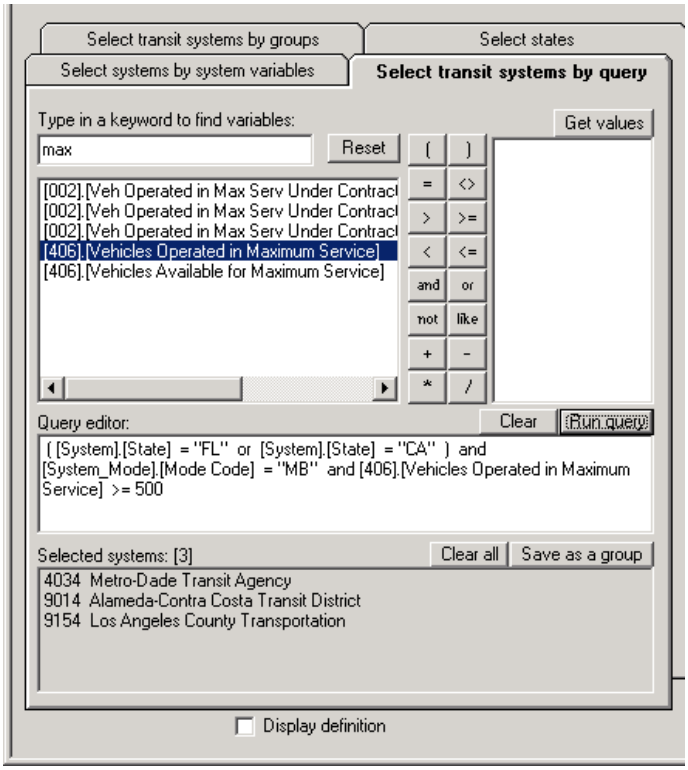
- Click the transit system name on the **Systems** list box, or

- Highlight the transit system name in the **Selected systems** list box and then click the **Delete** button.

Selecting Transit Systems by Query

This option allows you to identify and select transit systems by constructing and executing a SQL (Structured Query Language) query. It is best suited if you want to identify systems that fit a certain profile, e.g., all Florida motorbus transit systems that operates less than 10 maximum service vehicles. Figure 2-6 shows the interface for this option.

Figure 2-6: Screen Area for Constructing Query for Transit Systems Selection



To apply this option:

1. Select the **Select systems by query** tab.

2. Either search through the list or type in a keyword in the search box to narrow down the list of variables.

3. Identify and select a variable from the variable list box listed below the search box. Click a variable to send the variable to the **Query Editor** box. All possible data values for a selected variable are listed on the **Values** box.

Note: *The **Values** box will automatically show all values of a system variable (i.e., variable preceded by "system"). For attribute variables, you must click the **Get values** button to show the values.*

4. Click a math operators, such as "=" or ">=".

5. Click a value from the **Values** list box or type in the value from the keyboard. Repeat the steps above for more query conditions, which are usually separated by "and" or "or".

6. Click the **Run Query** button to run the query to identify transit systems that meet the query conditions. If the query is correctly constructed, the resulting transit systems will be listed in the **Selected Systems** list box. If the query contains invalid input, an error message will pop up. Edit and re-run the query.

Warning: *You may key in any query specifications using the keyboard. However, keying in the variable names is not advisable since most variables are long and are vulnerable to typos.*

Notes:

- *All character values must be bounded by double quotations.*

- *All conditions in parentheses are executed together.*

- *The "like" operator allows you to enter a text pattern to search. This option can only be used for text-related variables. For example, to find all the transit systems that have "Miami" as part of the transit system name, you may enter the following query:*

  *[System][Company Name] like "*Miami*"*

  The quotation marks must be included as part of the query.

Example: You are interested in only the motorbus transit systems in Florida and California that have at least 500 vehicles operated in maximum service. The query will be:

([System].[State] = "FL" or [System].[State] = "CA") and [System_Mode].[Mode Code] = "MB" and [406].[Vehicles Operated in Maximum Service] >= 500

Note: *Each variable name on the list box consists of two bracket components. The first set of brackets lists the source of the variable, generally the NTD form of the variable. The name of the variable is listed in the second set of brackets. For system variables, the source is the "System" table in the database. For system attributes, the source is the three-digit NTD form number. For Form 405, which has two pages, "405P1" and "405P2" are used.*

Steps for constructing the example query:

1. Click the **(** button.
2. Click the **[System].[State]** variable (fourth variable on the list) on the **Variables** list box.
3. Click the = button.
4. Click the **FL** list item on the Value list box, which lists all the available states.
5. Click the **or** button
6. Click the **[System].[State]** variable again.
7. Click the = button.
8. Click the **CA** list item on the Value list box.
9. Click the **)** button.
10. Click the **and** button.
11. Click the **[System_Mode].[Mode Code]** variable.
12. Click the = button.
13. Click the **MB** list item on the Value list box.
14. Click the **and** button.
15. In the "Type in a keyword to find" text box, type in an appropriate keyword, or a partial keyword, to find the variable for maximum vehicles (e.g., type "max"). The **Variable** list box should list all the variables that contain the keyword.
16. Click the **[406].[Vehicles Operated in Maximum Service]** variable.
17. Click the **>=** button.
18. Type "500" (without the quotation marks).

Selecting Transit Systems by System Groups

This option allows you to quickly select a pre-defined group of transit systems. The interface for this option is shown in Figure 2-7. To apply this option:

1. Select the **Select systems by groups** tab

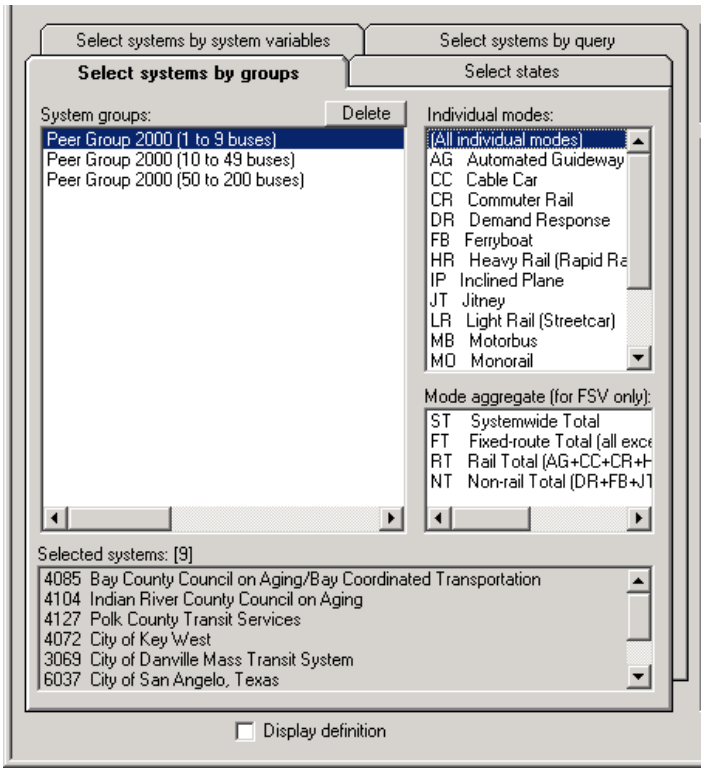
2. Select an item on the **Groups** list box.

3. Select the desired mode codes from the **Individual modes** list box and the desired mode aggregates from the **Mode aggregate** list box. Transit systems belonging in the selected group and serving at least one of the selected modes will be listed in the **Selected systems** box.

4. To delete an existing system group, highlight the system group name and then click the **Delete** button on top of the list.

Note: *See the section on **Saving System and Variable Selections** to learn how to create or modify a system group.*

Figure 2-7: Screen Area for Selecting Transit Systems by System Groups



Selecting States for Statewide Data

This option allows you to select states for which statewide data are to be retrieved. The interface for this option is shown in Figure 2-8. To apply this option:

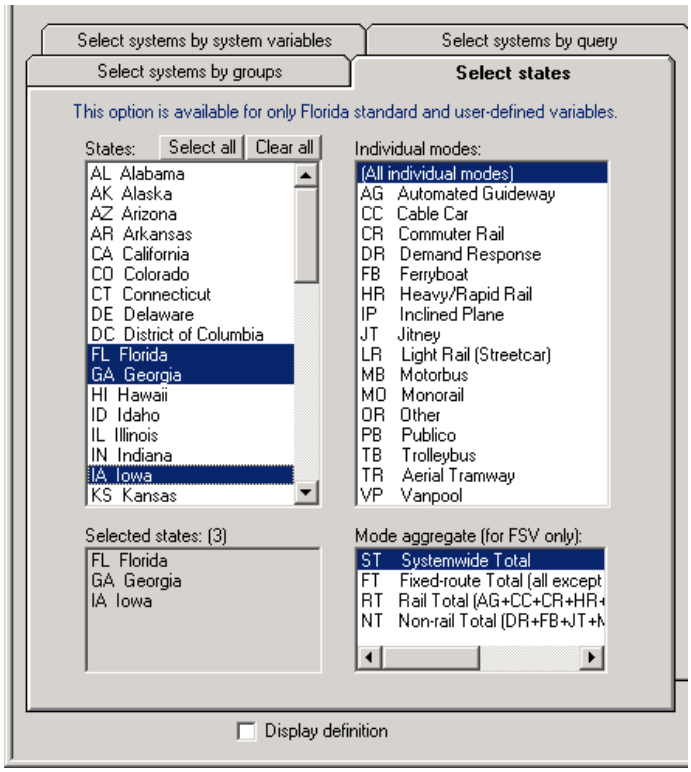
1. Select the **Select states** tab

2. Select one or more states from the **States** list box. The selected states will be displayed in the **Selected states** list box.

3. Select the desired mode codes from the **Individual modes** list box and the desired mode aggregates from the **Mode aggregate** list box.

Note: ***Statewide data are available for only the Florida standard and user-defined variables.***

Figure 2-8: Screen Area for Selecting States for Statewide Data



Selecting Data Variables

For the selection of NTD variables, INTDAS allows you to select variables by forms, by variable list, or by pre-defined variable groups. The following sections describe each option in detail.

Selecting Variables by NTD Forms

This option allows you to select the variables through the emulated NTD forms. It is only available for the selection of the original NTD variables and is especially suitable if you are familiar with the NTD forms. This option is accessible from the **Enter Here** button on the **Original NTD** tab shown in Figure 2-9.

After the **Enter Here** button is clicked, all the available NTD forms will be displayed, one tab for each form. Figure 2-10 shows the tab for Form 406. To select a variable:

1 Select the NTD form that contains the desired variable.

2 Identify the variable from the form.

3 Click the check box for the variable. Figure 2-10 shows that the following two variables are selected (i.e., checked): total unlinked passenger trips and total passenger miles.

Figure 2-9: Screen Area for Entering NTD Forms for Variable Selection

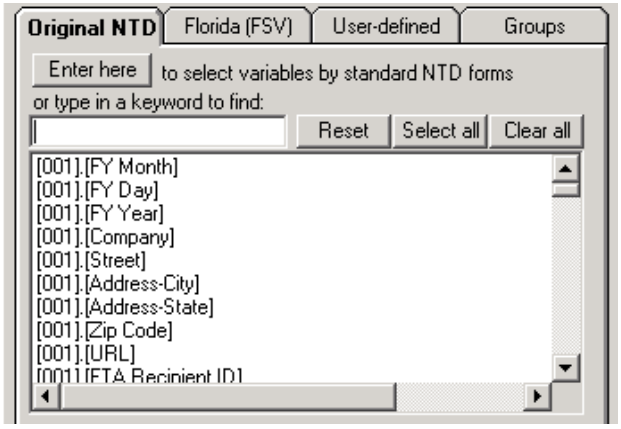
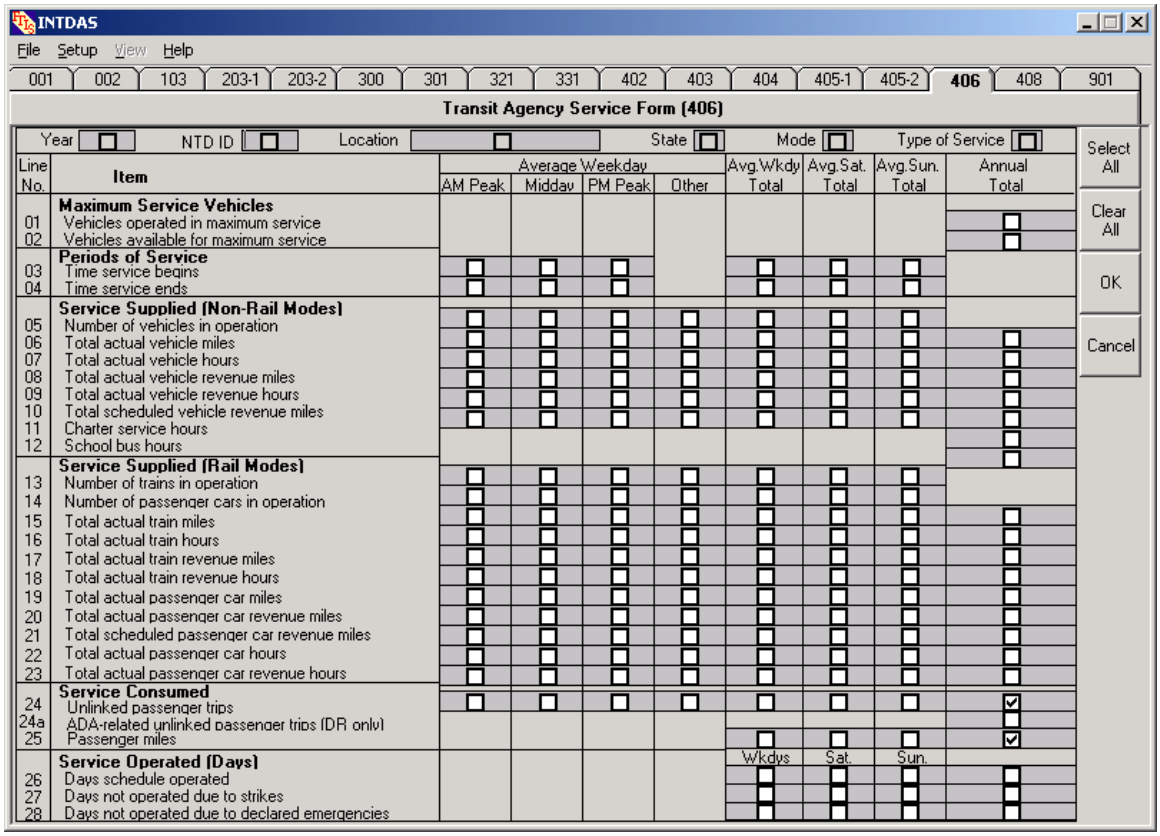


Figure 2-10: Tabs for NTD Forms for Variable Selection



You may select all variables on a form by clicking the **Select All** button. Click the **Clear All** button will clear all the check boxes in the current form. The selected variables are listed on the **Selected variables** list box and can be viewed after you click OK to exit to the INTDAS main screen.

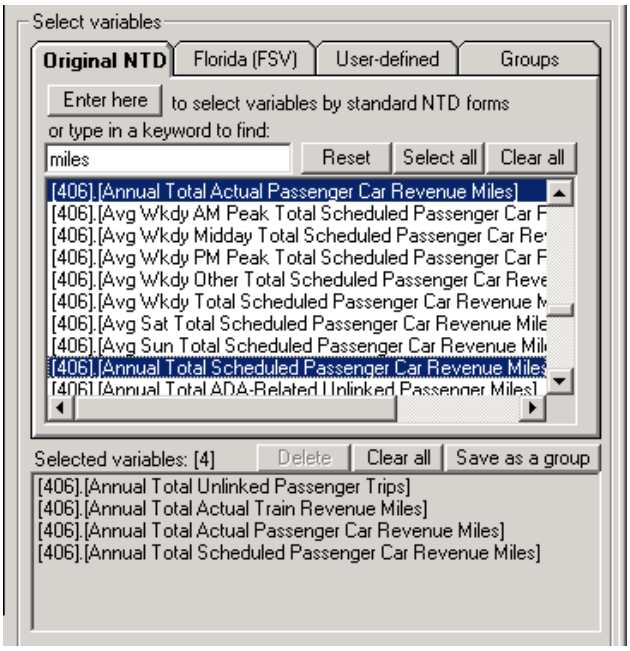
To unselect a variable:

- Click the variable name on the variable list box, or
- Click the **Go** button to return to the form to uncheck the check box.

Selecting Variables by Variable List

This option allows you to select variables from a list. It is available for all three variable types (i.e., original NTD, Florida standard, and user-defined), as shown in Figure 2-11, which shows one tab for each of the three variable types.

Figure 2-11: Screen for Selecting Variables by List



To identify and select a variable:

1. Enter a (or partial) keyword to search for all variables that match the keyword. All matched variables will be listed on the **Selected variables** list box. In the case of Figure 2-11, the keyword entered is “miles”. Instead of a keyword, you may enter a

form number to short-list to variables of a particular form. For example, typing in "406" will cause the list to include only Form 406 variables.

2. Select all variables by clicking the **Select All** button or any of the listed variables by clicking the specific variable names on the list box. All selected variables are highlighted on the variable list box and are listed on the **Selected variables** list box.

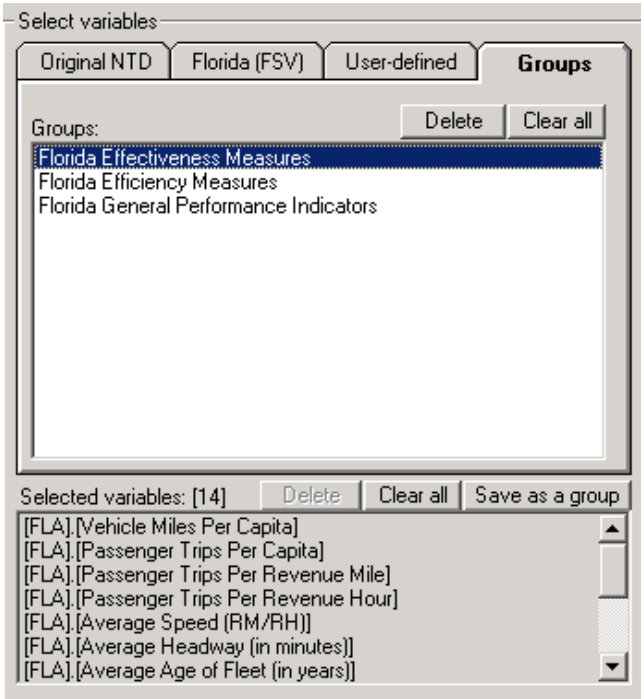
To unselect a variable:

- Click the variable name on the variable list box, or
- Highlight the variable name in the **Selected variables** list box and then click the **Delete** button.

Selecting Variables by Variable Group

This option allows you to quickly select a group of pre-defined variables. It is done by selecting an item on the **Groups** list box, as shown on the screen in Figure 2-12. To delete an existing variable group, highlight the variable group name and then click the **Delete** button on top of the list. See the section on **Saving System and Variable Selections** to learn how to create and modify a variable group.

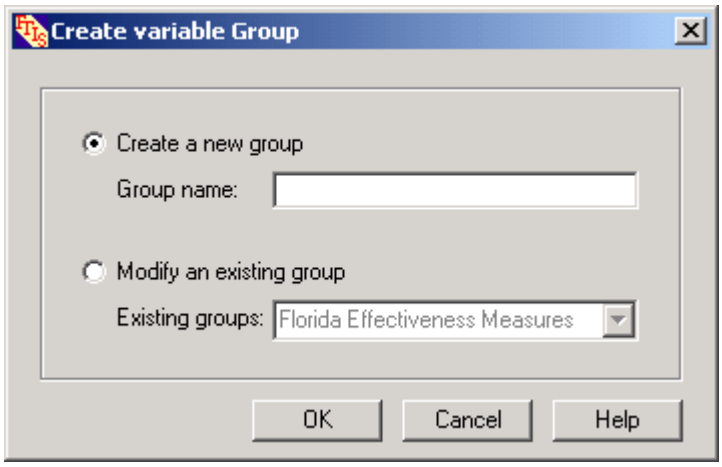
Figure 2-12: Screen for Selecting Variables by Variable Group



Saving System and Variable Selections

INTDAS allows selected transit systems or variables to be saved as a group. The ability to save a group of transit systems and a group of variables allows data for trend and peer comparison analyses to be retrieved quickly. The screen shown in Figure 2-13 will pop up when the **Save as a group** button is clicked.

Figure 2-13: Screen for Saving System or Variable Selections



- The first bullet allows you to save all the transit systems listed in the **Selected systems** list box under a new group name.
- The second bullet allows you to overwrite an existing system group with the transit systems listed in the **Selected systems** list box.
- Once the selections are saved, the name of the group of transit systems will appear on the **System groups** tab.

The operations for creating and modifying a variable group are similar.

Viewing Retrieved NTD Data

INTDAS allows you to view retrieved data in forms, tables, or graphs. The following sections describe each of these options in detail.

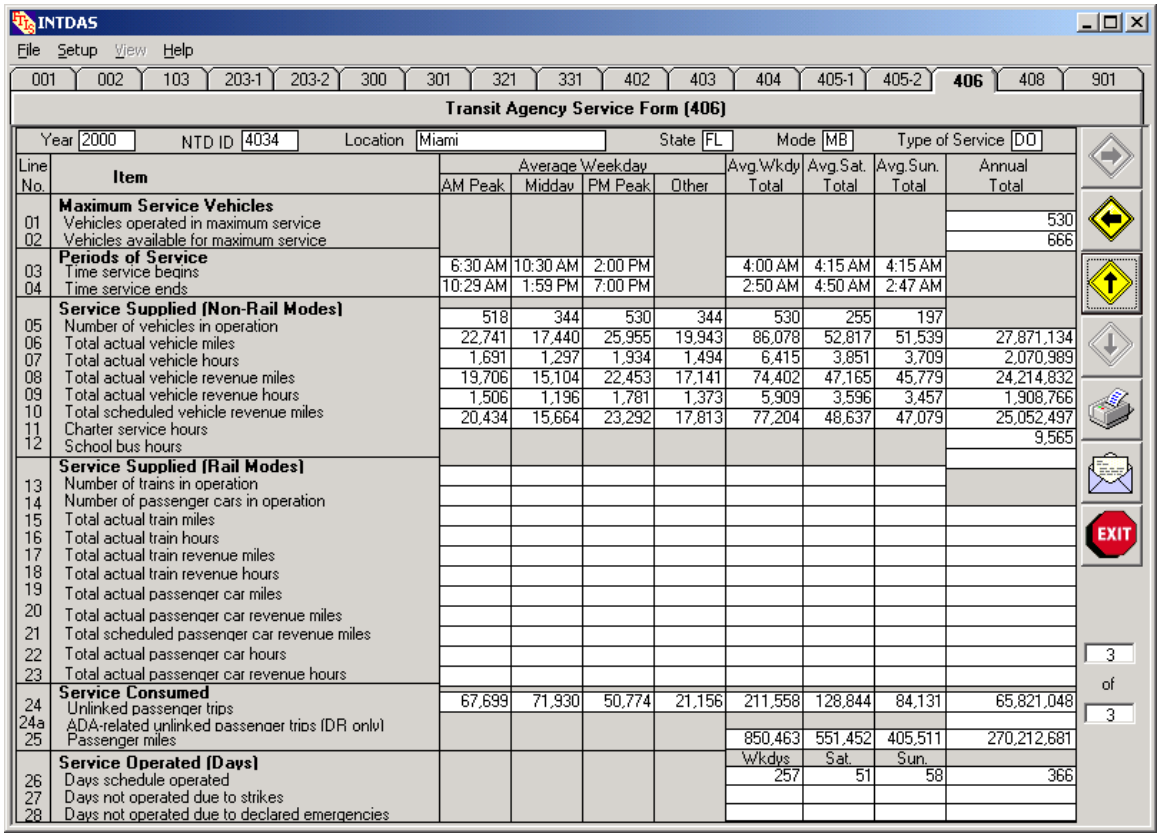
Viewing Retrieved Data by NTD Forms

If you are interested in retrieving comprehensive data for a small group of transit systems, you may want to display the data on the emulated NTD forms. The screen in Figure 2-14 shows an emulated NTD form (Form 406) that is loaded with data for a selected system. The tab allows you to navigate from one form to another easily. The following functions are available for each emulated NTD form:

- Use the **left**, **right**, **up**, and **down** arrow buttons to go to the next, previous, first, and last record, respectively. Alternatively, you can use the **Enter** key in lieu of a mouse click.

- Click the **Printer** or **Email** button to print the form on a printer or e-mail the form to a third party. INDTAS will automatically capture the screen, store it as a BMP graphics file, activate your email system if it is not already activated, open a new email, and attach the graphics file as a file attachment.

Figure 2-14: Retrieved Data on NTD Forms



Line No.	Item	Average Weekday AM Peak	Average Weekday Midday	Average Weekday PM Peak	Average Weekday Other	Avg.Wkdy Total	Avg.Sat. Total	Avg.Sun. Total	Annual Total
	Maximum Service Vehicles								
01	Vehicles operated in maximum service								530
02	Vehicles available for maximum service								666
	Periods of Service								
03	Time service begins	6:30 AM	10:30 AM	2:00 PM		4:00 AM	4:15 AM	4:15 AM	
04	Time service ends	10:29 AM	1:59 PM	7:00 PM		2:50 AM	4:50 AM	2:47 AM	
	Service Supplied (Non-Rail Modes)								
05	Number of vehicles in operation	518	344	530	344	530	255	197	
06	Total actual vehicle miles	22,741	17,440	25,955	19,943	86,078	52,817	51,539	27,871,134
07	Total actual vehicle hours	1,691	1,297	1,934	1,494	6,415	3,851	3,709	2,070,989
08	Total actual vehicle revenue miles	19,706	15,104	22,453	17,141	74,402	47,165	45,779	24,214,832
09	Total actual vehicle revenue hours	1,506	1,196	1,781	1,373	5,909	3,596	3,457	1,908,766
10	Total scheduled vehicle revenue miles	20,434	15,664	23,292	17,813	77,204	48,637	47,079	25,052,497
11	Charter service hours								9,565
12	School bus hours								
	Service Supplied (Rail Modes)								
13	Number of trains in operation								
14	Number of passenger cars in operation								
15	Total actual train miles								
16	Total actual train hours								
17	Total actual train revenue miles								
18	Total actual train revenue hours								
19	Total actual passenger car miles								
20	Total actual passenger car revenue miles								
21	Total scheduled passenger car revenue miles								
22	Total actual passenger car hours								
23	Total actual passenger car revenue hours								
	Service Consumed								
24	Unlinked passenger trips	67,699	71,930	50,774	21,156	211,558	128,844	84,131	65,821,048
24a	ADA-related unlinked passenger trips (DR only)								
25	Passenger miles					850,463	551,452	405,511	270,212,681
	Service Operated (Days)					Wkdys	Sat.	Sun.	
26	Days schedule operated					257	51	58	366
27	Days not operated due to strikes								
28	Days not operated due to declared emergencies								

Viewing Retrieved Data by Tables and Graphs

If you are interested in only select variables of multiple years, INTDAS provides three different ways for viewing the retrieved data:

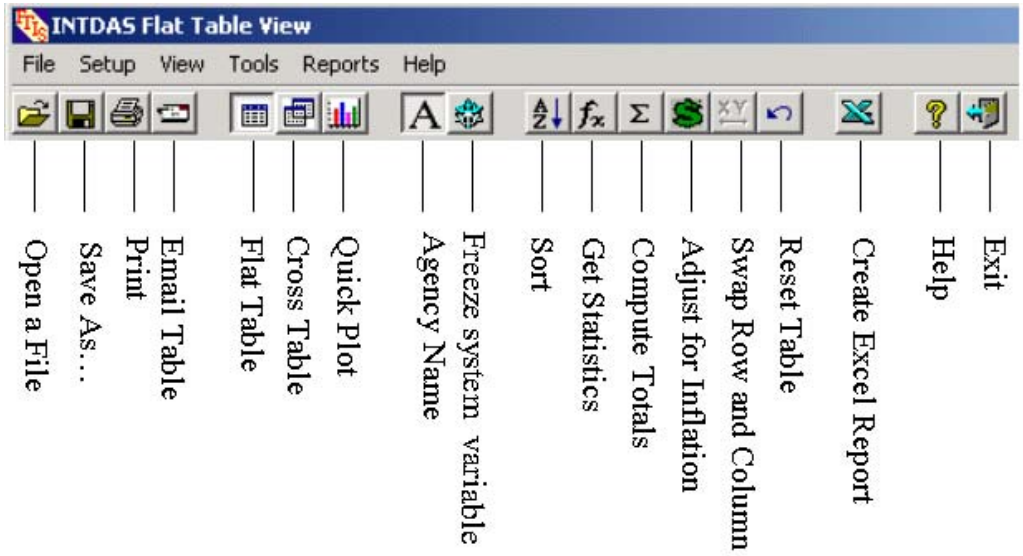
Flat Table View: It displays all the retrieved records and variables in a flat table. It is the default table option and is the first screen after you click the **View Tables** button.

Cross Table View: It displays attribute values that are cross-classified by any two selected variables.

Plot View: It is similar to the **Cross Table** view in that it also displays data for any two variables at a time. The only difference is that this one displays data in a graph, while the other in a table.

Figure 2-15 shows the tool buttons for accessing the different views. It also shows the tool buttons for a number of functions that can be applied to the data retrieved. The next three sections describe the different views in more detail.

Figure 2-15: Table Tool Buttons



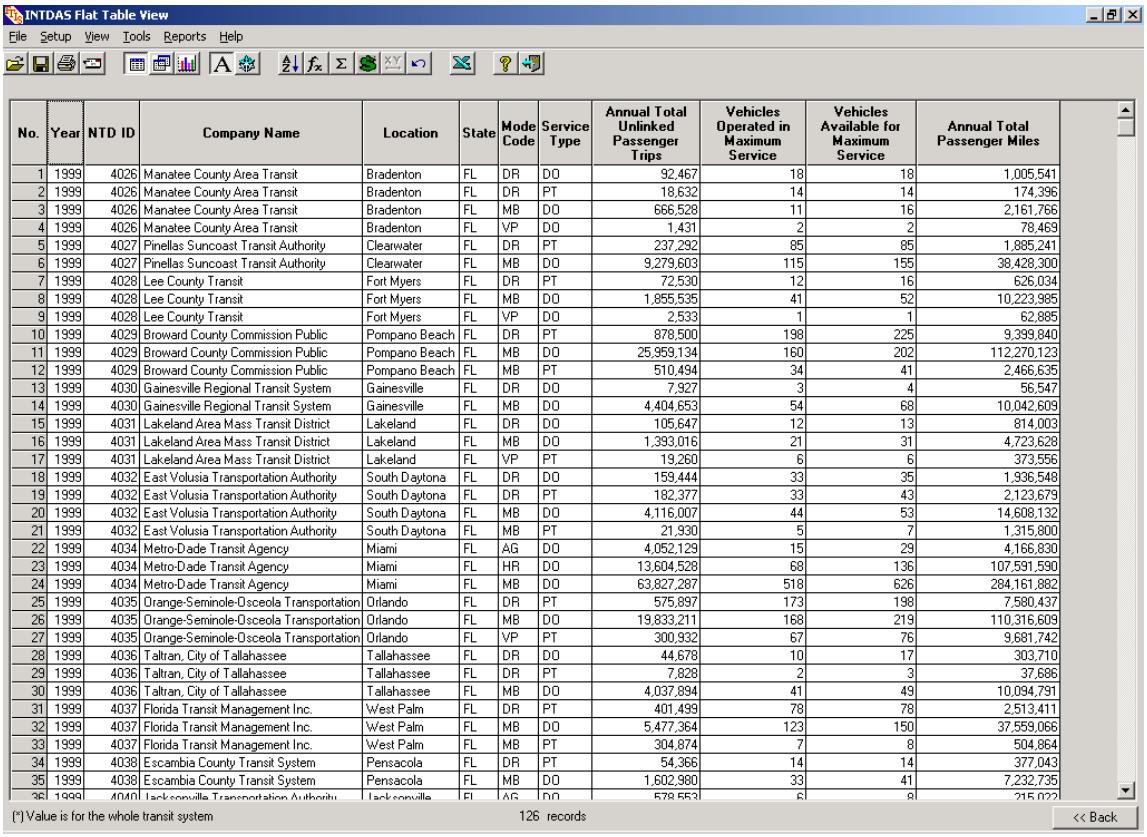
Applying Functions to Flat Table

Figure 2-16 shows a sample flat table for data for select variables for multiple data years for multiple transit systems.

The following functions may be applied to the flat table:

Freeze. It allows you to toggle between whether to freeze or unfreeze the system variables. When the system variables are "frozen", they do not move when you scroll the table horizontally to the right. This function is useful when the table contains many variables and you want to be able to always see the system variables when you move to the right of the flat table.

Figure 2-16: Sample Flat Table



No.	Year	NTD ID	Company Name	Location	State	Mode Code	Service Type	Annual Total Unlinked Passenger Trips	Vehicles Operated in Maximum Service	Vehicles Available for Maximum Service	Annual Total Passenger Miles
1	1999	4026	Manatee County Area Transit	Bradenton	FL	DR	DO	92,467	18	18	1,005,541
2	1999	4026	Manatee County Area Transit	Bradenton	FL	DR	PT	18,632	14	14	174,396
3	1999	4026	Manatee County Area Transit	Bradenton	FL	MB	DO	666,528	11	16	2,161,766
4	1999	4026	Manatee County Area Transit	Bradenton	FL	VP	DO	1,431	2	2	78,469
5	1999	4027	Pinellas Suncoast Transit Authority	Clearwater	FL	DR	PT	237,292	85	85	1,885,241
6	1999	4027	Pinellas Suncoast Transit Authority	Clearwater	FL	MB	DO	9,279,603	115	155	38,428,300
7	1999	4028	Lee County Transit	Fort Myers	FL	DR	PT	72,530	12	16	626,034
8	1999	4028	Lee County Transit	Fort Myers	FL	MB	DO	1,855,535	41	52	10,223,985
9	1999	4028	Lee County Transit	Fort Myers	FL	VP	DO	2,533	1	1	62,885
10	1999	4029	Broward County Commission Public	Pompano Beach	FL	DR	PT	878,500	198	225	9,399,840
11	1999	4029	Broward County Commission Public	Pompano Beach	FL	MB	DO	25,959,134	160	202	112,270,123
12	1999	4029	Broward County Commission Public	Pompano Beach	FL	MB	PT	510,494	34	41	2,466,635
13	1999	4030	Gainesville Regional Transit System	Gainesville	FL	DR	DO	7,927	3	4	56,547
14	1999	4030	Gainesville Regional Transit System	Gainesville	FL	MB	DO	4,404,653	54	68	10,042,609
15	1999	4031	Lakeland Area Mass Transit District	Lakeland	FL	DR	DO	105,647	12	13	814,003
16	1999	4031	Lakeland Area Mass Transit District	Lakeland	FL	MB	DO	1,393,016	21	31	4,723,628
17	1999	4031	Lakeland Area Mass Transit District	Lakeland	FL	VP	PT	19,260	6	6	373,556
18	1999	4032	East Volusia Transportation Authority	South Daytona	FL	DR	DO	159,444	33	35	1,936,548
19	1999	4032	East Volusia Transportation Authority	South Daytona	FL	DR	PT	182,377	33	43	2,123,679
20	1999	4032	East Volusia Transportation Authority	South Daytona	FL	MB	DO	4,116,007	44	53	14,608,132
21	1999	4032	East Volusia Transportation Authority	South Daytona	FL	MB	PT	21,930	5	7	1,315,800
22	1999	4034	Metro-Dade Transit Agency	Miami	FL	AG	DO	4,052,129	15	29	4,166,830
23	1999	4034	Metro-Dade Transit Agency	Miami	FL	HR	DO	13,604,528	68	136	107,591,590
24	1999	4034	Metro-Dade Transit Agency	Miami	FL	MB	DO	63,827,287	518	626	284,161,882
25	1999	4035	Orange-Seminole-Osceola Transportation	Orlando	FL	DR	PT	575,897	173	198	7,580,437
26	1999	4035	Orange-Seminole-Osceola Transportation	Orlando	FL	MB	DO	19,833,211	168	219	110,316,609
27	1999	4035	Orange-Seminole-Osceola Transportation	Orlando	FL	VP	PT	300,932	67	76	9,681,742
28	1999	4036	Taltran, City of Tallahassee	Tallahassee	FL	DR	DO	44,678	10	17	303,710
29	1999	4036	Taltran, City of Tallahassee	Tallahassee	FL	DR	PT	7,828	2	3	37,686
30	1999	4036	Taltran, City of Tallahassee	Tallahassee	FL	MB	DO	4,037,894	41	49	10,094,791
31	1999	4037	Florida Transit Management Inc.	West Palm	FL	DR	PT	401,499	78	78	2,513,411
32	1999	4037	Florida Transit Management Inc.	West Palm	FL	MB	DO	5,477,364	123	150	37,559,066
33	1999	4037	Florida Transit Management Inc.	West Palm	FL	MB	PT	304,874	7	8	504,864
34	1999	4038	Escambia County Transit System	Pensacola	FL	DR	PT	54,366	14	14	377,043
35	1999	4038	Escambia County Transit System	Pensacola	FL	MB	DO	1,602,980	33	41	7,232,735
36	1999	4040	Jacksonville Transportation Authority	Jacksonville	FL	AG	DO	579,553	6	8	215,022

- **Sort.** It sorts the flat table based on one or more variables.

- **Get Statistic.** It computes the general statistics associated with each of the data attributes in the flat table.

- **Compute Total.** It computes the total values based on one or more system variables. For example, to find the combined values of both directly operated (DO) and purchased transportation (PT) for a transit system.

- **Create New Variable.** It lets you create a new variable based on a formula.

- **Adjust for Inflation.** It converts financial values to the equivalent dollars of a specific year (i.e., constant dollars) based on the standard inflation rates derived from the Consumer Price Indexes (CPIs).

- **Save.** It lets you save a flat or a cross table into either a comma-delimited text file or an Excel file.

- **Send.** It lets you e-mail a flat or a cross table as a file attachment.

See Figure 2-15 for the tool buttons for accessing these functions. A corresponding menu item can be found in the drop-down menu for each of the tool buttons. The following sections provide additional details for some of these functions.

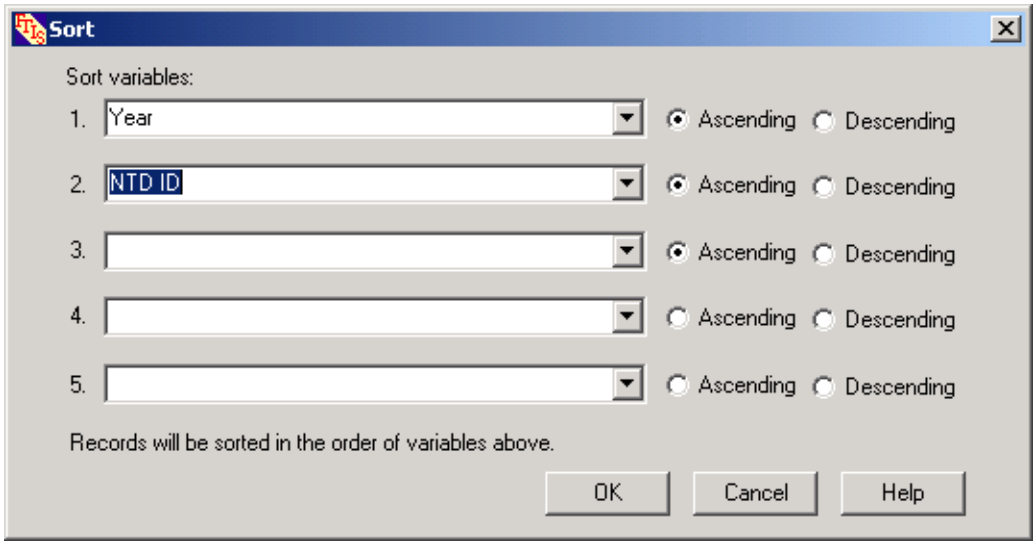
Sorting Tabulated Data

INTDAS allows a flat table to be sorted by one or more variables.

- To sort the table based on one variable, you can simply click the column header of the variable you want to sort. Clicking the header once will sort the table in the ascending order. Clicking the same variable again will re-sort the table in the descending order.

- To sort the table based on more than one variable, select **Tools|Sort…** or click on the **Sort** tool button. The screen shown in Figure 2-17 will pop up. The variables available for sorting will be listed on the list box on the left. You can select up to five variables to be sorted in either the ascending or the descending order. Click **OK** to sort the table in the order of the variables listed.

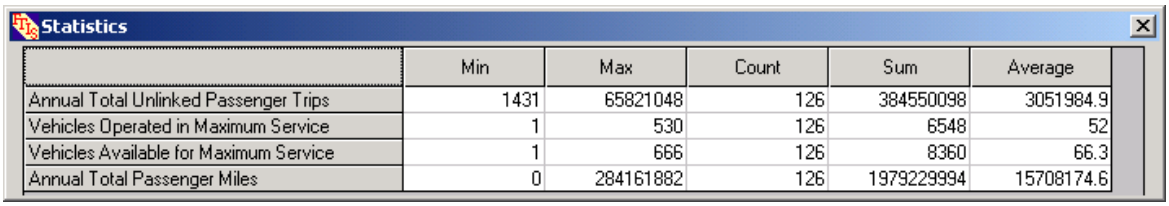
Figure 2-17: Screen for Specifying Sorting Variable and Sorting Order



Computing Table Statistics

INTDAS computes basic statistics for all attribute variables in a flat table. The statistics include maximum, minimum, total, number of records, and average. An example output is shown in Figure 2-18. *The next version of INTDAS will include additional statistical capabilities, including regression modeling.*

Figure 2-18: Sample Statistical Output

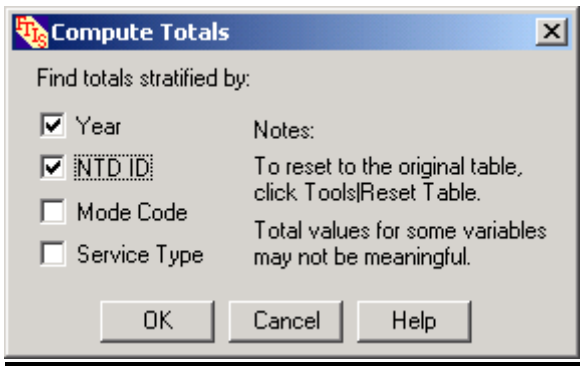


	Min	Max	Count	Sum	Average
Annual Total Unlinked Passenger Trips	1431	65821048	126	384550098	3051984.9
Vehicles Operated in Maximum Service	1	530	126	6548	52
Vehicles Available for Maximum Service	1	666	126	8360	66.3
Annual Total Passenger Miles	0	284161882	126	1979229994	15708174.6

Computing Totals

INTDAS allows records in a flat table to be combined to obtain totals for one or more system variables. The screen for specifying the variables for which the flat table is to be summarized is shown in Figure 2-19. Selections are made by checking the system variables that are to remain in the resulting flat table, i.e., the flat table will be stratified by the variables that you checked. Only the check boxes for the system variables that appear in the current flat table can be selected.

Figure 2-19: Input Screen for Computing Totals



Examples:

- Leaving all check boxes unchecked and click OK will result in only one record. This tells INTDAS not to stratify the resulting table by any system variables. In this case, INTDAS sums up values for each column.

- Checking Year, NTD ID and Mode Code will ask INTDAS to add values for "DO" and "PT" for each transit mode of a transit agency for each NTD year.

- Checking only Mode Code will compute totals for each mode code.

- Checking all boxes will result in no change to the current flat table.

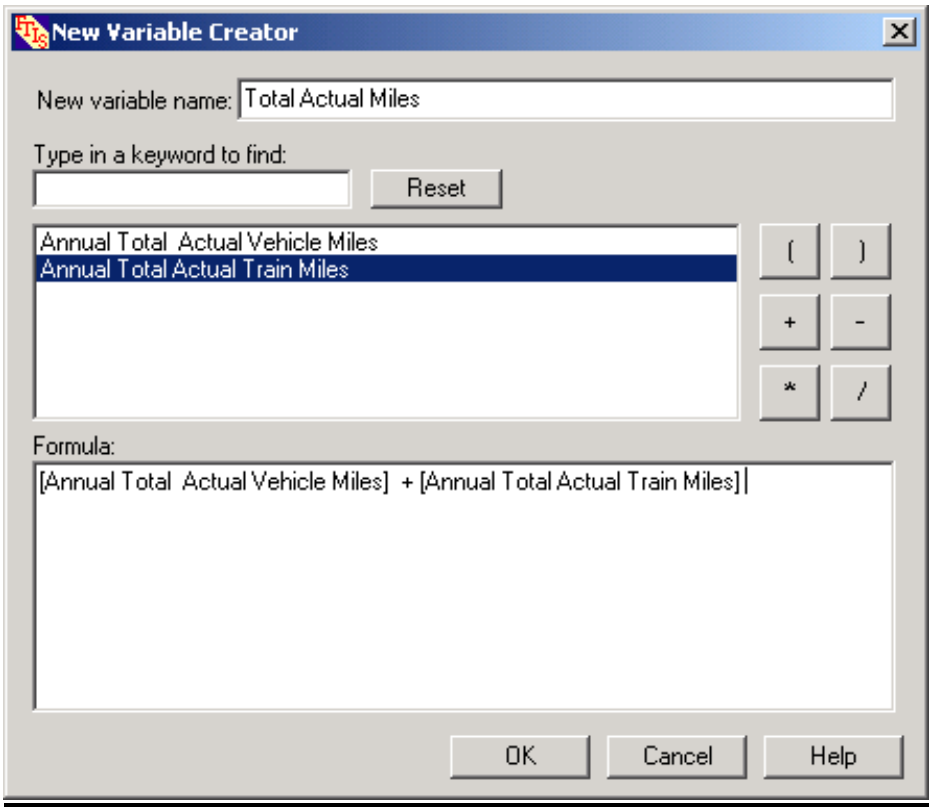
You may click the **Reset Table** tool button or select the **Tools|Reset Table** menu item from the dropdown menu to go back to the original flat table.

Creating New Variables

This function allows you to create a new variable through a formula, just like in a spreadsheet program. The steps for applying this function are as follows:

1. Select **Tools|Create New Variable** from the dropdown menu. The screen in Figure 2-20 will pop up. This option is selectable only when you are in the **Flat Table** view.

Figure 2-20: Input Screen for Computing New Variables



2. Enter a name for the variable.

3. (Optional) Type in a keyword to shortlist the variable list.

4. Compose a formula by selecting the listed variables and math operators.

In Figure 2-20, the application is to add the total actual vehicle miles and the total train miles to obtain a variable for total actual miles regardless of whether the modes are rail or non-rail.

Adjusting for Inflation

INTDAS allows you to adjust the financial variables in a flat table for inflation to a specific year from 1984 to the current year (if inflation rate is available) based on the national inflation rate. Inflation-adjusted dollars provide a more accurate representation of spending changes resulting from agency decisions by factoring out the general price inflation. The inflation rate reported is the percentage change in the Consumer Price Index (CPI) for all items (including commodities and services) from year to year.

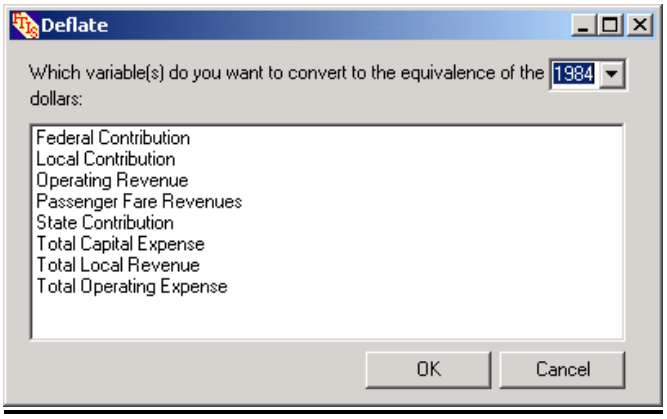
The steps for applying this function are as follows:

1. Select **Tools|Adjusment for Inflation** from the dropdown menu. The screen shown in Figure 2-21 will pop up. The screen allows you to select the base year and the financial variable(s) to adjust. Only financial variables are listed.

2. Select the base year you want to convert the dollar values to.

3. Select one or more variables by single-clicking the desired variables. As soon as you have clicked the **OK** button, INTDAS will start the conversion and a new variable with the equivalent values will be listed side-by-side each of the original variables selected. The name of each adjusted variable will be attached with the equivalent year in parentheses.

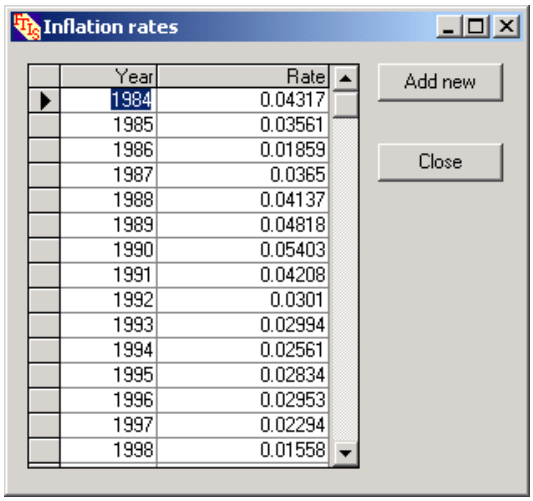
Figure 2-21: Screen for Specifying Year and Variables for Inflation Adjustment



A set of standard inflation rates derived from the federal consumer price indexes are defined in INTDAS and are used for the conversion. Although it is generally desirable to use these standard inflation rates, INTDAS allows you to modify them, if necessary, through the following steps:

- Select **Setup|Inflation Rates** from the dropdown menu. The screen shown in Figure 2-22 will pop up.

Figure 2-22: Screen for Specifying Inflation Rates



- Click an existing cell to enter a value. This overwrites an existing value.
- Click the **Add New** button to add the inflation rate for a new year.
- Click the **Close** button to exit. All changes or additions are permanent.

Note: *You are not allowed to specify an inflation rate for a year beyond the current year.*

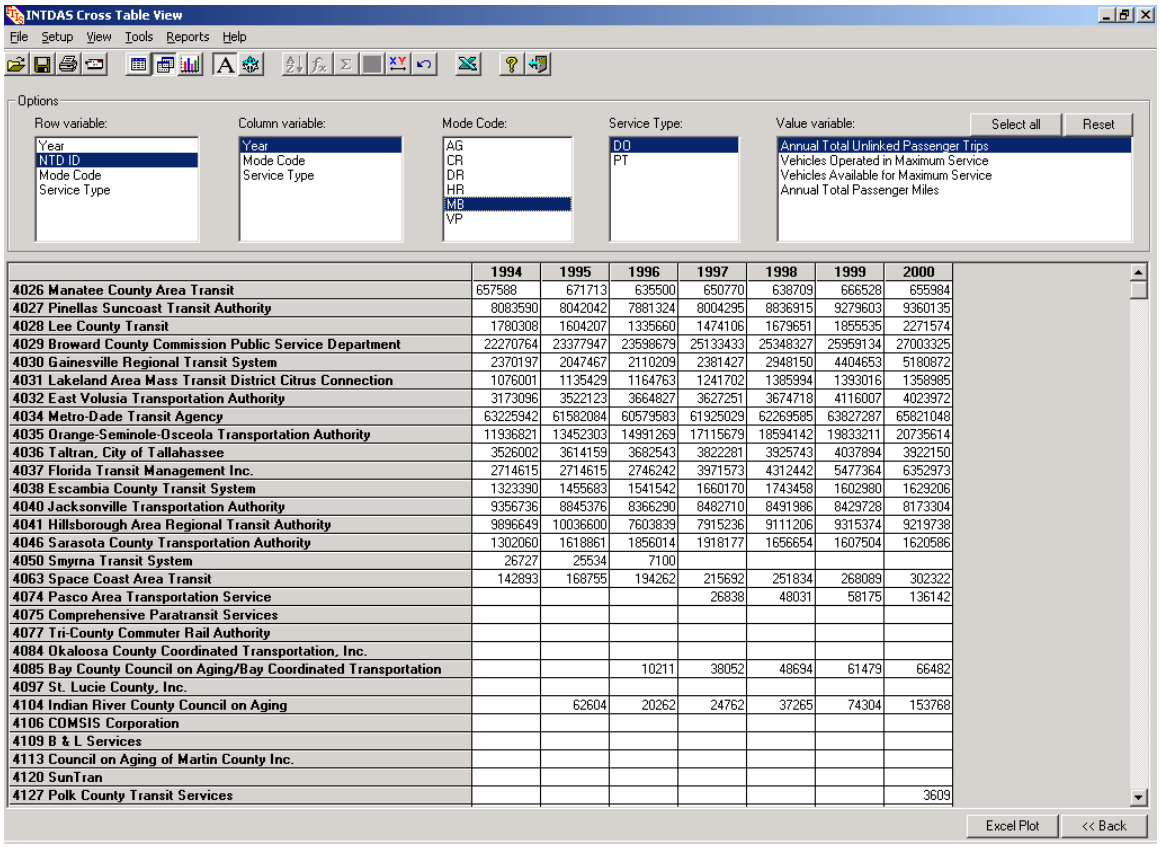
Transferring Tabulated Data

To ease data transfer, INTDAS allows retrieved data to be saved as an Excel file (*.xls) or a comma-delimited file (*.txt). Forms and plots can be saved as a BMP file. With a mouse click, INTDAS automatically activates the default email system and attaches either a data file or a BMP file to the email.

Creating Cross Tables

A cross table allows you to view values cross-classified by two variables at a time. To create a cross table, click the **Cross Table** tool button or select the **View|Cross Table** menu item from the dropdown menu. A screen similar to that in Figure 2-23 will appear.

Figure 2-23: Screen for Creating Cross Tables



	1994	1995	1996	1997	1998	1999	2000
4026 Manatee County Area Transit	657588	671713	635500	650770	638709	666528	655984
4027 Pinellas Suncoast Transit Authority	8083590	8042042	7881324	8004295	8836915	9279603	9360135
4028 Lee County Transit	1780308	1604207	1335660	1474106	1679651	1855535	2271574
4029 Broward County Commission Public Service Department	22270764	23377947	23598679	25133433	25348327	25959134	27003325
4030 Gainesville Regional Transit System	2370197	2047467	2110209	2381427	2948150	4404653	5180872
4031 Lakeland Area Mass Transit District Citrus Connection	1076001	1135429	1164763	1241702	1385994	1393016	1358985
4032 East Volusia Transportation Authority	3173096	3522123	3664827	3627251	3674718	4116007	4023972
4034 Metro-Dade Transit Agency	63225942	61582084	60579583	61925029	62269585	63827287	65821048
4035 Orange-Seminole-Osceola Transportation Authority	11936821	13452303	14991269	17115679	18594142	19833211	20735614
4036 Taltran, City of Tallahassee	3526002	3614159	3682543	3822281	3925743	4037894	3922150
4037 Florida Transit Management Inc.	2714615	2714615	2746242	3971573	4312442	5477364	6352973
4038 Escambia County Transit System	1323390	1455683	1541542	1660170	1743458	1602980	1629206
4040 Jacksonville Transportation Authority	9356736	8845376	8366290	8482710	8491986	8429728	8173304
4041 Hillsborough Area Regional Transit Authority	9896649	10036600	7603839	7915236	9111206	9315374	9219738
4046 Sarasota County Transportation Authority	1302060	1618861	1856014	1918177	1656654	1607504	1620586
4050 Smyrna Transit System	26727	25534	7100				
4063 Space Coast Area Transit	142893	168755	194262	215692	251834	268089	302322
4074 Pasco Area Transportation Service				26838	48031	58175	136142
4075 Comprehensive Paratransit Services							
4077 Tri-County Commuter Rail Authority							
4084 Okaloosa County Coordinated Transportation, Inc.							
4085 Bay County Council on Aging/Bay Coordinated Transportation			10211	38052	48694	61479	66482
4097 St. Lucie County, Inc.							
4104 Indian River County Council on Aging		62604	20262	24762	37265	74304	153768
4106 COMSIS Corporation							
4109 B & L Services							
4113 Council on Aging of Martin County Inc.							
4120 SunTran							
4127 Polk County Transit Services							3609

The top of the screen shows five list boxes for system and variable selections. The first four list boxes allows you to select each of the four system variables, namely, year, NTD ID, mode code and service type. The last list box lists all the data attributes.

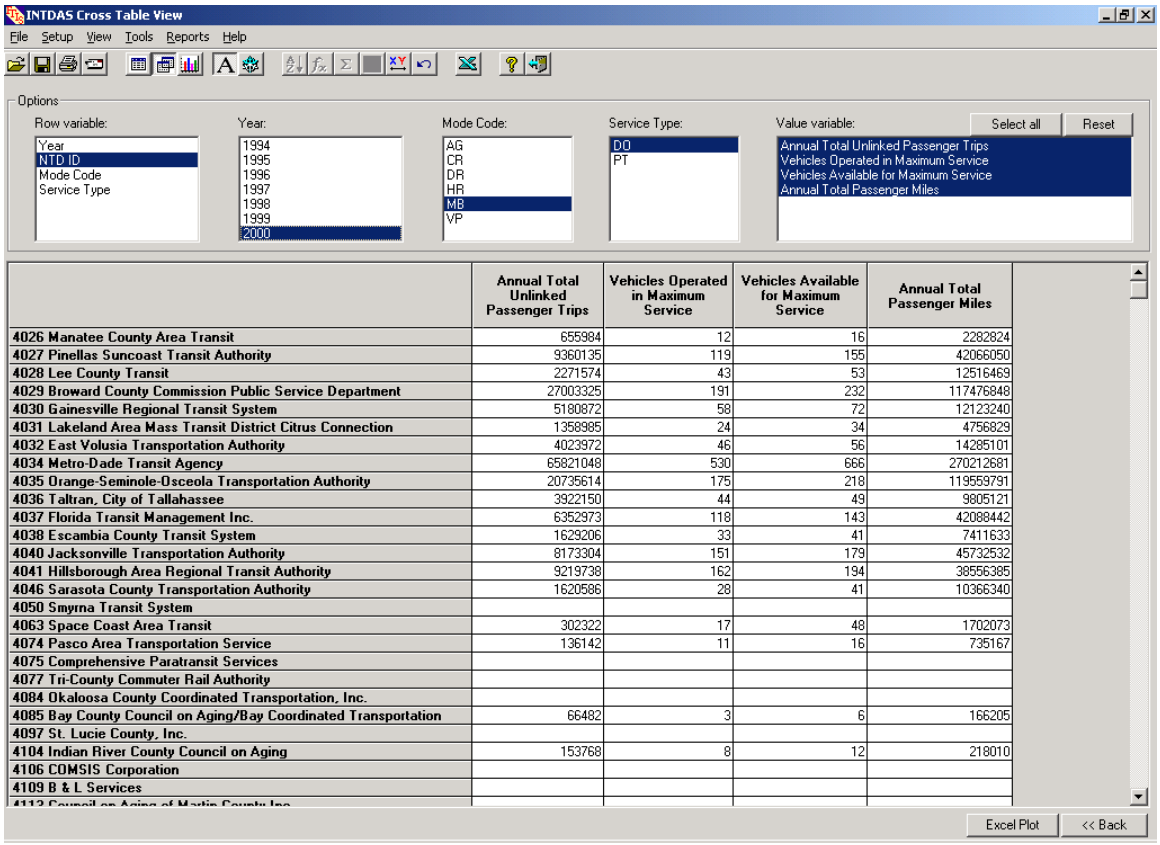
The second half of the screen shows the cross table that displays data cross-classified by two variables at a time. The cross table is updated instantly accordingly to your selections on the five list boxes, which have the following operational characteristics:

- The first two list boxes specify the row and column variables of the cross table. If a variable is selected in one of the two list boxes, it will not be listed in another list box.

- The third and fourth list boxes will list all possible values associated with each of the remaining two system variables. One value must be selected on each of these boxes. The default selection in each of these boxes is the first item on the list.

- One or more attribute variables may be selected on the fifth list box. When more than one data attribute is selected, as is shown in Figure 2-24, the second list box will list the possible values for one of the system variables, rather than list the system variables. The cross table will be cross-classified by the first and fifth list boxes.

Figure 2-24: Cross Table with More Than One Attribute Variable



	Annual Total Unlinked Passenger Trips	Vehicles Operated in Maximum Service	Vehicles Available for Maximum Service	Annual Total Passenger Miles
4026 Manatee County Area Transit	655984	12	16	2282824
4027 Pinellas Suncoast Transit Authority	9360135	119	155	42066050
4028 Lee County Transit	2271574	43	53	12516469
4029 Broward County Commission Public Service Department	27003325	191	232	117476848
4030 Gainesville Regional Transit System	5180872	58	72	12123240
4031 Lakeland Area Mass Transit District Citrus Connection	1358985	24	34	4756829
4032 East Volusia Transportation Authority	4023972	46	56	14285101
4034 Metro-Dade Transit Agency	65821048	530	666	270212681
4035 Orange-Seminole-Osceola Transportation Authority	20735614	175	218	119559791
4036 Taltran, City of Tallahassee	3922150	44	49	9805121
4037 Florida Transit Management Inc.	6352973	118	143	42088442
4038 Escambia County Transit System	1629206	33	41	7411633
4040 Jacksonville Transportation Authority	8173304	151	179	45732532
4041 Hillsborough Area Regional Transit Authority	9219738	162	194	38556385
4046 Sarasota County Transportation Authority	1620586	28	41	10366340
4050 Smyrna Transit System				
4063 Space Coast Area Transit	302322	17	48	1702073
4074 Pasco Area Transportation Service	136142	11	16	735167
4075 Comprehensive Paratransit Services				
4077 Tri-County Commuter Rail Authority				
4084 Okaloosa County Coordinated Transportation, Inc.				
4085 Bay County Council on Aging/Bay Coordinated Transportation	66482	3	6	166205
4097 St. Lucie County, Inc.				
4104 Indian River County Council on Aging	153768	8	12	218010
4106 COMSIS Corporation				
4109 B & L Services				

The following two functions can be applied to a cross table:

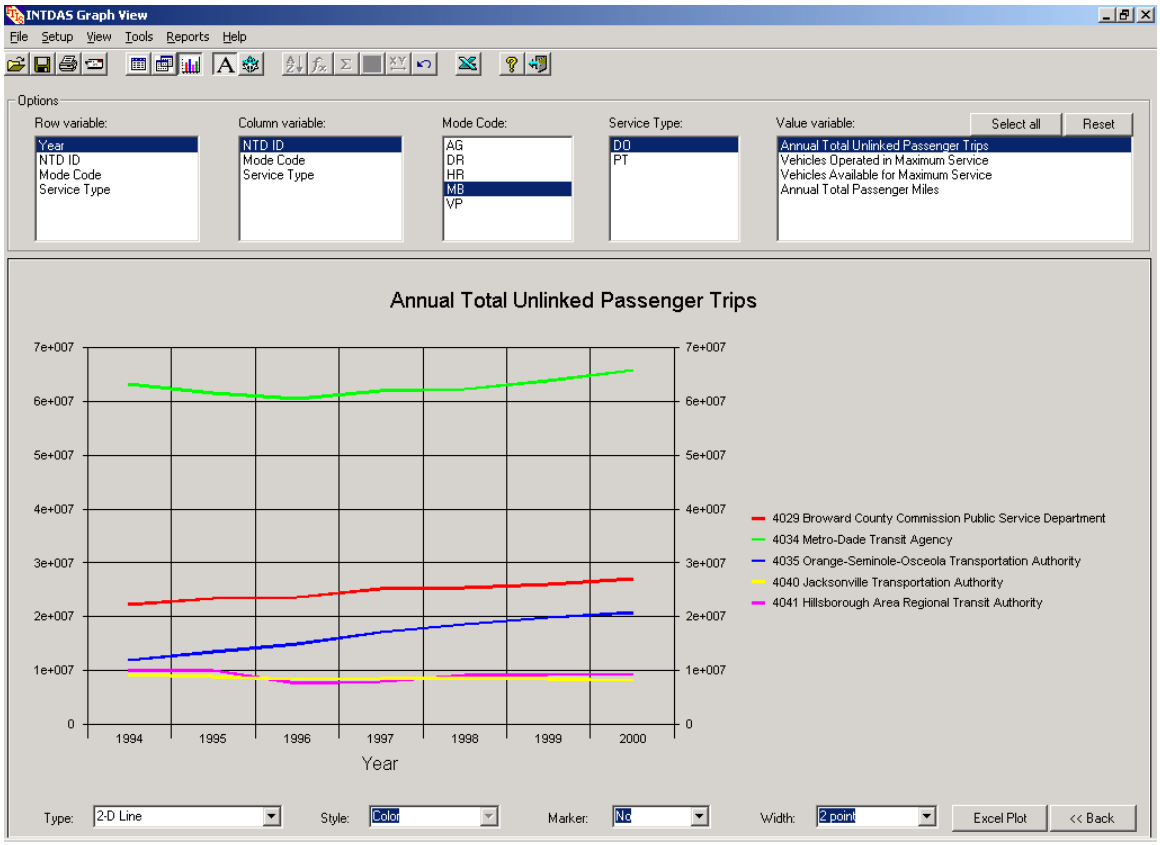
- You may select whether to include the agency name for each NTD ID by applying the **Agency Name** function.

- You may swap the row and column variables quickly by applying the **Swap Row and Column** function.

Plotting Tabulated Data

INTDAS provides an interactive plotting capability in the **Plot** view. The operations of this view are similar to that of the **Cross Table** view. Instead of displaying the data in a cross table, the **Plot** view displays data on a graph. Figure 2-25 shows a screen of the **Plot** view. See **Creating a Cross Table** for a detailed description of the operations.

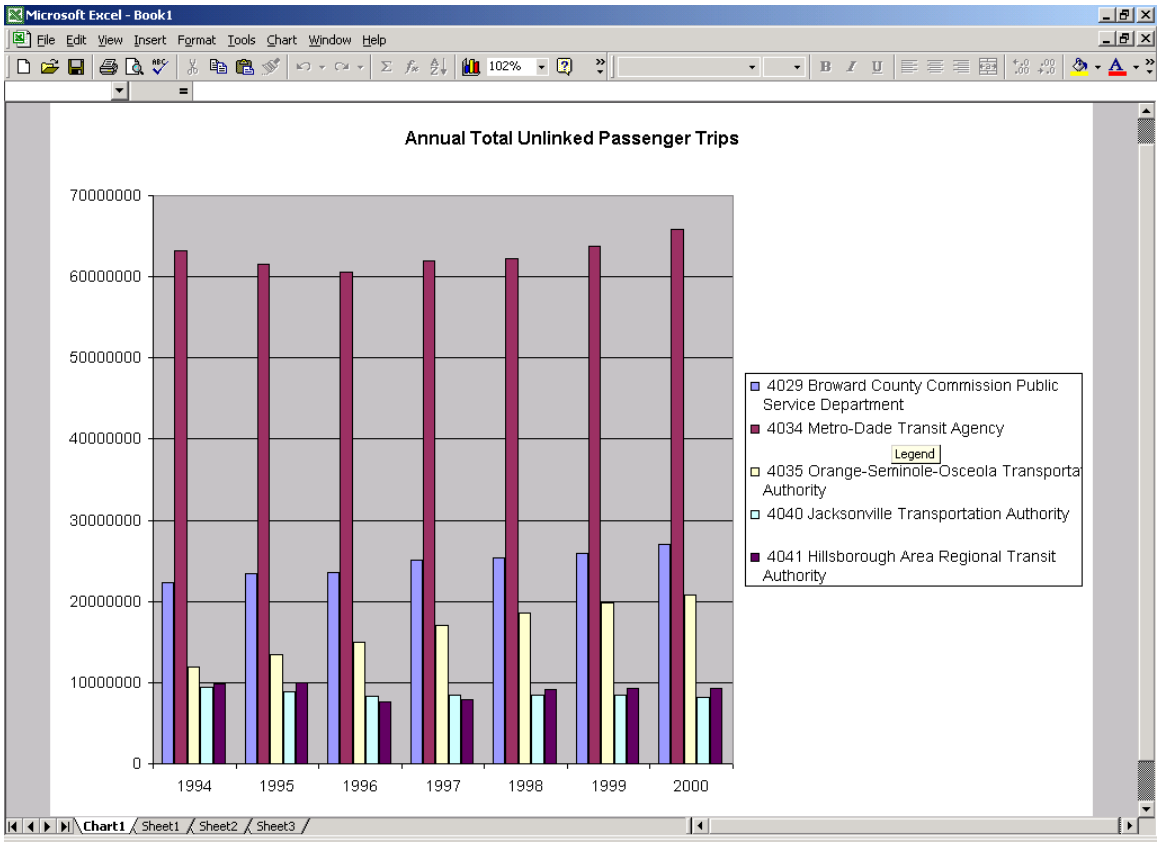
Figure 2-25: INTDAS Plotting Screen



In the **Plot** view, you can customize the color, line width, line type, legend, and label using the dropdown lists at the bottom of the plot. You may also change any of the variables selected on the five list boxes to instantaneously update your plot.

If your computer is installed with MS Excel, you may obtain an equivalent Excel plot by clicking the **Excel Plot** button at the bottom right of the screen. INTDAS will automatically activate Excel, import data into Excel, and then create an Excel plot, as shown in the example screen in Figure 2-26.

Figure 2-26: Excel Plot



What is Florida Peer Selection Process?

The Florida peer selection process attempts to identify comparable transit systems through a point scoring system based on the following eight original or derived variables (or measures):

- Service area population density
- Revenue miles
- Average speed
- Service area population
- Vehicles operated in maximum service
- Passenger trips
- Revenue hours
- Total operating expense

The first three variables are considered primary and the rest are secondary. Under the scoring system, primary variables are given extra points. The performance of each of the potential non-Florida peers is compared to the average of the Florida systems for each of

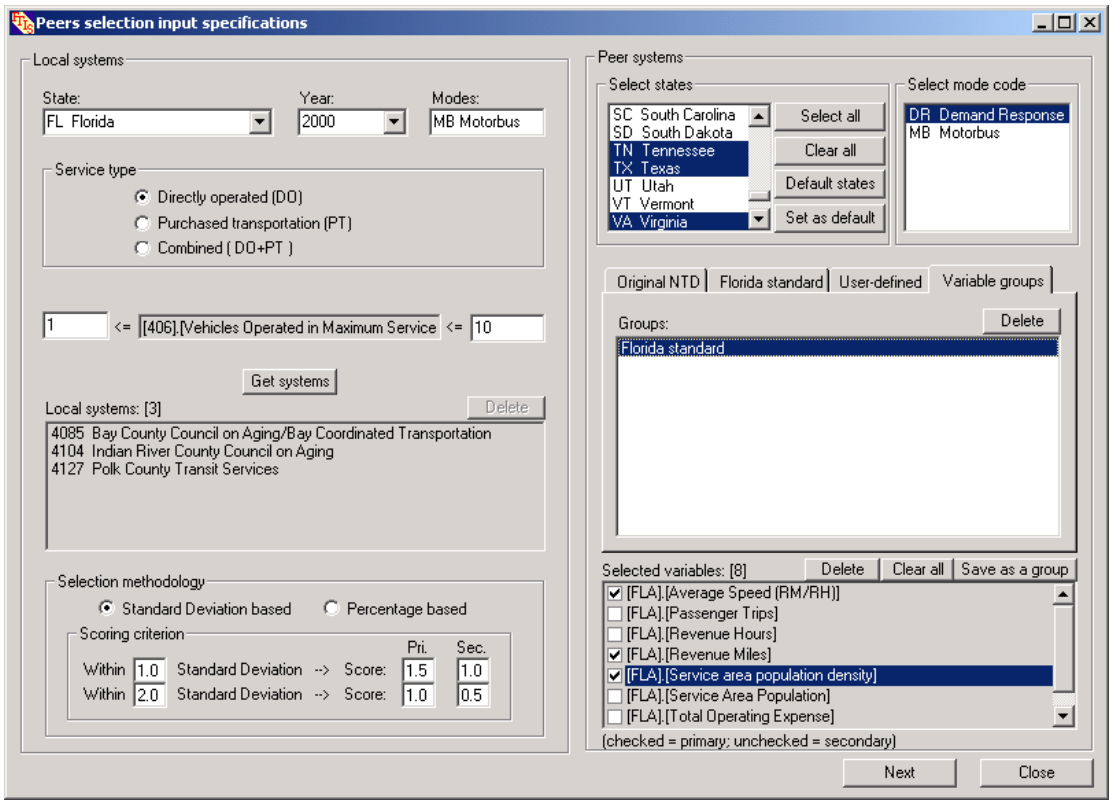
the eight measures. A peer receives one point for each measure for which it is within one standard deviation of the Florida systems' mean. One-half point is given for each measure that fell between one and two standard deviations from the Florida systems' mean.

The scoring system can also be based on percentage rather than standard deviation. In the percentage-based method, a peer receives one point for each measure for which it was within 10 percent of the Florida systems' mean. One-half point is given for each measure that fell between 10 and 15 percent from the Florida systems' mean. In both cases, an extra one-half point is given for each of the three primary measures.

How is Florida Peer System Process Implemented in INTDAS?

Figure 2-27 shows the main interface for the Florida peer selection process.

Figure 2-27: Main Interface for the Florida Peer Selection Process



The steps for setting up a peer group are as follows:

1. Select the state (default is Florida) for which its transit systems (i.e., local) are to be compared with peers from the other states.

2. Enter a range for the local grouping variable to find a group of local transit systems that are of comparable size.

3. Click the **Get Systems** button to find transit systems that satisfy the input conditions.

4. Select a scoring method and the corresponding scores to be assigned to different ranges of standard deviation (or percentage) for both primary and secondary variables.

5. Select one or more peer states. The default peer states are: Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia. You may reset the default peer states by first selecting your desired states and then click the **Set as Default** button.

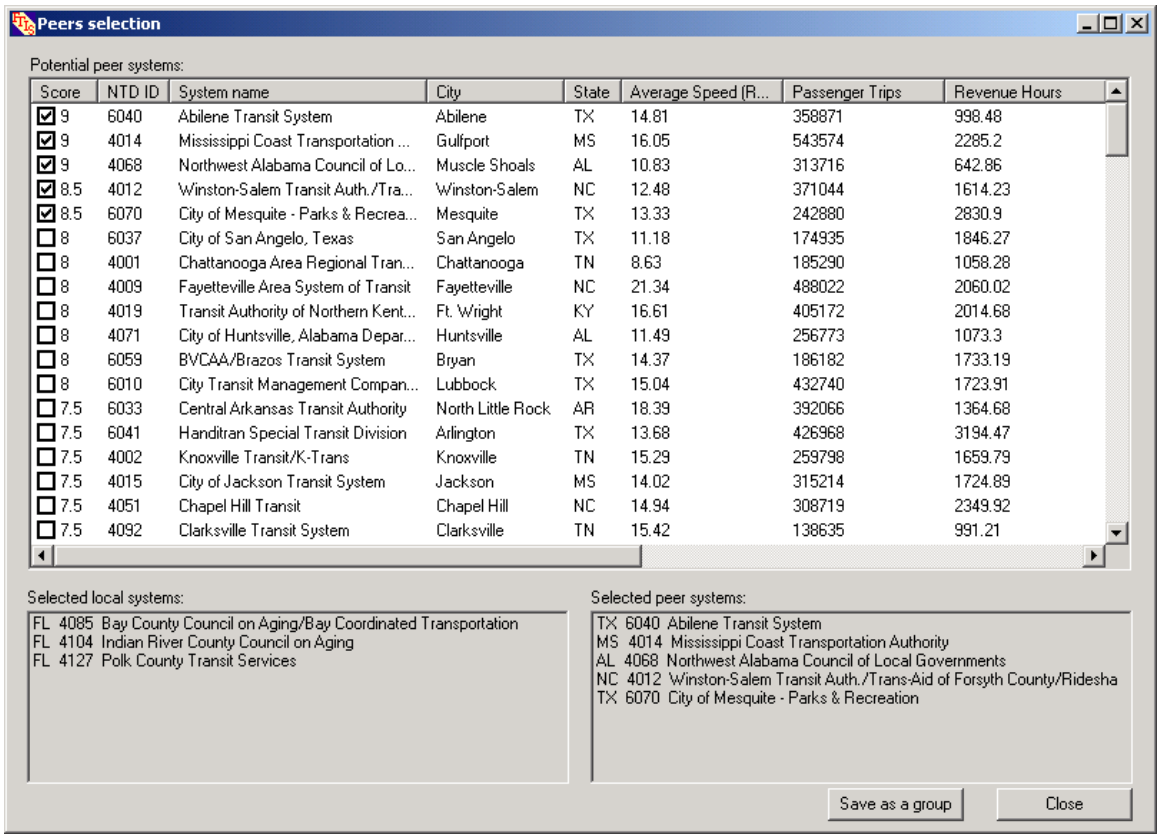
6. Select the mode code(s) that are to be considered. The **Select mode code** list box lists only those modes available for the selected local systems.

7. Select primary and secondary measures from the list of available variables. This is done by first selecting the measures from the lists of variables and then checking the variables that are to be used as the primary variables. Variables that are unchecked are treated as the secondary variables. See the previous section on the difference between the primary and the secondary variables.

8. Click the **Next** button at the bottom of the screen to start the peer selection process. When it is completed, the scores for all potential peers are listed, as shown in Figure 2-28. A high score means that the transit system is similar to the local group of transit systems. Select the top transit systems on the list as peers by clicking the corresponding checkboxes. As shown in Figure 2-28, the selected local and peer systems are listed on the two list boxes on the lower half of the screen, respectively. The selected systems can then be saved as a peer group and retrieved as a group.

A "wizard" option of the same peer selection process is also available. It is accessible from the Setup|Peer Groups (Wizard) dropdown menu item. This option takes the user through the selection process step-by-step, with instructions provided for each step. The multiple screens associated with this option perform the very same steps described above.

Figure 2-28: List of Ranked Potential Peers for Selection



(This page left blank intentionally)

FTGIS

FTGIS (**F**lorida **T**ransit **G**eographic **I**nformation **S**ystems) is a stand-alone GIS component developed using the MapObjects 2.0 library of the ESRI. It is designed to completely replace the previous version of FTGIS developed by the Center for Urban Transportation Research (CUTR). As with the previous version, this version is customized for easy access to several GIS shape files that come with FTGIS for Florida's transit systems. FTGIS includes functions ranging from the very basic zoom-in and zoom-out operations to the highly customized buffer zone analysis.

Why FTGIS?

The transit industry has been a major user of GIS because transit facilities and planning information are highly spatial oriented. Good examples of GIS applications by the transit industry include service planning, service evaluation, bus stop inventory, etc. FTGIS serves as a common repository for spatial data important for transit planning. The stand-alone nature of FTGIS provides the users access to a customized GIS system without an expensive commercial GIS system installed in their computer. Because FTGIS is developed at the source-code level with the aid of a GIS library, it has the flexibility of being tailored for specific application needs.

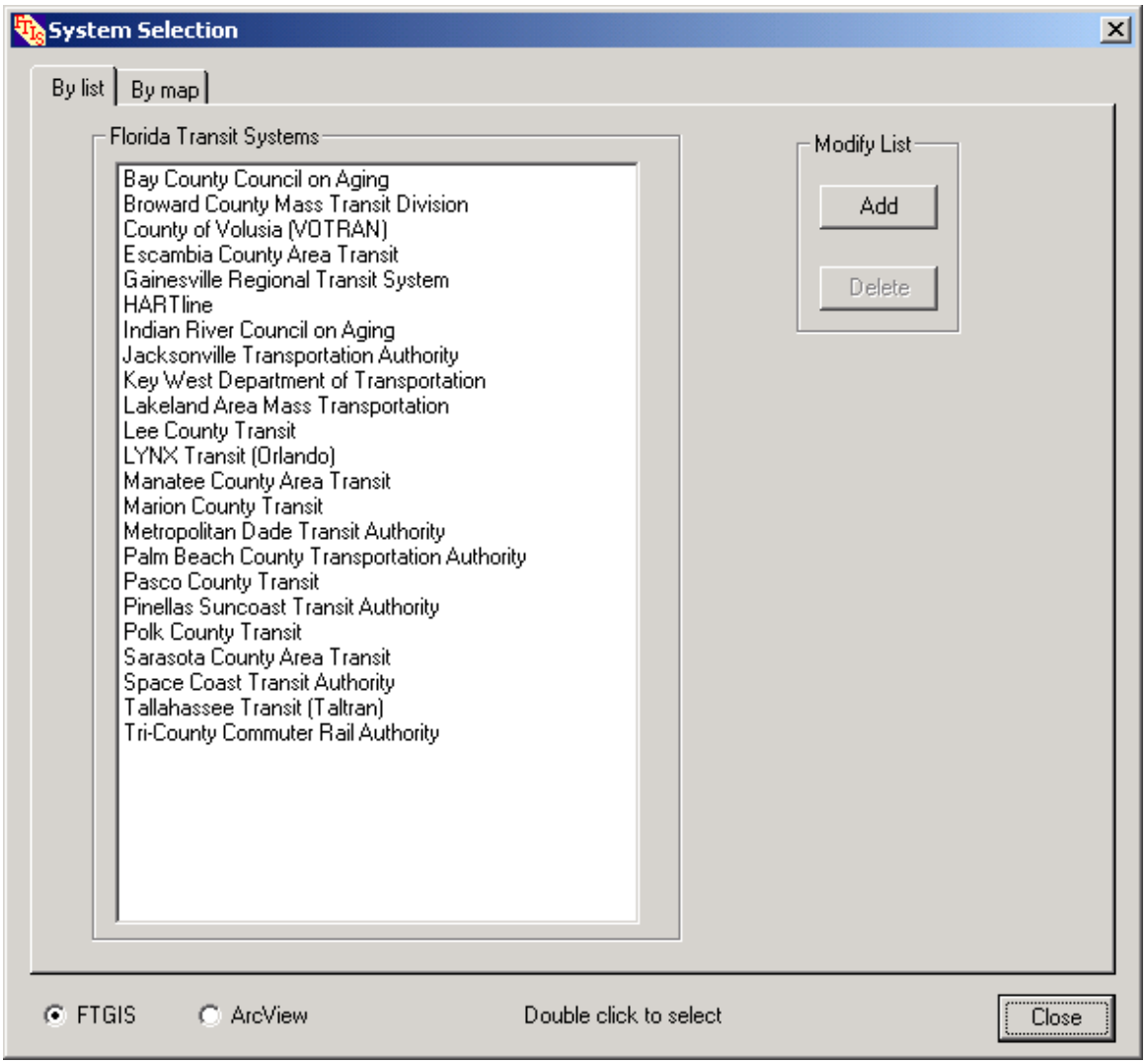
Getting Started

FTGIS is accessible from the **FTIS Main Menu** screen. Clicking the **FTGIS** button on the **FTIS Main Menu** will invoke the screen shown in Figure 3-1.

- The first tab lists the transit systems for which GIS data are currently available. Double-click a list item to select a transit system and enter the GIS interface.

- The second tab allows you to identify and select a transit system by a map shown in Figure 3-2. Each point on the map corresponds to an urban area where a transit system is located. Double click a city to select a transit system and enter the GIS interface.

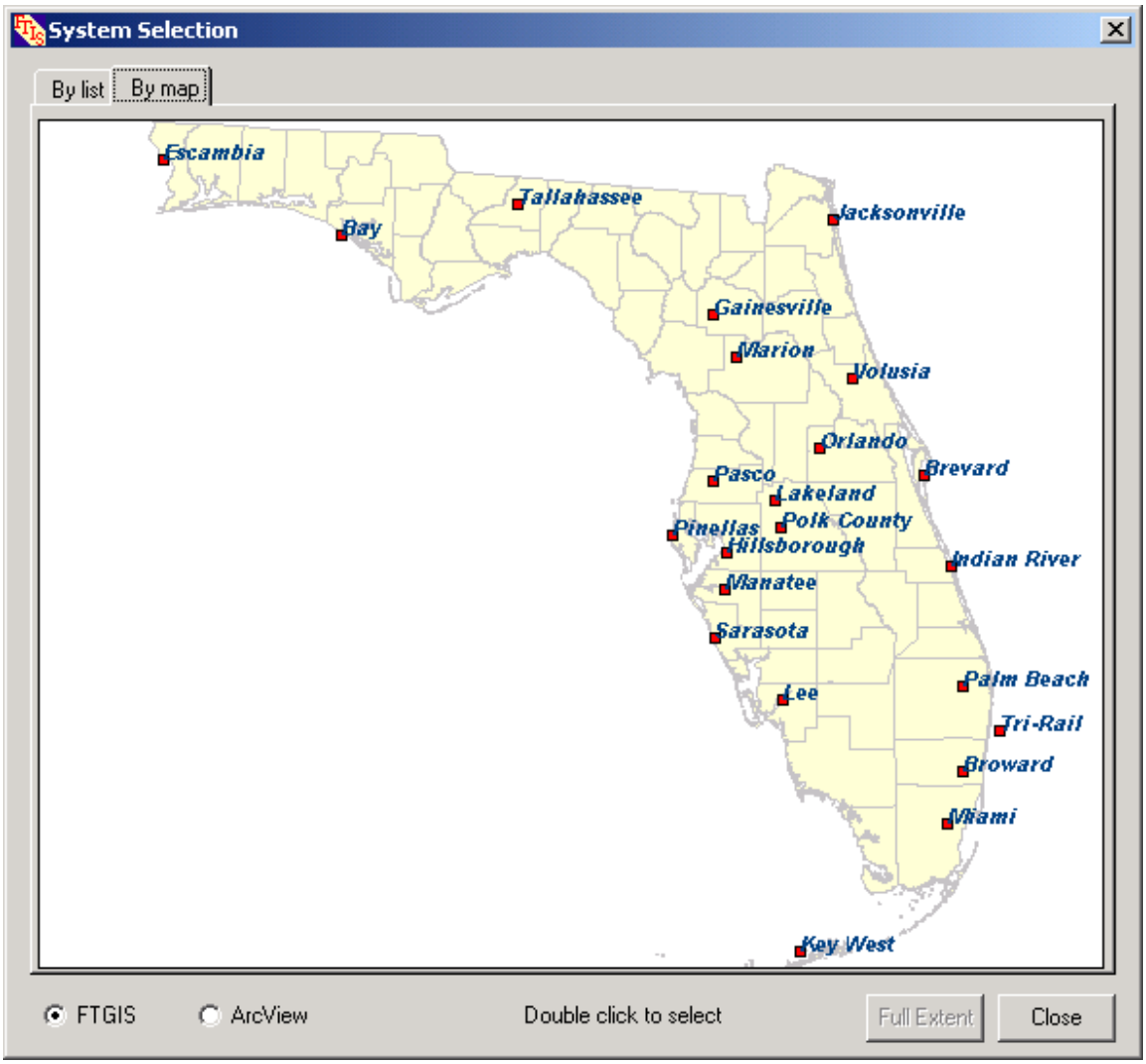
Figure 3-1: Screen for Selecting a Transit System by List



FTIS provides direct access to two GIS systems: FTGIS and ArcView. The selection is made at the bottom of the screen. The radio button for ArcVirew is active only if your computer is installed with ArcView. The default GIS interface is FTGIS. If, for any reason, you either prefer or need to use ArcView, you can simply select the ArcView option as the interface you want to launch. Refer to ArcView manuals for instructions on how to use ArcView.

As shown in Figure 3-1, the **System Selection by List** option also allows the list to be modified to either add a new transit system or delete an existing one. Note that update to the list does not automatically update the **System Selection by Map** option. In other words, any new systems you added can only be accessed by the **By list** option.

Figure 3-2: Screen for Selecting a Transit System by Map



FTGIS Functions

FTGIS currently supports the following GIS functions:

- ✓ **Map Viewing.** It allows maps to be zoomed in, zoomed out, panned, zoomed to the extent of all layers, and zoomed to the extent of the current layer.

- ✓ **Map and Layer Properties.** It allows customized map background color, line color, line width, and line style.

- ✓ **Map Legend.** It includes an ArcView-like map legend, which allows the users to choose which layers to display and in what order the layers are to be displayed.

- ✓ **Map Labeling.** It includes a set of functions to display labels based on a selected variable. The user can change the text color, font type, font size, location, and style.

- ✓ **Map Queries.** It includes the usual **Identity** function to retrieve data for a specific spatial unit and a **Find** function to search for spatial units containing a search text.

- ✓ **Map Select.** It allows the users to select spatial units by point, line, circle, rectangle, and polygon. Selected items can be saved to a new data layer.

- ✓ **Thematic Map.** It includes a set of functions for creating different thematic maps.

- ✓ **Map Charting.** It allows the users to create pie and bar charts on the map based on one or more data attributes.

- ✓ **Map Graphics.** It allows the users to add texts, lines, points, circles, rectangles, and ellipses to the map.

- ✓ **Map Editing.** It allows the users to edit point and line shapes. The editing functions include delete a line or a point, move a line or a point, and insert a point.

- ✓ **Data Editing:** It allows the users to modify the data for a selected feature.

- ✓ **Buffer Zone Analysis.** It allows the users to perform buffer zone analysis for either selected features of a layer or for a whole layer.

- ✓ **Image Background.** It allows display of aerial photographs as the background.

- ✓ **Table.** It allows the user to view the tabulated data for all records or selected records only. Selected data can be exported to an Excel or a text file.

- ✓ **Miscellaneous other features.** Other features include map tips, map printing, add or delete a layer, etc.

GIS Data Included

FTGIS currently includes the ArcView shapefiles for the following layers:

- ✓ Street
- ✓ Transit route
- ✓ Bus stop
- ✓ Census tract
- ✓ Census blockgroup
- ✓ Census block
- ✓ Census Traffic Analysis Zone

Table 3-1 gives the attributes that are currently included in all the census layers.

Table 3-1: Available Attributes in Census Layers

Attribute Name	Description
TOTAL_POP	Total population
WHITE	Total White population
BLACK	Total Black or African American population
INDI_ALASK	Total American Indian and Alaska Native population
ASIAN	Total Asian population
PACIFIC	Total Native Hawaiian and Other Pacific Islander population
OTHER_RACE	Total population of some other race
MIXED_RACE	Population of two or more races
HISPANIC	Total population of Hispanic or Latino origin
MALE	Total male population
FEMALE	Total female population
AGE_0_4	Number of persons between 0 and 4 years old
AGE_5_9	Number of persons between 5 and 9 years old
AGE_10_14	Number of persons between 10 and 14 years old
AGE_15_17	Number of persons between 15 and 17 years old
AGE_18_19	Number of persons between 18 and 19 years old
AGE_20_24	Number of persons between 20 and 24 years old
AGE_25_29	Number of persons between 25 and 29 years old
AGE_30_39	Number of persons between 30 and 39 years old
AGE_40_49	Number of persons between 40 and 49 years old
AGE_50_59	Number of persons between 50 and 59 years old
AGE_60_69	Number of persons between 60 and 69 years old
AGE_70_79	Number of persons between 70 and 79 years old
AGE80_OVER	Number of persons 80 or above years old
MEDIAN_AGE	Median age
HOUSE_UNIT	Total number of housing units
OCPIED_HU	Number of occupied housing units
VACENT_HU	Number of vacant housing units
OWNER_HU	Number of housing units occupied by owners
RENTER_HU	Number of housing units occupied by renters
TOTAL_HH	Total number of households
HH_W1_PERS	Households with one person
HH_W2_PERS	Households with two persons
HH_W3_PERS	Households with three persons
HH_W4_PERS	Households with four persons
HH_W5_PERS	Households with five persons
HH_W6_PERS	Households with six persons
HH_W7_PERS	Households with seven or more persons
AV_HH_SIZE	Average household size

Notes:

- *Unless specified otherwise, the data are updated to the year 2000 or later.*
- *The street layers were developed based on the 2000 TIGER/Line files.*
- *The route layers were either obtained directly from the transit agencies or were updated from the old route layers using hardcopy route maps provided by transit agencies.*
- *Only a few up-to-date bus stop layers have been obtained from transit agencies. Stops layers that have not been updated are labeled "old" as part of the shapefile name.*
- *The census tract, blockgroup, block, and TAZ data were developed based on the 2000 TIGER/Line files and the 2000 Census. The TAZ layers are available for only those urban areas that submitted the TAZ-census equivalency tables to the Census Bureau for inclusion in the 2000 Census.*

In addition to the census data, aerial photographs are included for the following transit systems: Broward County Transit, Miami Dade Transit, Tallahassee Transit, and Palm Beach County Transportation Authority.

Map Legend, Map View, and Table View

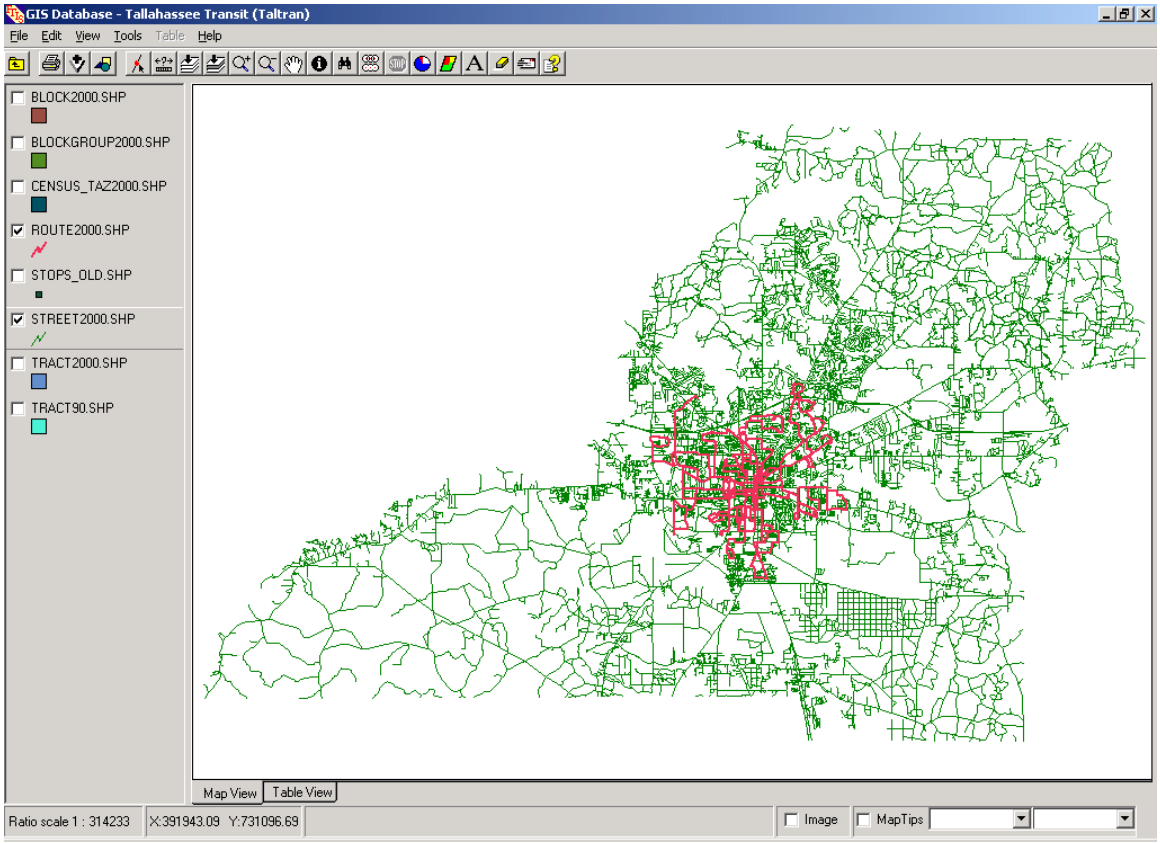
Once you have double-clicked to select a transit system and you have selected FTGIS as your GIS interface, you will enter the FTGIS main screen. All available layers for the selected systems will be automatically loaded. The Street and the Route layers are automatically displayed. By default, the Route layer is displayed on top of the Street layer and has a thicker line width. The viewing area of the screen is made up of map legend on the left and the map view on the right, as shown in Figure 3-3.

The map legend lists all of the available GIS layers by their shapefile names for the selected transit system. In front of each shapefile name (i.e., a layer), a check box allows you to choose the layers you want to display in the map view.

Notes:

- *The layers with their box checked are displayed in the map view in the same order as listed in the map legend.*
- *To reorder the map layers, for example, to display a route layer above the street layer, drag the route layer in the map legend to a location above the street layer.*

Figure 3-3: FTGIS Map Legend and Map Viewing Areas

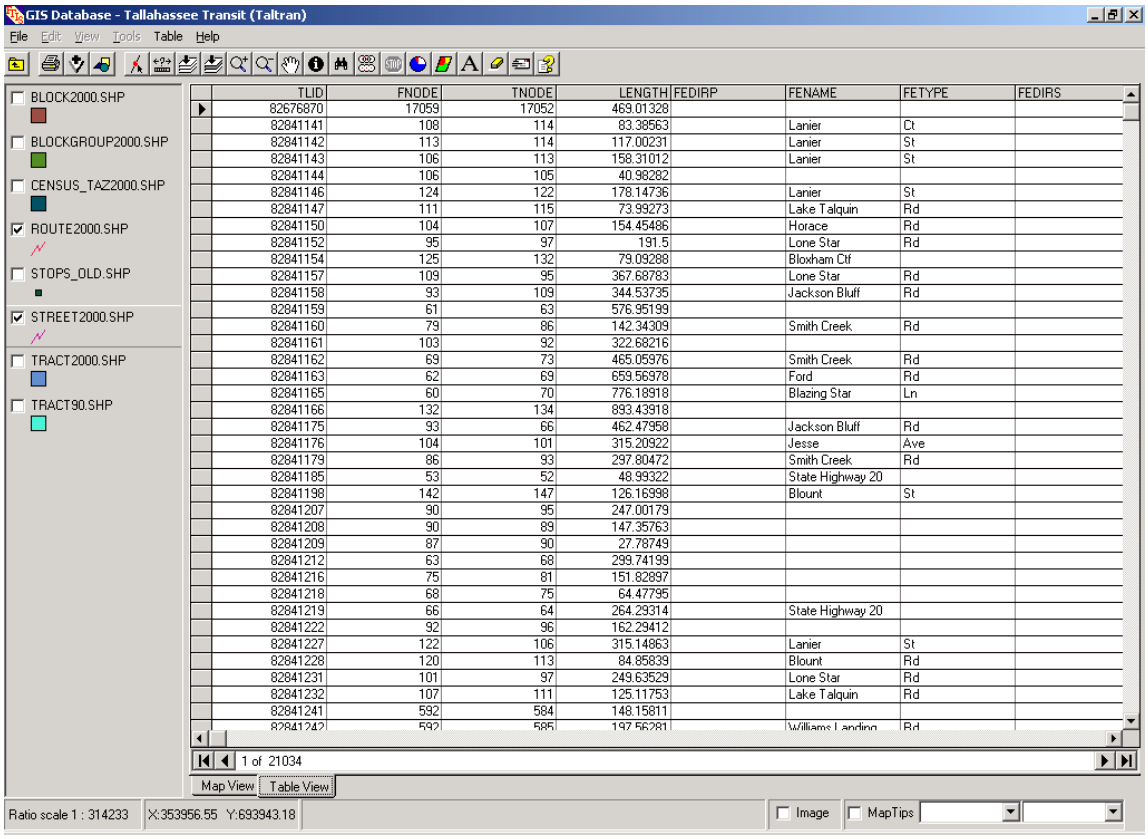


Out of all the available layers, there is always a "current" layer, referred to as the active layer. *The active layer is one that is highlighted with a raised bar in the legend*. Many FTGIS functions are automatically assumed to apply to the active layer.

The **Map** view on the right occupies the first of the two tabs, which are accessible from the bottom of the view. The second tab is for the **Table** view. Figure 3-4 shows an example of a table view. You may switch from one tab to another by clicking the tab.

The **Table** tab will always display the data table for the active layer. You can switch from one table to another by clicking a new layer (i.e., reset the active layer) in the legend. The **Table** dropdown menu allows you to select whether to display all records or selected records only. You can save the displayed records as either an Excel file or a comma-delimited text file by selecting the **File|Save into a File** dropdown menu item.

Figure 3-4: FTGIS Table Viewing Area

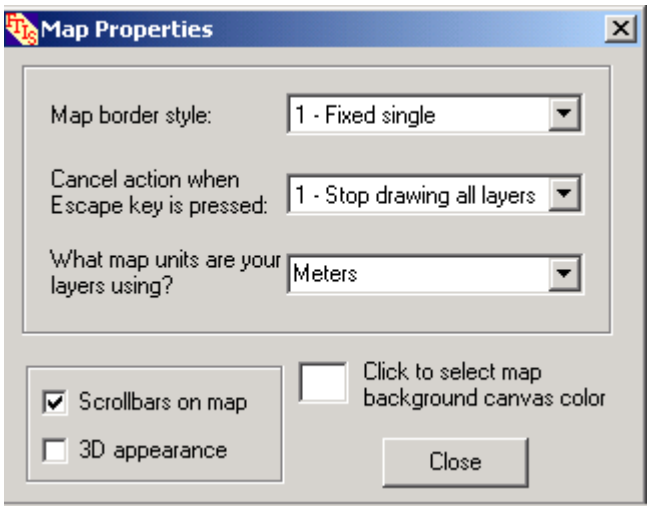


Map Properties

The **Map Properties** screen, as shown in Figure 3-5, allows you to set the properties of the **Map** view. To access the **Map Properties** screen, select **View|Map Properties** from the dropdown menu. The screen allows you to select:

- whether to have a map border for the map view,
- whether you want the Escape key to take no action, stop drawing all layers, or stop drawing the active layer,
- whether you want to have scrollbars on your map view,
- whether you want to have depressed map view to create a 3D appearance, and
- the color of your map background (the default is plain white).

Figure 3-5: Map Properties Screen



Layer Properties

The **Layer Properties** screen allows you to set the appearance of a specific layer for display. Depending on the shapefile type (point, line, or polygon), the property items are slightly different. Figures 3-6, 3-7, and 3-8 show the property setting screens for point, line, and polygon layers, respectively. Settings for point layers include point color, style, and size. Settings for line layers include line color, style, and width. Settings for polygon layers include polygon outline (or border) color, outline width, fill color, and fill style.

The operations for the three screens are similar. For example, to invoke this screen for a point layer and make changes to the settings:

- Double-click the target layer in the legend or select the **View|Layer Properties** dropdown menu item. The listed layer is the active layer and cannot be changed while you are on the screen.
- Click the **Marker Color** box to invoke the screen in Figure 3-9 to change to a different feature color. Color a color grid and then click **OK** to select a color.
- Click the **Style** dropdown list to define a shape for feature display.
- Click the spinner button to set the line width.
- Click **Apply** to preview the results of your selections.
- Click **OK** to retain changes and exit the screen or click **Cancel** to exit without changes.

Figure 3-6: Screen for Setting Point Layer Properties

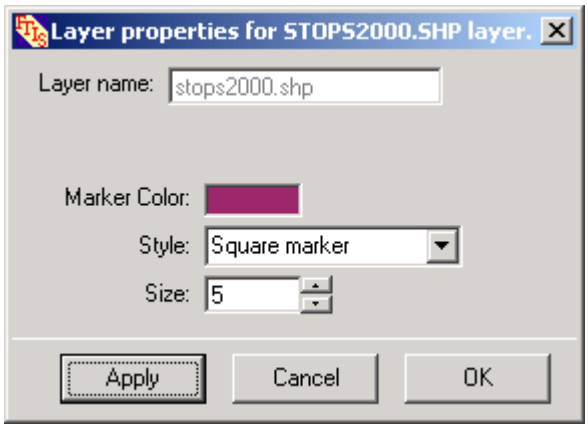


Figure 3-7: Screen for Setting Line Layer Properties

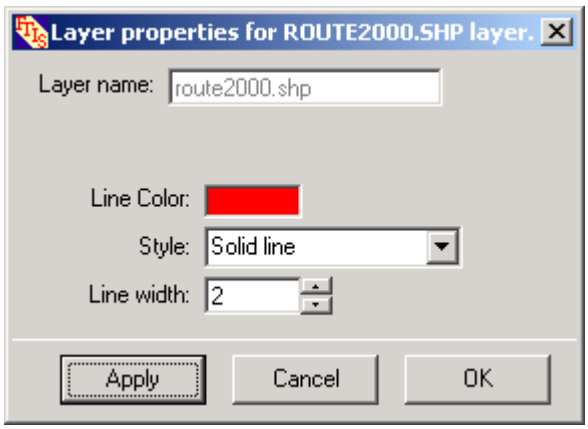


Figure 3-8: Screen for Setting Polygon Layer Properties

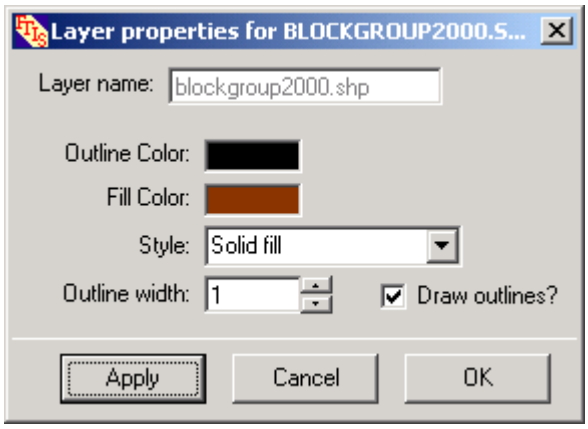
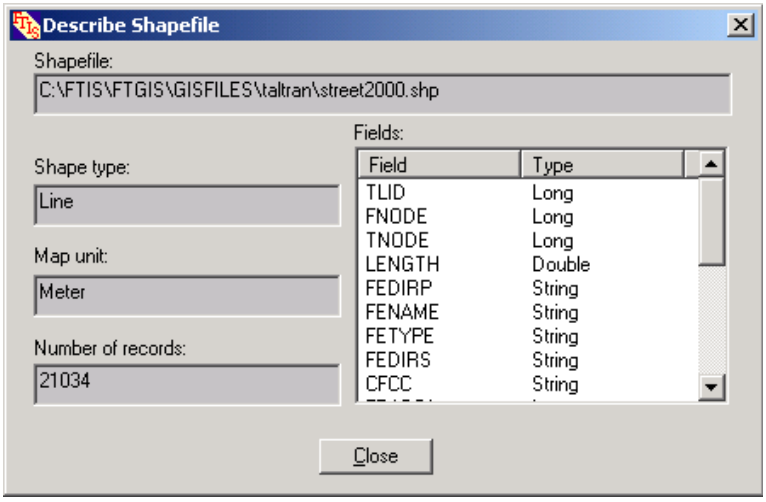


Figure 3-9: Screen for Defining a Layer Color

Describe Layer

Figure 3-10 shows the screen that gives the basic information for a layer, including the file path to shapefile, shape type, map units, number of records, and data fields and associated data type. The screen is accessible from the **View|Describe Layer** dropdown menu item.

Figure 3-10: Screen for Describing a Layer



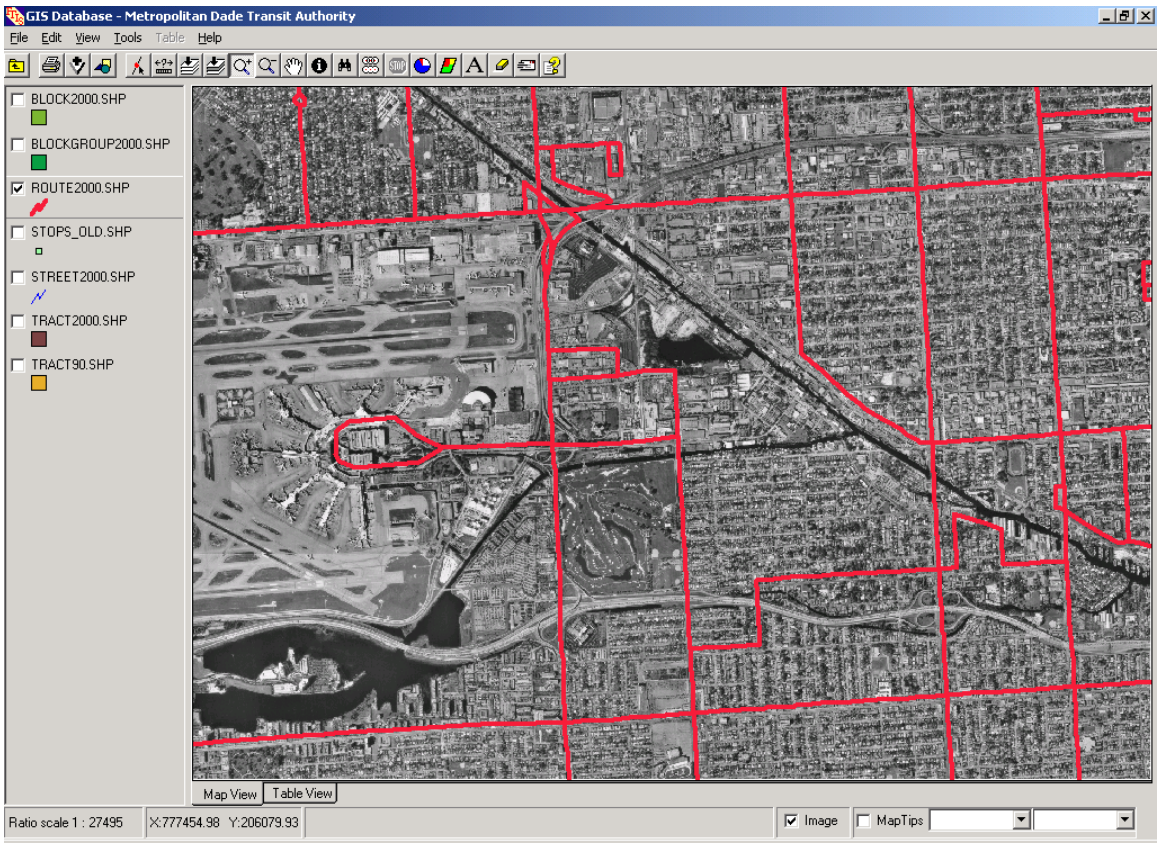
Remove Active or All Layers

If, for any reason, you want to remove the active layer or all the loaded layers, you may select the **View|Remove Active Layer** or **View|Remove All Layers** dropdown menu item, respectively.

Image Background

FTGIS allows you to display aerial images in the map background. Figure 3-11 shows an example of an image background. To display images, click the **Image** checkbox at the bottom-right corner of the main screen. To remove images, simple uncheck the checkbox. The checkbox is active only if image files are found in the file folder for the selected transit system. To view information related to the image files, select the **View|Image Documentation** dropdown menu item.

Figure 3-11: Image Background



Note: *When images are displayed, the vertical and horizontal bars of the map window are not available.*

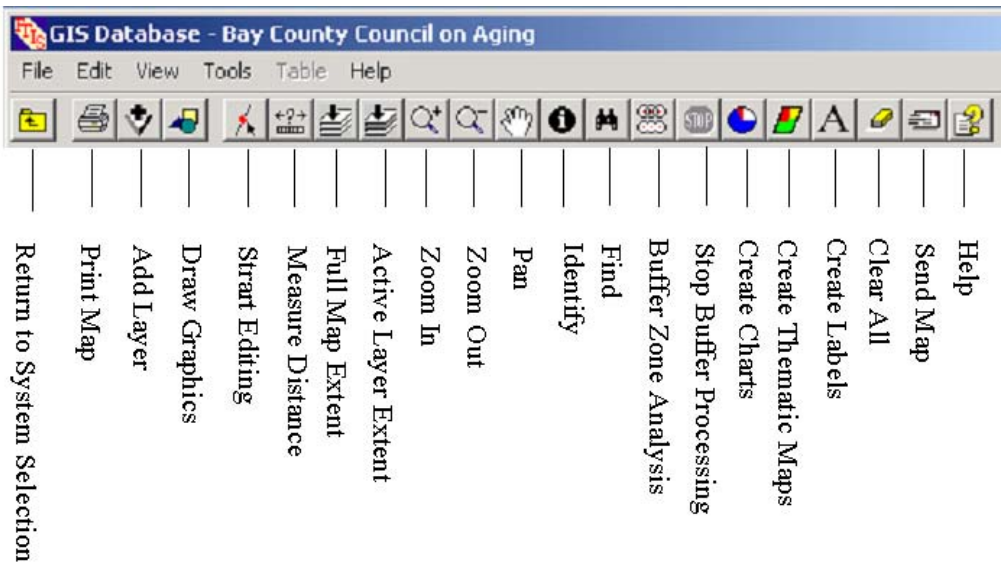
Change Feature Color at Mouse Cursor

You can have the color of the feature at the mouse cursor change to a different color to highlight the feature. To activate this function, select the **View|Change Feature Color at Mouse Cursor** dropdown menu item. The default is not to have the color changed.

Toolbar Commands

The common commands in FTGIS are implemented in a toolbar in the main screen. Placing your mouse cursor across a button will reveal a tooltip for the button. The commands in the FTGIS toolbar are shown in Figure 3-12.

Figure 3-12: FTGIS Toolbar



- **Return to System Selection** allows you to return to the **System Selection** screen (see Figures 3-1 and 3-2) to switch to another transit system.
- **Print Map** allows you to print the current map view to your default printer.
- **Add Layer** allows you to add a new layer.
- **Graphics** allows you to invoke the graphics toolbar to write text and draw geometric features on the tacking layer.
- **Start Editing** allows you to invoke the editing toolbar to start editing the active layer.

- **Measure Distance** allows you to draw one or more connected line segments and measure the distance between the starting and ending points.

- **Map Full extent** allows you to change the map extent in the map view to include all features in all map layers

- **Active Layer Extent** allows you to change the map extent to that of the active layer.

- **Zoom In** allows you to change the map extent to span two points that you set by dragging the mouse in the map view.

- **Zoom Out** allows you to decrease the map scale by a factor of two, centered on a point you click with the mouse.

- **Pan** allows you to change the map extent of the map view by dragging the mouse from one point to another.

- **Identify** allows you to identify features at or near where you click with the mouse.

- **Find** allows you to invoke the **Find Features** screen, which allows you to locate features by matching attribute values.

- **Buffer Zone Analysis** allows you to invoke the steps for performing buffer zone analysis.

- **Stop Processing** allows you to stop the buffer zone processing.

- **Draw Charts** allows you to invoke the **Draw Charts** screen to draw pie or bar charts for the active layer.

- **Thematic Maps** allows you to invoke the **Thematic Maps** screen to create thematic maps based on attribute values of the active layer.

- **Label** allows you to invoke the Label screen to add label based on attribute values of the active layer.

- **Clear All** allows you to clear all graphics, themes, charts, and labels.

- **Send Map** allows you to email a screen capture of the current map view as a file attachment.

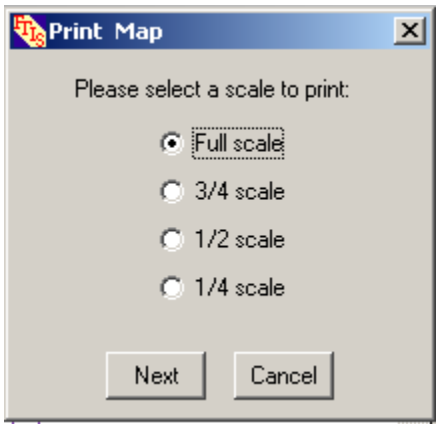
- **Help** allows you to access the FTGIS online help.

The following sections provide additional details for some of these functions.

Map Printing

To print your map shown in the map view, you click the **Print Map** tool button or select the **File|Print...** dropdown menu item to invoke the screen shown in Figure 3-13. The screen will ask you to select a scale to print. For example, 1/2 scale will print to your map to cover half of the page. The default is full scale and will print to cover the full page. After you have selected a print scale, click **Next** to invoke the standard Windows print screen, which allows you make additional selections, including printer, paper orientation, and number of copies. Click **Print** to start printing.

Figure 3-13: Screen for Map Printing



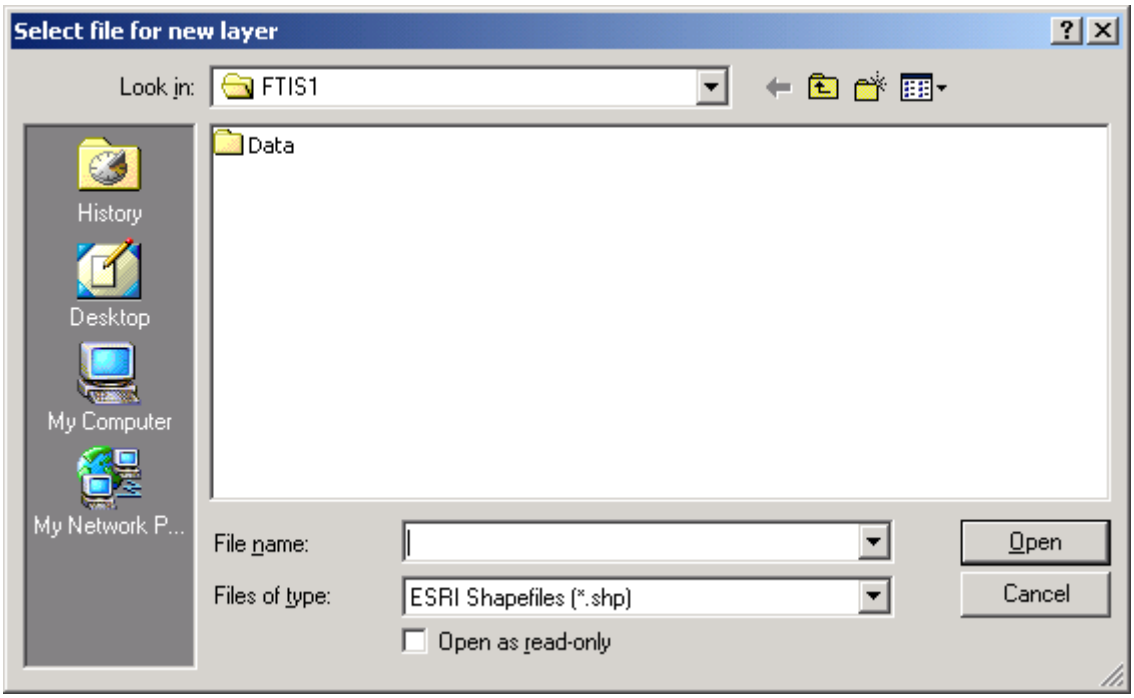
Add Layer

The **Add Layer** function allows you to add a layer or an image file. You may add any files with any of the following extensions:

- ESRI Shapefiles (*.shp)
- ESRI Coverages (*.adf, *.tat, *.pat, *.rat)
- GRID (hdr.adf)
- CAD drawings (*.dwg, *.def)
- VPF (*.pft, *.lat, *.aft, *.tft)
- Standard and military image formats

Figure 3-14 shows the screen for finding and selecting a layer of a particular file type. It is invoked from the **Add Layer** tool button or the **File|Add Layer** dropdown menu item.

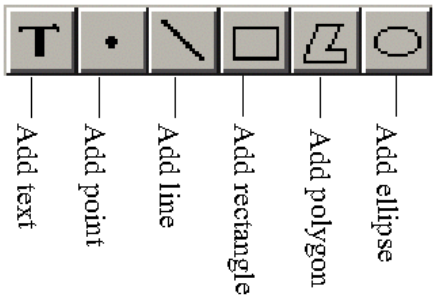
Figure 3-14: Screen for Adding a Layer



Graphics

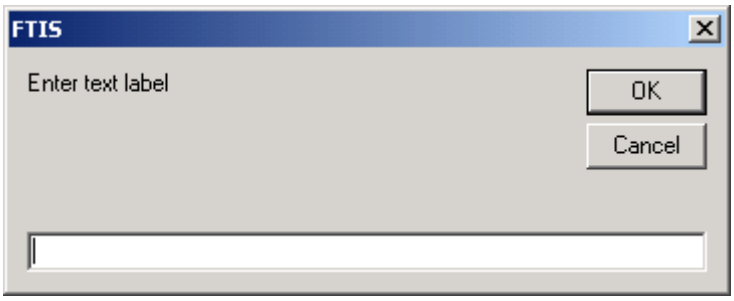
The **Graphics** function allows you to draw the following graphics on the map view: texts, points, lines, rectangles, polygons, and ellipses. Clicking the **Graphics** tool button or selecting the **Edit|Draw Graphics** dropdown menu item will activate the tool buttons shown in Figure 3-15 for drawing each of the graphics.

Figure 3-15: Tool Buttons for Drawing Graphics



To add text, click the first tool button in Figure 3-15, move your mouse cursor to the desired map location, and then left click. The screen shown in Figure 3-16 will pop up. Enter the text label and then click **OK**.

Figure 3-16: Screen for Specifying Text Label



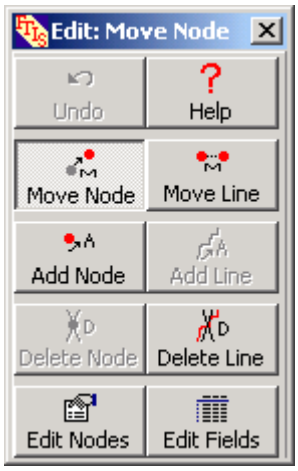
To draw a point, click at the desired location for the point. To draw a line, a rectangle, a polygon, or an ellipse, point your mouse cursor at the desired start location, hold down your left mouse button, drag your mouse cursor to the desired end location, and then release the left mouse button.

Map Editing

The map editing function allows you to edit an existing feature, add a new feature by drawing with the mouse, or select features from another layer and add them to the current layer. This version only allows point and line layers to be edited. To start editing:

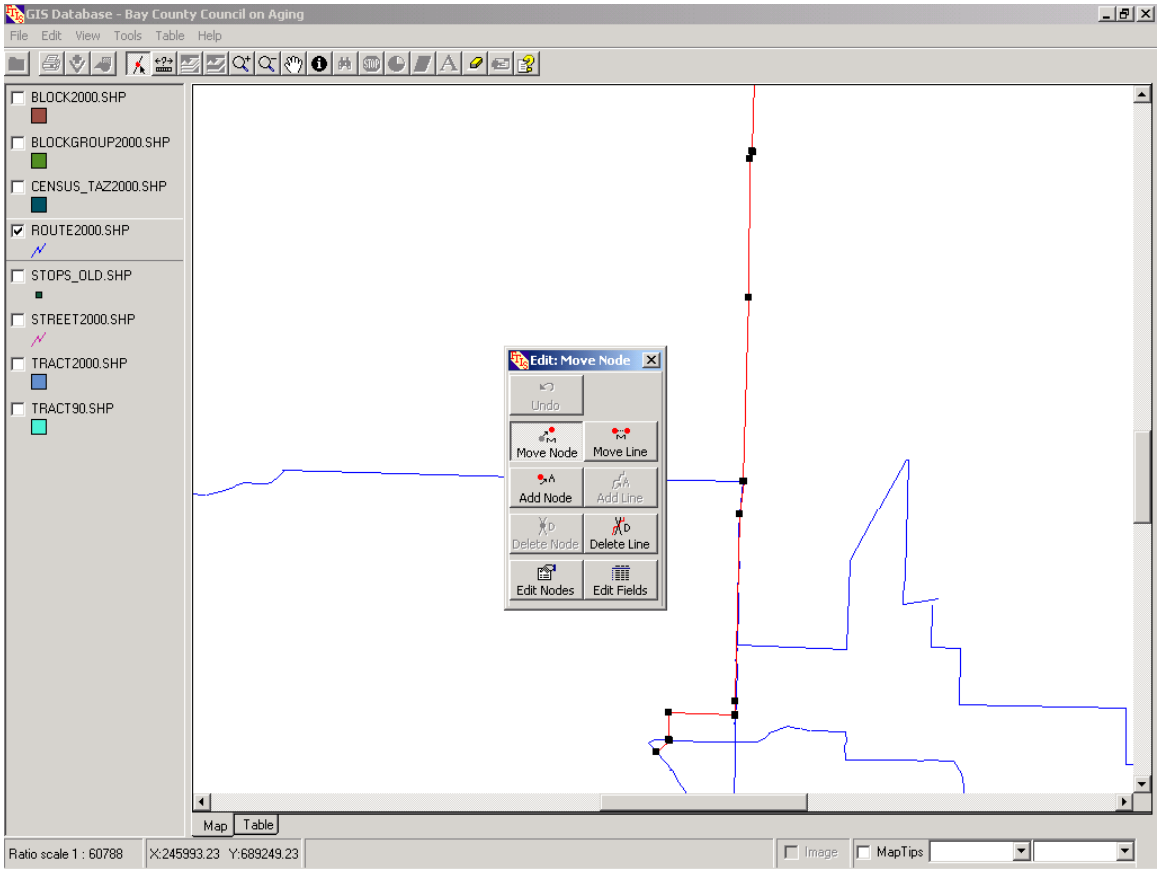
- Click the **Start Editing** tool button or select the **Edit|Start Editing** menu item. This will take you into the editing mode and bring up the **Edit** tool panel in Figure 3-17.

Figure 3-17: Edit Tools Panel



- Select a feature to edit by clicking on it. The selected feature and its associated nodes will be highlighted in red, as shown in Figure 3-18. All applicable buttons in the **Edit** tool panel will become active.

Figure 3-18: Selected Feature



- Click one of the tool buttons on the **Edit** tool panel to select an editing function. The button for the selected function will be depressed. Figure 3-17 shows that the selected editing function is to move a node.

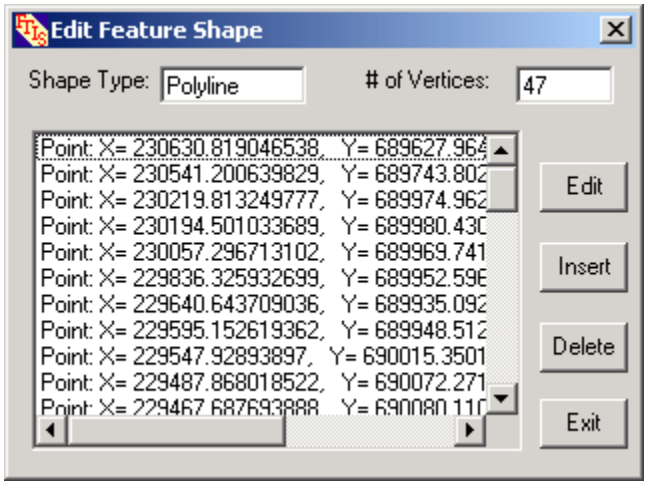
- To move a feature, left click a highlighted node (the highlighted node will turn white), hold down the button, and drag the node to a new location. In the case of moving a line, select the **Move Line** button, place your cursor across the feature, hold down your left mouse button, and then drag it to a new location. Click the **Undo** button to undo a change.

- To add a node, select the **Add Node** button and then left click at the location where the node is to be added.

- To delete a feature, select the feature to delete and then click the **Delete Node** or **Delete Line** button. *This action cannot be undone.*

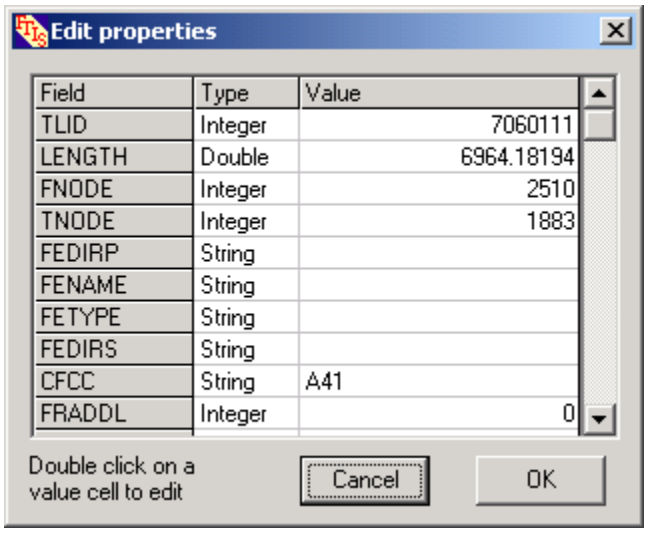
- If you know the specific coordinate for a node, you may want to edit the node coordinate manually. To do so, click the **Edit Nodes** button. The screen shown in Figure 3-19 will pop up. The screen lists all the node coordinates. To select a node to edit, click an item on the list. The corresponding feature will blink. Click the **Edit** button to enter a new coordinate. Click the **Delete** button to delete the node. Click the **Insert** button to insert a node.

Figure 3-19: Screen for Editing Nodes Manually



- To edit the data associated with a selected feature, click the **Edit Fields** button. The screen shown in Figure 3-20 will pop up. Double click a **Value** cell to edit the value.

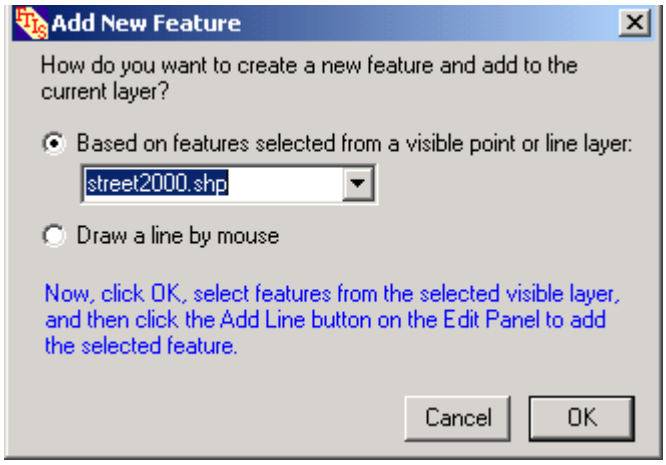
Figure 3-20: Screen for Editing Feature Data



FTGIS also allows you to add a feature by drawing a line by mouse or select features from another layer and add them to the current layer. To do so:

- In the Editing mode, select the **Edit|Add New Features** dropdown menu item. The screen shown in Figure 3-21 will pop up.

Figure 3-21: Screen for Adding Features by Drawing or from Another Layer



- Select the first radio button if you want to select features from an existing layer. Once this radio button is selected, the dropdown list will display all the visible layers. Select one visible layer. Instructions on how to proceed from this point will appear at the lower half of the screen. Click **OK**.

- Left click a feature to select it. To select additional features, hold down the **Shift** key while making the selection. Features must be connected for any successive selections.

- Click the **Add Line** button in the **Edit** tool panel to add the selected features to the current layer.

To draw a line by mouse:

1. Select the second radio button. Once the button is selected, instructions on how to proceed from this point will appear at the lower half of the screen. Click **OK.**

2. Start drawing a line. Single left click to draw the beginning and intermediate nodes of a line and double left click to end the line.

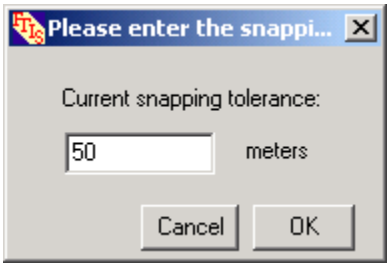
3. Click the **Add Line** button in the **Edit** tool panel to add the selected features to the current layer.

To stop editing, either click the **Start Editing** tool button again or select the **Edit|Stop Editing** dropdown menu item.

Set Snapping Tolerance

When the ends of two adjacent lines come close to within a certain distance during editing, you may want them to be connected by snapping the two ends together. You can set a tolerance for determining whether to snap the nodes by selecting the **Edit|Set Snapping Tolerance** dropdown menu item, which brings up the screen shown in Figure 3-22. To enable the snapping function, select the **Edit|Enable End Snapping** dropdown menu item. When this menu item is disabled, the snapping will not take place even when two end nodes come to within the set tolerance.

Figure 3-22: Screen for Setting Snapping Tolerance



Measure Distance

The **Measure Distance** function allows you to draw a line of multiple segments and calculate the total distance in feet, meters, and miles. To perform this function:

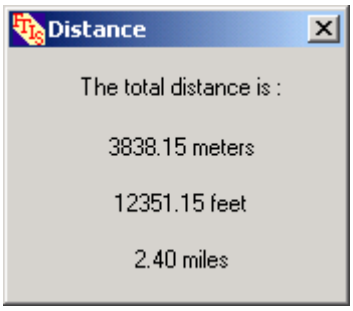
1. Click the **Measure Distance** tool button or select the **Tools|Measure Distance** dropdown menu item.

2. Left click at the location of the starting location.

3. Move the mouse to the second location and left click. Continue this step for additional line segments.

4. Double left-click the last point of the line. The resulting distances in different units will be displayed in a pop-up screen as shown in Figure 3-23.

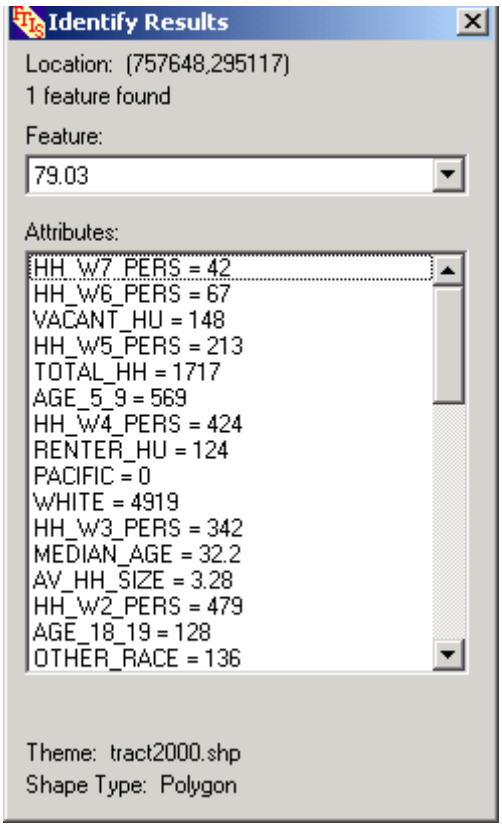
Figure 3-23: Output Screen from Distance Measurement



Identify

The **Identify** function allows you to retrieve and display data attributes associated with all features near the point of a mouse click. An example of the retrieved results is shown in Figure 3-24.

Figure 3-24: Screen Showing Identified Results



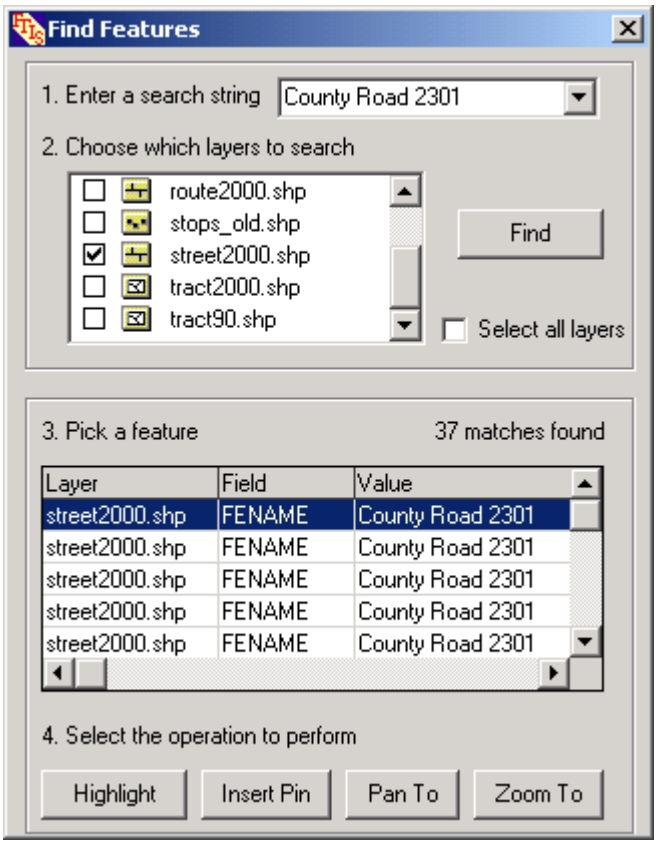
The **Feature** field lists the features in all the visible layers that come close to the location of the mouse click. After you have selected an item from the **Feature** list, the corresponding feature in the map will blink to signal the feature of which the results are being displayed. The results are displayed in the **Attributes** list box.

Find

The **Find** function lets you search for all features that match a search string in the selected layers. To find features:

1. Click the **Find** tool button or select the **Tools|Find...** dropdown menu item. The screen shown in Figure 3-25 will pop up.

Figure 3-25: Screen for Finding Features



2. Enter a search string.

3. Check the layers you would like to search or check the **Select all layers** box to select all layers.

4. Click the **Find** button to start finding features matching the search string.

5. After the search is completed and features are found, click a feature on the **Pick a feature** list.

6. Click the **Highlight** button to blink the feature. The feature may or may not be positioned in the visible map extent.

7. Click **Insert Pin** button to insert a pin at the feature.

8. Click the **Pan To** button to position the selected feature at the center of the screen.

9. Click the **Zoom To** button to zoom into the selected feature.

Buffer Zone Analysis

FTGIS allows you to create buffer zones around point or line features. You may also select one or more features or all features (i.e., the whole layer) to buffer. A buffer zone analysis is performed in several steps. A wizard is used to guide you through these steps.

Figure 3-26 shows the screen for the first step. It allows you to choose the layer of which the features are to be used to create buffers. Only visible layers are listed. Instead of creating a buffer around an existing feature, you can also choose to draw a feature using your mouse cursor. You select this option by clicking the second radio button.

Figure 3-26: Screen for Step 1 of Buffer Zone Analysis

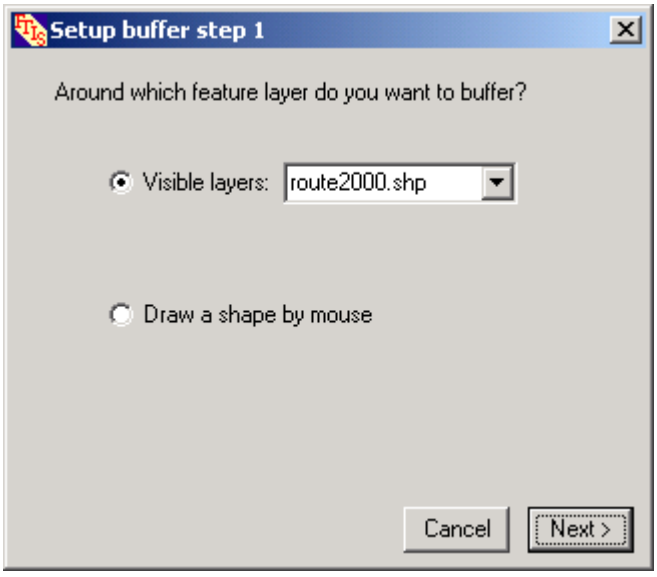


Figure 3-27 shows the screen for Step 2. It allows you to select a method to select features (to create buffer) from the selected layer.

- You may choose to select only some or all features. Choose the first radio button if you want to select only some features. Several methods are available to select features.

- You may use your mouse to either point to a feature, draw a line that overlaps the desired features, draw a circle that encloses all features within a certain radius, or draw a rectangle that encloses the desired features.

- As soon as you have chosen one of the feature selection methods, some instructions will appear on the screen to guide you through the selection.

- To perform multiple selections, hold down your **Shift** key while making additional selections. Once you have completed your selections, click **Next** to proceed to Step 3.

Figure 3-27: Screen for Step 2 of Buffer Zone Analysis

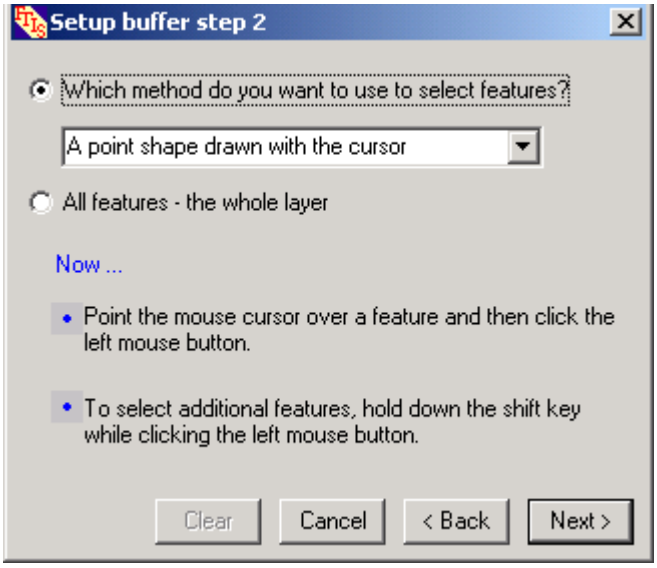


Figure 3-28 shows the screen for Step 3. It allows you to specify the width of the buffer in a select unit, whether to dissolve buffer barriers, and to change the buffer zone color. Click **Next** to proceed to create buffer. Figure 3-29 shows an example of a buffer that is performed for the whole Taltran bus route layer, with buffer barriers resolved. Once the buffer zones are created, the screen shown in Figure 3-30 will pop up.

Figure 3-28: Screen for Step 3 of Buffer Zone Analysis

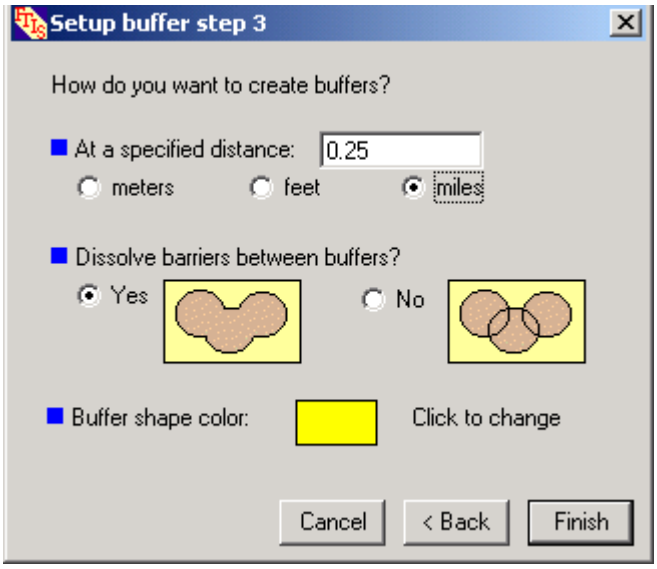


Figure 3-29: Resulting Buffer

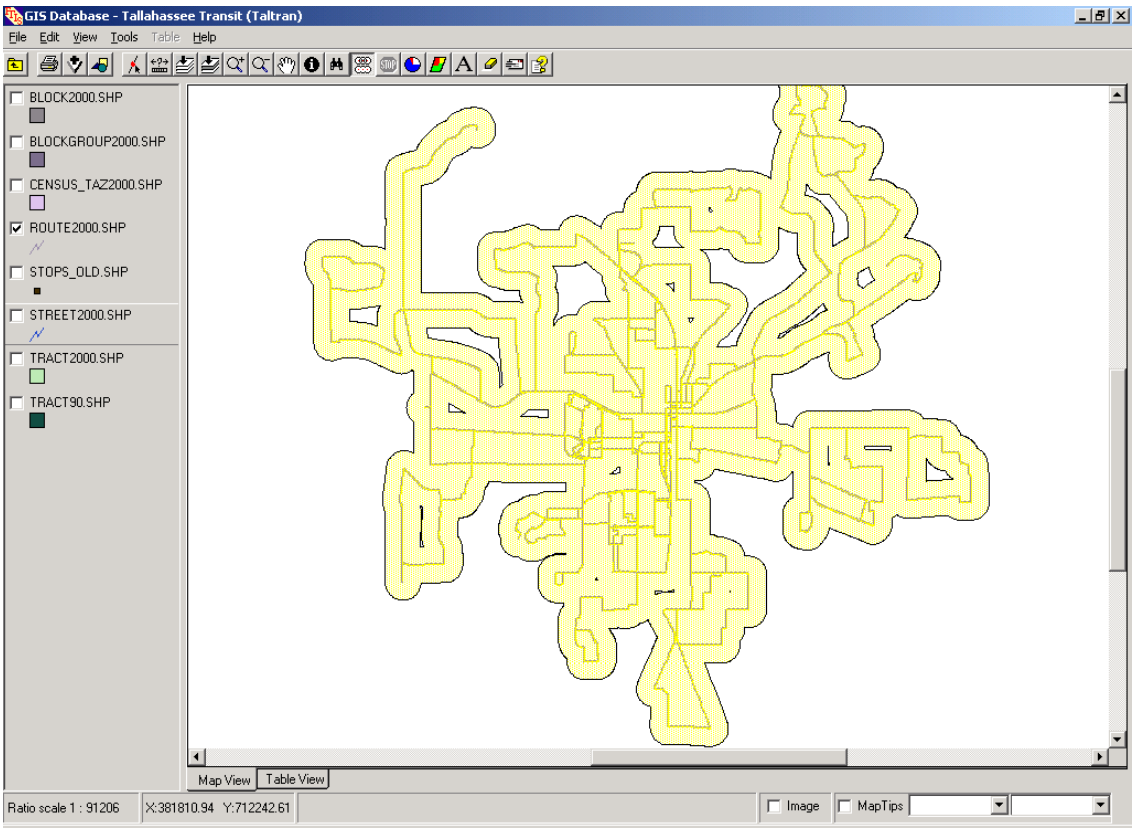
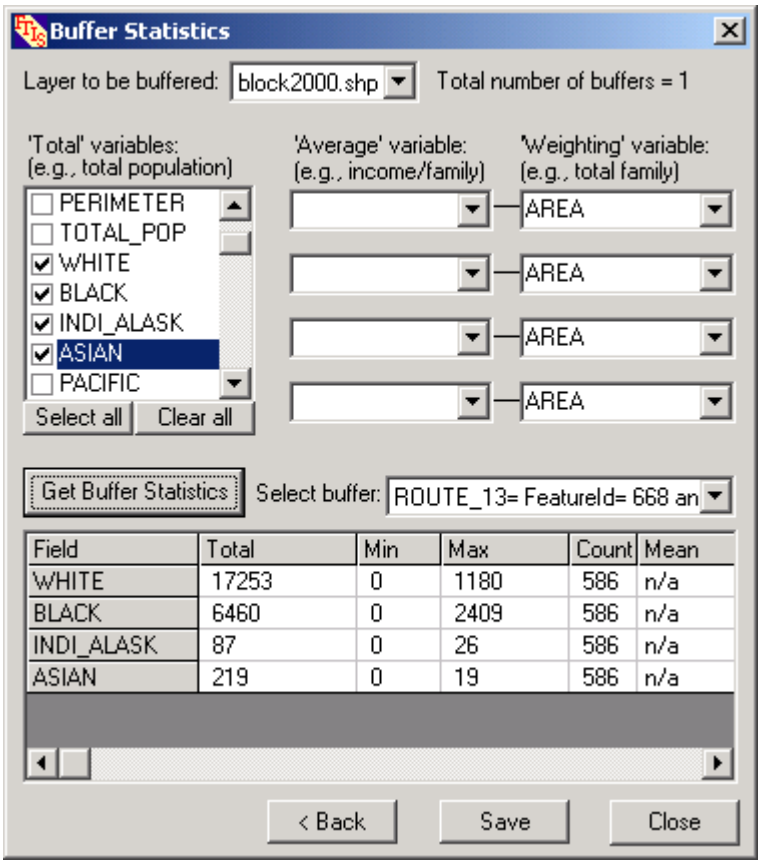


Figure 3-30: Screen for Selecting and Viewing Buffer Output



In the **Buffer Statistics** screen you:

1. Select one of the layers to be buffered. All data attributes for the layer will appear in the **'Total' variables** list box as well as the **'Average' variable** and the **'Weighting' variable** dropdown list.

2. Select the variables for which you want to retrieve data from the buffer(s). In the '**Total' variable** list box, you should select only the variables that are additive (i.e., summation is meaningful) by checking the checkbox in front of each variable. Click **Select all** to select all variables or click **Clear all** to clear all selections. For non-additive variables, such as population density, you should select from the dropdown list and specify the corresponding weighting variable. The default weighting variable is AREA, which is suitable for variables weighted by area, such as population density.

3. Click the **Get Buffer Statistics** button to compute buffer statistics. The output is shown on the bottom half of the screen. The output statistics include Total, Min, Max, Count, and Mean. The **Total** statistics sum all values from each buffered subareas that make up the total buffer. The **Count** statistics give the number of

subareas in a buffer. The **Min** and **Max** statistics give the minimum and maximum values, respectively, among the subareas. The **Mean** statistics are for only non-additive variables of which total values are not meaningful.

4. In the case when there are multiple buffers, you may select to display the statistics for a specific buffer from the **Select buffer** dropdown list. The selected buffer on the map will blink to indicate the selected buffer.

5. You may repeat the above steps for another layer.

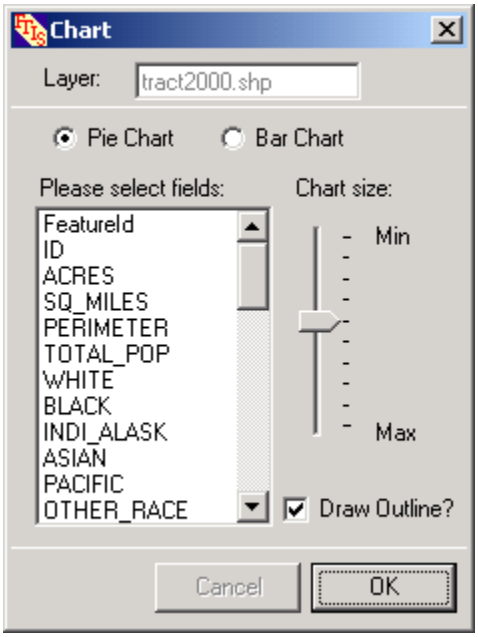
6. You may click the **Save** button to save the buffer zones and the associated statistics as a new layer, which will automatically appears on the map legend as soon as they are saved. You may also save the statistics to a text or an Excel file.

Create Charts

The **Create Charts** function allows you to create pie or bar charts based on one or more attributes of the active layer. To create a chart:

1. Click the **Create Charts** tool button or select the **Tools|Create Charts** dropdown menu item. The screen shown in Figure 3-31 will pop up.

Figure 3-31: Screen for Creating Charts



2. Click the radio button to select the chart type.

3. Click one or more variables on the variable list. Click a selected variable to unselect a variable.

4. Drag the **Chart Size** bar up and down to select a chart size.

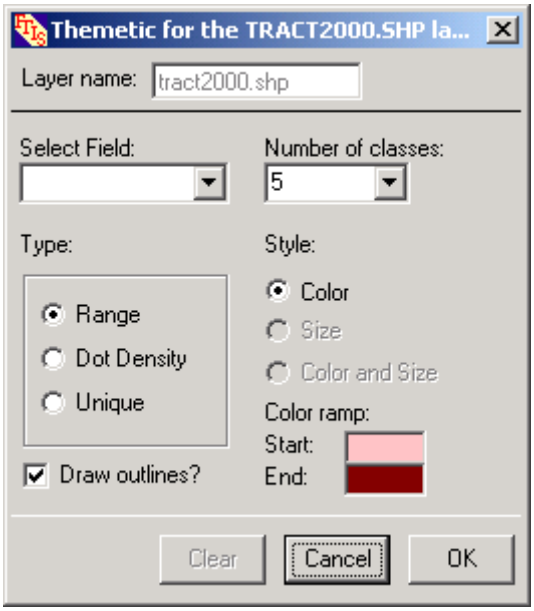
5. Uncheck the **Draw Outlines?** box to remove the chart outlines.

Create Thematic Maps

The **Create Thematic Maps** function allows you to quickly create a thematic map based on a selected attribute in the active layer. To create a thematic map:

1. Click the **Create Thematic Maps** tool button or select the **Tools|Create Thematic Maps** dropdown menu item. The screen shown in Figure 3-32 will pop up.

Figure 3-32: Screen for Creating Thematic Maps



2. Click the **Select Field** dropdown list and select an available field for classification. A thematic map will be created instantly.

3. Click the **Number of classes** dropdown list and select the desired number of classes.

4. A default thematic type is set for you. The **Range** type divides the field values into the specified number of classes of constant intervals. The **Dot Density** type plots the number of dots based on the attribute values and the number of classes. The **Unique** type plots each distinct value with a unique color. The number of unique values in an attribute cannot exceed 100.

5. A **Color** default style is set for you. For point and line layers, you may choose either size or a combination of color and size as your style.

6. If you have chosen Color as your style, a default color ramp is set for you. Click the **Start** and **End** color boxes to change the color ramp. If you have chosen Size as your style, a default color is also set for you. Click the color box to change the color

7. Uncheck the **Draw outlines** box to remove the polygon outlines.

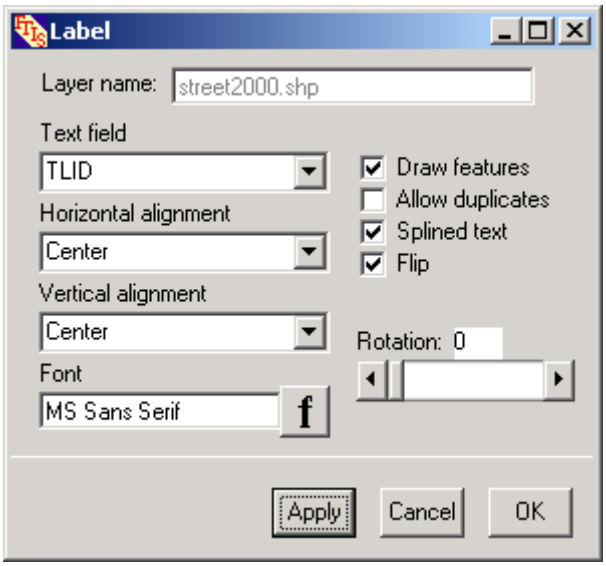
8. Click **OK** to exit the screen.

Add Label

The **Add Label** function allows you to label the active layer with a select variable in a preferred format. To create labels:

1. Click the **Create Labels** tool button or select the **Tools|Create Labels** dropdown menu item. The screen shown in Figure 3-33 will pop up.

Figure 3-33: Screen for Creating Labels



2. Click the **Text** field dropdown list, and click a field that has the label you want to display.

3. Click the **Horizontal alignment** dropdown list, and click an alignment for the labels.

4. Click the **Vertical alignment** dropdown list, and click an alignment for the labels.

5. Click the **Font** button and select the font, style, size, and color for the labels.

6. Check whether to draw features, allow duplicates, use splined text, or flip.

7. Drag the scroll bar to specify the degree of rotation.

8. Click **Apply** to display the lables. You can go back and change some of the settings or click **OK** to exit the screen.

Clear All

The **Clear All** function allows you to clear all labels, themes, and charts, and return to the original map setting.

Select Features

The **Spatial Features** function allows you to select features by:

- pointing at a feature,
- drawing a line that intersects one or more features (see Figure 3-34),
- drawing a circle that intersects one or more features, or
- drawing a rectangle or a polygon that intersects, encloses, or crosses one or more features. For this option, you can also select to enclose, intersect, cross, or contain the centroids of, the features being selected. Figure 3-35 shows selected features based on drawing a rectangle with the **cross** option.

Selected features may be saved as a new map layer by selecting the **Tools|Save Selected Set into a New Shapefile** dropdown menu item. Data associated with the selected features may be saved into a text or an Excel file by selecting the **Table|Save into a File** dropdown menu item. The **Table** menu is active only when you are in the **Table** view.

Figure 3-34: Select Features by Drawing a Line

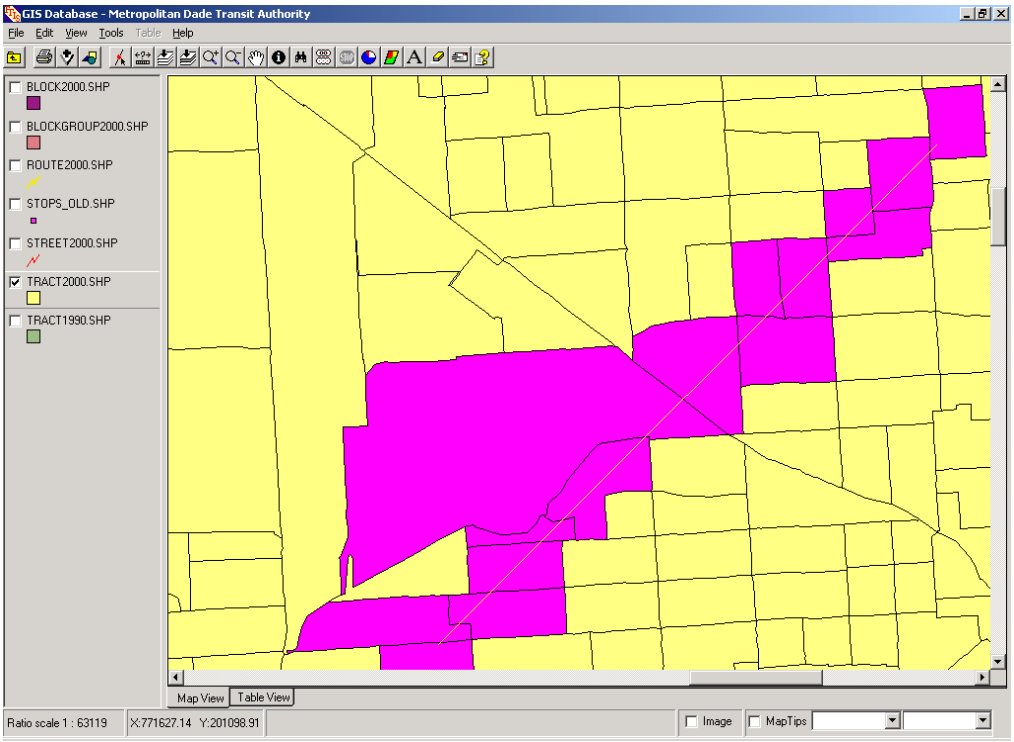
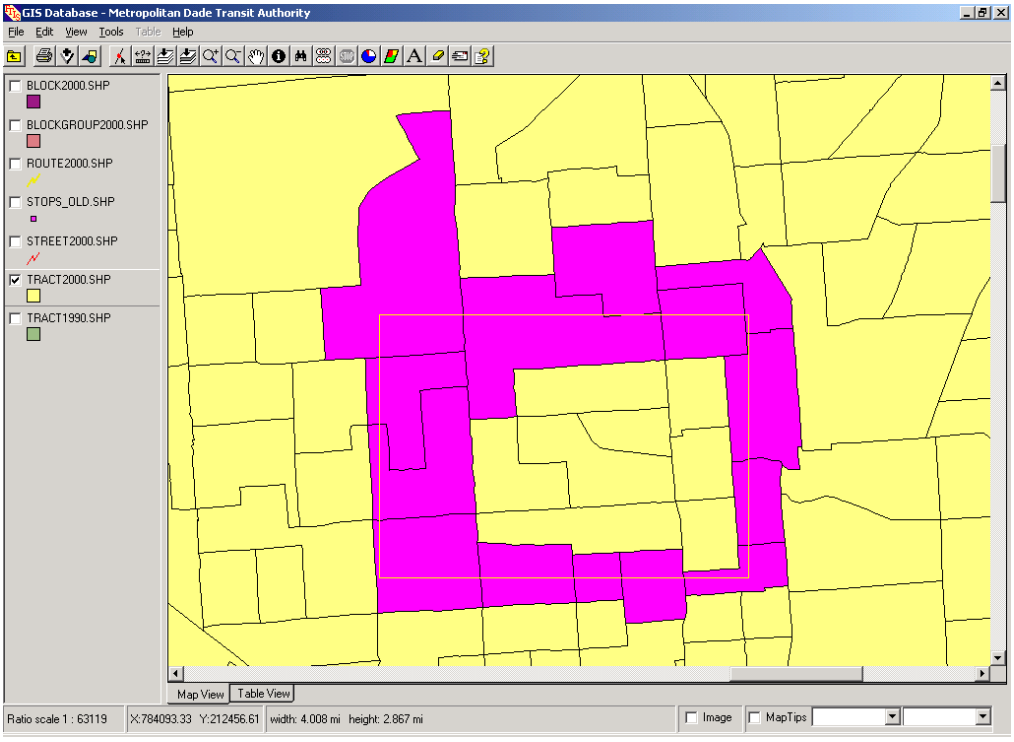


Figure 3-35: Select Features by Drawing a Rectangle



MISCELLANEOUS COMPONENTS

This chapter introduces all the other components accessible from the FTIS main screen.

TAMS

TAMS (**T**ransit **A**sset **M**anagement **S**ystem) is a FTIS component designed to perform the same tasks as the TimesLink program developed previously by the Center for Urban Transportation Research (CUTR). The program was redesigned to make it work more seamlessly with FTIS. As with TimesLink, TAMS allows transit agencies to electronically transmit PTMS (Public Transportation Management System) data to FDOT. PTMS is designed to collect, analyze, and disseminate information on the condition of Florida's transit assets. PTMS is one of the six management systems previously required by the Intermodal Surface transportation Efficiency Act (ISTEA) of 1991. The National Highway System (NHS) Act of 1995 made the management systems optional to the States. The Florida Department of Transportation intends to continue the collection of PTMS data.

Working with TAMS Database

TAMS is accessible from the third button of the **FTIS Main Menu** screen (see Figure 1-1). Clicking the **TAMS** button will invoke the screen shown in Figure 4-1. The screen allows you to specify whether to work on an existing database or to create a new database.

Once a database is selected, TAMS will take you into the screen shown in Figure 4-2. The screen consists of a set of five tabs for entering and displaying different categories of transit assent data. If you have selected an existing database, it will load all the available data onto the fields in each tab. The fields are empty if you have chosen to work on a new database. Enter the data in each field. Use the **Tab** key to move from one field to another. For fields that take only standard input, TAMS will prompt you a dropdown list to select a list item, as shown in Figure 4-2. After you have completely entered your data, click the **Save Record** button to save the record. The newly saved record should show in the table grid at the bottom half of the screen. To delete a current record, click the **Delete Record** button.

Figure 4-1: Screen for Selecting a Working Database

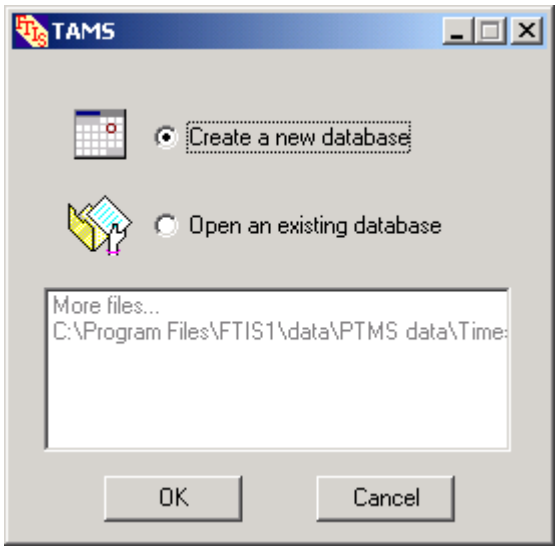
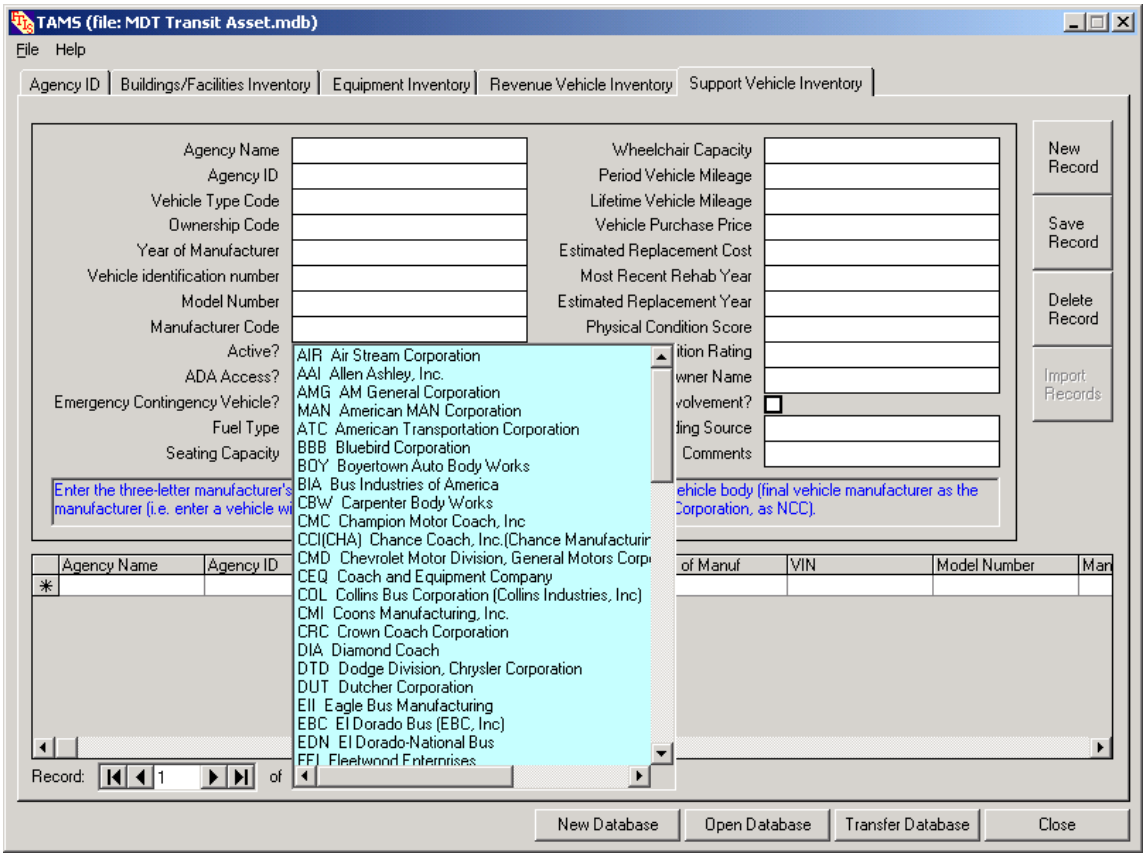


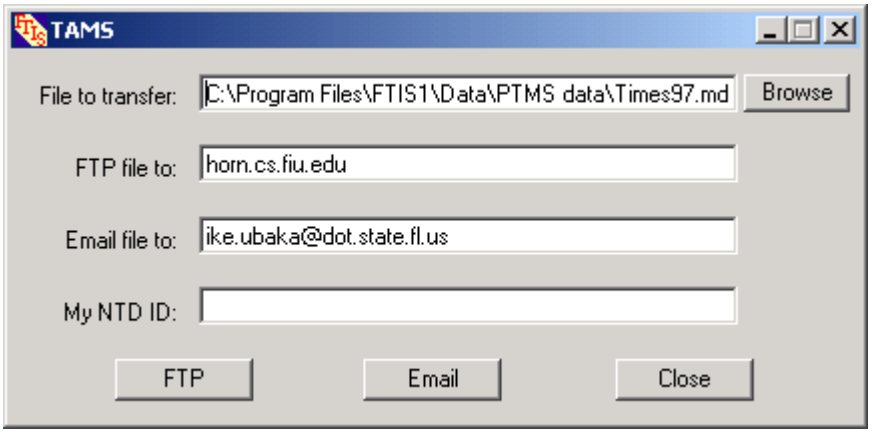
Figure 4-2: TAMS Data Entry and Display Screen



Submitting Database to FDOT

After you have completed your database and are ready to submit it to the FDOT, click the **Transfer Database** button in Figure 4-3. The screen shown in Figure 4-3 will pop up. By default the first data entry lists the current database. You may click the **Browse** button to select another database. The second and the third fields allow you to specify the FTP site and the email address, respectively, to submit the database to. The last entry lets you enter your NTD ID, which is required.

Figure 4-3: Screen for File Submission



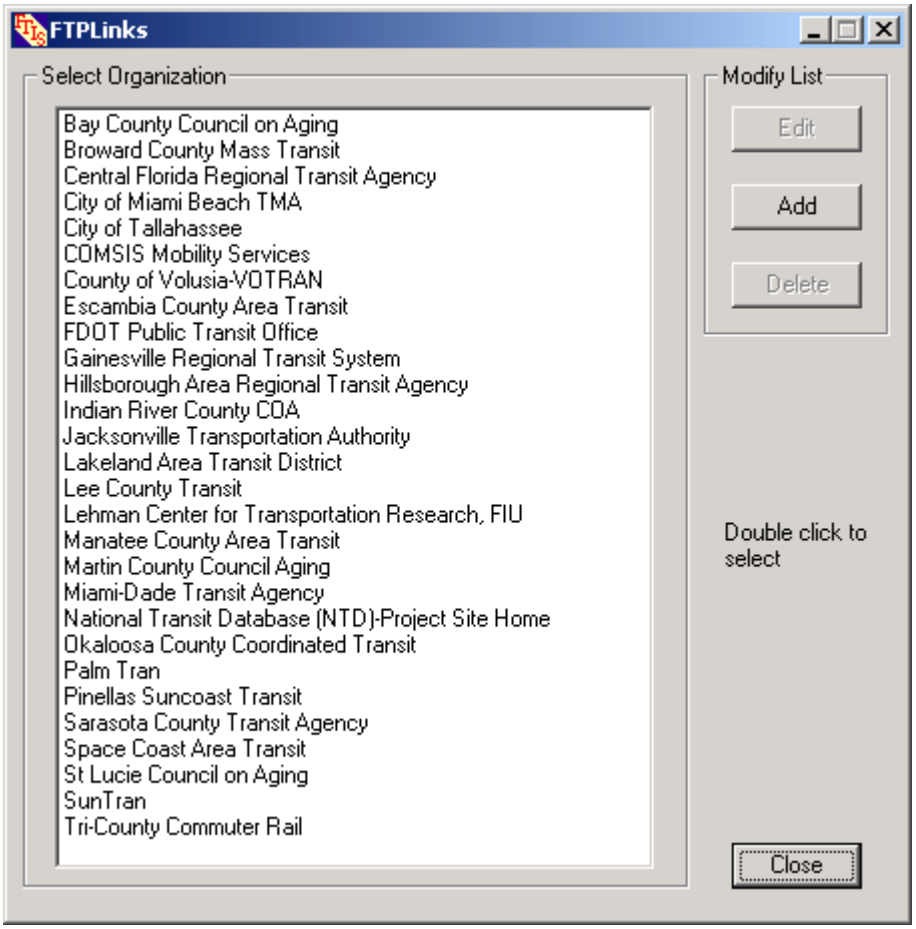
FTPLib

This function provides easy access to electronic documents in the transit planning areas. The function is still being developed and it includes only a few simple links in the current version. When completed, it will allow you to search and access a wide variety of transit planning literature.

FTPLinks

This function provides an interface for direct links to the websites of various agencies. The screen for this function is shown in Figure 4-4. You may add a new web link or edit an existing one using the **Add** and **Edit** buttons, respectively. To access a specific web site on the list, double click the desired list item to activate your default web browser.

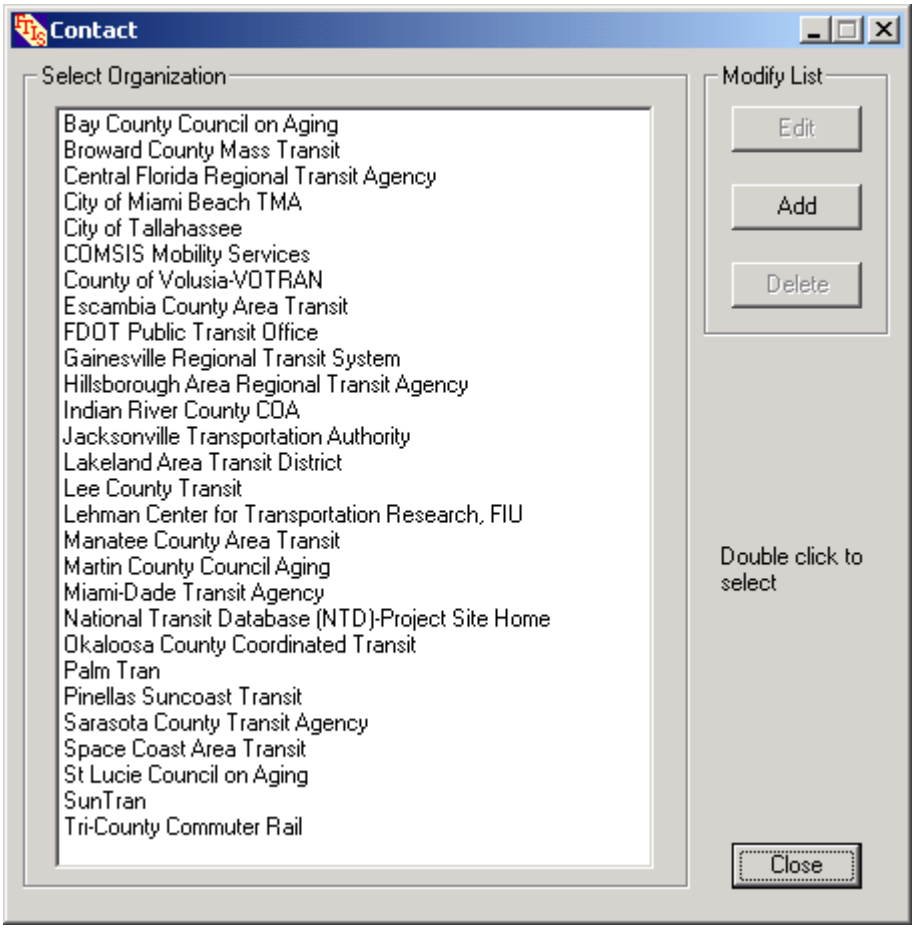
Figure 4-4: Agency Website List



Contact

This function provides an interface (see Figure 4-5) for direct email links to various agencies. You may add a new email link or edit an existing email link using the **Add** and **Edit** buttons, respectively. To email any of the agencies on the list, double click the desired list item to activate your default email system.

Figure 4-5: Email Contact List



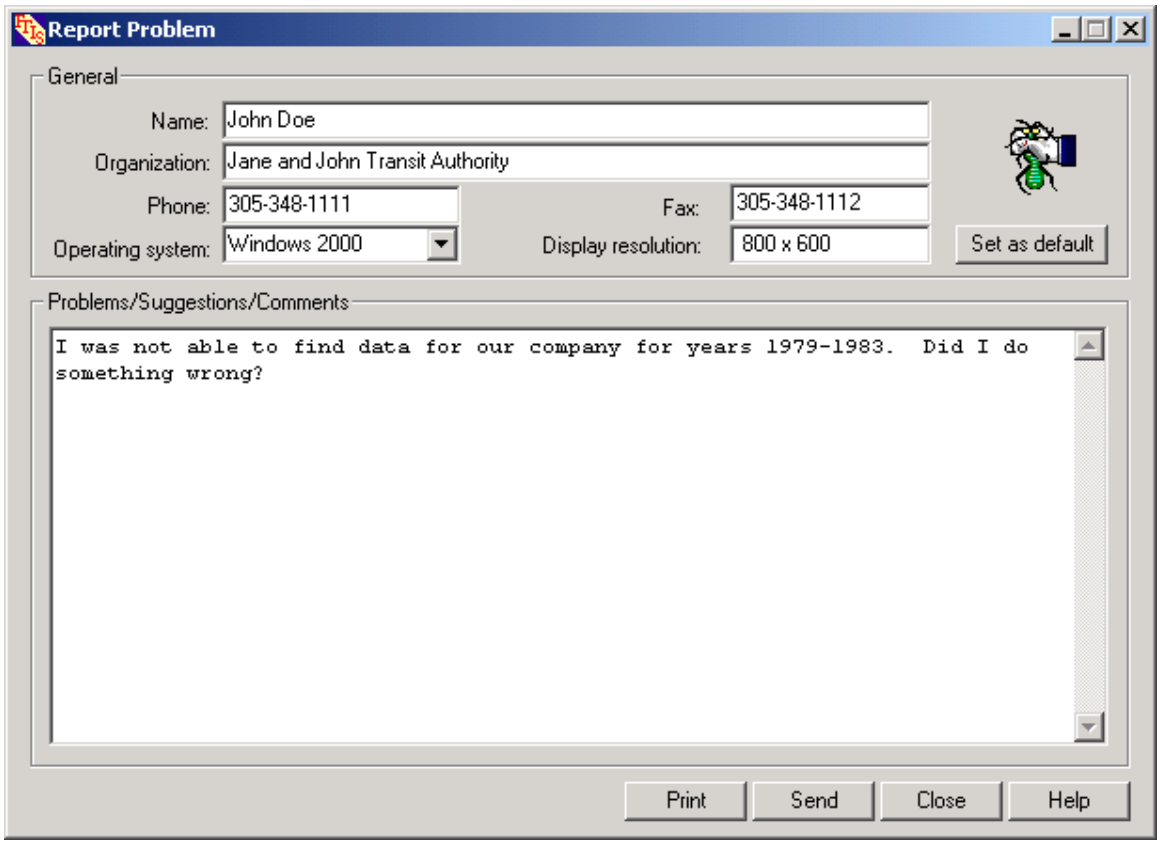
Report Problem

This function provides a convenient form for you to record and report to the developer any FTIS problems you encountered while using FTIS. The report form is activated either when you click the **Report Problem** button on the main screen or when the program encountered an error. In the later case, FTIS will automatically activate the form and insert the error information needed for the developer to pinpoint the source of the problem. In either case, you should complete to your best ability all the fields on the screen. Figure 4-6 shows the screen for the report form. You may click the **Save as default** button to save the general information you entered so that it will be automatically loaded when the form is reactivated again next time.

In the **Problems/Suggestions/Comments** box, you may enter all the information you wish to send to the developer. Please provide as much details as you can. The developer may contact you for additional information, if necessary. After you have completed your form, you can click the **Print** button to print out a hardcopy of the completed form for your record or fax it to the developer. If your computer is connected to the Internet, you

may click the **Send** button to email the report to the developer. The problem report will be automatically attached to the email as a file attachment.

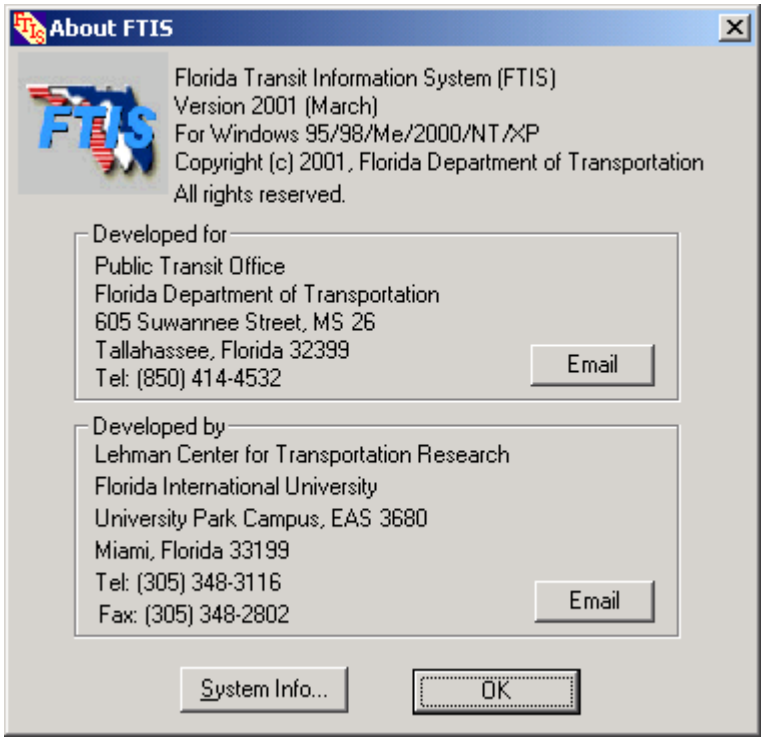
Figure 4-6: FTIS Problem Report Form



Help

This button provides access to this user's manual, the on-line help, and the **About FTIS...** box, which is shown in Figure 4-7.

Figure 4-7: FTIS' About Box



Exit

This button allows you to exit from the FTIS completely. It serves the same function as the standard **Close** button on the top-right corner of the screen.

(This page left blank intentionally)