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APPIAN™

DirectRoute
User Guide 21.2

Trimble

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1 Introduction

DirectRoute™ is an automated fleet routing program with intuitive design, powerful mapping insight and drag-and-drop functionality. DirectRoute easily interfaces with most existing accounting or ERP software and allows the user to build fixed or dynamic daily routes. Capabilities include single or multi-day routes, one-way deliveries or backhaul pickups, multi-depot planning, financial analysis of routes and fleet operations, customizable reporting, interface to real-time vehicle tracking, street level turn-by-turn driving directions, and more.

This file serves as a reference to help with the necessary steps involved in building optimal routes and the more common processes involved. While working in the DirectRoute program, the DirectRoute User Guide Help File can be accessed using the F1 key or select *Help→Contents* from the DirectRoute menu. For assistance, contact Trimble MAPS Support, **support@trimblemaps.com,** US (toll free): phone 1-800-663-0626 (Option 6, then Option 7), Monday-Friday, 7am-5pm CST.

1.1 Quick Reference

Below is a list of the commonly referenced subjects in this guide. Select the one that best fits your needs and refer to the indicated section.

SUBJECT	*NEED TO KNOW*
Menus and Toolbars	The DirectRoute menu, toolbar, and shortcut icons
Maps	Map tools, features, defaults, and preferences
Settings and routing preferences	Preference options and effects
Routing Data, Importing data	Data and file requirements
Geocoding Records	Locating coordinates, address updates
Route Building	Route building tools and requirements
Priority Routing, Selective Routing	Routing scenarios, manual options
Route modifications	Editing stops and routes
Advanced routing	Special codes, redispatch and relays, driving directions, backhauls, etc.
Drawing Files, Boundaries	Drawing tools and uses
Exporting Route Info	Export to ERP/WMS/OMS
PC*MILER road edits	Avoiding roads, setting road edits
ResourcePro*	Using the ResourcePro module
Transportation Modeler*	Using the Transportation Modeler Module
SchedulePro*	Using the SchedulePro Module
TerritoryPro*	Using the TerritoryPro Module
DOT Hours of Service Rules	Summary of U.S. Department of Transportation Hours of Service (HOS) Regulations
Spreadsheets	Functions, shortcuts, statistics
Shortcuts	DirectRoute Keyboard and Mouse shortcuts
Printing options	Printing routes and reports
What's new in DirectRoute	Highlights of changes in the most recent software update releases

Figure 1 – Routing Topics Quick Reference Table

Note: *Requires additional licensing.

1.2 DirectRoute installation

For local machine installation, the DirectRoute install files, and any subsequent update files, are generally downloaded by licensed users from the **Trimble ClientCenter**.

In addition to DirectRoute, licensing and access for additional Appian software modules (if purchased) will be included in the installation download. If the user system or network prevents the download and/or installation, a request should be made to provide an alternate installation method. Alternate methods may include mailing a copy of the installation (certified, registered mail) or onsite installation by an assigned Appian Implementation and Training Consultant.

Each licensed customer (primary contact) will receive an email with specific instructions on how to access the download, installation instructions, and the product code/license number.

It is important to note that the install cannot be done remotely, and one must have administrative rights on the machine to perform the DirectRoute installation.

The download file generally includes the DirectRoute program and component files, including:

- .NET 4.5
- Crystal reports
- PC*MILER embedded Map/Mileage System
- Address Cleanup File
- Zip9 Data File
- Help File
- ResourcePro Module*
- SchedulePro Module*
- TerritoryPro Module*
- Transportation Modeler Module*

Note: *Additional Appian software modules, if licensed for use.

Assistance during the download and/or installation is available, if needed, by contacting Trimble MAPS Support, **support@trimblemaps.com,** Phone: (800) 663-0626, Option 6 then Option 7.

1.2.1 DirectRoute updates

DirectRoute software updates, or releases, are issued to update or add/delete new, improved, or corrected features and functions. These updates usually occur a few times each year.

When updates are released, customers will be notified via email with a brief description of what is included in the updated release and instructions on how to retrieve and install the update. Each release update will also include an updated Help File.

1.3 System requirements

System requirements may vary dependent on which software modules have been licensed for use, the number of licensed users, and the types of operating systems being used.

The following table lists the standard requirements for operating DirectRoute from various platforms. Separate requirements are listed for PC standalone connections and server connections.

PC Standalone System		
	Min Requirements	***Recommended***
Operating System	Windows 7 w/ MS .NET 4.5	Windows 7 w/ MS .NET 4.5 or newer
Processor	Quad core 2.8 GHz or higher	Quad core 2.8 GHz or higher
Memory	4 GB	8 GB+
Hard Disk	125 GB	125 GB+
Network Card	1 GB	1 GB
User Permissions	Full control of Appian/DirectRoute File Folder and all sub-folders	Full control of Appian/DirectRoute File Folder and all sub-folders
Web Browser	Internet Explorer (IE) 9 or newer	IE 11 or Microsoft Edge

Server			
	1 – 5 Users	***6 – 15 Users***	***16+ Users***
Operating System	Windows 2008 Server R2 w/MS .NET 4.5 or newer	Windows 2008 Server R2 w/MS .NET 4.5 or newer	Windows 2008 Server R2 w/MS .NET 4.5 or newer
Processor	Quad core 2.8 GHz or higher	Quad Core 2.8 GHz or higher	Quad Core 2.8 GHz or higher
Memory	4 GB	8 GB+	16 GB+
Hard Disk	80 GB	160 GB+	220 GB+
Network Card	1 GB dedicated NIC for Terminal Services	1 GB dedicated NIC for Terminal Services	1 GB dedicated NIC for Terminal Services

Figure 2 – Systems Requirements Table

2 DirectRoute Components

This section will help to familiarize you with the basic components of DirectRoute, including window tabs, map functions, customizations, menus and toolbars, and mouse pointers.

2.1 DirectRoute Menu

The DirectRoute menu contains numerous sub-menu items that, when chosen, present a dropdown lists of action-based options. These items include:

- **File Menu**
- **Edit Menu**
- **Map Menu**
- **ResourcePro Menu**
- **Analysis Menu**
- **DRTrack Menu**
- **Window Menu**
- **Help Menu**

And on the far-right side of the DirectRoute menu is the *Module Menu*, a drop-down list of add-on software modules available for use with DirectRoute, if licensed.

Directly below the menu is the toolbar, containing various icons used to perform specific functions, each of which is explained later in this section.

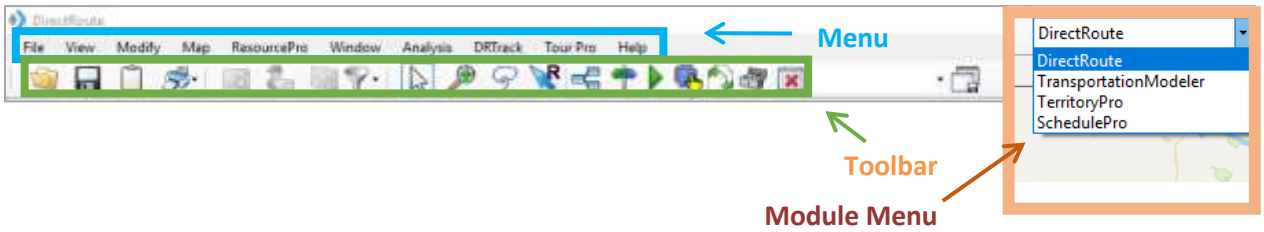

Figure 3 – DirectRoute Menu

Tip: If a menu or toolbar option is gray/faded rather than colored/clear, it is not accessible at that time. You may need to have specific files open and/or be in the routing mode to access certain functions, or it may be accessible only if licensed for additional Appian software modules (ResourcePro, TerritoryPro, etc.).

2.1.1 File Menu

The File Menu (ALT+F) contains commands for opening, closing and saving files in DirectRoute, as well as creating Upload and Extract Files, and generating Distance Files.

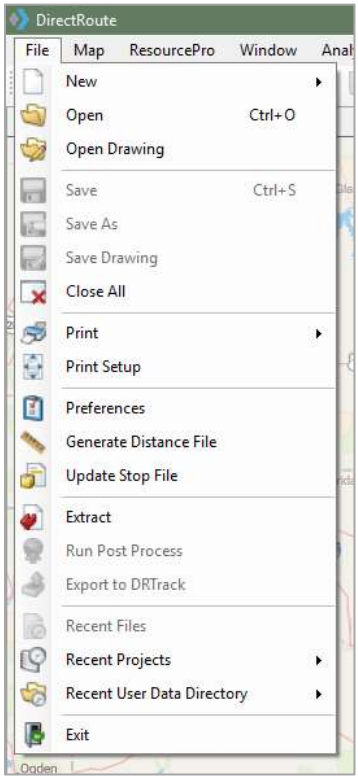

Figure 4 – File Menu

New (ALT+F+N) – Open and create new files. Choose Route File, Stop File, Truck File, or Distance File. When using modules other than DirectRoute, additional options may be present (i.e. Schedule, Shipment File, Solution, Pool Point File, etc.).
Open (CTRL+O) – Open any existing or previously saved DirectRoute file. The file type, directory location, and file name can be chosen from the dialog box that appears.
Open Drawing – Open any drawing files that were previously created and saved in DirectRoute.
Save/Save As (CTRL+S) – Save any open file. To save as a new file or assign a new name, select Save As.
Save Drawing – Map drawings can be created to set boundaries, territories, or assign drivers, etc., then saved (with a .DRW file extension) to use during the routing process. They can be used with more than one route file, and are editable.
Close All – Close all open files with one action.
Print (CTRL+P) – Print the Route Book, Map, Stop File, or Truck File. Select the file using the expanded menu (arrow).
Print Setup – Set up a printer/directory (print to file) to use with DirectRoute, change settings.
Preferences – Change program settings/configuration of data files. See **Routing Preferences** for additional information.
Generate Distance File – Without a Distance File, the software will use a straight-line distance and scale factor to calculate distances between stops. When a Distance File is generated, the miles calculated from the available mileage system will be used instead. See **Generate a New Distance File** for additional information.
Update Stop File – Update the Stop File with data from another Stop File.
Extract – Create a Stop File with an extract from an order management system.
Upload – When the routes have been finalized, create an Upload File that can be sent back to the order entry system for processing. See **Creating Upload Files** for additional information and instructions.
Upload to PeopleNet – Send stop, vehicle, and route information to the internet for use with an active PeopleNet license.

Export to DRTrack – Send route information to the internet for tracking of vehicles and routes through the DRTrack module (additional license required).
Recent Files/Recent Projects – Select recently viewed files and/or projects.
Recent User Data Directory – Quickly switch to and use another data directory that has been used recently, instead of switching via *File→Preferences→File Names/Paths*.
Exit (ALT+F4) – Exit and close the program.

2.1.2 Edit Menu

The **Edit Menu** (ALT+E) is only displayed and available when one or more spreadsheet files (Stop or Truck File) are open. The options included in this menu are used to manipulate and edit the spreadsheet files, and for plotting (Geocoding) records on the map.

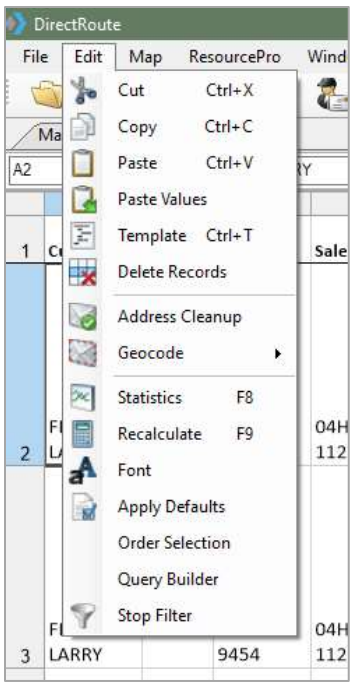

Figure 5 – Edit Menu

Cut (CTRL+X) – Move cells or cell content to another cell or spreadsheet; places cut data in the clipboard until it is pasted into another cell or discarded.
Copy (CTRL+C) – Copy cells or portions of cells from a spreadsheet to another cell or spreadsheet.
Paste/Paste Values (CTRL+V) – Paste cut or copied content into cells; use *Paste Values* to paste formula results (sums).
Template – Paste values or formulas into multiple cells within a spreadsheet; enables set up of **Apply Defaults** (enter changes in the sample spreadsheet, select **Apply Defaults**, then enter **To Row** and **From Row** to apply the new data).
Delete Records – Delete data from cells or rows.
Address Cleanup – Correct addresses and/or locate 9-digit Zip Codes; prepares records for Geocoding.
Geocode – Shortcut to the Geocode process; uses the address fields to locate Lat/Long coordinates of each record.
Statistics – Calculates summary statistics for records within the spreadsheet, or to records within drawings on the map.
Recalculate – Recalculate statistics. Use after changes have been made to valued cells.
Font – Select font style and size.

Apply Defaults – Sets default status for **Time Windows**, **EqCodes**, **Unload Rates**, **Fixed Time**, and **Zone** to a range of records on a Stop File.
Order Selection – Select and apply priority routing/delivery to records within the Stop File.
Query Builder – Build and save queried searches for records in the Stop File spreadsheet based on content values in the selected Stop Fields.
Stop Filter – Apply a temporary or permanent mass update to a selected **Stop Field** column on records found by a saved query.

2.1.3 ResourcePro Menu

The **ResourcePro Menu** provides access to functions using the ResourcePro Module (ref: **ResourcePro Module**) (additional license may be required).

2.1.4 Analysis Menu

The **Analysis Menu** launches the **Scenario Manager** tool when used for route modeling in conjunction with **Transportation Modeler** (additional license may be required).

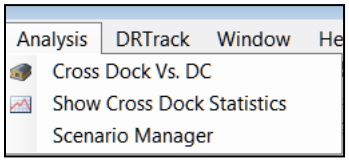

Figure 6 – Analysis

2.1.5 DRTrack Menu

DRTrack is an optional Appian web-based GPS tracking program. If you have a DRTrack site, the DRTrack Menu provides several options to upload and download information from DirectRoute.

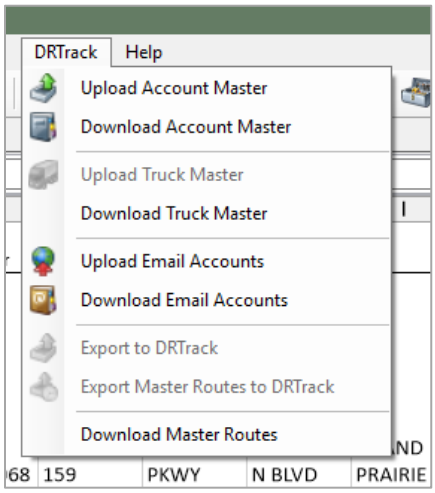

Figure 7 – DRTrack Menu

Upload/Download Account Master – Upload or download an Account Master File to/from DRTrack.
Upload/Download Truck Master – Upload or download a Truck Master File to/from DRTrack.
Upload/Download Email Accounts – Upload or download email accounts to/from DRTrack (If Email Manager is configured in DRTrack).

Export to DRTrack – Export a routing solution to DRTrack; routing solutions can be sent from DRTrack via web services to an ERP/WMS/OMS.
Export Master Routes to DRTrack – Export Master Routes to DRTrack.
Download Master Routes – Download Master Routes from DRTrack.

Note: See *Import and Extract Records* **and** *Routing Preferences and Options Table* **for more info.**

2.1.6 Window Menu

The **Window Menu** (ALT+W) enables switching between open files. A check mark identifies the current window view; select a window number to switch to another open window or use the shortcut, CTRL+F6.

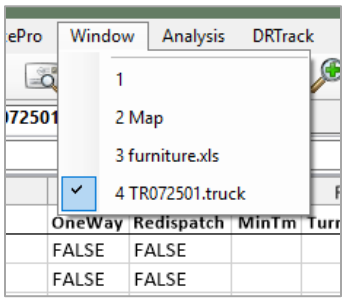

Figure 8 – Window

DirectRoute allows single or multiple files to be opened at any one time. Each open file will produce a labeled window tab. When multiple files are open, the active window will appear layered over the inactive windows.

To view one of the inactive window tabs, simply select the tab to bring it forward.

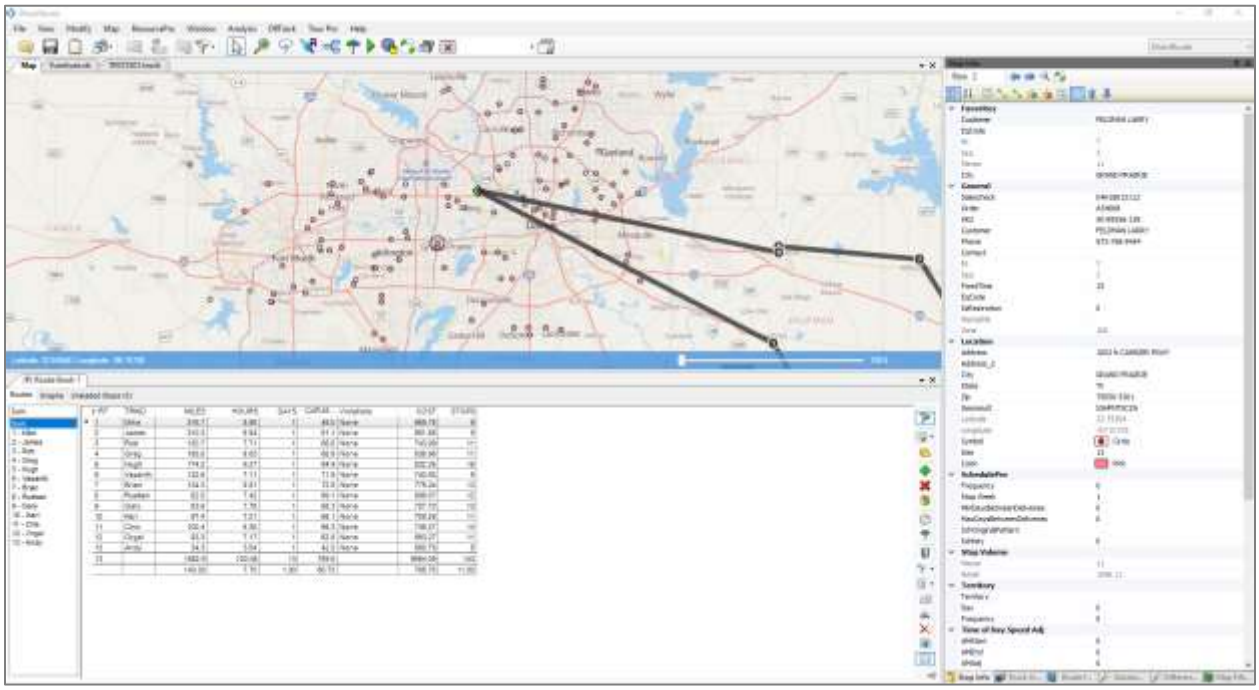

Figure 9 – DirectRoute Map Screen View

The software also enables alternate positioning of multiple windows/files when more than one is opened. As an example, when in the routing mode, with the Route Book, Stop File, and Truck File all open at the same time, you can position the various window tabs to enable viewing three or more files on the screen together.

Alternate positioning is simple to do; just grab the tab (with the mouse) of the window you want to move and drag it into the desired location.

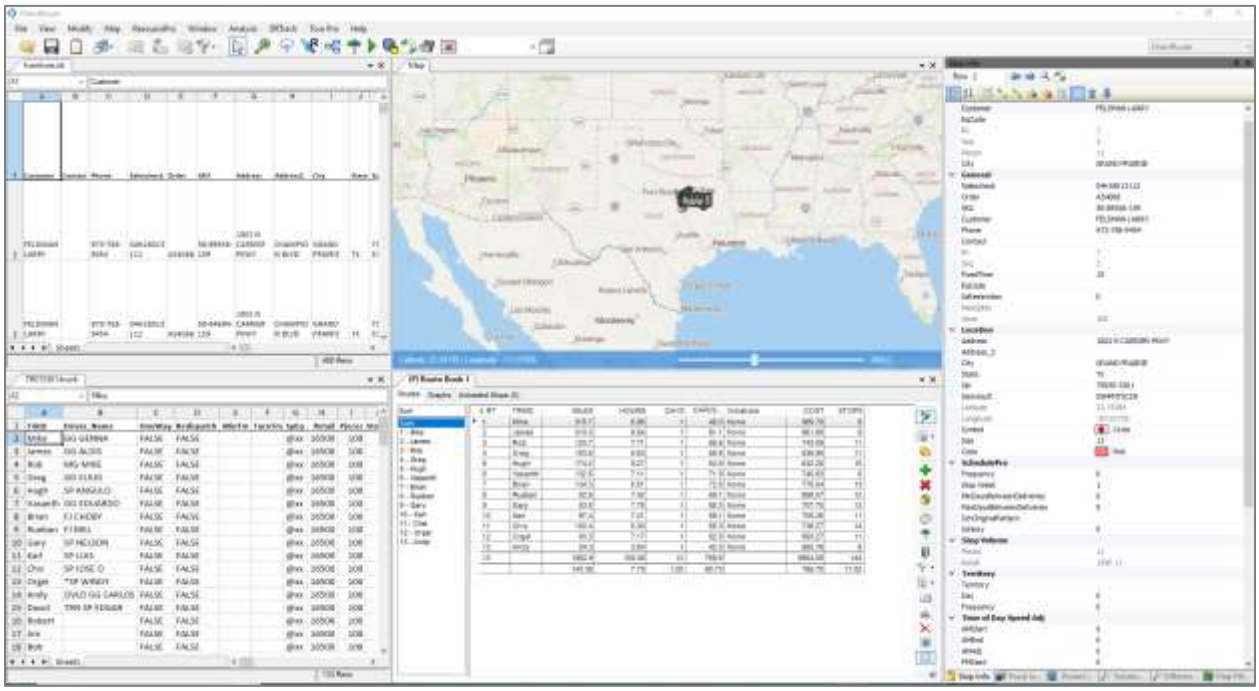

Figure 10 – Alternate Positioning of Open Windows

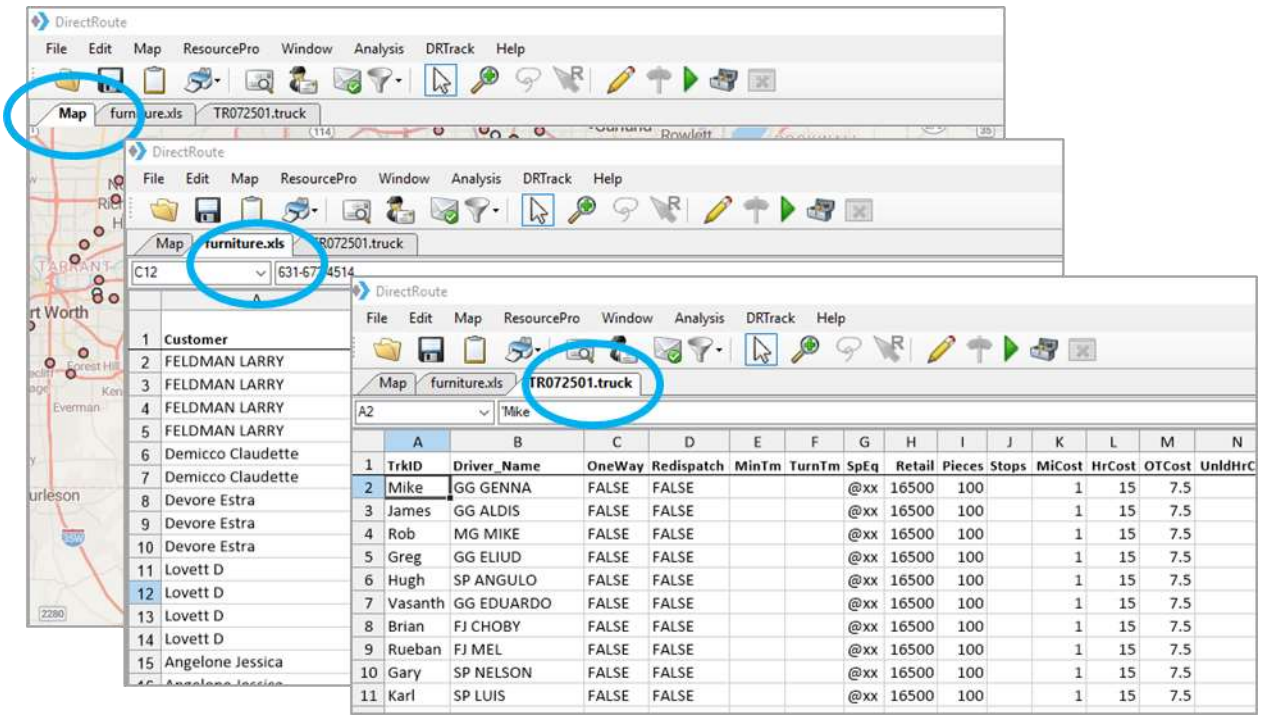

Figure 11 – DirectRoute Multiple Window View

Tip: Use CTRL+F6 shortcut to move between windows.

2.1.7 Help Menu

The Help Menu (ALT+H) can be accessed at any time, from any screen, while using the software. Options listed provide valuable access to guidance and instructions, and important information concerning the software program and system in use.

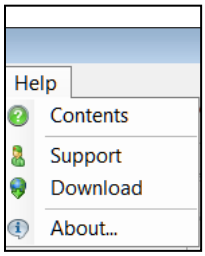

Figure 12 – Help Menu

Contents – Access the HTML Help File, for guidance and instructions on using DirectRoute.
Support – Contact information for Trimble MAPS Support, **support@trimblemaps.com**.
About – Identifies the DirectRoute (software) license #, version # and date, and primary application path in use by the operating system.

Tip: During Customer Support calls, user's may be asked for the license# and version# installed on system, to emulate operating environment and/or enabler faster, more accurate resolution of issues.

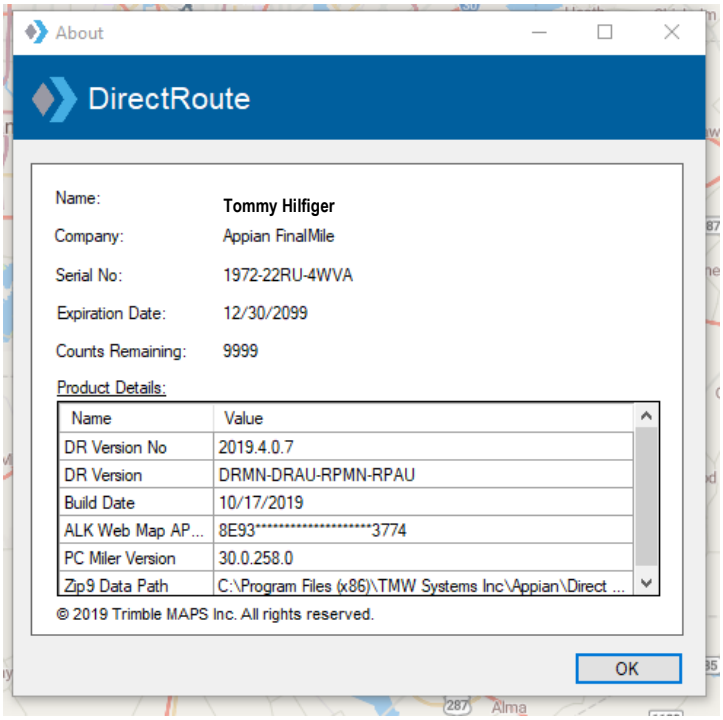

Figure 13 – DirectRoute License & Version

2.2 Map Menu and Map Tools

Trimble maps provided by PC*MILER Web Services replace the older PC*MILER maps. These maps are provided via an active internet connection each time a new DirectRoute session is started. DirectRoute calls the web service to locate and retrieve the most current maps.

If an active internet connection is not available, DirectRoute will display a gray screen with no map, as it will not be able to retrieve any map data. However, all routing functions remain available without the maps or an internet connection, if the mileage system selected for routing is set to PC*MILER Direct (*Preferences→Other→Mileage System→PC *MILER Direct*).

DirectRoute does not cache maps, except those used during a working session. If the internet connection is lost during a session, the maps in use at that time will be cached and remain available for use if the session itself is not terminated. If the internet connection is restored before the session ends, the maps will refresh automatically; if the session ends/is restarted before an internet connection is restored, a gray screen will appear in place of the maps, since any cached maps were deleted when the original session ended.

The Map Menu (ALT+M) contains linked actions that can be performed while working in the map window. Additional functions within the map menu allow for customizing the map view and certain map zoom functions.

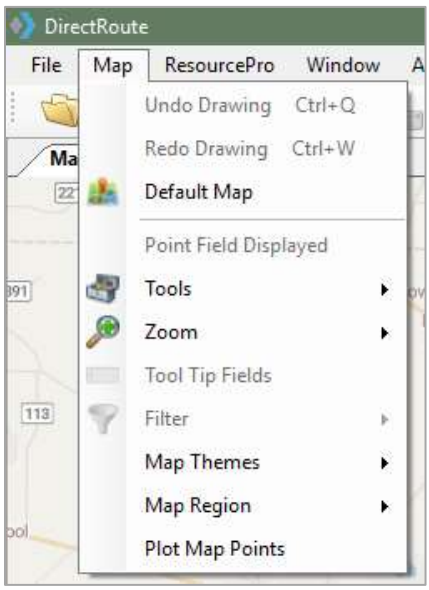

Figure 14 – Map Menu

2.2.1 Default Map

Select a custom Default Map (area and zoom level) to be displayed each time a DirectRoute session is started. The installed default view is set to show the entire United States.

Example: If you work mostly with the eastern half of the USA, and most routes only span part of this area, then set zoom in to the specific area and set the default map to this area.

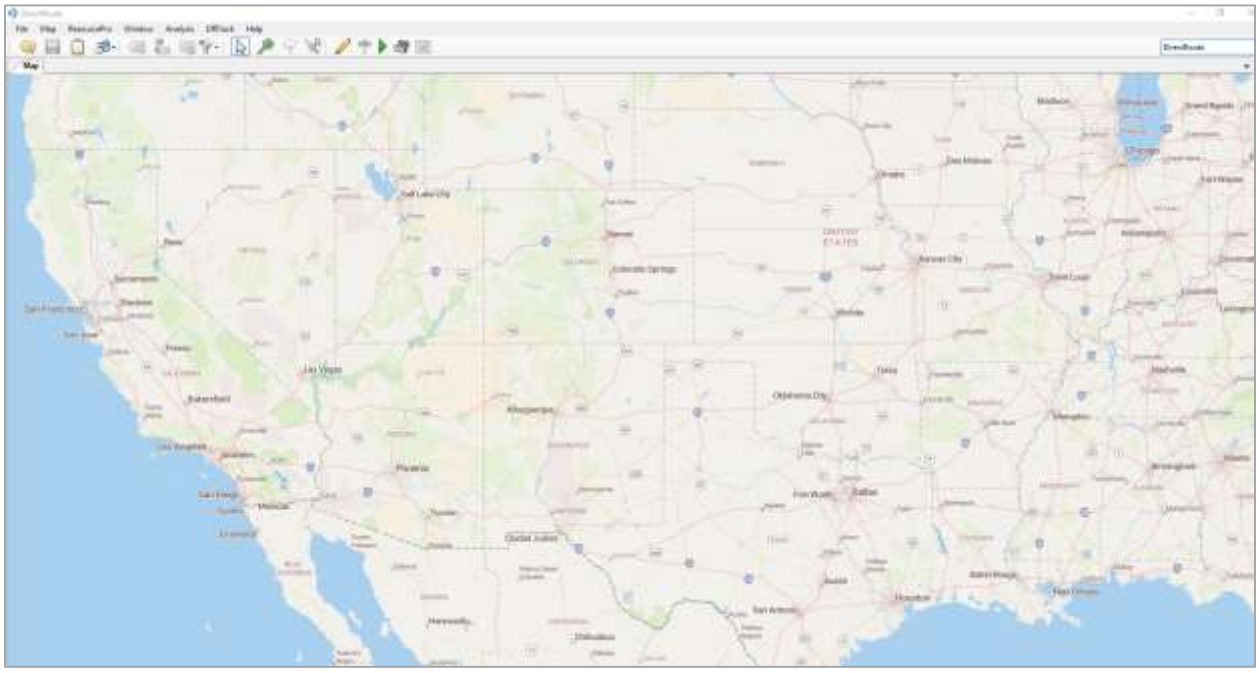

Figure 15 – Default Map View

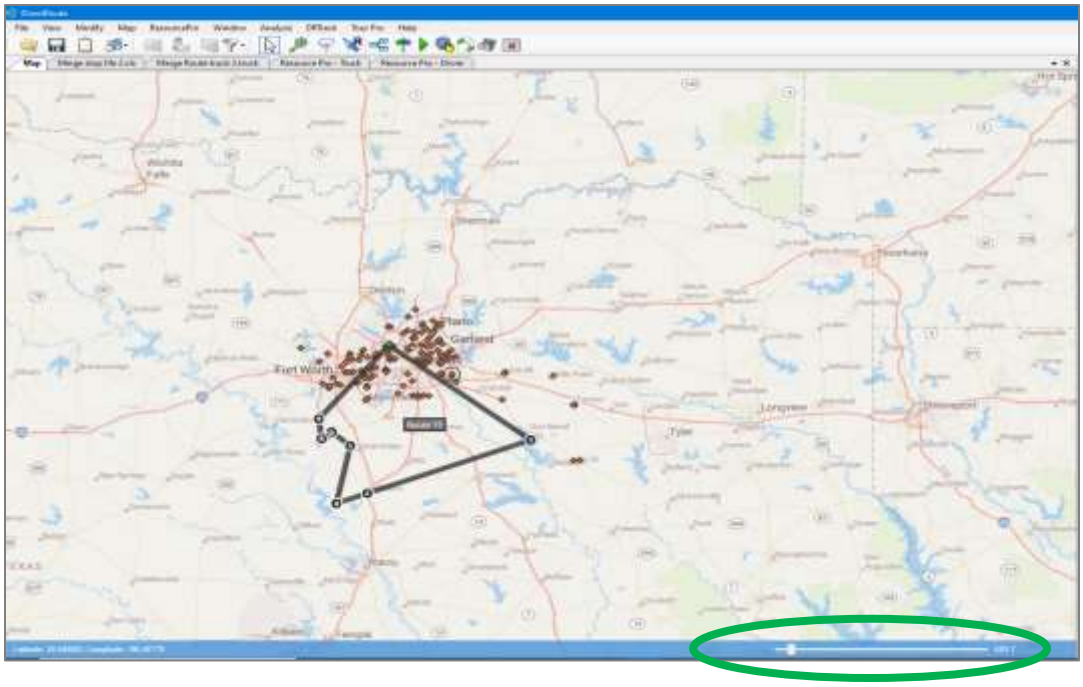

Figure 16 – Customized Default View

To reset the default view to a new area or region:

- Zoom to the desired location/zoom level (closer in, farther out)
- Select *Map→Default Map* from the menu bar

After moving about the map, and/or while zooming in/out of locations, use *Map→Zoom→Restore* (CTR+R) to return the screen to the default map.

You can also use the zoom control bar in the bottom right corner of the map to control your zoom level. Simply grab the bar with your mouse and slide it left or right to zoom in/out.

2.2.2 Point Field Displayed

Set and/or change the information displayed on the map for each stop that is geocoded when the zoom level is 100 miles or closer. Any record column heading from the Stop File can be selected to display on the map. Includes option to choose which records are displayed (i.e. Display all, Display routed stops only, etc.).

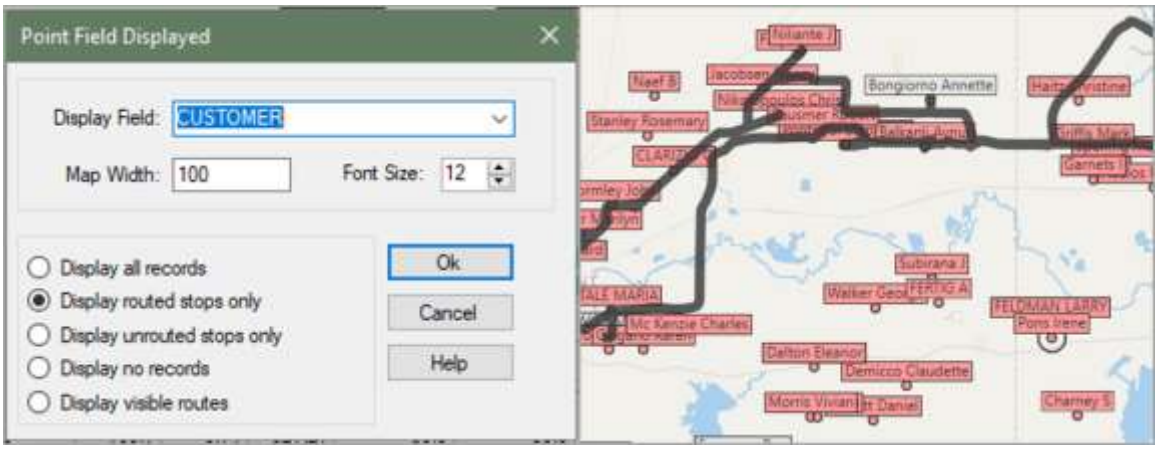

Figure 17 – Point Field Displayed

2.2.3 Map Tools

Map Tools include functions for analyzing and displaying data, Drawing Tools to define boundaries or territories, and filter actions to search for specific records and streets.

- **Build to Value** – Color-code locations based upon geographical area and a volume criterion (i.e. build a route based on area and volume). DirectRoute will apply a color and symbol to locations that fall within the criteria chosen. The software searches in concentric circles from the starting point.
- **Draw/Clear Drawings** – Used to enable the Drawing Tools, which are used to place objects, boundaries, and text boxes on the map; use Clear Drawings to erase drawings from the map.
- **Find Streets/Clear Streets** – Use Find Streets to search for or locate a street name on the map; use Clear Streets to remove the search results from view.
- **Unique Value** – Assign a different color symbol to each unique value within a spreadsheet column. Quickly color code records based upon unique criteria (*TerritoryID*, *Driver Name*, etc.)
- **Select** – Select specific records from the Stop File to plot on the map.

Tip: Drawing Tools can also be activated by using the Drawing Tools icon on the toolbar.

2.2.4 Zoom

DirectRoute offers predefined zoom options as well as the ability to customize the zoom function. Select one of the predefined areas listed to set as the default zoom range, or customize with by changing the Settings.

- USA
- Region
- City
- 5 Digit Zip
- Settings to control quick zoom features
  - **Zoom Percent** – Control zoom level (Zoom In %, Zoom Out %) applied when the (+plus) and (- minus) keyboard keys are used
  - **Zoom To** – Set a specific map width to zoom to when you left click the mouse
  - **Double Click** – Select the type of action that occurs when you double left click the mouse

Tip: Select Restore (CTRL+R) to return to the default map view

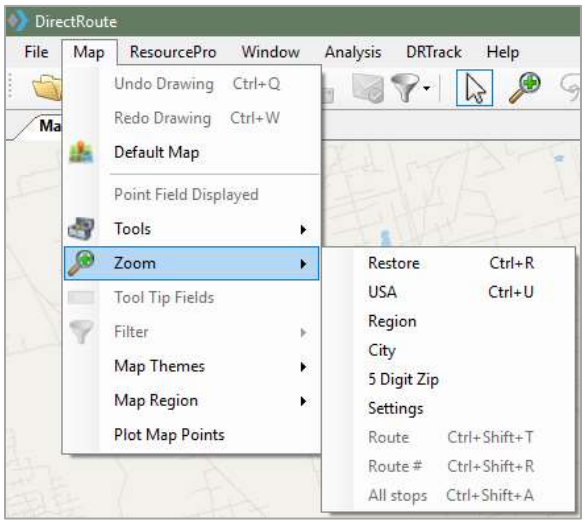

Figure 18 – Predefined Zoom Areas

Tip: Availability of cities is limited only by the types of maps installed on your system. If you do not have maps of other countries installed, this will not work for any city listed in those countries.

Tool Tip Fields – Map Tool Tip (Stop Info Box) provides color coded results for quick identification. Detailed info related to each stop can be seen in the Stop Info box that appears on the screen when the mouse cursor is positioned/hovers over the stop. Any data column from the Stop File spreadsheet can be chosen to display on the screen in an info box that appears above the stop point on the map as the mouse cursor rolls over it.

Filter – Use a map filter to isolate specific stops on the map. Filters can be identified using any Stop File field from the spreadsheet.

- Select *Map→Filter→Show Filter*; use the *Saved Queries* drop down menu to select the saved filter
- Stop Filters applied and saved in the primary Route Book will also be available for use in any additionally opened Route Books (Route Book 2, Route Book 3, etc.)
- Any saved filter can be accessed from any open file, as well as from the map

Map Themes – Map Themes provide options for the type of map to use/display. Several options are provided, including *Transportation, Datalight, Datadark, Terrain,* and *Satellite*.

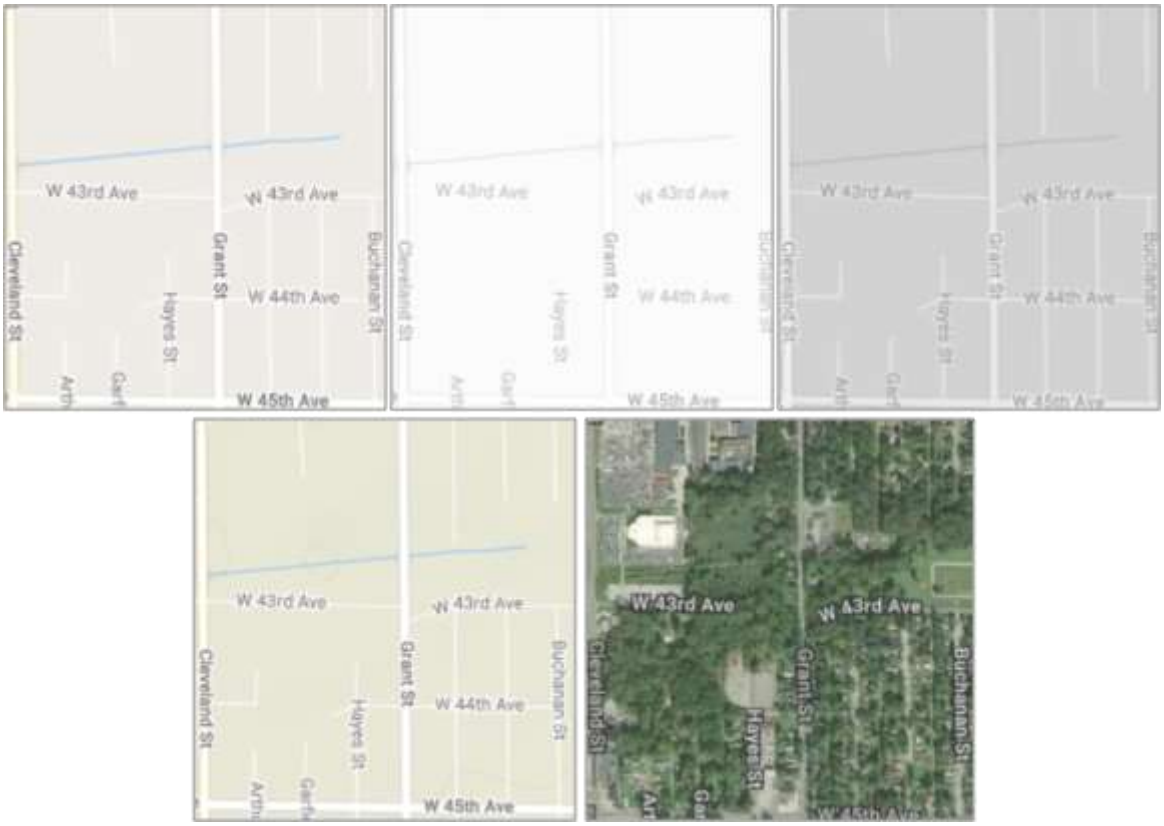

Figure 19 – Map Themes

Map Region – Select from 9 specific map regions. When a region is selected/changed from the available drop-down menu, DR will display the most current map data for that selected region

- A related setting in *Preferences→Trimble Maps→Data Version*, enables selecting the map data version; when the region is selected in this setting, DR will automatically call web services (requires internet connection) to retrieve the most current map data available for the selected region
- The 9 new options available from which to select include
  - PCM_NA = North America
  - PCM_EU = Europe
  - PCM_OC = Oceanic
  - PCM_SA = South America
  - PCM_ME = Middle East
  - PCM_AS = Australia
  - PCM_AF = Africa
  - PCM_WW = Worldwide
  - PCM_GT = GeoTrack/Energy (oil site roads, mostly dirt roads)

Note: GeoTrack/Energy maps are not regularly available on normal versions of mapping data.

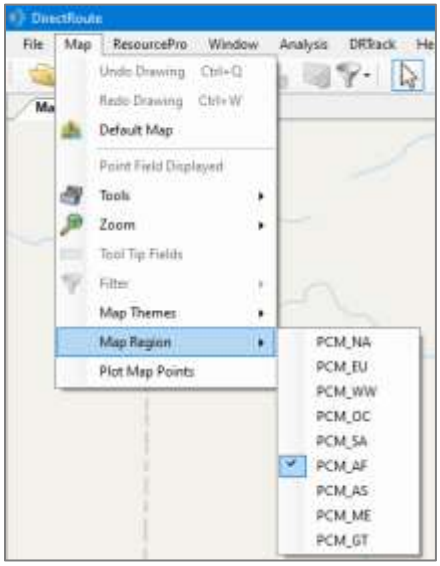

Figure 20 – Map Region

Plot Map Points – Opens a control box in which a specific address can be input to geocode, or just enter the Lat/Long coordinates to plot that point on the map. From the main Menu, select *Map→Plot Map Points*.

- **Add New Point** – Add additional lines to the info box to enter additional addresses
- **Clear All** – Clear all the stops from the map and from the list of stops
- **Zoom to All Stops** – Zoom the map to all the stops
- **Close** – Close the Map Point info box
- **Geocode** – Geocode the address entered in the control
- **Add Stop** – Add the stop(s) to the map

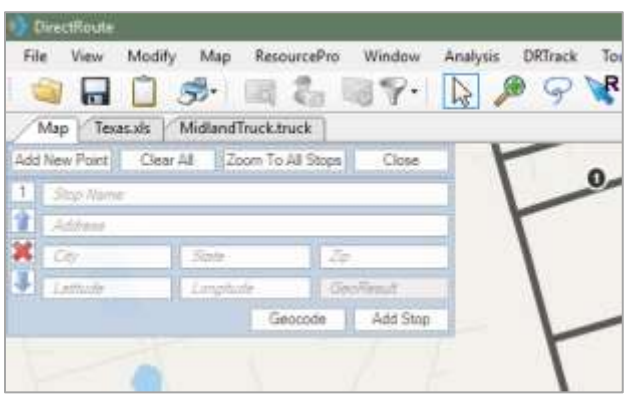

Figure 21 – Map Region

2.2.5 Additional Assorted Map Features

Unlike other programs that have rigid zoom settings, DirectRoute's map features assorted tools to enhance or define the map viewing area. In addition to the Map Menu options, the following map tools are also available.

Map Scroll Bar – Located on the bottom of the map, the scroll bar can be used to zoom in or out on the map. Grab the cursor with the mouse and manually move it left (zoom in) or right (zoom out). Or left click and hold on the scroll arrows (on either side of the cursor) to zoom.

Zoom to Selected Spreadsheet Record – left click once on a stop record in the spreadsheet to select it, then right click once and select *Zoom To*; the screen will switch to the map window, zoomed in to the stop.

Note: If a stop is not geocoded, this function will zoom to the selected record's Zip Code, instead. If no Zip Code is listed for the record, the Zoom To function will not work.

Map Zoom Icon – Located on the DirectRoute Toolbar, use the Zoom icon to zoom in closer on a selected area. Select the icon from the toolbar, then left click and hold the mouse button and drag the mouse outward to encapsulate the desired area. When the mouse button is released, the screen will jump to the area that was selected.

Zoom Using Mouse Double Click – Double left click the mouse over any area to zoom in or out (percentage setting defined in *Map→Zoom→Settings*).

Cursor Panning – To pan the map left, right, up or down, click and hold the mouse, moving the cursor to the location you want to view, then release.

Locate Latitude/Longitude – Lat/Long coordinates are always displayed in the bottom left corner of the map. As you move about the map with the cursor, the coordinates change and will display the coordinates at which the cursor is located. To search for coordinates without a specific address, zoom to a level that enables viewing the point of interest, then glide the cursor into position to display the coordinates for that location.

2.3 Map Symbols and Color Chart

Symbols and colors are chosen and saved in the Stop File to represent stops as they are displayed on the map with the Stop File open. There are several ways to use symbols and colors to quickly identify types of stops. Use colors and/or symbols to identify customers who receive deliveries on specific days of the week (red for Mondays, yellow for Tuesdays, etc.) or a circle for convenience store deliveries and a square for grocery store deliveries. With 30+ symbols and 40+ colors to choose from, numerous combinations can be used to customize the map display.

Symbols – Symbols are used to represent each stop (or Truck) displayed on the map when the Stop File (Truck File) is open. The symbols are chosen from within the file during the edit process.

To change or add a symbol type for any record:

- Double click on any cell or column within the Stop File to open the Stop Dialog box
- On the right side of the Stop Dialog box under Location, locate the Symbol box and use the drop-down arrow to select from the options listed

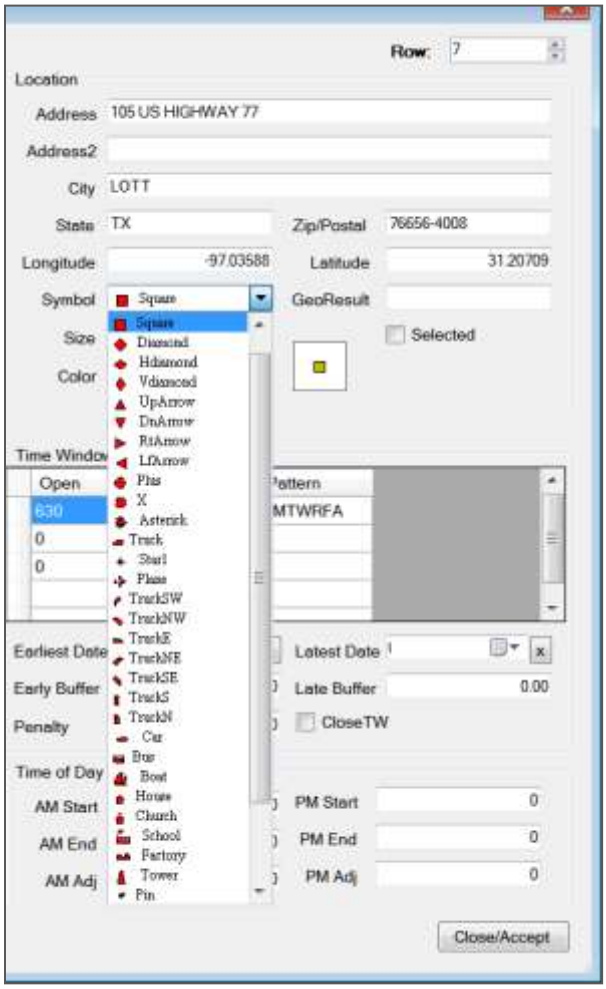

Figure 22 – Symbol Chart

2.3.1 Color Chart

The map symbol color chart lists the various colors available to assign to each symbol chosen for display on the map. To choose or change the symbol color:

- Double click any cell on the line of the record to be edited to open the Stop Dialog box
- On the right-hand side of the dialog box under Location, locate the Color box and use the drop-down arrow to select from the options listed

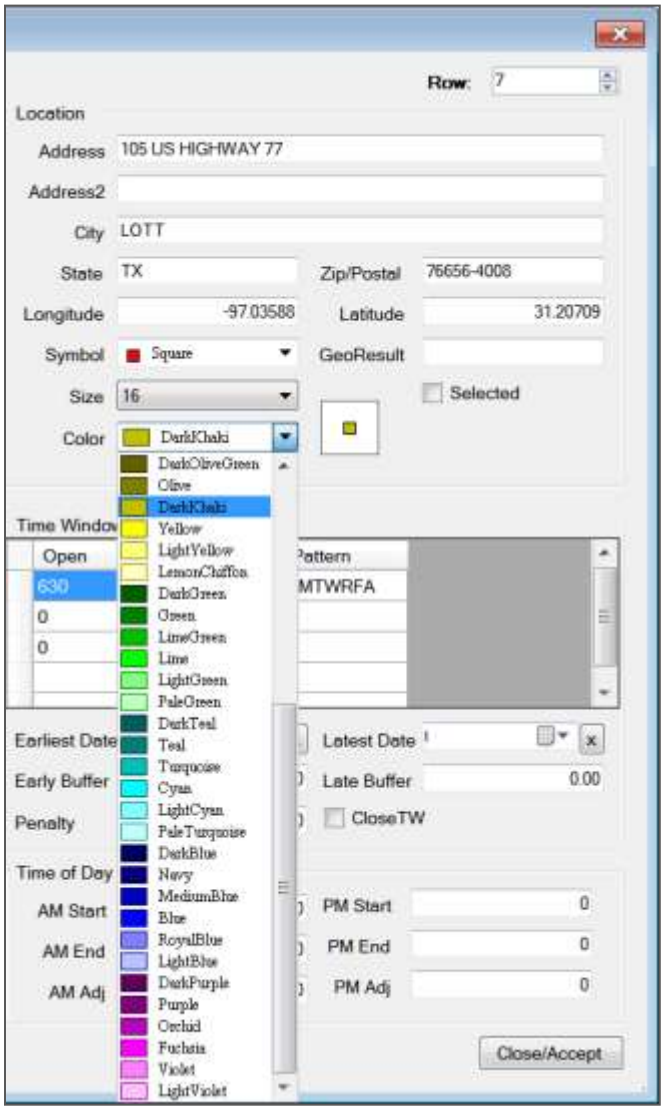

Figure 23 – Color Coding Chart

2.3.2 Display / Edit Stop Info on the Map

DirectRoute allows you to display and edit the spreadsheet data for a symbol that you point to on the map. The Stop Info box displays the spreadsheet row and focuses the corresponding symbol on the map.

Detailed info related to each stop can be seen in the Stop Info Box that appears on the screen when the mouse cursor is positioned/hovers over the stop (hold the CTRL key down and left click the mouse). Info in the center of the box (custom user defined fields) will always be white text on black background. Header color indicates a stop's status.

- **Yellow** = unloaded stop prior to routing; no footer
- **Red** = unloaded stop in routing mode; footer reads Unloaded
- **Blue** = loaded stop in the routing mode; footer message reads Route, Leg, and Sequence #

When stops (routing mode) are tightly grouped on the map, all stop info is displayed in one box; footer lists the number of stops loaded vs. total stops displayed.

Figure 24 – Display Stop Info on the Map

Tip: While we use the Stop File as our example in this section, the same can be applied to the Truck File and/or Route File (Truck Info box, Route Info box), as this option is available for any spreadsheet record.

2.4 Toolbar and Icons

The DirectRoute toolbar contains shortcut icons for performing frequent or critical tasks. Some of the icons will not be active or cannot be used unless specific files are open, certain actions have already been completed, or one of the additional software modules has been installed and is in use.

Figure 25 – DirectRoute Toolbar

Tip: If a menu or toolbar option is gray/faded rather than colored/clear, it is not accessible at that time. You may need to have specific files open and/or be in the routing mode to access certain functions, or it may be accessible only if licensed for additional Appian software modules (ResourcePro, TerritoryPro, etc.).

File Open – Use to open a spreadsheet, data, or Route File. The file type, directory location, and file name can be chosen from the dialog box that appears.

File Save – Use to save an active spreadsheet and/or route.

Clipboard – Enables copying a portion of the map and drawings you are viewing to the Windows clipboard. Click/drag the mouse in the map window to copy a portion of the Map window to a photo image program (Microsoft Paint, Paintbrush, etc.) or to a Word application.

Print – Print the map (active), records from your spreadsheets, or routes.

Geocode by Zip – Locates the Lat/Long of records within the Stop File and Truck File, and updates the records according to their 5-digit Zip Code centroid.

Geocode by Address – A shortcut to geocoding, which locates the Lat/Long of records within the Stop File and Truck File according to their exact address and ZIP+4.

Address Cleanup – Provides a quick and easy means for correcting address information and attaching the 4-digit extension (ZIP+4) to the Zip Code. Address Cleanup should be used prior to Geocoding records.

Stop Filter – Enables selection and separation of unique records from the Stop File to display on the map alone (without all others). The clear function allows the filter to be cleared when done. When filters are used and saved in the Primary (P) Route Book, the filter becomes available for use in each additional Route Book, as well as in any other open file, and from the map. To access a saved filter:

- While viewing the map, select *Map→Filter→Show Filter*; select the saved filter from the drop-down menu
- While in the Stop File and/or Truck File, select *View→Stop Filter*; select the saved filter from the drop-down menu

Additionally, Stop Filters can be applied and used in the Preprocess function (route selected records only, versus all records in the entire Stop File). See **Routing Preferences and Options Table** for additional information on how to use a Stop Filter in the Preprocess function.

Normal Cursor – Used to cancel a DirectRoute action. For instance, to end a drawing tool action such as the circle-drawing tool, select the normal cursor icon on the toolbar.

Tip: Can also be used to cancel the Zoom or Pan Map function.

Map Zoom – Use to zoom in closer on a selected area. Select the icon from the toolbar, then left click and hold the mouse button and drag the mouse outward to encapsulate the desired area; when the mouse button is released, the screen will jump to the selected area.

Lasso – Use to encircle (select) a group of stops on the map. Can be used to select and edit stops, load or unload stops, move stops to additional routes, etc. See **Using the Lasso Tool** for additional information.

Manual Routing – Selects specific stops to route.

Drawing Tools – Activates the tool bar, enabling the drawing of shapes, selection of records, and placement of text boxes on the map.

Get Directions – Provides turn by turn directions for each selected route, while in the routing mode.

Generate Route Directions on Route Edit – Regenerates new directions if routes are edited after directions were initially produced. When Generate Route Direction on Route Edit is selected on the DirectRoute menu, the button will be outlined in black ink. When a stop is on any route is edited or modified, as soon as that action occurs, the Generating Route Directions info box should appear in the lower left side of the screen, indicating new directions are being generated.

Priority Routing – Used to activate Priority Routing, a tool used to build routes manually.

Selective Routing – Used to reopen the Truck and Stop Grids when working with routes created with Selective Routing.

Sync Map – Sync with other windows. When in the routing mode, use this after editing any data to sync all open windows.

External Utilities – Provides additional configuration utilities for some users. Options are defined in the **utils.config** file.

Minimize All Info Grids – Will minimize all info panels that are open in the Route Book and create a tab to each on the left side of the screen.

Rate Orders – Used with Transportation Modeler to apply rates from a designated Rate File to a Shipment File (this icon is normally only visible when using the TM module).

2.5 Mouse Pointer Symbols

The Mouse Pointer assumes different shapes and sizes to let you know what functions are currently being performed.

Unlike your PC's theme options, the Mouse Pointer symbols in DirectRoute are not interchangeable or customizable. In other words, you cannot select which pointer you would like to use while working in DirectRoute. The types of pointers available while working in DirectRoute are dependent on the module and/or process that are currently activated.

Arrow Pointer – When pointing at the toolbar, menus, scroll bars, mini-map, spreadsheet, or status bar.

Map Pointer – While working in the Map window. Lat/Long coordinates, in relation to the pointer's location, is displayed in the bottom left corner of the status bar; also used to point at individual symbols displayed on the map.

Spreadsheet Pointer – When pointing at spreadsheet cells, the mouse pointer assumes this shape. Left click on any cell or use the keyboard arrow keys to move between cells.

Frame Hand Pointer – Indicates that the Pan Map icon is active. To cancel, select the normal cursor icon.

Hourglass Pointer – While DirectRoute is performing a task.

Magnifying Glass Pointer – Use to zoom in on an area. To cancel, select the normal cursor icon.

I-Beam Pointer – When the mouse is positioned over a selected cell or when the mouse is over the formula bar (just below the toolbar, when a spreadsheet file is active.)

Two-Headed Arrow Pointer – When resizing drawings, spreadsheet cells, or windows.

Four-Headed Arrow Pointer – When moving a drawing or text box.

Clipboard Pointer – When the Clipboard icon is active.

Manual Routing Pointer – When the Manual Routing icon is active.

3 Routing Overview

DirectRoute's routing technology provides one of the fastest optimal route planning algorithms now available in routing solutions on the market today. Utilizing DirectRoute to plan and develop routes can improve efficient workflows in every step of the logistical arena, from planning and analysis to dispatch, tracking and reporting.

- Improve capacity usage
- Reduce empty miles
- Less manual routing through advanced algorithms
- Save time planning/routing
- Build various routing scenarios with the **Scenario Manager** tool
- Automate load and optimization of routes
- Download order and customer files
- Route modifications from the map screen
- Route modifications from the Route Book

As each stop is loaded, DirectRoute uses the routing parameters defined in each project to determine truck departure and arrival times, and distances between stops and depot. As the routes are built, key statistical data pertaining to each route is summarized and provided with each routing solution, including:

- The total miles driven on each route and time required to complete
- Total volume (i.e. weight, cube, etc.) and cost
- Combined totals (all the above) of all routes and averages

Once routes have been established, DirectRoute provides several options that allow routes to be immediately viewed, modified, printed, and saved. Additional options include:

- Maintain key route statistics (total drive time, work time, miles driven, capacity utilization, costs, etc.
- Display and print detailed delivery schedules with arrival/departure time
- Upload routes to an Order Management System, GPS tracking system, or other
- Download orders from an Order Management System to update or build additional routes

DirectRoute utilizes a few primary components to develop an effective routing solution.

- Routing data provided in the form of Routing Files determines the 'who', 'what', 'when' and 'where' of routing
- Types of routes, or the type of results expected, in the routing solution (fixed, skeletal, zone based, or dynamic)
- Routing Parameters, or Routing Preferences, help DirectRoute determine the 'how' to route, or routing environment, which may include various constraints (work rules, travel restrictions, delivery windows, available equipment, etc.) that must be followed

3.1 Routing Data

Before DirectRoute can assist in developing routes, it must know something about your routing environment and the deliveries to be made (routing data). This routing data (fleet and customer delivery information) is provided within routing files (Stop File, Truck File, Distance File, etc.). The more

you understand the way DirectRoute uses the data you provide, the more effective you will be in using DirectRoute.

Some of the data fields in the Stop File relate to data fields in other files, and vice versa. For instance, the Truck File contains a data field that relays vehicle capacity information to DirectRoute for use during the routing process.

Example: Assume that each truck has a capacity of 45,000lbs. For DirectRoute to know when the truck is full, it must also know the delivery quantity (weight) assigned on each Stop Record. Therefore, the Stop File must include a data field that indicates the quantity (weight) of each delivery.

The Quantity Fields in DirectRoute can be used for any Quantity Value (weight, cube, pallets, etc.).

- Users assign the type(s) of Quantity Fields that will be used (**Routing Preferences,** next section)
- More than one (additional) Quantity Fields can be used together (weight, cube, pallets, etc.)
- Remember to use the same Quantity Value in both the Truck and Stop Files

3.2 Types of Routes

Typically, the most common types of routes used are Fixed, Dynamic, Skeletal, and Zoned. The type of routing you perform will depend largely on your type of operation and may include more than one these, or a combination of these, to get the optimal results for your business.

- ***Fixed Routes*** – Fixed Routes are performed when all customers are pre-assigned to a route and the number of routes ran each day is pre-determined; the customer base is very static, and order patterns are very predictable with only occasional fluctuations. Fixed Routes are also used when drivers also perform sales functions or a two-step delivery process with merchandisers following the delivery route.
- ***Skeletal Routes*** – Skeletal Routes are performed when primary customers are pre-assigned routes and typically have very tight delivery times so routes can only be ran a certain way, and the number of routes ran each day is pre-determined. Skeletal Routes are used to keep primary customer deliveries very consistent and non-primary customers will be routed within their time window, but not always at the same time. This type of routing requires a core set of customers, generally 80%, all with very predictable order patterns.
- ***Zone Based Routes*** – Zone Based Routes are performed when routing is based on geographically set areas, or zones, and driver assignment is by zone/area. Areas can be defined as small as one truck or larger, with multiple trucks assigned, and user set rules and constraints are set to enforce assignments (hard or soft time windows, length of workday, etc.). This encourages driver familiarity with route and clients, and aides in focusing on managing cost and customer service. While similar to Dynamic Routing, it facilitates a first shift picking before final order cutoff, and can be used for jobsite type deliveries while still keeping drivers in zones Depending on how the zones are created, there is opportunity to reduce the number of routes required.
- ***Dynamic Routes*** – Dynamic Routes are performed when routes vary from day to day, with ability to adapt to a very dynamically changing customer base with the greatest customer flexibility. Routes are built based on the lowest overall cost without violating any delivery rules associated with customer requirements. This type of routing can offer improved customer service through flexibility, offers the highest reduction in transportation costs, and

works best when used in conjunction with DRTrack for schedule visibility and re-time tracking.

3.3 Routing Preferences

Routing Preferences, or parameters, help DirectRoute determine the 'how' to route, or routing environment, which may include various constraints (work rules, travel restrictions, delivery windows, available equipment, etc.) that must be followed.

Routing Preferences are used to supply the software with necessary information about your routing environment and the type of results expected in the routing solution. These settings help DirectRoute identify specific data fields, volume types, and delivery windows used in the Truck File and Stop File, and direct specific actions, behaviors, or special considerations that the software should perform or consider when building routes.

Tip: Upon initial installation of the DirectRoute software program, the assigned Appian Implementation and Training Consultant will help identify and update all settings that best fit your specific routing environment.

The **Routing Preference and Option Table** identifies and explains each setting and available options more completely. To access and update Routing Preferences in DirectRoute, select *File→Preferences* from the main menu.

While all the preference settings are important to each routing solution, some settings are more critical, and dependent on your routing environment, some settings may not be used at all. Preference settings are divided into multiple sections, as briefly identified below.

- **Configuration** – Settings specific to the Truck and Stop Files
- **Defaults** – Default options applied during the extract process
- **DRTrack** – For DRTrack users; identify URL path and IDs for uploading routes
- **ETS Provider** – For users of TMW ETS or TMW Innovative services
- **Extract** – Extract settings for use with an Order Management/Host system
- **File Names/Paths** – Identifies location paths of key files used in the routing process
- **Geocode Options** – Select a Secondary Geocode processes and options (ex. Google)
- **Import** – Settings used to import XML Files from integrated TMW Systems software
- **Mode Selection** – Options used in conjunction with Transportation Modeler software
- **Other** – Identify mileage system and custom Geocode Files or special Map Files to use
- **PC*MILER** – Routing and vehicle options for use WITH a PC*MILER license
- **PC*MILER Direct** – Routing and vehicle options for use WITHOUT a PC*MILER license
- **PostProcess** – Accelerates after-routing processes when Upload Files is used
- **Preprocess** – Accelerates routing process with selected automatic actions
- **Routing** – Options used in the automatic load building and optimization processes
- **Tanker** – Load building options for compartments, used with the Tanker Algorithm
- **Trimble Maps** – Route and Distance File options for use with PC*MILER Web Services
- **Update Stop File** – Select Stop Fields to update automatically during the Upload process
- **Upload** – Upload settings for export to an Order Management/Host system

3.3.1 Routing Preferences and Options Table

FIELD	SAMPLE ENTRY	EXPLANATION
CONFIGURATION		Config settings applied to the Stop and Truck Files
ID1	Acct#	A unique field to identify a stop (customer#, account#, invoice#, etc).
ID2	Order#	Optional secondary field identifying a stop (order#, SKU#, etc.)
ID3	ID3	Optional tertiary field (item#, etc.)
Name	Name	Customer name, Account#, etc.
Address 2	Addr2	Optional secondary address info (bldg#, dock#, door#, etc.)
Contact	Tom Jones	Contact info for delivery
Phone	516-222-1234	Contact info for delivery
Volumes	(Collection) (weight, cases, pallets, units, etc.)	Volume type used in the Stop File
Stop User Fields	(Collection) Ex: Comments, Style, Descript, Order Status, etc.	Optional additional fields to list in the Stop File; use to collect info for reports, display in Route File, etc.
Truck User Fields	(Collection) Ex: Driver, Shift, Maint. Cat, etc.	Optional additional fields to display in the Truck File; use to collect info for reports, display in Route File, etc.
Number of Time Windows	2	Number of delivery time windows (1 thru 10)
DEFAULTS		Applied to all stops
Time Window	(Collection)	Default delivery time window applied to ALL stops
Fixed Time	15	Standard fixed time (minutes) applied to ALL vehicles at each delivery
EQ Code	LG-BH-002 Ex: 1 to 3 characters per code; multiple codes separated by a dash (–)	Special identifier for vehicles and/or requirements (lift gate, backhauls, priority codes, OD Pairs, etc.)
Unload Rates	(Collection) (weight, #cases, #pallets, etc.)	Standard number of Volume quantity unloaded per hour
Zone	100 Note: Increase or decrease applied as percentage to drive time to affect speed of vehicle Ex: 110 = increase drive time by 10%, decreases speed; 90 = reduce drive time by 10%, increases speed	Default = 100; used to increase or decrease drive time (speed) within a pickup or delivery area; applied within 8 mile radius of depot, or applied to stops located within 8 miles of another stop
Earliest Date	1 Jan 2016	Earliest date of delivery
Latest Date	3 Jan 2016	Latest date of delivery

FIELD	SAMPLE ENTRY	EXPLANATION
Early Buffer	.25 Ex: 1.00 = 1 hour, 0.25 = 15 min, 0.5 = 30 min, 0.75 = 45 min	Time before actual delivery window allowed for early delivery without penalty
Late Buffer	.25 Ex: 1.00 = 1 hour, 0.25 = 15 min, 0.5 = 30 min, 0.75 = 45 min	Time after actual delivery window allowed for late delivery without penalty
Penalty Cost	50 (50 = $50)	Fee ($) assessed when delivery Time Window is violated
Max Splits	2 Note: When Apply Defaults is set to TRUE, then Max Splits value is applied to each stop	Maximum # of times any stop (volume) can be split
DR TRACK		Use with DRTrack license
DRTrack URL	http://companyname.routetracking.com/Login.aspx	URL to DRTrack site; used for uploading data/files
Company Name	Johnson Tile	Used for importing and exporting
DRTrack Username		Username for DRTrack
DRTrack Password	Enter DRTrack password	Password for DRTrack
DRTrack Proxy Server	(If used to filter internet traffic)	Name of the proxy server
DRTrack Proxy Port		Port for proxy server
DRTrack Proxy Username		Proxy Username
DRTrack Proxy Password		Proxy password
DRTrack Timeout	10	System time-out value, in minutes
Branch	(Collection)	Branch names, if used
Default Branch		Default branch name
Profiles	(Collection)	Truck profiles, if used for different routing days
Route Upload Version	5	Upload version#
Master Profiles		Master Profile names. More than one can be recorded and used
Shift	(Collection) (Shift name, From time, To time, Truck Profile)	Enter Time Shifts when routing occurs (if used)
Account Master Upload Version	1	Upload version#, if more than one is used
Use LoadID From Stop File	TRUE (FALSE)	Default is FALSE
Compression Method	None (Zip)	File compression method
Manage Master Profile Routes		Set the start and end dates for each Master Profile
ETSPROVIDER		Interface settings for additional TMW software modules
TMW ETS	Truckmate	Select product family for interface
TMW INNOVATIVE LOGIN	Username	Login credentials (requires additional license)
	Password	Enter Password
	SCAC code	Enter SCAC code
	Service Version	Version 1
EXTRACT		Use with OMS to extract data for Route Files

FIELD	SAMPLE ENTRY	EXPLANATION
Account Master File	Master.XLS	Master File name
Append New Accounts to Account Master	TRUE (FALSE)	Set to TRUE, will append (add to) the Master File with new account data found in the Extract File.
Extract Option	CreateStopFile	Creates a Stop File from the Master File with all account information, or Update Account Master File
Get Address from Account Master	TRUE (FALSE)	Gets address information from the Master File
Overwrite Address in Account Master	TRUE (FALSE)	Overwrites address in the Master File with address from Extract File
Primary Identifier	ID1	ID1 from Configuration setting
Secondary Identifier	None	ID2, if used
Tertiary Identifier	None	ID3, if used
Update Blank Account Master Fields	TRUE (FALSE)	If TRUE, will update blank fields (existing customers only) in the Master File with data from the Extract File.
Use Defaults for New Accounts	TRUE (FALSE)	If TRUE, will populate the default field settings (Time Windows, Unload Rates, etc.) to any new accounts in the Master File.
Zero Coordinates if Address doesn't match	TRUE (FALSE)	If TRUE, will clear the Lat/Long from the Stop File if the address in both the Master File and Extract File does not match
Populate LoadID in Truck File	TRUE (FALSE) Note: Applies when an Extract is performed with a new Route Build, and LoadID columns are populated	If TRUE, copies LoadID from Extract File to Truck File when routes are initialized
LoadID Column Name		Column that contains LoadID in Extract File
Interface		Interface
FILE NAMES AND PATHS		Identifies location of files used in the routing process
User Data Directory	C:\Program Files\Appian\DirectRoute\Data Note: Should be in the DirectRoute folder that was created during the installation process. Note: DirectRoute will display a message on the screen when the user doesn't have access (authorized API key) to the selected Directory, and the info box will be restored to the original User Data Directory path.	Location of the User or project DirectRoute Data Folder

FIELD	SAMPLE ENTRY	EXPLANATION
9-Digit Zip Directory	C:\Program Files\Appian\DirectRoute\ ZIP9 Data Note: Should be in the DirectRoute folder that was created during the installation process	Name and location of the ZIP9 Data File
Account Master File	C:\Program Files\Appian\DirectRoute\Data\Acct Master File.XLS	Location and name of the Account Master File
Base Map Directory	C:\Program Files\Appian\DirectRoute\ Base Maps Note: Should be in the DirectRoute Data Folder that was created during the installation process	Location of the Map File
Cross Dock File Path	C:\Program Files\Appian\Direct Route\Data\Cross Dock.XLS	Location and name of Cross Dock File
Custom Geocode File Path	C:\Program Files\Appian\Direct Route\Data\Geo File.XLS	The path to the Custom Geocode File
Drawing File Name	C:\Program Files\Appian\Direct Route\Data\ Drawing File.drw	The path of the Drawing File
Geoset	C:\Program Files\Appian\Direct Route\BASEMAPS\USA\USA.GST	The location of the .gst File
OBC Folder Path		OBC upload output folder path
Product Family File Path (*.XLS)	C:\Program Files\Appian\DirectRoute\PFFP File.XLS Note: File should contain populated ProductFamilyName column {mapped with TankSpEq column in Truck File} and populated ProductName column	Select Product Family File for Tanker Algorithm
Relay File Path	C:\Program Files\Appian\DirectRoute\Data\Relay File	Enter the path name to the Relay Truck File
Upload File Name	Upload File	Enter the name of the Upload File
Upload File Path	C:\Program Files\Appian\DirectRoute\Data\ Upload File	Enter the path to the Upload File
Upload Format File (*urp)		URP File name and location; input here will remove prompt during every upload session
Z1 Path	C:\Program Files\Appian\ DirectRoute\Address Cleanup\Z1.DAT Note: Should be in DirectRoute\Address Cleanup folder	Name and location of the Z1 File
Z8 Path	C:\Program Files\Appian\ DirectRoute\Address Cleanup\Z8.DAT Note: Should be in DirectRoute\Address Cleanup folder	Name and location of the Z8 File
GEOCODE OPTIONS		Used to find and validate location coordinates
Secondary Geocoder	None, Google	Use Google to validate geocode results, or to obtain

FIELD	SAMPLE ENTRY	EXPLANATION
	Note: Limited to 2,500 requests per 24hr period, and 10 requests per second.	Canada or Australia geocode results.
Fallback to secondary geocoding after	Always, Never, Level 1, Level 2 *Level 1*: Recheck if result = other than Level 1 *Level 2*: Recheck if result = other than Level 1 or 2 *Never*: Never recheck addresses *Always*: Always recheck addresses	Default is Always
GOOGLE SETTINGS		Required when Google is Secondary Geocoder
Google API Key	800900700601 (12-digit # issued when User initiates a Google Maps account)	Google API address
Google Geocode Accuracy Level	Rooftop *Rooftop* – (High Accuracy) Precise down to street address precision *RangeInterpolated* – (Same Street) Reflects an approximation (usually on a road) interpolated between two precise points (such as intersections); *Geometric Center* – (Same Region) Result is the geometric center of a result such as a polyline (ex. a street) or polygon (region); *Approximate* – (Approximate) Indicates the result is approximate	Default is Rooftop
IMPORT		Use with Integrated TMW Systems to Import files
Enable Order Selection	TRUE (FALSE)	Set to TRUE if downloading orders for next dispatch date + additional days
Overwrite Quantity Fields	TRUE (FALSE)	Set to TRUE if not passing required fields
Overwrite User Fields	TRUE (FALSE)	Set to TRUE if not passing User Fields
Ignore Trucks passed in XML	TRUE (FALSE)	If FALSE, will prompt the user to pick a Truck File
Enable Preprocess	TRUE (FALSE)	If set to TRUE, enables Preprocess to run when importing from an XML File
MODE SELECTION		For use with Transportation Modeler, identifies mode types available, files, costs, and limitations
MaxRoutesPerShipment	3	Max# of routes per shipment; default is 3
Rate File	C:\Program Files\Appian\DirectRoute\Data\Rate Table	Path to Rate File
Distance File	C:\Program Files\Appian\DirectRoute\Data\ Data.dist	Distance File name/path; usually the DirectRoute Data Folder
Default TLRate	1.5	Default truckload rate
Weight (Primary Qty Field)	Weight	Primary Qty field used

FIELD	SAMPLE ENTRY	EXPLANATION
Volume (Secondary Qty Field)	Cube	Volume field used
Count (Trichiary Qty Field)	Skids	Quantity count (WT, Cube, Skids, etc.)
SECURITY CREDENTIALS	USER CREDENTIALS	Use with Rateware, UPS
FEDEXCONFIGURATION	SERVICE TYPE	Use with FEDEX service
Wait cost in LTL shipments	150.5	Wait cost in LTL shipments
Border crossing delay	90	Border crossing delay (minutes)
Max Allowed Work Hours in DOT Cycle	0	Max allowed work time on multi-day route (ex. 60 hrs)
Team Rate Premium	890	Team Rate Premium
Aggregate LTLCost on Consolidate	TRUE (FALSE)	Default is FALSE
LTL Consolidation Type	Costs or Miles	Consolidation type for LTL Shipments
LTL COST ADJUSTMENT		Cost adjustments (LTL Rate)
Quantity Name	Weight	Volume type
Quantity Over	0	Threshold after which LTL Cost Adjustment is added
Additional Cost	0	Additional cost when threshold is reached
OTHER		Mileage System and Map Files
Mileage System	Trimble Maps (PC*MILER Direct, PC*MILER, MapInfo, MapInfoCV, or None)	Name of the Mileage System to be used with the software
Date Format		MM/dd/yyyy, dd/MM/yyyy, MMMM dd yyyy, or yyyy-MM-dd
Time Format		Time format used when passed to primary business system using an Upload File
Custom Geocode File Path	C:\Program Files\Appian\DirectRoute\Data\ Geo File.XLS	Location of custom Geocode File, if used
Geocode File Col Identifier	CTY	Name of the column in custom Geocode File, to be examined when applying custom geocoding
Distance Options	Miles	Miles or Kilometers, used in map bar display
Coordinate Option	Decimal Degrees	Decimal degrees, (Degree:Minute:Seconds) used in the map status bar
Convert STP/XLS File	TRUE (FALSE)	If TRUE, converts .STP and older .XLS Files to newer format
FIND STREET LAYER		Designation of street level GST layer used in Find Street utility
Major Road	Main Street	Name of the road

FIELD	SAMPLE ENTRY	EXPLANATION
Street 1	Usa_dap	
Street 2		
Country	En-AU (English) Australia	For use with Google Maps API Geocoding, select applicable country code, if needed
Company Name	Parks	Name
Auto-save solution after generating directions	TRUE (FALSE)	If TRUE, saves solution after direction generation
Auto-save Route Book layout files	TRUE (FALSE)	If TRUE, saves Route Book layout (F8 key) when the Route Book is closed
Clone Stop and Truck File while saving Route File with Save As option	TRUE (FALSE)	If TRUE, saves and copies Stop, Truck, and Route File, when using Save As option to close files; copied files are assigned a new (same) name as the Route File, while original Routing Files are left intact and unchanged
Store distance entries in:	File Note: If entries are stored in Database {Db}, use the following app settings in the exe.config File: Use Database for DistanceEntries =TRUE ConnectionStringName = Name of the string configured {Connection Strings section} CompanyID =1 {default})	Select File or Database (PC*MILER route type)
ORDER CRITERIA		Enables Order Selection Filter for DRTrack download, and Selective Routing
Query by User Field	Status	Enter each Stop User Field (*Configuration→Stop User Fields*) to enable use as a filter for stop selection
Query by Values	Ready / Not Ready Ex: Stop User Field chosen is Status. Values found in the Stop File (in this field) are Ready and Not Ready	Enter all Values separately, as found in the selected Stop User Field
Stop Selection Color	Choose color for stop selection	Blue
Auto open Stop Grid on Routing	TRUE (FALSE)	When set to TRUE, automatically opens the Stop Grip in a routing solution
Replenishment Point Name	Default TruckID	Choose refuel point name to be displayed
PC*MILER	Use with a PC*MILER license	PC*MILER routing options
Route across borders	TRUE (FALSE)	If TRUE, will allow routes to cross international borders; default is FALSE
Route Type	Practical	Practical, Shortest or Air (straight line)

FIELD	SAMPLE ENTRY	EXPLANATION
Route Type option	Default	Default, National, Avoid Toll, or Fifty Three
Hazardous option	None	None, General, Explosive, Inhalant, Radioactive, Corrosive, or Flammable
Thread	Single	For use when generating Distance File, for multi-core CPU, set threading to Multiple; otherwise set to Single
PC*MILER DIRECT	Use without a PC*MILER license	PC*MILER routing options
Route across borders	TRUE (FALSE)	If TRUE, will allow routes to cross international borders; default is FALSE
Route Type	Practical	Practical, Shortest or Air (straight line)
Avoid Toll	TRUE (FALSE)	If TRUE, will avoid toll roads when possible during the routing process; default is FALSE
Hazardous option	None	None, General, Explosive, Inhalant, Radioactive, Corrosive, or Flammable
Thread Count	0	Preset; not editable
Distance Generation Mode	Pair	Option to change how PC*MILER generates distance entries. Default is Pair
Vehicle Profiles	(Collection) Profile allows edit of vehicle height, length, width, weight limit, and # of axles (no less than 2). Ex: Light Assets, Full Sized Van, Double Trailers, Straight Truck, 48’ Semi Trailer, 53’ Semi Trailer, or Custom (PC*MILER Direct/Vehicle Profiles). Add additional if necessary, under ‘Custom’.	Add/Enter all vehicle profiles used in the Truck File. Only those profiles entered will be available for selection in as a Default Vehicle Profile.
Default Vehicle Profile	Only vehicles entered in Vehicle Profiles will be available for selection.	Select the default vehicle profile to use during the route building process.
Map Region	Default Map Region	N/A (not used at this time)
Use Historical Traffic Data	Requires additional Appian licensing. When not used, system will default to DirectRoute Drive Time (or other installed Mileage System).	If TRUE, generates drive times and distances based on historic traffic time estimates and collected real-time traffic data, instead of DirectRoute’s calculated drive time/distances.
POSTPROCESS		Use to accelerate additional processes after routing
Upload	TRUE (FALSE)	If TRUE, will pass orders/routes in an upload file (UPL) after routing

FIELD	SAMPLE ENTRY	EXPLANATION
Upload DRTrack	TRUE (FALSE)	Set to TRUE, will pass orders/routes to DRTrack after routing
Print Route Book	TRUE (FALSE)	If TRUE, will automatically print the Route Book upon completion of the routing process
PREPROCESS		Use to accelerate the routing process
GENERATE DISTANCE FILE		
Generate Distance File	TRUE (FALSE)	If TRUE, generates Distance File during Preprocess
Minimum Distance Between Stops	0	Minimum distance the software will compute distance between stops
Maximum Distance Between Stops	800	Maximum distance the software will compute distance between stops
Speed Adjustment	100	Adjust drive time by this factor (100 is baseline, 120 increases drive time by 20%, etc.)
Maximum Speed	60	Maximum allowable speed by vehicle on a route
Generate 2-way entries for stops less than (x miles)	5	Add a return distance, between two stops within X miles of each other
Generate 2-way distance entries	TRUE (FALSE)	If TRUE, will calculate distances To and From stops
Stem Distances Only	TRUE (FALSE)	If TRUE, will calculate distance between the Terminal and City where the stop is located (not the stop itself)
In Cone	TRUE (FALSE) (Angle and radius created from the terminal, defaulting to 57º)	If TRUE, only stops within the Angle or Radius may be added to the selected route
Overwriting Existing Entries	TRUE (FALSE)	If TRUE, will overwrite any Distance File in the DirectRoute Data Folder
Within Territories	TRUE (FALSE)	Set to TRUE, will generate a Distance File with distances listed between EqCodes of the same type
Route Across National Border	TRUE (FALSE)	If TRUE, will allow route to cross Canada and/or Mexico borders; if FALSE, will prevent routes from crossing borders (may result in more miles)

FIELD	SAMPLE ENTRY	EXPLANATION
Commercial Restrictions	TRUE (FALSE)	Option for Prophesy to use only roads permitted for commercial vehicles
Avoid Toll Roads	TRUE (FALSE)	If TRUE, keeps trucks from using toll roads
Use DirectRoute Drive Time	TRUE (FALSE)	If TRUE, will generate distances and drive times using DirectRoute calculations (instead of any optionally installed Mileage System or Historic Traffic Data.
Threading	Single Thread	For use when generating Distance File, multi-core CPU = set threading to Multiple, otherwise set to Single
Distance File		Location to save Distance File, generated during pre-process
Use Mileage System Drv Time if it is > DirectRoute Drv Time	TRUE (FALSE)	If TRUE and an optional Mileage System is installed, will use the optional Mileage System's drive times when generating the Distance File if those drive times are greater than DirectRoute's calculated drive times.
GEOCODING		
Geocode Stops	TRUE (FALSE)	If TRUE, will Geocode Stop File before routing
Clean Address	TRUE (FALSE)	If TRUE, calls the Address Clean up module to clean the records prior to Geocoding
Skip Geocoded Records	TRUE (FALSE)	If TRUE, will skip any records that have been previously Geocoded
Color Code Stops	TRUE (FALSE)	If TRUE, color codes stops
Update Address, City, and Zip	TRUE (FALSE)	If TRUE, updates corrected Address, City and Zip
APPLY BOUNDARY		
Apply EqCodes to stops	TRUE (FALSE)	If TRUE, applies EqCodes to stops
Drawing File Name		Name of the Drawing File (if used)
Overwrite Existing EqCodes	TRUE (FALSE)	If TRUE, overwrites existing EqCodes
APPLY DEFAULTS		
Apply Defaults	TRUE (FALSE)	If TRUE, enables the Stop Filter selection during the routing process (actives the Stop Filter Pop-up menu).

FIELD	SAMPLE ENTRY	EXPLANATION
Overwrite Existing Entries	TRUE (FALSE)	If TRUE, overwrites existing entries in Stop File
FIXED ROUTE		
Run Fixed Routes	TRUE (FALSE)	If TRUE, stops are matched to trucks based on the fields selected to get route assignments
Truck File Matching Field	Trk ID	Select a field from the Truck File
Stop File Primary Matching Field	Trk ID	Select field in the Stop File that corresponds to the field in the Truck File
Stop File Secondary Matching Field	Driver	Select the field in the Stop File that corresponds to the field in the Truck File
Copy Sequence	TRUE (FALSE)	If TRUE, sequence number will be copied from the selected field to the SEQ field
Stop File Sequence Field		Select the field that has the sequence number
Get DOW Sequence Code Based Upon Pattern 1	TRUE (FALSE)	For fuel-specific functions
Overwrite Route and Sequence	TRUE (FALSE)	If TRUE, will overwrite existing Route and Sequence, if any, already in the Stop File
Generate Route Directions	TRUE (FALSE)	If TRUE, will generate route directions after routes are built
Enable Stop Filter	TRUE (FALSE) (Applies to selected records only, versus all records in the Stop File)	If TRUE, will enable the Stop Filter during the route building process
ROUTING		Options for Automatic Load Building and Optimization
ALGORITHM SETTINGS		
Add Turn Time	TRUE (FALSE)	If TRUE, and redispatch is selected in the Truck File, DirectRoute will add the specified turn time to the route work time
Algorithm	REGULAR – Normal two-way routes DOW – Day of Week, for fuel specific functions INBOUND TO – Route from stops back to depot, similar to a one-way inverted route FARTHESTIN – Two-way routes from the farthest stop back to the depot OUTBOUND – Farthest stop is the last stop, with return to the depot	Select the desired Algorithm type to use
Box Expand	5 Note: When optimizing, the software constructs the smallest box that will contain all the stops on a route; parameter affects the optimization process.	Number of miles (size of box around stops); default is 1

FIELD	SAMPLE ENTRY	EXPLANATION
Check In Cone	TRUE (FALSE) (Not recommended for One-way routing)	If TRUE, forces the software to select and group stops in a geographical direction
Cone Angle	55	Angle of cone, with depot at center; default is 55
Depot Radius	10	Radius around depot (miles) to which stops can be loaded on same route out of cone; default is 10
Lambda	2 (Determines how much weight to give cone expansion vs. distance from depot)	Used by Algorithm when deciding which stop to load on a route next; less than 2, will build tighter routes
Lambda Increments	0.2 Ex: If Lambda is = .6, increments = .2, and iterations = 4, the software will construct routes four times (iterations) in increments of .2, starting at .6 (ex .8, 1, 1.2)	Incremental value added to LAMBDA for each iteration, when constructing routes
Lambda Iterations	1 (To find which value yields the lowest cost solution, run several routes using 1 thru 4)	The number of times the software will build routes using the Lambda Values
Max Redispatch Iterations	4 (How the software determines the feasibility of redispatching a route)	If set to 4, the software creates up to 4 load passes to determine the best scenario
Max Wait Time	1000	Maximum amount of time a vehicle will be allowed to stay at a stop
Max Dist Between Stops	8000	Prevents stops that are more than X miles apart from loading on the same route
Max Work Time LO	0	Maximum work time before a layover is required
Optimize Stops After Loading	TRUE (FALSE)	If TRUE, moves stops between and within routes to minimize cost
Optimize Trucks After Loading	TRUE (FALSE)	If TRUE, moves loads from bigger to smaller trucks to minimize cost; if using various vehicle sizes in the Truck File, set to TRUE
TW Gap For Buffers	1.75	If early and late buffer overlaps the gap between time windows, then they are adjusted to have the specified amount as gap between time windows
Load Backhaul Stop on Empty Truck	TRUE (FALSE)	If TRUE, loads backhaul stop on empty trucks
Max Out of Route Miles For Backhaul	1000	Set max miles to consider for backhaul route; if stop is

FIELD	SAMPLE ENTRY	EXPLANATION
		farther than this, it will not be considered for backhaul
Max Percent Out of Route Miles for Backhaul	50	Set max percentage of route miles, instead of distance, to consider for backhaul
Max Closest Stops	200	Maximum closest stop
Refuel Algorithm	Original, Distance Based *Original* - Default option, works using the existing algorithm; will insert refuel points based on location, in reference to stop locations. *Distance Based* - Will keep track of route capacity and adds refuel points only when capacity is available and still 30% of work time left in a route. This option will also remove refuel points when not needed.	Select which algorithm to apply during routing.
Add Pre-Post time on redispatch	TRUE	When TRUE, adds Pre/Post time on all legs. When FALSE, adds only for the starting and ending terminal on the whole route.
Use Terminal as Refuel Point	TRUE	When TRUE, considers the terminal as a refuel point. If false, DR does not consider the terminal as a refuel point.
Max Routes Per ID1	-1	Max number of routes to allocate per ID1. Less than 1 will disable this feature.
GENERAL		
Enable Start Time Column	TRUE (FALSE) Using this function removes the necessity to edit individual routes each time a change is needed to the actual route start time.	When TRUE and Start Time column is added to the Stop File, DirectRoute will use the Start Time listed in the Stop File as a route dispatch time when initializing routes.
Allowing Logging	TRUE (FALSE)	If TRUE, sets tracking mechanism for algorithm xml
Display Build Route File tab option	TRUE (FALSE) (For DRTrack users)	Show/Hide Build Route File tab on New Route dialogue box
Distance Cache	1000000	Max size of cache used for Distance File records
Drop Count	0	Subtracts a drop cost from equal number of stops
Field used in Distance File	Lat/Lon	Field other than city (account, zip, etc) to use in Distance File
Lock on Init and Load		If TRUE, locks trucks already routed from being considered when routing new stops.

FIELD	SAMPLE ENTRY	EXPLANATION
Make Empty Trucks Unavailable after loading	TRUE (FALSE)	If FALSE, allows empty trucks to be loaded during the Modify Load process
Maximum Stops Per Route	50	Set max number of stops per route
Mileage Adjustment	100	Percentage to adjust calculated mileages; default is baseline 100. Ignored if distance entries are used.
Minimum Time Between stops (minutes)	0	Minimum time between stops; overrides drive time calculations if calculated time is less than this number
Apply Min Time Between Stops after directions	TRUE (FALSE)	If TRUE, will automatically apply the Min Time Between Stops (Min)
Route Colors	(Collection)	Define colors for each route
Route Line Width		Use the dropdown menu to select the width of the line displayed on the map (planned routes on the map)
Color Empty Miles		Use the dropdown menu to select a color to apply on the map to portions of a route performed by an empty vehicle
Scale Factor	0	Used to increase miles on a route using percentages. Ex: 1.1 = 110%
Secondary Route Identifier	TrkID	Secondary Identifier for a Route
Speed	50 (50 =50 mph)	Sets an average speed on a route, in miles per hour
Speed Adjustment (Drive Time)	95 Increase drive time = decreases vehicle speed Decrease drive time = increases vehicle speed *Ex:* 95 = Decreases drive time 5% by increasing vehicle speed by 5%	% to increase or decrease Drive Time; default is 100. 10% increase = 110 10% decrease = 90
Use DirectRoute Drive Time	TRUE (FALSE)	If TRUE, used DirectRoute drive times instead of other installed Mileage System
Rush Hour Distance	0 *Ex:* If Rush Hour distance is set to 30 miles, it will apply to the truck for a 30mile radius from the depot. If set in the Stop File, it will apply to the truck for a 30mile radius from the customer.	Distance in which adjusted speed is implemented to account for traffic delays; used in conjunction with Speed Adjustment and AM/PM Adj fields in the Stop File and/or Truck File.
Dispatch Date Offset	1	Number of days out from the date routes are run, to begin dispatch/delivery

FIELD	SAMPLE ENTRY	EXPLANATION
CONSOLIDATE SETTINGS	Note: Consolidation settings are validated each time the settings are updated	If TRUE, consolidates stops with same settings (Time Windows, EqCodes, Lat/Long, Size Restrictions, etc.)
Consolidate by ID1	TRUE (FALSE)	If TRUE, consolidates stops by value in ID1
Consolidate by ID2	TRUE (FALSE) Note: An error message will be generated if Consolidate by ID2 is set to TRUE and both Consolidate by ID1 & Consolidate by Address is set to FALSE; this setting must be corrected to save/close the dialog box, or select Cancel to exit without saving the erroneous setting changes)	If TRUE, consolidates stops by value in ID2; set to FALSE if Consolidate by ID1 and Consolidate by Address are both set to FALSE
Consolidate by Address	TRUE (FALSE)	If TRUE, consolidate stops by address
Consolidate (Sum) Fixed Times	TRUE (FALSE)	If TRUE, will consolidate all stops to the Fixed Time of first stop in the group
Consolidate on Initialize	TRUE (FALSE)	If TRUE, consolidates routes upon initialization
STATIC SPLITTING		Restrictions for Split Loads
Split Size	0	Set minimum size of load to split. Generally, set with split stops 'TRUE' and split orders 'FALSE'
Split Stops	TRUE (FALSE)	If TRUE, allows splitting a stop between routes
Split Orders	TRUE (FALSE)	If TRUE, allows splitting an order (by line item) between stops
Split Line Items	TRUE (FALSE)	If TRUE, allows splitting of line items between stops
Quantity Field To Split	None	Qty field used to calculate splits (i.e. weight, cube, Pallets, etc.)
DYNAMIC SPLITTING		Restrictions for Routes with low stop counts
Split Stops While Loading	TRUE (FALSE)	If TRUE, will split the load to ensure delivery of the product; if FALSE, the remaining parameters for Dynamic Splitting are inconsequential
Split Orders	TRUE (FALSE)	If TRUE, software will consider splitting an order by line item, between routes; if FALSE, will only split stops by full orders
Split Line Items	TRUE (FALSE)	If TRUE, software will consider splitting stops at the line item level; only valid

FIELD	SAMPLE ENTRY	EXPLANATION
		for stops that have just one order with one Line Item
Evaluate All Splitting Options	TRUE (FALSE)	Evaluates splitting options during optimization process
Max Splits Per Stop	0 (generally, just 1 or 2 times)	Max number of splits per stop
Min Split Size	0	Minimum size (Quantity 1 field) for a split order
Splits-Truck Full	0	Used in conjunction with Min Split Size; determines vehicle capacity percentage used for split loads
GRAPH		Fields from the Truck File, to appear on the Graph Chart in the Route Book
Route Identifier 1	None	Route identifier, from the Stop File
Route Identifier 2	None	Route identifier, from the Stop File
Route Identifier 3	None	Route identifier, from the Stop File
Route Identifier 4	None	Route identifier, from the Stop File
Route Identifier 5	None	Route identifier, from the Stop File
Route Identifier 6	None	Route identifier, from the Stop File
STOP CAPACITY ADJUSTMENT		Allows lowered vehicle capacity based on the number of stops
Capacity Field	None	Qty field to use for stop capacity adjustment
Stop Adjustment	0	Amount of Qty to reduce capacity
CROSS DOCK/RELAY ROUTES		Use with Relay and Cross Dock Files
Cross Dock Col Identifier		Column heading in Cross Dock File to identify cross dock location
Cross Dock File Path		Location of the Cross Dock File
Relay File Col Identifier		Column heading in the Truck File that identifies a Relay Route
Relay File Path (*.XLS*, **.XLSX*)		Location of the Relay Truck File
PASSWORD PROTECTION		Pswd protection for Routing Category
Enable	TRUE (FALSE)	Default is FALSE
Password	TRUE (FALSE)	Add/Edit password
TANKER		Used for load building compartmentalized vehicles

FIELD	SAMPLE ENTRY	EXPLANATION
Weight		Choose from Volume fields
Volume		Choose from Volume fields
Count		Choose from Volume fields
Tote File Name	C:\Program Files\Appian\ DirectRoute\Data\ Tote.XLS	Name and path of the Tote File, typically found in the DirectRoute Data Folder
Product Ratio File Name	C:\Program Files\Appian\DirectRoute\Data\ Ratio.XLS	Name and path of the Ratio File, typically found in the DirectRoute Data Folder
Use Tanker Algorithm for Product Assignment	TRUE (FALSE)	If TRUE, uses tanker algorithm to ensure products loaded on trucks are placed in designated compartments
Max Number of Totes Per Order	10	Max number of totes allowed on each order
Split Orders to Totes	TRUE (FALSE)	If TRUE, allow splitting of orders into totes; if FALSE, attempts to split the order will only be done on tanks
Split unloaded stops and try loading	FALSE	Split unloaded stops and try loading
Trimble Maps		
Thread Count	30000	Sets the number of threads to use during the distance generation process. Max threads = 8. Enter 0 to use all threads possible. This can slow down your computer during processing.
Elevation	30000	Sets the elevation limit. The unit of measure is based on Other->Distance Options. If Distance Option is set to Miles, set elevation to miles. If set to KM, set elevation to Meters.
Route Across National Border	TRUE (FALSE)	If TRUE, will allow route to cross Canada and/or Mexico borders; if FALSE, will prevent routes from crossing borders (may result in more miles)
Route Type	Practical, Shortest	Sets the routing type when getting directions
Avoid Toll	FALSE (TRUE)	
Hazardous Option	None	Indicates the directions hazard options
Vehicle Profiles	(Collection)	Vehicle profiles (sizes)
Distance Generation Mode	Pair (Matrix)	Option to change how Trimble MAPS generates distance entries

FIELD	SAMPLE ENTRY	EXPLANATION
Default Vehicle Profile	Select one from Vehicle Profiles (above)	Default vehicle profile to use
Use Historical Traffic Data	FALSE (TRUE)	Use historical traffic data
Highway Only	FALSE (TRUE)	Indicated if the route should travel on highways and/or primary roads only.
Data Version	PCM_NA = North America PCM_EU = Europe PCM_OC = Oceanic PCM_SA = South America PCM_ME = Middle East PCM_AS = Australia PCM_AF = Africa PCM_WW = Worldwide PCM_GT = GeoTrack/Energy (oil site roads, mostly dirt roads) **Note:** GeoTrack/Energy maps aren't usually available on normal versions of mapping data.	Target map data from different regions or access the World Wide data. May require additional licensing.
UPDATE STOP FILE		
Primary Identifier	ID1	Primary Stop File field
Secondary Identifier	ID2	Secondary Stop File field
Third Identifier	ID3	Tertiary Stop File field
Convert TW	TRUE (FALSE)	Convert old style time windows to new
UPLOAD		Options for uploading Route Files to OBCs, terminal systems, etc.
Upload Consolidated	TRUE (FALSE)	If TRUE, consolidated orders will be uploaded in consolidated format
Upload Displayed Only	TRUE (FALSE)	If TRUE, will write (to the Upload File) only those routes that are locked and displayed on the map; if FALSE, will write ALL routes
Upload Header Record	TRUE (FALSE)	If TRUE, adds Header row at top of the Upload File
Upload Starting Terminal	TRUE (FALSE)	If TRUE, adds the beginning terminal/distribution center to the Upload File
Upload Ending Terminal	TRUE (FALSE)	If TRUE, adds the ending terminal/distribution center to the Upload File
Upload Date Format	MM/DD/YYYY	Choose date format
Upload Format File (*urp)		Enter path and file name of URP File; If used, system will not prompt for the info during upload process
Upload File Name	RTUPLOAD	Default name for the file it can be changed later in the Data Folder)

FIELD	SAMPLE ENTRY	EXPLANATION
Upload File Path	(Blank)	Location of the Upload File, if different than current Data Folder
Upload File Type	*.UPL	Enter type (Upload File) used
Upload XML Version	5	XML version number used
Upload Sequence	TRUE (FALSE)	Set to TRUE, will list the route and sequence number
OBC Upload	None	Allows choice of onboard computer system (XATA, PeopleNet, etc.) to Upload File format for OBC File
OBC Folder Path		Path to OBC File
OBC Upload File Name	RTUPLOAD	OBC Upload File name
Upload Time Format	Hmm, HHmm, H:mm, HH:mm	Choose time format
V8 Compatible	TRUE (FALSE)	Backwards compatibility with DR Version 8
Display Arrival and Departure Time on Consolidated Order	TRUE (FALSE)	If TRUE, will display the same arrival and depart time for consolidated orders on the same stop
Display Miles on Consolidated Order	TRUE (FALSE)	If TRUE, will display the same miles for consolidated orders on the same stop
Display Unload Time on Consolidated Order	TRUE (FALSE)	If TRUE, will display the same unload time for consolidated orders on same stop
Ignore Terminal in XML Upload	TRUE (FALSE)	If TRUE, ignores the terminal stop in the Upload File when appropriate
Display Drive and Work Time on Consolidate	FALSE (TRUE)	Displays drive and work time on consolidated orders
Abbreviate Rt Violation	FALSE (TRUE)	Abbreviate Route Violation
Display Total Distance on Consolidated Orders	FALSE (TRUE)	Display route total distance on consolidated orders

Figure 26 – Routing Preferences and Options Table

3.3.2 Lambda and Lambda Values

Lambda is a variable factor that controls how much weight to give a potential stop based on how far it is away from a depot (cone expansion vs. distance from the depot) during the loading phase of the algorithm. The routing algorithm uses lambda when it is deciding on which stop to load on a route next.

Lambda Values are typically between 0.5 and 2.0, depending on the density of the stops in your delivery area (a high density of stops usually calls for a lower Lambda value).

- The default setting for Lambda is 2, which provides the best results over a large range of problem types.
- Setting Lambda Value to less than 2 will cause DirectRoute to build tighter routes (less expanded cone) but might result in an overall increase in miles.

- For high stop count routes (very dense), you might consider lowering the Lambda Value, but it would be best to run a few scenarios with various Lambda Values (1 thru 1.5) to determine the right number.

Example: Assume that the depot is represented by the green diamond and the three red dots are stops to be routed. Each stop has a volume equal to one half of a vehicle's capacity. Given this set of facts, it will require two vehicles to service the three stops. The algorithm will typically load the farthest stop from the depot first, in this case that is Stop A. The next decision is to determine which of the remaining stops to load. This decision is based on a combination of how much mileage the prospective stop will add to a route and how far the stop is from the depot times the Lambda factor.

If Lambda where set to zero (thereby giving no weight to how far the stop is from the depot) the stop selected to be loaded next would be Stop C, since it adds almost no additional mileage to a route already going to Stop A. This vehicle would now be full and require the second route to service Stop B. This solution would have higher miles than the solution that paired Stops A and B, and a second route containing Stop C.

The following (High Lambda, Low Lambda) depict two sets of routes running the same stops with a low and high Lambda Values.

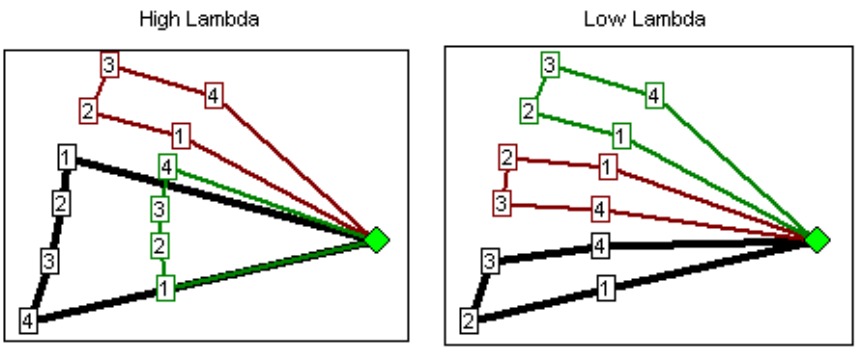

Figure 27 – Lambda

You can see that the routes ran with the higher Lambda attempt to pick up the stops farther away from the depot. Although the high Lambda routes may not look as good as the low Lambda routes they are actually 3% fewer miles because they are only running two trucks to the outer perimeter stops (the red and black routes) versus three routes in the low Lambda scenario.

To edit Lambda settings, select from the DirectRoute menu: *File→Preferences→Other*. There are three values to set; experiment with the value of Lambda and decide which setting is best for your routing environment

- **Lambda Setting** – Specifies the initial value of Lambda, or the value of Lambda to use for running Iteration 1; default value is 2 and ranges can vary from .1 up thru 2.0.
- **Lambda Iterations** – Number of times to calculate routes using increments
- **Lambda Increments** – Value used to increase Lambda while calculating routes; allows several attempts at a routing solution that yields the lowest cost

Example: Suppose Lambda is set to 0.6 and Lambda Increments and Iterations were set to 0.2 and 4, respectively. DirectRoute will construct routes four times using Lambda Values of 0.6, 0.8, 1.0, and 1.2 and display the solution that yielded the lowest cost.

Tip: Once the best settings are discovered, the Iterations should be set back to 1. Keeping a higher iteration setting will cause the route to be re-run several times, even once the best Lambda Settings have been found.

When using Redispatch, it is recommended that Lambda Iteration 1 be used.

Caution: When using Lambda with Iterations, and cancel is pressed, the user must cancel each of the iterations as they begin. When one is canceled, the next route begins to load.

3.3.3 Box Expand and Box Expand Values

Box Expand is a parameter that defines which routes are considered for between route optimization. During optimization, DirectRoute constructs the smallest box that will contain all the stops on a route. When DirectRoute considers making moves, the logic does not consider moving stops between routes, unless their boxes intersect. This includes routes that are in the same vicinity.

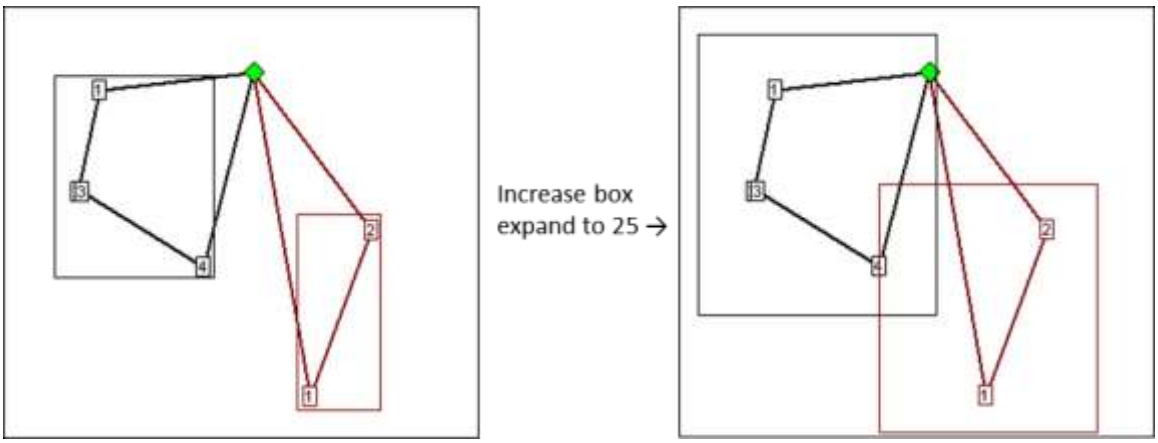

Figure 28 – Box Expand

The Box Expand Value is represented in miles and determines how far to expand the box. Larger numbers increase time it takes for the system to complete optimization; adjusting the parameter allows the system to consider more routes during optimization.

The miles would be saved if Stop 4 (black route) was placed on the red route. By increasing the parameter to 25, the boxes now intersect, thus allowing more moves to be evaluated. The increased value of Box Expand will also increase the amount of time the system takes to complete the optimization process.

To edit Box Expand Values, select from the DirectRoute menu: *File→Preferences→Other*. Enter the number of miles to identify how far to expand the box.

4 Route Files

The Route Files are used primarily to provide fleet (truck) and customer delivery information to DirectRoute. While directions for creating these files are covered in the following section (**Creating Route Files**), below is a brief description of each of the files used.

- **Account Master File** – The Account Master File, sometimes referred to as the Customer File, is an Excel spreadsheet, an .XLS file, with all of the standard information about each of your customers, and their locations. This is not an order file, but more of a contact list, with static information that does not change with each order received by the customer (i.e. point of contact, address, account number, etc.). Each location you deliver to for each customer will have a record entry in the spreadsheet, containing all permanent information about the customer location; address, Lat/Long coordinates, time windows, time at the stops, and any other pertinent info necessary for delivery to each location. The data for this file is usually exported from an Order Management/Host system (OMS) or ERP/WMS and copied into or formatted as .XLS spreadsheet. Each location will have a record entry in the spreadsheet, containing all permanent information about the customer location; address, Lat/Long coordinates, time windows, time at the stops, and any other pertinent info necessary for delivery to each location.
- **Stop File** (Daily Order File) – The Daily Order File, also referred to as the Stop File, is used in the extract process, along with the Customer Master File, to correctly set up orders to Route. It too is normally extracted from an Order Management/Host system (OMS) and copied into or formatted as .XLS spreadsheet. It may come out of the OMS as a tab delimited text file, with an .XLS extension, or a comma delimited file with a .csv file extension. It is not as detailed as the Customer Master File and will only contain the current order info (order quantities, loading instructions, etc.) for each customer that will be used to create routes for the day.
- **Truck File** – The Truck File is a spreadsheet that will contain all the information about each truck in your fleet, and the drivers to whom routes will be assigned. In the Truck File, every row represents one Truck/Driver combination to which stops can be assigned/loaded. The key fields in the Truck File are truck availability, driver availability, vehicle start time and end times, truck capacity, variable cost factors, and work rules for both the trucks and drivers.
- **Distance File** – The Distance File contains a record of distances and drive times between the pickup point and every city in the Stop File, and/or pick up every Stop, to include from, to, and in between. When a Distance File is used in the routing process, DirectRoute will calculate the distances and times between each stop location based on the entries in this file. If a Distance File is not used, DirectRoute will calculate distance and drive times using an adjusted straight-line distance between locations.

4.1 Creating Route files

The routing files used to provide DirectRoute specifics concerning your customers and fleets are necessary to creating any route. Creating and/or updating these files are key steps that must be done to initiate a routing project. The following sections will guide you thru the process of creating and or updating the regular used files.

4.2 The Stop File

The Stop File is a spreadsheet that contains the customers' order and delivery information. Key fields represented in the Stop File include order volume, required delivery dates, customer address, and any special delivery rules; all critical information the software needs to build the routes. Optional data fields can also be used to manage customer schedules and territories, provide statistical data, or generate reports, and/or generate additional Route Files.

If you already have a Stop File, or a spreadsheet with the required customer information, it can be used in the project so long as it contains the required data columns. If you do not already have a Stop File, a new one can be created that will automatically populate the necessary header columns and allow manual input of all customer data.

4.2.1 Create a New Stop File

- From the menu, select *File→Open→Stop*, or *File→New→Stop*.
- Enter each customer's data directly into each column of the spreadsheet, or (double) left click on each row to launch the Stop Dialog box and enter all the data for each customer in one window.
- The **Stop File Fields and Descriptions Table** identifies and explains each field that is required or recommended to be used in each Stop File.

The Stop Dialog box is divided into five sections:

- **General** – Add the General information, including customer name, account number (unique identifiers), address, type of symbol, route and stop numbers (if predetermined), fixed time, EqCodes, and truck size restriction.
- **Location** – Add Location information, symbol, and color code options. Long/Lat will be added later when the completed Stop File is geocoded.
- **Stop Volume** – Add Volumes and unload rate information.
- **Time Windows** – Add Time Windows (Open/Close) and pattern (days of the week); use military time (1:30PM = 1330), and enter Earliest/Latest Date, Buffers and Penalty (if used).
- **User Fields** – Add the field data for each field listed (*Preferences→Configuration*).

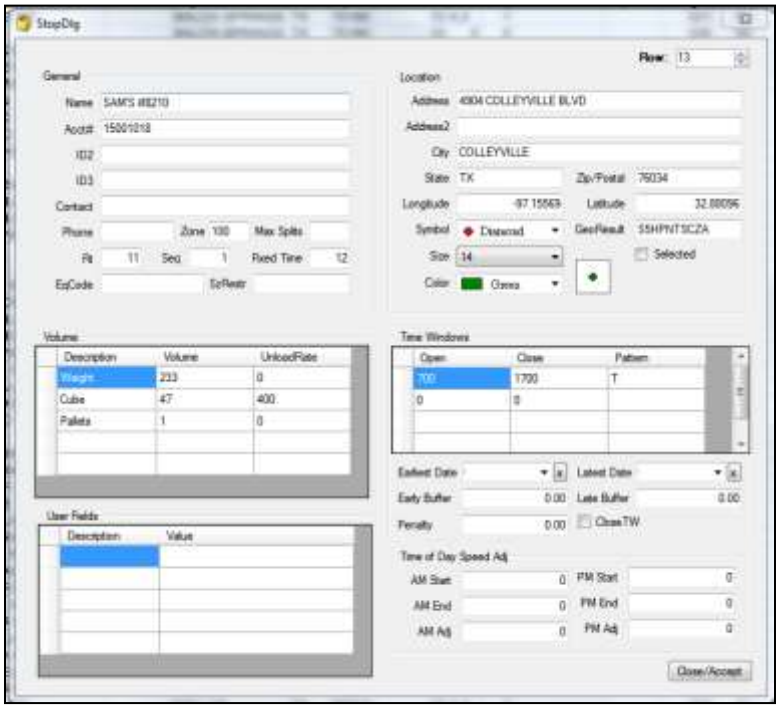

Figure 29 – Stop File Dialog Box

When all entries have been completed for the customer, select *Close→Accept* to close the box. Repeat as necessary for each individual record.

After all customer data has been entered into the Stop File:

- Geocode the Stop File to locate the correct Lat/Long for each record in the file (see **Geocoding Records**).
- Save the updated Stop File in the DirectRoute Data Folder.
- Select *File→Save*, or *File→Save As*, and assign a name to the file.

4.2.2 Stop File Fields and Descriptions Table

FIELD NAME	***DESCRIPTION***	***REQUIRED OR OPTIONAL***
Name	The name of the customer/business (stop) to be delivered.	Required
Contact	The name of a contact at the customer stop.	Optional
Phone	Telephone number at the stop location. If the Area code is included, the software can use it for geocoding.	Optional
ID1	Primary unique identifier for the customer/stop. Ex:: Account#, Customer#. User defined field in *Preferences→Configuration*. Used in the extract files process.	Required
ID2	Secondary unique identifier for the customer/stop. Ex: Store#, Stop#. User defined field *in Preferences→Configuration*.	Optional
ID3	Tertiary unique identifier for the customer/stop. Ex: Line Item, SKU. User defined field in *Preferences→Configuration*.	Optional
Address	Street Address for the customer. Address, along with City, State, and Zip are used to geocode by address. Also used by Address Cleanup module.	Required

FIELD NAME	DESCRIPTION	REQUIRED OR OPTIONAL
Address2	Additional Address information. Ex: Suite#, building#, Door#, Dock#.	Optional
City	Name of the city (Address). This field can be used in conjunction with the Distance File to determine distances and drive time. Required to geocode.	Required
State	2 letter state (Address) abbreviation. Ex: WA, CA, OR. Required to geocode.	Required
Zip	The zip code (Address). Can be used for geocoding in conjunction with the Address field or geocoding by 5-Digit or 9-Digit Zip.	Required
Country	This column will be used during the geocoding process for passing country code to the mileage system. If no value is present in this column, the country code set in the Preferences will be used. The value in this column should be ISO2 or ISO3 country code format (i.e. valid country code for the US is USA/US and for Canada CAN/CA). If no address information is given in the file, DR will try to geocode the stops using City, State, and Zip.	USA/US
FixedTime	Used to identify a required/mandatory time that all vehicles must spend at the stop (in addition to unload rate/time). Can be used to account for completing required paperwork. Input Fixed Time in minutes; may be different for each customer. Ex: An entry of 15 would require the truck to be at the stop for 15 minutes, in addition to the time calculated by the UnldRate. Total time at the stop will be calculated by the software by adding these two fields together. Note: DR will route without this field, but in practice a Fixed Time is needed as the truck will have to stop for certain amount of time to unload (and perform other activities). Typical range is 15-45 (15 to 45 minutes). Enter number in minutes.	Optional
SzRestriction	Size Restriction will inform the software that this is the maximum size or volume for a vehicle that may deliver to this stop. Using a size restriction will limit which truck size the customer load can be put on. Ex: A quantity of 20,000 would mean that the customer load could only be put on trucks with a capacity of 20,000 or less in (Volume 1 field) the Truck File.	Optional
EqCode	An alphanumeric code (unlimited number of characters) used to designate special equipment or requirements for a stop (lift gate, refrigerated compartment, etc.). Corresponding Truck File field: SpEq. When EqCodes are used, the software will only load the stops on a vehicle with a matching SpEq code listed in the Truck File. Ex: If a stop requires a lift gate in order to complete delivery, place a code in the EqCode field that designates lift gate, and use the same code in the SpEq field on a truck in the Truck File. It is possible to combine the use of several EqCodes, but each code should be separated by a dash (i.e. AJ-BH-HH-XX). If there are no special requirements for a stop, this field should be blank. Note: There are also special EqCodes that can be utilized for Back Hauls, prioritizing and sequencing of stops, territory codes and exclusion codes.	Optional
Volume1	The volume to be delivered; user defined field (*Preferences→Configuration*) can be any quantity type (weight, cube,	Optional

FIELD NAME	DESCRIPTION	REQUIRED OR OPTIONAL
	pallets, cases, etc.). If no volume type is entered, the software will load all stops on one route, or until it reaches the maximum stops per route, as defined by the user. The capacity fields in the Truck File correspond to the volume fields in the Stop File. Ex: Volume used is Cases; the column heading appears in the Stop File as Cases. Capacity 1 column heading in the Truck File will also appear as Cases. Note: Must be at least one (1) volume field in use, even if left blank.	
UnldRate (UnldVol1)	Identifies the amount of time it takes to unload Volume1 value, in hrs. Ex: Volume1 = Cases. The field appears in the Stop File as UnldCases. it takes one hour to unload 1000 cases. A truck that carries 2000 cases would have an unload rate of 2 (2000 ÷ 1000/per hr.). The UnldRate time is added to the Fixed Time. The UnldRate heading will mirror the volume name defined in the *Preferences→ Configuration→Volumes* (Weight = UnldWeight, Cases = UnldCases).	Optional
CloseTW	TRUE or FALSE. When this option is set to TRUE, a vehicle must reach the stop, deliver, and complete unloading before the Time Window closes (including Fixed Time plus UnldRate).	Optional
Zone	A percentage adjustment to the drive time. Default is 100 = normal rate of speed. An increase to the drive time will lower speed; a decrease to drive time will increase speed. Zone is hard coded to eight miles. Ex: If rush hour distance is set to 30 miles, it will apply to the truck for a 30mile radius from the depot. If it is set on the customer in the Stop File, it will be a 30mile radius from the customer. Ex (Truck File): A value of 110 would increase the drive time by 10%, hence lowering the speed by 10%. A value of 90 would decrease drive time by 10%, increasing speed by 10%. The speed adjustment is only applied to the first 8 miles of each route segment (from Depot). Ex (Stop File): If all customers in downtown Chicago have a value of 110 in this field, the software will increase drive time for the stops in downtown Chicago (within the 8 mile radius), while lowering the speed of travel.	Optional
AMStart	Set AM start time to adjust speed to account for heavier/lighter traffic.	Optional
AMEnd	Set AM end time to adjust speed to account for heavier/lighter traffic.	Optional
AMAdj	Set drive time adjustment for AMStart and AMEnd. AM/PM Adjust works the same as Zone; increase the number (110) to increase the drive time by 10 percent. In turn the speed is decreased by 10 percent. The radius is based on the rush hour distance setting (*Preferences→Routing→General*). Zone is hard coded to eight miles, while AM/PM Adjust is based on the rush hour distance. Ex: If rush hour distance is set to 30 miles, it will apply to the truck for a 30mile radius from the depot. If it is set on the customer in the Stop File, it will be a 30mile radius from the customer.	Optional
PMStart	Set PMStart to adjust speed to account for heavier or lighter traffic.	Optional
PMEnd	Set PMEnd to adjust speed to account for heavier or lighter traffic.	Optional
PMAdj	Set drive time adjustment for PMStart and PMEnd. See AMAdj for additional info.	Optional

FIELD NAME	DESCRIPTION	REQUIRED OR OPTIONAL
Open1	Earliest time of day delivery can be made. Using Military Time format (0000-2400), delivery time windows are entered in the Open1 and Close1 fields. Multiple Time Windows can be established (up to ten), and are defined as Open1, Close1, Pattern1; Open2, Close2, Pattern2; Open3, Close3, Pattern3 and so forth. Ex: Customer can receive deliveries between 800 and 1130 on Sunday, Wednesday, and Saturday. This corresponds to Open1=0800, Close1=1130, and Pattern1=SWA.	Required
Close1	Latest time a delivery can be made. See Open1 for additional info.	Required
Pattern1	Days of the week when the customer will accept deliveries. Time Windows are entered as patterns of opening and closing times and days of the week (SMTWRFA) that define when the customer will accept deliveries. Ex: Customer can receive deliveries between 800 and 1130 on Sunday, Wednesday, and Saturday. This corresponds to Open1=0800, Close1=1130, and Pattern1=SWA. S=Sunday, M=Monday, T=Tuesday, W=Wednesday, R=Thursday, F=Friday, A=Saturday	Required
EarliestDate	(MM/DD/YY). May be used to ensure that a stop is not serviced before a specific date, or when used in combination with LatestDate, used to ensure the stop is delivered within a specific time window, and can allow multi-day/week deliveries based on date versus time window only. If this column is blank, it will be ignored.	Optional
LatestDate	(MM/DD/YY) Used in conjunction with EarliestDate; determines the latest the date that the stop may be serviced. May be the same date as EarliestDate if there is only one day in which the stop may be serviced. If this column is blank it will be ignored.	Optional
EarlyBuffer	Used to activate the Soft TimeWindows function within the software, allowing stops to be loaded before the hard time window. A penalty cost is counted against the uses of the buffers. Note: EarlyBuffers and LateBuffers are used to expand time windows.	Optional
LateBuffer	Used to activate the Soft Time Windows function within the software. allowing stops to be loaded after the hard time windows. A penalty cost is counted against the use of the buffers. Note: EarlyBuffers and LateBuffers are used to expand time windows.	Optional
PenaltyCost	Used in conjunction with the EarlyBuffer and LateBuffer, is used to calculate and apply a penalty cost to stops that use the buffers. During the Optimization process, the software will try to move a stop with a penalty cost to another route to eliminate the penalty (calculated per hour). Enter dollar amount per hour.	Optional
MaxSplits	Max number of splits allowed for a stop	Optional
Rt	Route Number will be populated when the Stop File is routed. If there is already a value in this field, the software will automatically place the stop on this route. When Redispatching is used, the entry may have two numbers, separated by a comma. Ex: 3, 1. The first will denote the Route Number, and the second will be the Leg Number on that route.	System Defined
Rt2	(Transportation Modeler) The Destination Route#, populated by the system during the shipment building phase. (Rt1 will be OriginRt #)	System defined
Seq	Sequence Number (the order of loading on the route) will be populated by the software during the routing process and refers to	System Defined

FIELD NAME	DESCRIPTION	REQUIRED OR OPTIONAL
	the order of the stop on the route. If there's already a value in the field, the system will automatically place the stop in this sequence Ex: If the value is 3, indicates the customer is the third stop on the route.	
Seq2	(Transportation Modeler) The Destination Sequence#, populated by the system during the shipment building phase. (Seq1 will be the OriginSeq#)	System defined
Priority	Used with the Priority Routing Tool, to apply and adjust appropriate weight factors for prioritization during the routing process.	Any number (1– 9999)
Longitude	Coordinates that define where a customer is located. Geocoding is the process used to identify these coordinates.	System Defined
Latitude	See Longitude.	System Defined
AddressErr	Error description, if any, assigned by system when the record is geocoded.	System Defined
GeoResult	Results received when the geocode process concludes. Indicates level of accuracy match to the address. Level 1 – An exact match was made; for street addresses, trust is 95% or greater AND if address is outside the range listed in the database, the top match is within 100 address units of input address; OR for any other match level if there are multiple matches they are all within 1 air mile of each other. Ex: "100 Main Street" was input; best match in database is "150-250 Main Street". Level 2 – Inexact match but unique result (i.e. there is only one match).For street addresses, trust is 85% or greater AND if address is outside the range listed in the database, the top match is within 500 address units of input address*; OR for any other match level if there are multiple matches they are all within .5 air miles of each other. Ex: "100 Main Street" was input and the best match in the database is "450-550 Main Street". Level 0 – Inexact match and there is more than one match in the database. For street addresses, trust is 50% or greater. Z1 – Zip5 match. Z3 – ZIP9 match. No results found – Record not geocoded (results column blank).	System Defined
Symbol	Specifies the symbol used to represent a stop when displayed on the map (Stop File is open). Symbols are chosen in the Stop File; double click on the Symbol column/field to open the dialog box; make the selection, then select the OK button.	Optional
Size	Specifies size of the symbol to be displayed on the map. Default is 8.	Optional
Color	Specifies the color of the chosen symbol. Select colors in the same fashion/at the same time as selecting symbols.	Optional
Selected	TRUE or FALSE; displays the selected stop on the map. This field is not used when routing but is useful for performing various operations when editing and modifying routes.	Optional
MinDaysBetween Deliveries	(SchedulePro) The minimum number of days required between deliveries to the customer. Ex: A customer requires deliveries to occur no more than once a week, then input 7 (number of days) in MinDaysBetweenDeliveries column.	Optional

FIELD NAME	DESCRIPTION	REQUIRED OR OPTIONAL
MaxDaysBetween Deliveries	(SchedulePro) The max number of days allowed between deliveries. Ex: If a customer requires deliveries at least every two weeks, then input 14 (14 days) in the column.	Optional
Frequency	(SchedulePro/TerritoryPro) Number of times a stop is serviced during a schedule period. Enter the number conversion for the frequency pattern. 1 = 1x a week 2 = 2x a week 3 = 3x a week 5 = 5x a week (daily, weekdays) 0.5 = 1x every 2 weeks (14 day cycle) 0.33 = 1x every 3 weeks (21 day cycle) 0.25 = 1x every 4 weeks (28 day cycle) 0.125 = 1x every 8 weeks (56 day cycle)	Optional
StemTm	(SchedulePro/TerritoryPro) Calculated value of Distance File fields (FromDrvTm/ToDist/NumStops), Frequency, and Cycle; populated automatically when Territories are built.	System Defined
Day	(TerritoryPro) Day of the week that a Territory is to be serviced; if a Territory covers five days, then five days may be created to reflect each day's routes.	Required
OrgDay	(TerritoryPro) Original Day. The previous Day the territory was assigned for service, if included in the data file; leave blank if not used.	Optional
Territory	(TerritoryPro) Name or Number designation of the Territory. When the Territories are built, TerritoryPro will assign the Territory designation based on the TrkID field in the Truck File.	Required
OrgTerritory	(TerritoryPro) Original territory. Used to list previous Territory designations, if included in the data file; leave blank if not used.	Optional
Locked	(TerritoryPro) TRUE or FALSE. Indicates if column Territory should be locked to editing; if existing Territories are in the file, it can be locked so as not to overwrite what was designated. If not populated, TerritoryPro will return a value of FALSE when Territories are built.	Required
EstTime	(SchedulePro/TerritoryPro) The sum of StemTm, DrvBtwnStop, and ServTm; populated automatically when Territories are built.	System Defined
ServTm	(SchedulePro/TerritoryPro) Calculated sum of FixedTime, UnldRate, Frequency, Cycle; populated automatically when Territories are built.	System Defined
ForcedMode	(Transportation Modeler) Designates if a shipment should be routed using a pre-designated mode (TL, LTL, etc.).	Optional
DropCharge	Cost added as a drop charge for each shipment; input in *File→Preferences→Routing→General (DropCount)*	Optional
TLMinCharge	(Transportation Modeler) Minimum charge applied for shipment by Truckload; populated by the Rate Orders function	System Defined
TLTeamRate	(Transportation Modeler) The rate used for Team Drivers, if used in the Rate File.	Optional
TLTeamMinCharge	(Transportation Modeler) The minimum charge for Team Drivers on Truckload shipments when used in the Rate File.	Optional
TLRate	(Transportation Modeler) The Truckload rate per mile (ex. $2.5/mile is input as 2.5); populated by the Rate Orders function.	System Defined
LTLCost	(Transportation Modeler) Cost per pound to ship via LTL; populated by the Rate Orders function.	System Defined

FIELD NAME	DESCRIPTION	REQUIRED OR OPTIONAL
Distance	(Transportation Modeler) The distance in miles between the Origin and Destination points; populated by the Rate Orders function.	System Defined
ItineraryID	(Transportation Modeler) The ID assigned to the shipment (automatically) during the Shipment Solution building phase.	System Defined
OID	(Transportation Modeler) The origin point ID.	Required
DID	(Transportation Modeler) The Destination point ID.	Required

Figure 30 – Stop File Fields and Descriptions Table

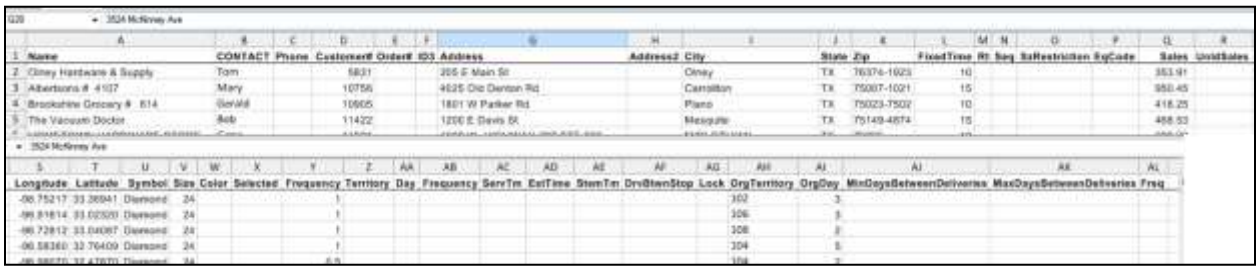

Figure 31 – Layout of Stop File

4.2.3 Time Windows

Soft Time Windows allow the stops to deliver/unload before or after the actual windows, in exchange for a penalty cost. These are standard Time Windows used in conjunction with Early and Late Buffers as well as the Penalty Cost calculations. The Penalty Cost is judged against the use of the buffers.

Example: Early/Late Buffers = one hour, and Penalty Cost is $20/hr. Time Windows are Open1/Close1 = 0700-1000, and Open2/Close2 = 1300-1700. The truck arrives at the stop at 0645 (early, but within the one-hour buffer period). Though no Window Violation is generated, a penalty is assessed against the stop: 15 min (.25) x $20 = $5.

Tip: Only use for customers that allow early/late delivery.

Time Window Gap Buffer

The Time Window Gap Buffer should not be confused with Time Window Buffers. Time Window Gap Buffer is used to determine if a buffer can be used. The Gap Buffer, default 1.75hrs, will determine if Buffers can be used.

Example 1: Gap Buffer ignored; Buffers used: Early/Late Buffers are set to .5 (Half-an-hour). The Time Windows are set to 0700-1100 and 1300-1700. There is a two-hour gap between the latest window of the first set, and the early window of the second set of windows. This is larger than the Gap Buffer (1.75). In this case the Gap Buffer would be ignored, and the Soft Time Windows would be used.

Example 2: Gap Buffer used; buffers ignored: Early/Late Buffers are set to .5 (30 min). First Time Window: Open1 = 0700 and Close1 = 1230. Second Time Window: Open2 = 1330 and Close2 = 1700.

There is only a one-hour gap between the two Time Windows. Since the Gap Buffer was set at 1.75 (# is greater than the one-hour gap between the two Time Windows), the Gap Buffer would be used, instead of the Buffers (would close the window into a solid block).

Example 3: Delivery time = 2100 until 0300. First Time Window: Open1 = 0 and Close1 = 0300. Second Time Window: Open2 = 2100 and Close2 = 2400.

The earliest period (midnight to morning) must be placed first. Ensure the midnight Time Window is covered on the proper day.

Tip: When a delivery day crosses over midnight, then two sets of Time Windows will be required. Caution: Reversing Time Windows may cause Window Violations or failure of any stops to load.

4.3 Account Master File

You may already have an Account Master File (spreadsheet or database file) that contains customer data information that is used regularly in a Stop File. If it is not already in a worksheet (.XLS) or ASCII (.csv) format, it will need to be converted either by importing the data into a spreadsheet, or by using the Extract process in DirectRoute.

You can use the Master File exactly as the name implies; as a master file in which information is copied from to input into a daily Stop File, or you can use the Master File as your daily Stop File. It all depends on your business needs, whether your daily orders from each customer are always the same, or always different. In the following sections we will run through three different methods for creating this file.

Tip: The ASCII format can be fixed length delimited or comma delimited.

```
Acct#,Name,Order,Address,City,State,Zip,Weight,Revenue,Cube,Pallets
95609022,TOM THUMB #39,CONS047   ,1616 W HENDERSON,CLEBURNE,TX,76031,441,75,88.25,2
35609021,KROGER #191         ,605000,HWY 174 917,JOSHUA,TX,76058,172,75,34.32,1
35609019,FOOD LION #1034,1045000,600 W HENDERSON ST ,CLEBURNE,TX,76031,166,75,33.24,1
35609006,TEXAS WHOLESALE,1274000,326 S COVINGTON ST,HILLSBORO,TX,76645,304,75,60.74,1
35609004,BROOKSHIRE #73      ,599000,2211 E CRINER,GRANDVIEW,TX,76050,210,75,41.98,1
35603605,ALBERTSONS #4114,2169000,HIWAY 22 WEST,WHITNEY,TX,76692,150,75,29.94,0
35603602,K-MART #4733,2171000,HWY 22 SOUTH,WHITNEY,TX,76692,174,75,34.79,1
35109606,WINN DIXIE #2563    ,CONS046   ,905 W CORSICANA,ATHENS ,TX,75751,186,75,37.14,1
35109002,KROGER #433         ,CONS045   ,1405 E TYLER,ATHENS,TX,75751,355,75,71.1,2
35103008,KROGER #423         ,2838000,201 E HWY 243,CANTON ,TX,75103,220,75,44.1,1
35103005,CARNIVAL #109,CONS044   ,603 HWY 243 EAST,CANTON ,TX,75103,613,75,122.57,3
15031042,MASS DISCOUNT MERCH,CONS043   ,3770 BELTLINE RD,ADDISON ,TX,75001,555,75,111.05,2
15031039,BROOKSHIRE #47,3009000,1305 S HWY 121      ,LEWISVILLE,TX,75067,209,75,41.87,1
15031038,KROGER #204         ,3010000,121 AND CORPORATE,LEWISVILLE,TX,75067,242,75,48.49,1
15031011,TX DRUG WHSE #3     ,CONS042   ,3616 FOREST LANE    ,DALLAS ,TX,75234,190,75,37.97,1
15029101,SAMS #6376,3008000,7201 GRAPEVINE HWY  ,FORT WORTH,TX,76180,235,75,46.93,1
15029039,WINN DIXIE #2458    ,3005000,6537 NORTHEAST LP 820,FORT WORTH,TX,76180,236,75,47.15,1
15029029,SACK N SAVE #211    ,3007000,5650 BROADWAY AVE   ,HALTOM CITY,TX,76117,206,75,41.21,1
15029020,ALBERTSONS #4160,2805000,6246 RUFE SNOW RD,N RCHLND HLS,TX,76148,229,75,45.7,1
15015034,ALBERTSONS #4163,CONS041   ,2661 MIDWAY RD,CARROLLTON,TX,75006,227,75,45.46,1
15015032,DAVIDS #1,CONS040   ,17194 PRESTON RD    ,DALLAS ,TX,75248,523,75,104.51,2
15015022,BROOKSHIRE #32,3180000,4150 BELTLINE ROAD,ADDISON ,TX,75244,2846,75,569.25,7
```

Figure 32 – Comma Delimited (.csv) File

Regardless of the method used to create the Account Master File, it should generally contain the data items listed below. Each of these items represents a required (or recommended) item for use in the Stop File.

- **Name** – Name of the customer; DirectRoute will add as new if not already in the file (Recommended).
- **Contact** – Customer contact (name) at delivery location (Recommended).
- **Phone** – Telephone number at the delivery location; can be used to geocode the record location (Recommended).
- **ID1** – A unique primary identifier, ex: Account Number (required).
- **ID2** – A secondary unique identifier, ex: Store#, Stop#, etc. (recommended).
- **ID3** – A tertiary unique identifier, ex: Line item, SKU, etc. (recommended).

- **Qty1** – Measured volume quantity of an order, as set/selected in Routing Preferences. (*File→Preferences→Configuration→Volumes*) (required).
- **Address** – Street address for the customer (recommended).
- **Address2** – Additional address information, ex: Suite #, building#, etc. (recommended).
- **City** – Name of the city (can be used by DirectRoute to determine distances/drive times) (recommended).
- **State** – Two letter abbreviation for the state, ex: CA, AZ, NM, etc. (recommended).
- **Zip** – The zip code (recommended).
- **User Fields** – Any additional fields (optional, up to 20); create/select the fields in Routing Preferences (*File→Preferences→Configuration→Stop User Fields*) (recommended).
- **Latitude** – The GPS coordinates for the latitude of the delivery location (required).
- **Longitude** – The GPS coordinates for the longitude of the delivery location (required).

Note: DirectRoute can use an Address, City, State, Zip, or Phone Number to geocode the stop locations for each record in the Stop File. If Geocoding is to be used, at least one or more of these fields are required to be used.

4.3.1 Import / Extract an Account Master

Import current account records (Account Master File) for use by DirectRoute.

- Create an Account Master File with the required column headings (ref. **Account Master File**).
- Save the edited file as an ASCII (.csv) or spreadsheet (*.XLS*) file in the DirectRoute Data folder; rename it as something you will remember.
- Open DirectRoute and (from the menu) select *File→Open*; select Stop Files from the drop-down menu in the bottom right corner of the info box, then select the new master file you just created and saved (from the step above).
- Select the Open button to open this file.

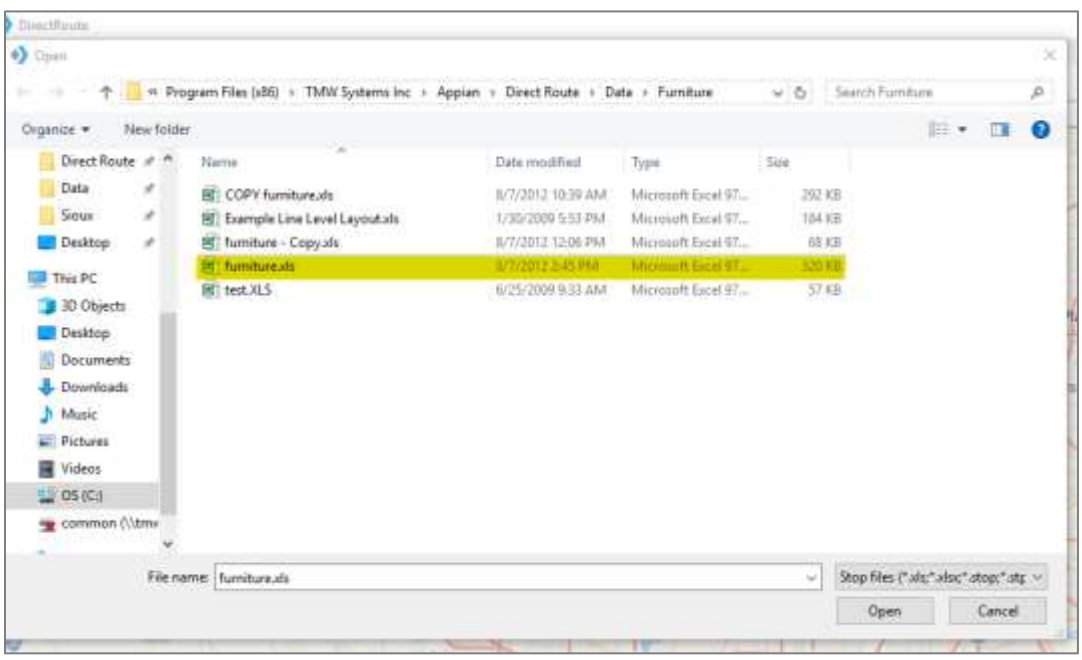

Figure 33 – Open Stop File

This new master file can be used to copy/paste into a daily Stop File. Remember to save the file again after any further editing is done.

- Open DirectRoute and (from the menu) select *File→New→Stop*; a new Stop File will be created and open; it will be blank, except for the column headings.
- Return to the other file you opened (the file created in the steps above, from the Account Master).
- Copy/paste the data from that file into the new Stop File, in the matching columns.
- When all data has been copied to the new Stop File, save the file (*File→Save As*) with a new name.

Note: When completed, the new file(s) should always be saved to the DirectRoute Data folder, located in the directory where DirectRoute is installed.

4.3.2 Extract a Daily Order File

This method is used when the customer base is steady and new customers are added infrequently. The process uses an Account Master File (maintained and updated by DirectRoute during the extraction process) to create a Daily Order File.

A Daily Order File extracted from your ERP/WMS system, is typically a tab delimited (*.EXT*) or comma delimited (.csv) file, and contains only new orders (Account ID, Order Number, Quantity, etc.) associated with a customer that is listed within the Account Master File. Once extracted, the Daily Order File is converted into a Stop File for use in the route building process.

DirectRoute will match the ID1 field in the Extract File (Daily Order File) to the ID1 field in the Account Master File, and will then edit the appropriate Stop File fields (Account ID, Order Number, Quantity, etc.) with the values from the Extract File. At the end of the process, you will have a Stop File containing only new orders for current for current customers, ready to route.

- Using your ERP/WMS systems normal extract process, extract the Daily Order File, then edit the file to add the required Stop File column headings (ref. **Import and Extract Records**).
- After editing the Extract File (Daily Order File), save it as an ASCII (.csv) or spreadsheet (.xls) file in the DirectRoute Data folder.
- From the menu, select *File→Open*; select Stop files from the drop-down menu in the bottom right corner of the info box, then select the saved Extract File (Daily Order File).
- Select the Open button to open the file.

The file will now open as a Stop File that can be used in the route building process. Remember to save the file again if any further editing is done.

Note: To simplify the daily process, create a custom extract (if possible) with the required Stop File column headings that can be used to extract the data from your ERP/WMS.

4.3.3 Extract to Create a New Stop File

This method is used when new customers are added frequently and is the most common method for creating a Stop File. The process uses an Account Master File maintained and updated by DirectRoute and ensures that static account data (Long/Lat, Time Windows, Unload Times, etc.) remains as accurate as possible. The column headings used in the Extract File must be identical to those used in the Account Master File.

- Using your ERP/WMS systems normal extract process, extract the Daily Order File, then edit the file to add the required Stop File column headings (ref. **Import and Extract Records**)
- After editing the Extract File (Daily Order File), save it as an ASCII (.csv) or spreadsheet (.XLS) file in the DirectRoute Data folder
- From the menu, select *File→Extract*
- In the Extract box, choose the appropriate files for the extract process
  - **Master File** – Select the *Master File* button, then *Account Master File*, and then the *Open* button
  - **Extract File** – Select the *Extract File* button, then *Daily Order File*, and then the *Open* button
  - **Stop File** – The file name will auto-fill (same name as Daily Order File) with an *.XLS* extension

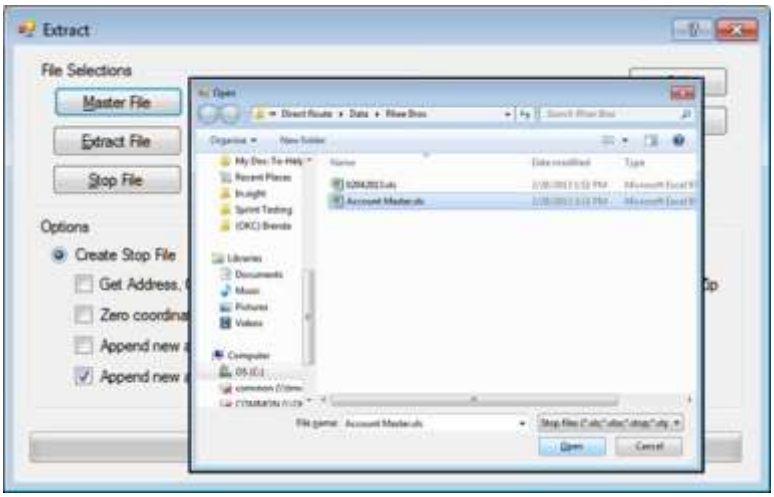

Figure 34 – Extract Dialog Box

In the Options section of the Extract box, select the specific functions that should be performed during the extract process (left click on the box to select).

- **Create Stop File** – Selected by default
  - **Get Address, City, State and Zip from Master** – Will use the address, city, state and zip data listed in the Account Master File for each customer.
  - **Zero coordinates if addresses don't match** – Will update the Lat/Long column (Stop File) to all zeros if the addresses in the Daily Order File and Account Master File don't match
  - **Append new accounts to Stop File** – Appends new customer stop info from the Daily Order (Extract) File to the Stop File only (does not update or append the Account Master File)
  - **Append new accounts to Master** – Appends new customer stop info from the Daily Order (Extract) File to the Account Master File only (does not update orappend the Stop File)
- **Update Master File** – Select to perform any of the following (not selected by default)
  - **Overwrite Address, City, State and Zip** – Overwrite the address, city, state and zip data in the Account Master File with the address, city, state, and zip data from the Daily Order File
  - **Update Blank Fields** – Will append blank fields in the Account Master File for existing customers only, with data from the Daily Order (Extract) File
  - Select the OK button

Note: Review and edit the Extract options in Routing Preferences (File→Preferences→Extract) before initiating the Extract process.

When the extract process has completed, a dialog box will appear to display the results.

Figure 35 – Extract Complete

4.4 Truck File

The Truck File is a spreadsheet that contains all the information about the fleet that will be used to make deliveries. Each row in the file represents a Truck on which the Stops can be loaded. Key fields represented in the Truck File include Capacity, Availability, and Costs.

If you already have a Truck File, or a spreadsheet with the required fleet information, it can be used in the project if it contains the required data columns. If you do not already have a Truck File, a new one can be created that will automatically populate the necessary header columns and allow manual input of all customer data.

4.4.1 Create a New Truck File

A new Truck File can be created that will automatically populate the necessary header columns and allow manual input of all necessary data. Or, if you already have a spreadsheet file with current fleet information, it can be used by copying the information into the Truck File.

- From the menu, select *File→Open→Truck* or *File→New→Truck*
- Update, or enter (copy/paste) each vehicle's data directly into each column of the spreadsheet; or (double) left click on each row to open the Truck Dialog box and update/enter all the data for each vehicle in one window
- The **Truck File Fields and Descriptions Table** identifies and explains each field that is required or recommended to be used in each Truck File

The Truck Dialog box is divided into six sections: General, Location, Costs, Work Rules, Capacity, and User Fields.

- **General** – Includes Truck ID, special equipment codes , and availability (if the One-way route box is marked, the Redispatch feature is not used; if Redispatch is required, set to TRUE, enter minimum time and turnaround time); change Zone if you wish to adjust the speed for this truck

- **Location** – Add location information, symbol, and color code options; Long/Lat for the depot or dispatch start point can be added later, during the Geocode process
- **Costs** – Enter any known fixed costs for each vehicle
- **Work Rules** – Enter all restrictive work rules for each vehicle, including start times and dates (Day 1 is the first day of the routing scenario) (LatStart should be left blank to allow DirectRoute to best calculate time required to meet Time Windows)
- Time of Day Speed Adjustments – Enter any, if needed
- **Capacity** – Enter capacities in the volume fields; should match those in the Stop File
- **User Fields** – Add any fields/entries needed; see **Routing Preferences and Options Table** for additional information

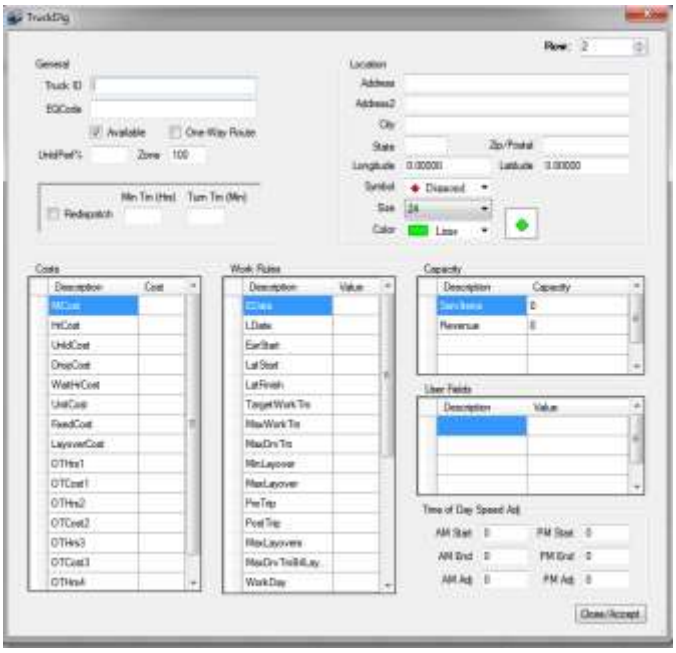

Figure 36 – Truck File Record

When all entries have been completed, select *Close→Accept* to close the box. Repeat as necessary for each additional vehicle.

After all vehicle data has been entered into the Truck File:

- Geocode the Truck File to find the Lat/Long for each record in the file (see **Geocoding Records**
- Finally, save the updated Truck File in the DirectRoute Data Folder
- Select *File→Save*, or *File→Save As*, and assign a name to the file

4.4.2 Truck File Fields and Descriptions Table

FIELD NAME	*DESCRIPTION*	*REQUIRED OR OPTIONAL*
TrkID	Truck ID entry may be a number, truck name, driver name, or what is of most importance to the router.	Required
Territory	(TerritoryPro) The Territory ID will represent the name of each Territory. It can be any number in length, an alpha name, or	Required

FIELD NAME	DESCRIPTION	REQUIRED OR OPTIONAL
	alphanumeric. When Territories are built, this ID will be passed to the Stop File column named Territory, to identify the Territory that each Stop has been assigned. The number of unique Territory IDs used in the Truck File will determine how many Territories will actually be built. Ex: TrkID's 101, 102, and 103 are all assigned to Territory 10000. TrkID's 201, 202, 203 are all assigned to Territory 20000.	
Available	This must be set to TRUE in order to make the vehicle available for use in the route build.	Required
One-way	Set to TRUE for vehicle which will routed out, but not returned to the depot. Set to FALSE if the vehicle will return to the depot upon completion of the route.	Required
SpEq	Special Equipment Codes, used to identify special designations for the vehicle (Lift Gate, Refrig compartment, etc.); must have coordinating EqCode in the Stop File. Note: If using refuel points, insert 'REFUELPOINT' in this field (no corresponding EqCode necessary in Stop File) to designate the refuel location.	Optional
Volume1	The maximum quantity of Volume1 (Stop File) that the vehicle can carry (vehicle capacity). Use the same *Volume1* type used in the Stop File.	Required
UnldPerf%	Unload Performance regulates changes to the UnldRate. When a value is entered into this field, the unload rate will either increase or decrease. 100% is the default value. An increase to 110 will increase the Unload Rate by 10% (shorter time to unload). A decrease to 90 will decrease in the Unload Rate by 10% (increase the time to unload).	Required
Redispatch	Set to TRUE if vehicle will be sent back out on another route, if time remains in the workday; FALSE if Redispatching is not used.	Optional
MinTm	Minimum Time; used with Redispatching. Reflects amount of time (hours) that must remain in a workday upon return to depot, in order to redispatch the vehicle.	Optional
TurnTm	Turn Time is used with Redispatching; the amount of time (minutes) it takes to reload or any required time at the depot, between routes, before Redispatching.	Optional
MiCost	Mileage Cost is cost per mile to operate this vehicle.	Required
HrCost	Hourly Cost is the hourly cost of the driver for this vehicle.	Required
OTCost1	Overtime Costs is the cost per hour added if the time to complete the route exceeds the time set for WorkDay. Ex: If the cost for the first two hours of overtime is $5, then OTCost1 = 5.	Optional
OTHrs1	The level at which overtime hours are calculated; used with OTCost1. Ex: If OT costs are paid in 2 hr. increments, then OTHrs1 = 2.	Optional
FixedCost	Costs that don't change (tractor rental, maintenance, etc.)	Optional
UnldHrCost	Cost to unload per hour.	Optional
DropCost	Drop Cost is the drop cost for each stop. User input, *File→Preferences→Routing→General (Drop Count)*. A number in this section will add a drop cost to each stop on the route.	Optional

FIELD NAME	DESCRIPTION	REQUIRED OR OPTIONAL
WaitHrCost	The cost per hour if a vehicle must wait at the stop before making its delivery.	Optional
UnitCost	The cost of each unit delivered (volume).	Optional
LayoverCost	The cost applied when a vehicle must layover before completing its route and returning to the terminal.	Optional
EarStart	The earliest time a vehicle may leave the terminal to begin a route; enter in military time format (2400).	Optional
EDate	The earliest day, from the dispatch date, a vehicle may depart. The Date of Dispatch is DAY 1. A one (1) would be entered in this field if the trucks could leave on the first day of dispatch. One day vehicles may have an Edate of 1-7, depending on which day of the Dispatch cycle they are released to proceed.	Required
LatStart	The latest time a vehicle can leave out of the terminal; enter in military time format (2400).	Optional
LatFinish	The latest time a vehicle must return to the depot; enter in military time format (2400).	Optional
LDate	The latest date a vehicle must return to the terminal. This day is calculated from the dispatch date. A one-day route may have an Edate of 1, but also a Ldate of 1, while a weekly route may have an Edate of 1 and an Ldate of 7.	Required
WorkDay	The number of hours in a normal workday, OTCosts are incurred if the Workday hours are exceeded to complete the route (required if OTCost1 is used)	Optional
NormalStart	The normal daily start time of the vehicle	Required
Brk1Start	How far into the shift/route a mandatory break should start; if the driver should take a break four hours into the route, then Brk1Start = 4. Note: Up to five break fields can be used.	Optional
Brk1Duration	The duration of the break; entered in decimal or whole number format (30 min = .5, 15 minutes = .25, etc.). Each numbered Break Start field must have a corresponding numbered Break Duration field.	Optional
MaxWorkTm	The max time a vehicle can be out before returning to the depot (per day)	Required
TargetWrkTm	The target work time for each vehicle.	Optional
MaxDriveTm	The max drive time per shift on a route before a layover is implemented; entered in hours.	Optional
MinLayover	The minimum number of hours a vehicle can layover.	Optional
MaxLayover	The maximum number of hours a vehicle can layover.	Optional
MaxDrvTmB4Layover	Used by the software to determine how long a vehicle must drive before a layover can be implemented.	Optional
MaxLayovers	The maximum number of layovers allowed per route.	Optional
Max Miles	Enter the number of miles by which to limit the vehicle. When used, DirectRoute will not attempt to build routes that exceed the number of miles set in the field. Field is considered during the optimization process; moves or swaps will not be made if the total route miles will exceed this setting. If a route is manually edited to go over the Max Miles set in this field, DR will return a MaxMiles route level violation.	Optional

FIELD NAME	DESCRIPTION	REQUIRED OR OPTIONAL
PreTrip	In accordance with DOT rules, time added (in minutes) at the start of each route.	Optional
PostTrip	In accordance with DOT rules, time added (in minutes) at the end of each route.	Optional
Origin	Name of the Depot	Optional
Address	Address where the vehicle (Depot) is located.	Required
City	City where address is located; used to geocode and used in the Distance File.	Required
State	2 letter state abbreviation for the address; used to geocode.	Required
Zip	Zip Code of the address; used to geocode.	Required
Country	This column will be used during the geocoding process for passing country code to the mileage system. If no value is present in this column, the country code set in the Preferences will be used. The value in this column should be ISO2 or ISO3 country code format (i.e. valid country code for the US is USA/US and for Canada CAN/CA). If no address information is given in the file, DR will try to geocode the stops using City, State, and Zip.	USA/US
Longitude	The Depot's longitude coordinate, discovered during the geocode process.	Required
Latitude	The Depot's latitude coordinate, discovered during the geocode process.	Required
Zone	A percentage adjustment to the drive time. Default is 100 = normal rate of speed. An increase to the drive time will lower speed; a decrease to drive time will increase speed. Zone is hard coded to eight miles. Ex: If rush hour distance is set to 30 miles, it will apply to the truck for a 30mile radius from the depot. If it is set on the customer in the Stop File, it will be a 30mile radius from the customer. Ex: (Truck File) A value of 110 would increase the drive time by 10%, hence lowering the speed by 10%. A value of 90 would decrease drive time by 10%, increasing speed by 10%. The speed adjustment is only applied to the first 8 miles of each route segment (from Depot). Ex: (Stop File) If all customers in downtown Chicago have a value of 110 in this field, the software will increase drive time for the stops in downtown Chicago (within the 8 mile radius), while lowering the speed of travel.	Optional
AMStart	Set AM start time to adjust speed to account for heavier/lighter traffic.	Optional
AMEnd	Set AM end time to adjust speed to account for heavier/lighter traffic.	Optional
AMAdj	Set drive time adjustment for AMStart and AMEnd. AM/PM Adjust works the same as Zone; increase the number (110) to increase the drive time by 10 percent. In turn the speed is decreased by 10 percent. The radius is based on the rush hour distance setting (*Preferences→Routing→General*). Zone is hard coded to eight miles, while AM/PM Adjust is based on the rush hour distance. Ex: If rush hour distance is set to 30 miles, it will apply to the truck for a 30mile radius from the depot. If it is set on the customer in the Stop File, it will be a 30mile radius from the customer.	Optional

FIELD NAME	DESCRIPTION	REQUIRED OR OPTIONAL
PMStart	Set PMStart to adjust speed to account for heavier or lighter traffic.	Optional
PMEnd	Set PMEnd to adjust speed to account for heavier or lighter traffic.	Optional
PMAdj	Set drive time adjustment for PMStart and PMEnd. See AMAdj for additional info.	Optional
Symbol	The symbol (size and color) that is displayed on the map, to represent the Stop. Symbols are chosen from the Stop File; Double+Click on the customer record to open the dialog box; select the symbol, size and color, then select on OK.	Optional
Size	Specifies the size of the symbol to be displayed on the map. Default size is 8.	Optional
Color	Specifies the color of the chosen symbol. Select colors in the same fashion/at the same time as selecting symbols.	Optional
AMStart	Set AM start time; adjust speed for heavier/lighter traffic.	Optional
AMEnd	Set AM end time; adjust speed for heavier/lighter traffic.	Optional
AMAdj	Set drive time adjustment for AMStart and AMEnd. AM/PM Adjust works the same as Zone; increase the number (110) to increase the drive time by 10 percent. In turn the speed is decreased by 10 percent. The radius is based on the rush hour distance setting in the Preferences. Zone is hard coded to eight miles, while AM/PM Adjust is based on the depot radius distance (*Preferences→Routing→Algorithm→Depot Radius*). Ex: If rush hour distance is set to 30 miles, it will apply to the truck for a 30mile radius from the depot. If it is set on the customer in the Stop File, it will be a 30mile radius from the customer.	Optional
PMStart	Set PMStart to adjust speed to account for heavier or lighter traffic.	Optional
PMEnd	Set PMEnd to adjust speed to account for heavier or lighter traffic.	Optional
PMAdj	Set drive time adjustment for PMStart and PMEnd. See AMAdj for additional info. Note: AM/PM Adjust works the same as zone; increase the number (110) to increase the drive time by 10 percent. In turn the speed is decreased by 10 percent. The radius is based on the rush hour distance setting in the Preferences. Zone is hard coded to eight miles, while AM/PM Adjust is based on the depot radius (*Preferences→Routing→Algorithm→Depot Radius*). Ex: If rush hour distance is set to 30 miles, it will apply to the truck for a 30mile radius from the depot. If it is set on the customer in the Stop File, it will be a 30mile radius from the customer.	Optional
Georesult	Georesult will display the results received when records are geocoded.	Automatic

Figure 37 – Truck File Fields and Descriptions Table

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
TrkID	Available	OneWay	Redispatch	MinTm	TurnTm	SpEq	Weight	Volume	Pieces/Rolls	UnldPerf%	MiCost	HrCost	OTCost1	OTCost2	OTCost3

Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
OTHrs1	OTHrs2	OTHrs3	UnldHrCost	DropCost	WaitHrCost	UnitCost	FixedCost	LayoverCost	EarStart	EDate	LatStart	LatFinish	LDate	WorkDay

AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ
NormalStart	Brk1Start	Brk1Duration	Brk2Start	Brk2Duration	Brk3Start	Brk3Duration	Brk4Start	Brk4Duration	Brk5Start	Brk5Duration	MaxWorkTm

AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE
TargetWrkTm	MaxDriveTm	MinLayover	MaxLayover	MaxDrvTmB4Layover	MaxLayovers	Longitude	Latitude	Address	City	State	Zip	Zone	Symbol

BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO
Size	Color	PreTrip	PostTrip	AMStart	AMEnd	AMAdj	PMStart	PMEnd	PMAdj

Figure 38 – Layout of Truck File

4.5 Distance File

The Distance File is a spreadsheet that contains a record of distances and drive times between the pick-up point (terminal, DC, etc.) and every city in the Stop File (stem distance), and/or pick-up point to every stop, and from stop to stop. When a Distance File is used in the routing process, DirectRoute will calculate the distances and drive times between each stop location based on the entries in this file.

The software provides three options to calculating and/or collecting distances and drive times:

- **DirectRoute Drive Time** – Uses DirectRoute's internal algorithm settings and map files.
- **Optional Mileage System** – Uses any optionally installed (by the user) Mileage System.
- **Historic Traffic Data** – Calculates drive times and distances based on historical traffic data (requires additional Appian licensing).
  - Historical data reflects how average traffic patterns affect road speeds on the road segments used by the generated route. An 'average' pattern is created using a historical time slice: 7 days in a week, with each day divided into 15-minute time slices.
- **Highway Only when Get Directions is used** – Default option in *Preferences→Trimble Maps→Highway Only*, Highway Only means local streets are not considered when running a route; vehicles are restricted to primary roads and highways only, regardless of vehicle profile.
- **Elevation Limit** (*Preferences→Trimble Maps→Elevation Limit*) – DirectRoute will look for an alternate route to avoid roads that would exceed the set limit. The unit of measure chosen (Feet, Meters) should be the same unit of measure chosen for Distance Option (*Preferences→Other→Distance Options*). If the Distance Option is set to Miles, then set Elevation to Miles; if set to Meters, then set Elevation to Meters.

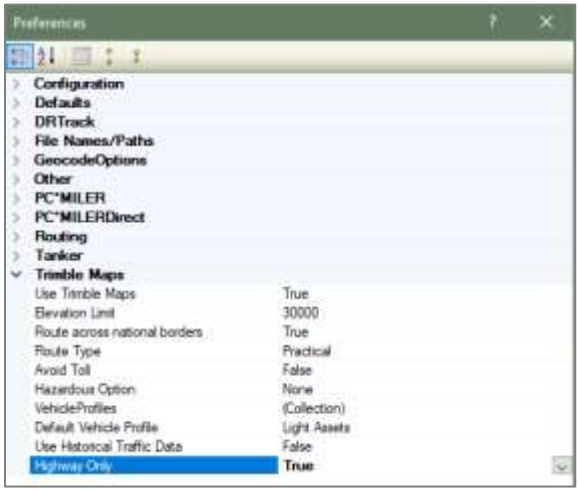

Figure 39 – Layout of Truck File

If a Distance File is not used, DirectRoute will calculate distances and drive times using an adjusted straight-line distance (as the crow flies) between locations. When there is a Distance entry for a pair of Stops, the software will use the Distance and Drive Time listed in the file, instead of calculating distances based on Lat/Long Coordinates, or other barriers that may be present.

A Distance File can also be generated to record Stem mileage, the Distance between the terminal and each city listed in the Stop File.

The software uses the Min/Max Distance settings to calculate the Distance entries in the Distance File. Min/Max Distance refers to the minimum and maximum distance between stops, using straight line distance. If the stops fall within the Min/Max Distance setting, the distance and drive Times will be calculated using the road network. Using the road network will sometimes return a distance result above the Max Distance setting chosen; this does not indicate an error, as it is only the result of converting a straight-line distance to a road network distance.

Example: If the Min Distance is set at 40 miles and the Max Distance is set at 500 miles, the system will generate an entry for every city that is between 40 and 500 air miles (straight line distance) from each city listed in the Stop File.

Tip: A good rule of thumb for the max distance setting is one half to one times more the distance to the farthest stop in the delivery area.

Before beginning any type of routing project, or generating a new Distance File, it is a good idea to review and edit, if necessary, the current Distance File settings in use by the software.

- From the menu, select *File→Preferences→PreProcess→Generate Distance File*
- Use the **Distance File Settings Table** to assist in updating each item, as necessary
- Select *OK* when all selections are completed to exit the Preferences screen

4.5.1 Get Distance Entries from Database (Db)

The following app settings are needed in DirectRoute.exe config for this to work.

- **UseDatabaseForDistanceEntries** – Set to TRUE (default value)
- **ConnectionStringName** –Connection string name configured in Connection Strings section

- **CompanyID** – 1 (default value) (setting does not have any impact for now)

In Preferences, chose either the Distance File, or the Database for distance entries (downloaded entries will be saved to a file).

4.5.2 Distance File Settings Table

Distance File settings are found in various sections of the DirectRoute Preferences table. When updating or changing any of these settings, it is a good idea to review all the sections to ensure that all the necessary settings match when necessary and are accurate.

- *Preferences→PreProcess→Generate Distance File*
- *Preferences→PC*MILER* (or *PC*MILER Direct*) if appropriate license has been purchased
- *Preferences→Routing→General*
- *Preferences→Other* (set distance options, mileage system, etc.)

The following settings can be found at *Preferences→PreProcess→Generate Distance File*:

FIELD	SAMPLE ENTRY	EXPLANATION
Generate Distance File	TRUE (FALSE)	If TRUE, generates Distance File during Preprocess
Minimum Distance Between Stops	0	Minimum distance the software will compute distance between stops
Maximum Distance Between Stops	800	Maximum distance the software will compute distance between stops
Speed Adjustment	100	Adjust drive time by this factor (100 is baseline, 120 increases drive time by 20%, etc.)
Maximum Speed	60	Maximum allowable speed by vehicle on a route
Generate 2-way entries for stops less than (x miles)	5	Add a return distance, between two stops within X miles of each other
Generate 2-way distance entries	TRUE (FALSE)	If TRUE, will calculate distances To and From stops
Stem Distances Only	TRUE (FALSE)	If TRUE, will calculate distance between the Terminal and City where the stop is located (not the stop itself)
In Cone	TRUE (FALSE) (Angle and radius created from the terminal, defaulting to 57º)	If TRUE, only stops within the Angle or Radius may be added to the selected route
Overwriting Existing Entries	TRUE (FALSE)	If TRUE, will overwrite any Distance File in the DirectRoute Data Folder
Within Territories	TRUE (FALSE)	Set to TRUE, will generate a Distance File with distances listed between EqCodes of the same type
Route Across National Border	TRUE (FALSE)	If TRUE, will allow route to cross Canada and/or Mexico borders; if FALSE, will prevent routes from

		crossing borders (may result in more miles)
Commercial Restrictions	TRUE (FALSE)	Option for Prophesy to use only roads permitted for commercial vehicles
Avoid Toll Roads	TRUE (FALSE)	If TRUE, keeps trucks from using toll roads
Use DirectRoute Drive Time	TRUE (FALSE)	If TRUE, will generate distances and drive times using DirectRoute's calculations (instead of any optionally installed Mileage System or Historic Traffic Data.
Threading	Single Thread	For use when generating Distance File, multi-core CPU = set threading to Multiple, otherwise set to Single
Distance File	C:\Program Files (x86) \Appian\DirectRoute\Data\ xxxx\xxxx.DIST	Enter the path to the existing Distance File
Use Mileage System Drive Time if it is > DirectRoute Drive Time	TRUE (FALSE) When an additional mileage system is installed and used, and the calculated drive time is greater than the drive time calculated by DirectRoute, adjust this setting to use the greater (longer) drive time (TRUE), or use the DirectRoute calculated drive time (FALSE).	Only set to TRUE if an additional mileage system is installed and/or used (PC*MILER, etc.). DirectRoute calculates distances/drive times using an adjusted straight-line distance (as the crow flies) between locations.
Preferences→PC*MILER Direct		
FIELD	***SAMPLE ENTRY***	***EXPLANATION***
Route Across National Border	TRUE (FALSE)	If TRUE, will allow route to cross Canada and/or Mexico borders; if FALSE, will prevent routes from crossing borders (may result in more miles)
Route Type	Practical Practical Routes - distances and driving routes that a driver would normally take to minimize time and cost. Shortest Routes - distances and driving routes that a vehicle would take to minimize total distance traveled while still following a reasonable route.	Choose from Practical, Shortest, Air. Practical considers distance, road quality, terrain, urban/rural classifications, truck-restricted roads, and designated principal and secondary through routes. Shortest will avoid truck-restricted roads and, in some cases, may favor a beltway rather than traveling directly through a city.
Avoid Toll	TRUE (FALSE)	
Hazardous Option	None General Explosive Inhalant Radioactive Corrosive Flammable	
Thread Count	0	Number of thread counts to use in Matrix Mode (see Distance Generation Mode below)

Distance Generation Mode	Pair Matrix	Changes how distance entries are generated
Vehicle Profiles	48' Semi Trailer Ex: Double Trailers, Straight Truck 53' Semi Trailer, Full Sized Van Light Assets, Custom, etc.	Edit/Add all vehicle types/options available from your vehicle fleet using the VehicleProfile Collection Editor.
Default Vehicle Profile		Choose the default vehicle type for each new routing project.
Map Region	NA	Map Region option is not provided at this time. Default is set to NA.
Use Historical Traffic Date	TRUE (FALSE)	Calculates drive times and distances based on historical traffic data (requires additional Appian licensing).

Figure 40 – Distance File Settings Table

Note: When using Historic Traffic Data to generate distances/drive times, ensure the appropriate settings are edited in Preferences.

- *PC*MILER Direct→Use Historical Traffic Data* = TRUE.
- *Routing→General→Use DirectRoute Drive Time* = FALSE.
- If also using Preprocess, ensure *PreProcess→Generate Distance File→Use DirectRoute Drive Time* = FALSE.

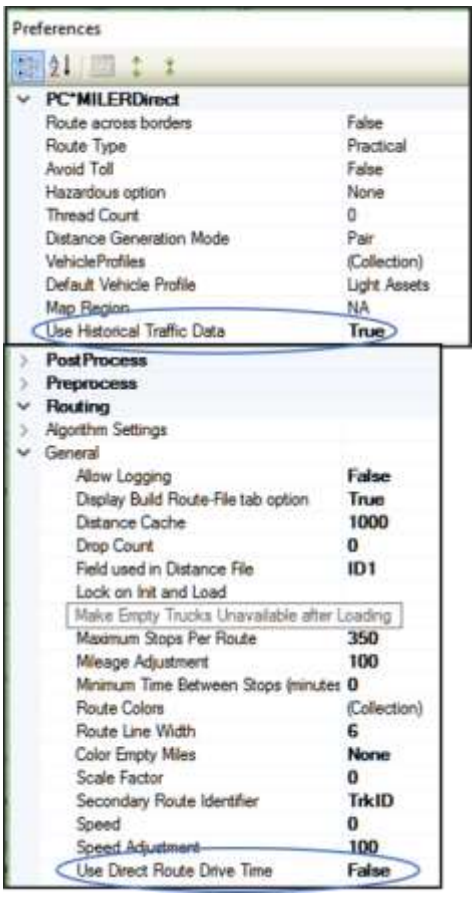

Figure 41 – Distance File Settings Table

4.5.3 Generate a Distance File

To generate a Distance File, first geocode both the Stop and Truck files, then save the files.

- From the menu, select *File→Generate Distance File*
- Edit the distance settings *From* and *To* (Min and Max distance between stops), *Speed Adj* and *Max Speed*
- Select *Use DirectRoute Drive Time* unless using an alternate mileage system
- Select any other options appropriate: Stem Distance (distance between Terminal and city only in the Stop File), in Cone (angle and radius created from the terminal), Overwrite existing entries (in current Distance File), Within Territory (generate a Distance File with distances listed between the same EQ codes), and Two Way Distance Lesser than… (compute the distance between 2 points with a return distance added)
- Select the Stop, Truck, and Distance File names/path (to create a new Distance File, do not select a Distance File name)
- Select the second tab (mileage system, i.e. Trimble MAPS, PC*Miler, etc.) to review/edit vehicle profiles that will be used in the routing project
- When all options from both tabs have been updated, select the *OK* button to generate the Distance File

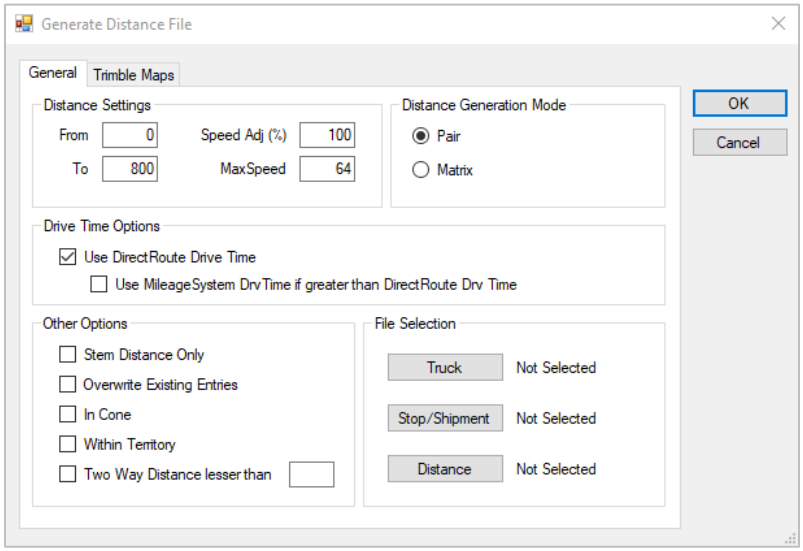

Figure 42 – Generate a Distance File

Tip: If an optional mileage system is installed and selected in Preferences→Other→Mileage System to generate a Distance File, only the General tab will appear/be available from which to choose distance and drive time options.

4.5.4 Add New Entries to a Distance File

New entries can be added to the Distance File when adding new stop records to a Stop without having to generate a whole new Distance File. DirectRoute can calculate and update the file by adding an entry for any new stops that do not already have an entry listed.

To enable adding new entries as they occur, ensure the *Preprocess* setting is enabled in the Distance File settings, and always select the preprocess option when creating new routes. (**Routing Preferences and Options Table**, and **Distance File Settings Table.**)

- Select *File→Preferences→Preprocess→Generate Distance File* = TRUE

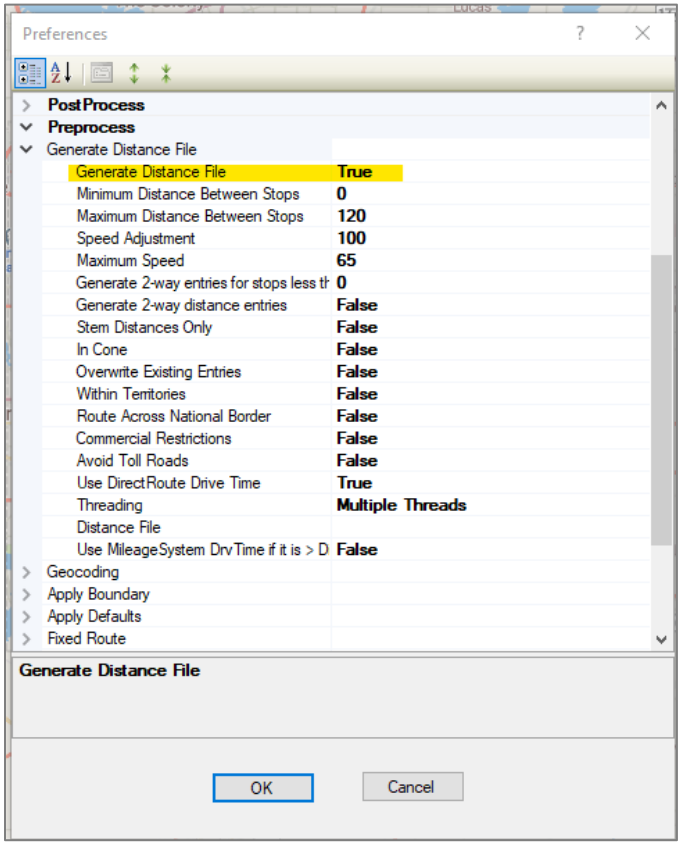

Figure 43 – Preferences Preprocess Options

When creating new routes, always select *Enable Preprocess* (Load Options).

- Select *File→New→Route*
- Under **Load Options**, select *Enable Preprocess*.

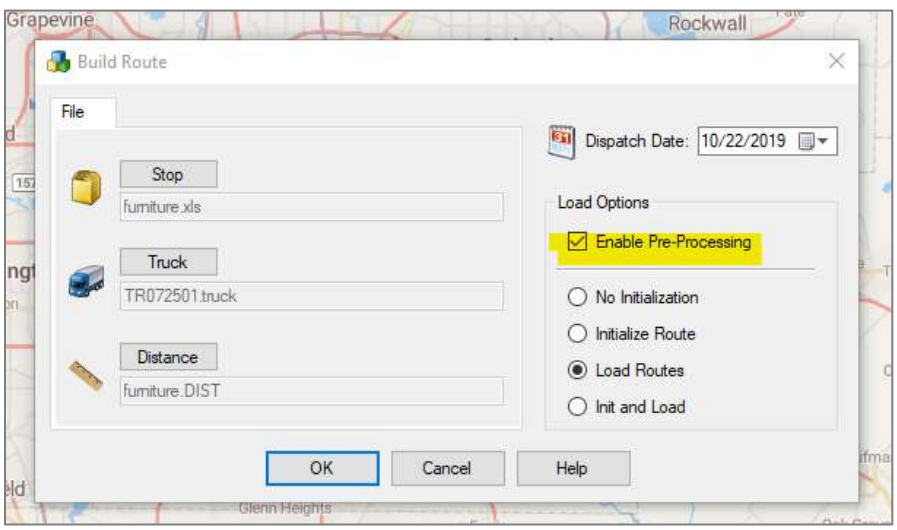

Figure 44 – Build Route Load Options

In the event of that multiple new accounts must be added, it is recommended that a new Distance File be generated.

4.5.5 View, Edit, Save, or Export a Distance File

The Distance File can be opened within DirectRoute, and individual entries edited when necessary. The opened file will resemble an Excel spreadsheet, with a file extension type of *.DIST*. Once opened, the file can be saved as an Excel spreadsheet and viewed (exported) outside of DirectRoute.

4.6 Refuel Points (Replenishment)

Refuel Points can be used to replenish vehicles in between stops and the terminal when needed. There are two algorithm options provided by DirectRoute to determine the insertion of refuel points:

- **Original** – DirectRoute will insert the refuel point based on its location in relation to the stops on a route.
- **Distance Based** – DirectRoute will insert the refuel point only when necessary, based on distances traveled, work time completed and remaining, and capacity.

The algorithm option should be identified in Routing Preferences prior to creating new routes.

- Select *File→Preferences→Routing→Algorithm→Refuel Algorithm*
- Select either **Original**, or **Distance Based**.

Note: If Distance Based is selected, the Algorithm will insert the refuel point only when needed, based on distances traveled between stops and terminal, and work time.

4.6.1 Refuel Point Locations

Refuel point locations are designated within the Truck File, and identify the physical address/location where fleet vehicles can refuel. For each refueling location, add a new Truck Record to the Truck File and populate the following fields:

- **SpEq** – Insert Refuel point
- **Lat/Long** – Latitude and Longitude (for geocoding)
- **Available** – TRUE
- **One way** – FALSE
- **Redispatch** – FALSE
- **TurnTime** – Add the number of minutes it will take to refuel
- **Optional Fields** – Symbol, Size, and Color (to view refueling points on the map), and Cost fields.

DID	XTrkID	TrkID	Available	OneWay	Redispatch	MinTm	TurnTm	SpEq	Gallons	Longitude	Latitude	City	State	Zip
Pheonix	15	UMO3-F	TRUE	FALSE	FALSE			Refuelpoint	4000	-112.151898	33.446615	PHOENIX	AZ	85043-3930
Houston	31	C1M	TRUE	FALSE	FALSE			Refuelpoint	4000	-95.2599	29.7629	HOUSTON	TX	77029
Grand Junction	45	PKG1-F	TRUE	FALSE	FALSE					-108.561029	39.061077	GRAND JUNCTION	CO	81501-7736
Santa Ana	51	U1M	TRUE	FALSE	FALSE			Refuelpoint	4000	-117.858816	33.747944	SANTA ANA	CA	92701-4749

Figure 45 – Refuel Point in Truck File

- Once the fields have been completed, use the Geocode process to populate and (or) update Lat/Long (if necessary), then save the file.

During the route building process, DirectRoute will determine when to insert the Refuel Points (Replenishment Point 1, Replenishment Point 2, etc.) in the route, based on the miles/distance traveled, proximity to a refueling point, and vehicle load factors.

Tip: The Refuel Points will need to be added to the Distance File. If using Preprocess and generating new distance points during the route building process, DirectRoute will do this automatically. When not using Preprocess, be sure to run a new Distance File to include the Refuel Point locations before routing.

RT	TRKID	Miles	Hours	Days	Day	Violati...	Cost	Stops
2	2	168.2	10.84	1	Tu	None	337.05	15

W	SE	Name	ID1	City	ST	ARV	DEPT	DA	DIST
	0	Terminal Leg [1]	TACOMA	TACOMA	WA	5:13	5:28	Tu	0.0
	1	ALASKA AIRLINES INC	ALASAI01	KENT	WA	6:00	6:16	Tu	19.5
	2	CITY OF BELLEVUE	BELLFS1	BELLEVUE	WA	6:44	7:09	Tu	15.2
	3	NORTHWEST	NORTCO34	Bellevue	WA	7:15	7:24	Tu	1.2
	4	CITY OF BELLEVUE	BELLCO01	BELLEVUE	WA	7:38	8:08	Tu	5.2
	5	UNIVERSAL LAND	UNIVLA03	Redmond	WA	8:18	8:27	Tu	2.7
	6	FRUHLING INC	FRUHIN01	Kenmore	WA	8:51	9:13	Tu	12.3
	7	Replenishment Point - 1	Replenishment Point - 1	SEATTLE	WA	9:41	10:41	Tu	15.4
	8	MANSFIELD OIL CO	MANSUN01	KIRKLAND	WA	11:12	11:21	Tu	19.3
	9	UNIVERSAL LAND	UNIVLA04	Bothell	WA	11:37	11:46	Tu	6.1
	10	UNIVERSAL LAND	UNIVLA22	Bothell	WA	11:46	11:55	Tu	0.0
	11	HOS BROTHERS CONST INC	HOSBR05	WOODINV	WA	12:11	12:20	Tu	5.9
	12	SEATTLE BOAT CO	SEATBO01	BELLEVUE	WA	12:50	13:53	Tu	18.2
	13	NORTHWEST ASPHALT INC	NORTAS01	Renton	WA	14:15	14:22	Tu	10.0
	14	RAINIER WOOD RECYCLERS	RAINWO01	KENT	WA	14:51	14:58	Tu	17.3
	15	MANSFIELD OIL CO	MANSUN02	FEDERAL...	WA	15:23	15:30	Tu	12.6
	16	Terminal Leg [1]	TACOMA	TACOMA	WA	15:48	16:03	Tu	7.3

Figure 46 – Refuel Point in Route File

Tip: if Refueling Points are used in the Truck File, and Route Assist is used to manually build routes, the Refueling Points will be available to manually insert into the routes.

5 Geocoding Records

Geocoding is the process of finding associated geographic coordinates, expressed as Latitude and Longitude, from the address data provided in the Stop File, Master File, and Truck File. This step in the routing process is required, as it enables the locations to be mapped and used to establish appropriate routes. All addresses in the Stop File and Truck File must have a Lat/Long attached for the routing process to work correctly.

DirectRoute can use an Address, City, State, Zip, or Phone Number to geocode your spreadsheet records. Once a record has been geocoded, you can manually move the record anywhere on the map. In addition, to keep track of the method used to geocode different records, you can select a color to assign to the stop symbols as they are placed on the map.

If the file you are using already has the coordinates (Lat/Long) for each stop, the stops will automatically be placed on the map when the file is opened in DirectRoute. For new files that have not been geocoded, this function will need to be performed. The methods for geocoding your records are contained in the next sections.

Before geocoding any records, it is important to ensure the addresses in each file are accurate. If unsure, or if any part of the address is missing, use the Address Cleanup feature in DirectRoute to verify the Street, City and Zip match, and correct any records that do not match. Address Cleanup can also identify 5-digit Zip Codes and update the record to a 9-digit Zip Code, which provide better geocode results.

The following sections provide easy instruction for completing the geocode process.

- Clean up addresses with **Address Cleanup**
- **Assign colors** to the different geocode options
- Select a **Geocode Option** (Address, City, State, Zip, or Phone Number) to geocode your records
- Review the **geocode results** and validate, if necessary
- Create a **custom geocode file**
- Geocoding with **Google Maps API**

5.1 Address Cleanup

Using the Address Cleanup feature can help verify the Street, City and Zip match, and correct any records that do not match. In addition, *Address Clean*up can also identify 5-digit Zip Codes and update the record to a 9-digit Zip Code, which provide better geocode results. The ZIP9 Data folder, included with the DirectRoute install, is used by Address Cleanup to locate, and attach the Zip+4 to the records.

Open the Stop File and review the Address column. Look for items that should be moved to a secondary address column (Address 2):

- Suite, Ste, Room, Rm, Apartment, Apt, Building, Bldg, Floor, Unit, etc.
- #, -, /, ½ or letters following the address number range (ex. 3217B, 3217-B or 3217 ½)

Select the Address Cleanup icon from the toolbar or select *Edit→Address Cleanup* from the menu.

The *Address Cleanup* dialog box will open, displaying the first record in the spreadsheet file (Row 2).

Figure 47 – Address Cleanup

It is possible at this point to review and correct each record in the spreadsheet individually or allow Address Cleanup to review and correct all the records more quickly.

To review and correct each record individually:

- Select the Correct button, or
- Type the Row # (from the spreadsheet file) of the record to check then select the *Correct* button

The results will appear immediately at the bottom of the info box, with the corrections listed. In the example below (Figure 46), the street name was corrected.

Figure 48 – Address Cleanup Corrections

To review and correct all records:

- Select the *Process All* button

The results returned identify the number of records corrected.

Figure 49 – Address Cleanup Results Count

During the cleanup process, an "AddrErr" (address error) column is added to the spreadsheet. Any records that could not be corrected automatically will contain information in this column explaining why this record was not corrected. These records can usually be corrected manually.

5.1.1 Color Coding and Symbols

Each record (stop) in the spreadsheet (Stop File, Truck File) is represented by a symbol. When the spreadsheet is opened in DirectRoute, the symbols appear on the map to identify the location of that stop. To keep track of the different methods used to geocode the spreadsheet records (Address, City, State, Zip, or Phone Number), select a color to assign to the method; as the symbols (stops) are displayed on the map, their color on the map will indicate how the record was geocoded.

To select the colors for each geocoding method, open the spreadsheet file (Stop File).

- Select *Edit→Geocode→Color Code Options* from the menu

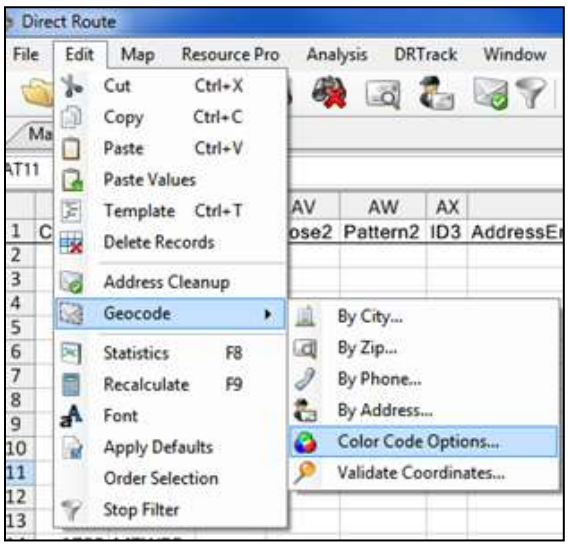

Figure 50 – Color Code

- Default colors will appear in the color code options box; use the dropdown arrow adjacent to each geocode method and select a color
- Select OK to close the dialog box

Once the color coding options have been set, ensure you have set the scatter radius for matching records.

Figure 51 – Color Coding Options

5.2 Geocode Options

Geocoding by Address is the most accurate and frequently used option when geocoding records. However, using other available geocode options in DirectRoute can help identify and record missing components of an address. While geocoding by other options is not ideal for actual routing purposes, it can be helpful for other reasons, including as an alternate means to locate a record when the full address is not available. The additional options available in DirectRoute include:

- **Geocode by City** – Geocode by City looks for a matching City name and State to correctly place records on the map. This process will return the Lat/Long for the centroid of the City, and will place the record on the map at the center of each City
- **Geocode by Zip** – Geocode by Zip locates the Lat/Long for the centroid of the Zip Code, and will place the record on the map at that location
- **Geocode by Phone** – Geocode by Phone looks for the matching Area Code; The process will return the Lat/Long for the centroid of the Area Code, and will place the record on the map at that location
  - Select *Edit→Geocode→City→Phone→Zip* from the menu
  - Select the record range by typing the first and last record numbers into the respective fields (the default selection includes all records in the file)
  - For a single record, use the same number in both the first and last row fields
  - Specify the *Scatter Radius* for separating identical entries on the map
  - Do not select the *Skip Non-Zero* option if the record was previously geocoded (ex. Lat/Long cells contain a number other than zero)
  - Select *Color Code* if you want to assign the color code option previously selected for Geocoding by this option
  - Select the OK button
- **Geocode a Single Record** – Geocode a single record or selected records in a Stop File.

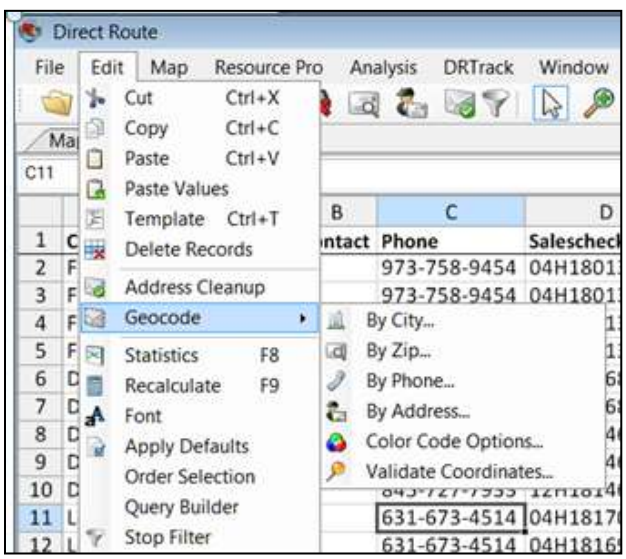

Figure 52 – Geocode Options

Additional geocode settings (options):

- **Scatter Radius** – Geocoding by City, Zip, and Phone Number have a scatter radius option. The Scatter Radius is the distance by which multiple matching records will be separated on the map during the geocoding process. For instance, if records are geocoded by Zip Code, they can be separated by a Scatter Radius so that multiple matching entries are not placed

on top of one another on the map. An entry of 1 will place matching records randomly scattered within 1 mile of the centroid point (or KM, dependent on distance type set in *Preferences→Other→Distance Option*).

- **Skip Non-Zero** – All geocoding options include a *Skip Non-Zero* option. This is used to skip over records that were previously geocoded (already assigned Lat/Long coordinates in the spreadsheet) and will only geocode records that have zero's in those two fields.

5.2.1 Geocode by Address

DirectRoute looks at a record's Address and Zip to geocode the record by address. Each type of data must be placed in the proper spreadsheet column with the correct heading. For example, street addresses should be contained within the Address column and cities should be contained within the City column, etc.

The address is broken down into segments.

- Prefix
- Suffix
- Street name
- Address number
- Street type
- Zip Code

If the address components do not match completely, DirectRoute will not attach the coordinates to the record during the process. This can be corrected by carefully editing your address records and making them as complete as possible, and or use *Address Cleanup*.

Geocode by Address enables the geocoding of single or multiple records at one time. Use the Geocode By Address icon , or select *Edit→Geocode→Address*.

- Either selection will open the Geocode by Address dialog box
- Select the options for geocoding
- Select the Color Code option to assign a specific color to records that are geocoded
- Select Skip Geocoded to skip over records previously geocoded
- Select Zip Fallback to Zip if no address information is located
- Select Update *Address→City→Zip* and DirectRoute will correct addresses as they are found
- Select Correct to geocode a selected record, or
- Select Process All to geocode an entire file

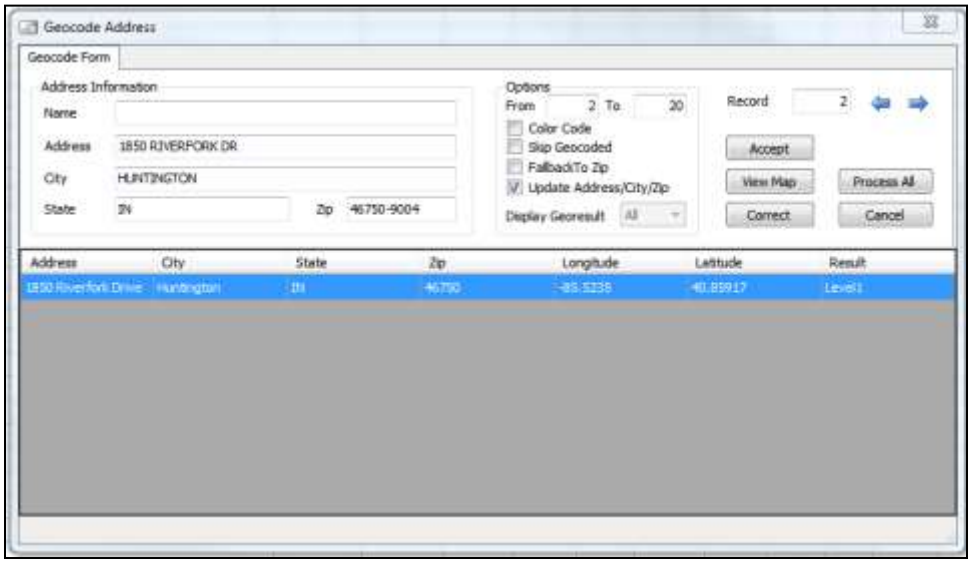

Figure 53 – Geocode by Address

Once the process is complete, a dialog box will display the number of records geocoded, and how (by address, number of records geocoded by 9-Digit Zip, etc.). If you check the color code option, the geocoded records will be assigned the chosen color (Color Code Options dialog box).

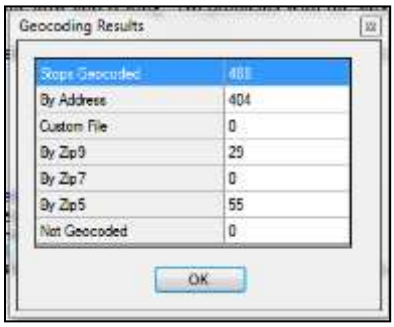

Figure 54 – Geocoding Results

It is possible that not all addresses will be found during the process (address coverage is best in metro areas). Geocoding individual records allow you to identify errors and plot a record at a near address if the record does not have an exact address match.

To geocode the remaining addresses individually:

- Select the Geocode by Address icon from the toolbar
- Select the record by typing the record number in the Record field
- The geocoding engine will display the address selected
- The information box at the bottom will show available addresses
- Find and select the correct or nearest address to the selected location
- Select Correct to change the address to match the selected entry

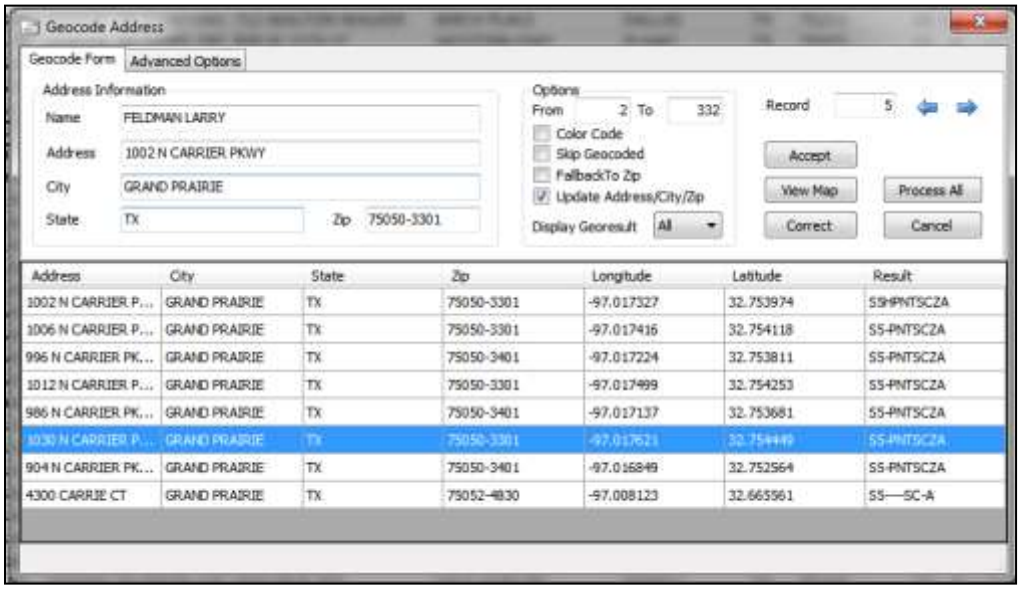

Figure 55 – Near Address Geocoding

5.3 Geocode Results

When the geocode process concludes, the results are presented to explain how the record has been geocoded. Four possible results can be received.

- ***Level 1*** – An exact match was made; for street addresses, trust is 95% or greater AND if address is outside the range listed in the database, the top match is within 100 address units of input address; or for any other match level if there are multiple matches they are all within .1 air miles of each other

Example: "100 Main Street" was input; best match in database is "150-250 Main Street"

- ***Level 2*** – Inexact match but unique result (only one match); for street addresses, trust is 85% or greater AND if address is outside the range listed in the database, the top match is within 500 address units of input address*; or if there are multiple matches, they are all within .5 air miles of each other

Example: "100 Main Street" was input and the best match in the database is "450-550 Main Street"

- ***Level 0*** – Inexact match and there is more than one match in the database; for street addresses, trust is 50% or greater
- ***Z1*** – Zip5 match
- ***Z3*** – ZIP9 match
- ***No Results Found*** – Record not geocoded (column will be blank)

Tip: All records must be geocoded for the routing process to be completed. If there are records without geocoding, the process will be aborted.

If a stop receives a poor match, you may need to edit its location and/or address. Edits can be made to a stop's coordinates via the map (by moving the stop), or edit the stop's Lat/Long directly in the Stop File, all while the Geocode info box is still open.

5.3.1 Validate Coordinates

Use this command to double check the geocoding results and finds any errors that may have occurred during the data entry process, such as transposed digits in a Zip Code entry. To validate, a geocoded Stop File must be open.

Figure 56 – Validate Coordinates

- Select *Edit→Geocode→Validate Coordinates* from the main menu.
- Choose which item(s) to validate and enter the distance limits in miles.
- Select any column on the spreadsheet as the Result Field where the results will be displayed (select a field not being used, or insert a blank column in the spreadsheet).
- Select the OK button to run.

Records that meet the validation criteria chosen will display the results in the AddressErr column (ex. PASSED – Zip, PASSED - City, etc.). If the record entry is PASSED, then the location of that point is within the specified number of miles from that field. If the results returned are question marks, this indicates incorrect data that prevents this record from being validated, such as misspelled or duplicate cities, abbreviations or invalid numbers in the Zip Code or phone number fields. If the results show a number, such as 08.8-City, this indicates the location of that point is within .08 miles from that field.

	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1	Latitude	Symbol	Size	Color	Selected	EarliestDate	LatestDate	EarlyBuffer	LateBuffer	PenaltyCost	AddressErr
86	43.70340	Circle	10	Green							PASSED-City
87	39.08490	Circle	10	Green							08.4-City
88	36.65060	Circle	10	Green							PASSED-City
89	38.57410	Circle	10	Green							04.2-City
90	39.08510	Circle	10	Green							PASSED-City
91	38.13640	Circle	10	Green							02.7-City
92	39.78750	Circle	10	Green							???.?-City
93	39.78750	Circle	10	Green							???.?-City
94	41.23520	Circle	10	Green							09.3-City
95	41.26410	Circle	10	Green							05.8-City
96	41.26240	Circle	10	Green							PASSED-City

Figure 57 – Validate Coordinates Result Sample

5.4 Custom Geocode File

The *Custom Geocode File* is a separate File from the Stop File or Master File. It is a spreadsheet containing special locations that are hard to geocode or cannot be geocoded normally, such as new housing developments, apartments, or other locations.

The *Custom Geocode File* contains a *SiteID* (User defined) and the Longitude and Latitude of the stop. Only one Custom Geocode File is necessary if one is being used.

The *SiteID* is a unique name or string identifier, established by the user, to identify a specific location. This *SiteID* will be used to identify the Longitude and Latitude of the location and will allow DirectRoute to determine if a stop in the Stop File is available for geocoding through the Custom Geocode File.

Separate SiteIDs allow any number of locations to be entered, even if not all the locations appear in each Stop File. The file will use only those locations it finds in the Stop File.

When geocoding records, DirectRoute will first attempt to geocode the records by Address, ZIP+4, and then by the Custom Geocode File. Stops with matching identifiers (*SiteID*) used in the Custom Geocode File will be geocoded using the coordinates from that file.

5.4.1 Creating a Custom Geocode File

Before a Custom Geocode File can be used in DirectRoute, it must be created.

- Create a new spreadsheet with three columns: *SiteID*, Longitude, and Latitude
- Enter the unique identifiers (*SiteID*) for each location to be geocoded using this file

Once created, the *Custom Geocode File* must be geocoded. This can be done either by copy/paste from the Stop File, or manually. If the Stop File already contains the Lat/Long coordinates, copy them to this new file. If the information is not available, you will need to manually locate them.

- Zoom to the location on the map where the stop is located and place the cursor over it; the Lat/Long Coordinates will appear in the lower left-hand corner of the map screen
- Copy the coordinates into the Lat/Long columns of the Custom Geocode File

Tip: To ensure the coordinates are placed in the correct column, remember that the Longitude is the negative number (ex. -96.91080) and the Latitude is the positive number (ex. 32.98247).

5.4.2 Preparations for Using Custom Geocode File

After the file has been geocoded properly, save the file to the DirectRoute/Data folder. Once the *Custom* Geocode File is prepared, DirectRoute Preferences and the Stop File must also be updated and prepared.

- In the Stop File
  - Create a column called SiteID
  - Locate the stops that will be affected and used by the Custom Geocode File, and enter the *SiteID* s from *the Custom Geocode File*
  - Save the file changes
- In Preferences
  - From the menu, navigate to *File→Preferences→Other*
  - Locate the Custom Geocode File Path
  - Manually type in the file path location or, select the button that appears on the right side of this line and navigate to where the Custom Geocode File was saved
  - Double click the file name to capture the path location
  - Locate the Geocode File Col Identifier line and enter the column header name used in both the Custom Geocode File and the Stop File as your unique identifier column (SiteID)

- Select OK and close the Preference dialog box

5.5 Geocoding with Google Maps API

Geocoding with Google Maps API is available to check the validity of DirectRoute geocode results, or to obtain Canada or Australia geocode results. The service is available as a limited alternative to DirectRoute's built-in geocoding capabilities, provided by Google without cost. Google Maps API uses an API Key, a unique key that generates when using the Google APIs Console, to identify your application. When the application needs to call an API that is enabled in this project, the application passes this key into all API requests as a key=API key parameter. Use of this key doesn't require any user action or consent, it doesn't grant access to any account information, and it is not used for authorization.

The free API provides:

- 2,500 requests per 24 hr. period
- 5 - 10 requests per second

Google Maps API does provide additional, increased usage for a fee. Users who may be interested in these additional paid options can explore Google Maps API for Work, Google Places API or Google Geolocation API. Additional information on these and other Google services can be found at **Google Maps API for Work Web Services**.

5.5.1 Create a Google Maps API Key

To create your key:

- Login to the Google Account (create a free Google Account/Login if you do not already have one)
- Navigate to **Google Developers Console**
  - Create or select a project
  - Select Credentials, the select API Key
  - Create a new key by selecting get a *Server key*

Note: If you have an existing Server key, you may use that key.

  - Apply a *Name* to the *Server Key* then select *Create*
  - When the API Key window opens, use your mouse to copy the *Key,* then select *OK*

To prevent quota theft, **secure your API key** following these best practices

- Paste the copied API key into *Preferences→GeocodeOptions→Google API Key*

Tip: By default, a key can be used from any server, though it is recommended that you restrict the use of your key by IP address to servers that you administer.

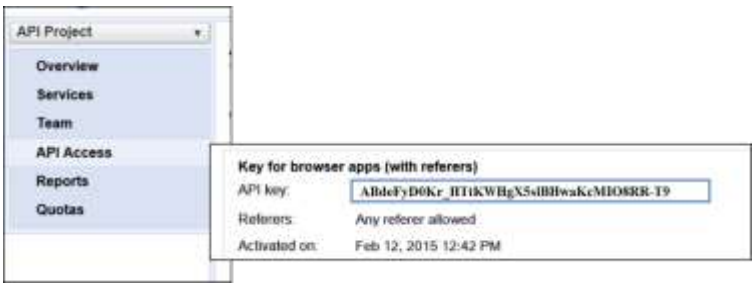

Figure 58 – Google API Console

5.5.2 Google Geocode Settings

DirectRoute **Routing Preferences** should be updated to enable the Google Geocode service. To update, select *File→Preferences→Geocode Options* from the menu.

- **Secondary Geocoder**
  - Select *Google* or *None*; default is *None*
- **Fallback to Secondary Geocoding after**…
  - If *Secondary Geocoder 'None'* is selected, ensure *Fallback to secondary geocoding after* is set to *Never.*
  - If Secondary Geocoder 'Google' is selected, ensure Fallback to secondary geocoding after is set to other than 'Never'.
  - *Level 1* – Will recheck addresses with geocode result level less than 1 (Level 2 or Level 0).
  - *Level 2* – Will recheck addresses with geocode result level less than 2 (Level 0).
  - *Always* – Will recheck all addresses every time, regardless of geocode result.
- **Google API Key**
  - Assigned through the *Google Console*
- **Google Geocode Accuracy Level**
  - *Rooftop* – Default; (High Accuracy) precise down to the street address.
  - *RangeInterpolated* – (Same Street) An approximation, usually on a road, interpolated between two precise points, such as intersections.
  - *Geometric Center* – (Same Region) The geometric center of a street (polyline) or region (polygon).
  - *Approximate* – (Approximate) The result is approximate.

To geocode international (Australia and Canada only, at this time), the appropriate country code will need to be set in Routing Preferences (**Routing Preferences and Options Table**).

- Select *File→Preferences→Other→Country*
- Use the drop-down menu to select the country code
  - En-US-English (Australia), or
  - En-US-English (Canada)
  - En-US-English (United States)

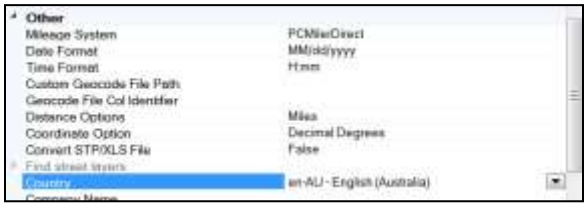

Figure 59 – Country Code

When geocoding files with a US address, after geocoding international addresses, be sure to reset the country code selection to En-US-English (United States).

5.5.3 Google Geocoding Results

Generally, only one entry in the results array is returned for address lookups, though the geocoder may return several results when address queries are ambiguous.

- **Rooftop** – High accuracy; indicates the result is precise down to the street address.
- **Range Interpolated** – Same street; indicates the result is an approximation, usually on a road, interpolated between two precise points, such as intersections.
- **Geometric Center** – Same region; indicates the result is the geometric center of a street (polyline) or region (polygon).
- **Approximate** – Approximate; indicates the result is approximate.

When the Geocode function is used, the results will be displayed for each stop in the Stop File under the column heading Geo Result, as well as in the Geocoding Results info box.

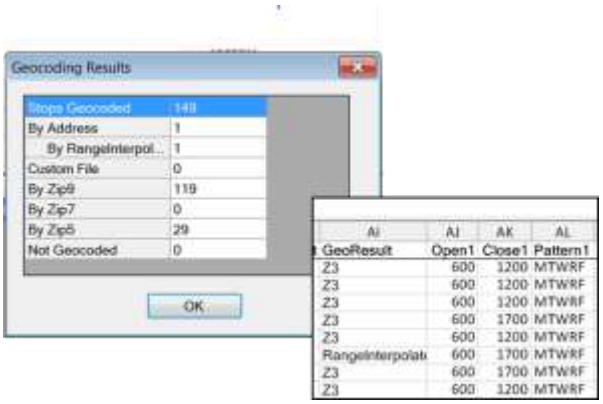

Figure 60 – Google Geocode Results

5.6 Geocoding with PC*MILER Web Services

Geocoding with PC*MILER Web Services is still in early development and should not to be relied upon solely for geocoding without double checking your results. The following is provided for informational purposes only.

Geocoding with PC*MILER Web Services requires an active internet connection. Currently, only three methods are available to geocode: City, Zip, and Address.

To ensure your geocoding results are the most accurate possible, edit your Routing Preferences (*Preferences→Other→Mileage System)* to select mileage system *Trimble Maps*, and make sure your Data Version under Trimble MAPS is set to PCM_NA (or other, if applicable).

- Exact
- Good
- Uncertain
- Failed
- Zip

6 Building Routes

DirectRoute provides several tools to enable the building of routes both quickly and efficiently. Which tool you use will depend on your individual routing environment, and the type of results expected.

There are two primary stages to building successful routes:

- The initial route construction
- Optimizing routes

The initial route construction involves preparing the routing files (**Creating Route Files**), review and update the **Routing Preferences**, and then load/build the routes.

Optimizing routes enables DirectRoute to review how the routes were loaded and factors used to determine the load sequence and evaluate the feasibility of making moves. Several factors can affect this process, but results can offer cost savings and/or decreased miles.

6.1 Create a New Route

After preparing the Routing Files and reviewing/updating the Routing Preferences, the loading and route build can be initiated.

- From the DirectRoute menu, select *New→ Route→ Regular*, and the Build Route dialog box will open

Figure 61 – Build Route

- Select the files that will be used to the build the routes.
  - Select the *Stop* button, then select the *Stop File*
  - Select the *Truck* button, then select the *Truck File*
  - Select the *Distance* button, to select a Distance File (if one is being used)
- Select *Dispatch Date*
  - Set the *Dispatch Date* to the 1st day the trucks can load/depart
- Select load options to direct how the routes will be built
  - **No Initialization** –To manually load all the stops onto routes, select *No Initialization*
  - **Initialize Routes** – If the *Stop File* has predetermined routes (i.e. RT and sequence number), and you want them displayed, select *Initialize Route*
  - **Load Routes** – To have DirectRoute automatically load all stops onto routes, select *Load Routes*

- **Init and Load** – To use Rt and sequence number already contained and have DirectRoute load all stops not already on a route, select *Init and Load;* will put the maximum number of stops on the first available truck, and so on.
- **Enable Preprocess** – Generates a Distance File and/or updates the Distance File being used and ensures all stops have *Lat/Long* coordinates.

Finally, select the OK button to launch the routing process.

When the routing process has completed, the first route (Route 1) will populate on the Map and the Route Book will appear in the tab view (if the Route Book tab is missing, select *View→Route Book* from the menu).

6.2 Inbound Routes

Inbound Routes are routes that begin at the furthest stop, and route back to the depot. The distance from the depot to the first stop (Farthest stop) is not calculated.

This mode of routing may be completed without using One Way Routes, and then inverting the route. Inbound Routes are calculated when using the Inbound Algorithm setting (*File→Preferences→ Routing→Algorithm Settings→Algorithm*).

When building Inbound Routes, all routes will be calculated as Inbound Routes; standard two-way routes cannot be completed within the same Stop File.

6.2.1 Set up Inbound Routes

- Edit Routing Preferences to select Inbound Algorithm
  - *File→Preferences→Routing→Algorithm Settings→Algorithm*
- Open the Truck File and locate the column named *One Way*; ensure it is set to FALSE for all vehicles
  - Save and close the file
- From the DirectRoute menu, select *New→Route* and the Build Route dialog box will open
- Select the files that will be used to the build the routes.
  - Select the *Stop* button, then select the Stop File
  - Select the *Truck* button, then select the Truck File
  - Select the *Distance* button, to select a Distance File (if one is being used)

Select the load options.

- **No Initialization** –To manually load all the stops onto routes, select No Initialization
- **Initialize Routes** – If the Stop File has predetermined routes (i.e. RT and sequence number), and you want them displayed, select Initialize Route
- **Load Routes** – To have DirectRoute automatically load all stops onto routes, select Load Routes
- **Init and Load** – To use Rt and sequence number already contained and have DirectRoute load all stops not already on a route, select Init and Load; will put the maximum number of stops on the first available truck, and so on
- **Enable Pre-Process** – Generates a Distance File and/or updates the Distance File being used and ensures all stops have Lat/Long coordinates

Finally, select the *OK* button to launch the routing process.

When the build is complete, the routes will look the same as One Way routes, but each route will begin at the furthest stop and route back toward the depot.

- The distance from the Depot to the first stop (furthest) will not be calculated.

To resume building Two Way routes, edit the Algorithm setting in Routing Preferences to select Regular.

6.3 Manual Route Building Tool

Routes can be built manually while viewing the stops on the map and selecting just the stops desired, instead of all stops. This can be done using the Manual Route Tool , located on the DirectRoute toolbar. To start, ensure the Stop and Truck Files are updated as needed and saved in the DirectRoute Data Folder.

- From the DirectRoute menu, select *File→New Route.*
- Select the Stop File, Truck File, and Distance File (if used) to use in the routing scenario.
- Select *No Initialization* and select the *Dispatch Date* (first day vehicles should depart).
- Select the *OK* button to launch the build process.

When the build process has completed, select the Map tab to view the stops on the map.

- From the toolbar, select the Manual Route Tool; the mouse cursor will change to resemble this symbol.
- Use the dropdown menus to select the first Route number to apply to the new route, and the vehicle (TruckID) to use on the new route.
- Left click to add a check mark to the *Show Hints* box, to color code stops that will not exceed the vehicle capacity, and then select the *OK* button.
- To select a stop to add to the route, position the cursor over the stop and use the Shift key and left click to select; repeat for each additional stop to add it to the new route.
- When all desired selections have been made, select the *Normal Cursor Tool* from the tool bar. This will end the build process for the route.
- To build a second route, repeat the process, starting with the selection of the *Manual Route* icon from the toolbar; repeat until all desired routes have been built
- Complete routes can be viewed by selecting the Route Book tab from the top of the screen (additional editing can be performed in the Route Book as well, if needed).
- Be sure to save and name the completed routes when all is done.

Tip: Manual Route Building can also be accomplished using the Lasso Tool. See **Using the Lasso Tool** for more information.

6.4 Optimization Options

During the route build phase, DirectRoute considers truck availability time, travel time, receiving time, unload time, and distance; all the parameters set within the Truck File, Stop File and Routing Preferences. When optimizing, DirectRoute is performing additional passes over the routing data, while considering penalty factors, time windows, work time, etc., to look for options that would allow stops to be moved either within each route, or between routes, in an effort to return a lower-cost routing solution. Additional options can be selected to attempt loading any unloaded stops at the same time.

The following optimization options are available:

- **Optimize Trucks After Loading** – Looks to minimize costs by moving stops between routes and within routes
- **Optimize Stops After Loading** – Looks to minimize costs by moving stops between routes and within routes
- **Optimize Within Routes** (SHIFT+CTRL+W) – Attempts to re-order the stops within a route to lower the overall cost.
- **Optimize Between Routes** (shortcut: *Shift+CTRL+O*) – Evaluates the effects of moving a group of stops to other routes.

Optimization settings can be chosen before the load/route process begins:

- Review/update selections in Routing Preferences (*Preferences→Routing→Algorithm*), or
- Choose and apply Optimization preferences to routes already built; with the Route Book open, select *Modify →Optimize* from the menu

Regardless of the option chosen, for Optimization to work properly and effective, it is important to ensure that all necessary cost fields within the Truck File are updated accurately.

- Set the mileage cost, fixed cost, hourly cost to a higher cost value for those vehicles that should be used only as a last resort (prevent them from being used until necessary)

6.4.1 Optimize Trucks After Loading

Optimize Trucks After Loading is designed to let DirectRoute choose the right vehicle for the load, when there is a mixed fleet of different type/sizes of equipment. DirectRoute will move loads from larger trucks (higher costs) to smaller trucks (lower costs) to minimize cost. If target work time was used, the optimization phase will ignore it and use MaxWkTime instead.

Use Optimize Trucks After Loading when:

- There is a mix of vehicle types in the Truck File
- Some vehicles should be used as a last resort (rentals)
- Some stops did not load because there are no available vehicles of the type needed

6.4.2 Optimize Stops After Loading

Optimize Stops After Loading looks to minimize costs by moving stops between routes and within routes. DirectRoute will evaluate the effects of moving one or more stops to other routes, and/or changing the sequence of stops within the routes. Each route is viewed and modified individually. See **Optimize Routes** for additional information.

6.4.3 Optimize Within Routes

Optimize Within Routes (SHIFT+CTRL+W) attempts to re-order the stops within a route to lower the overall cost. When selecting *Optimize Within Routes*, the info display box will display fields To and From, providing Users the option to select a range of routes.

Example: Input the number 2 in the To field and the number 10 in the From field, and Optimization Within Routes will be performed for all routes 2 thru 10 (2, 3, 4, 5, 6, 7, 8, 9, and 10).

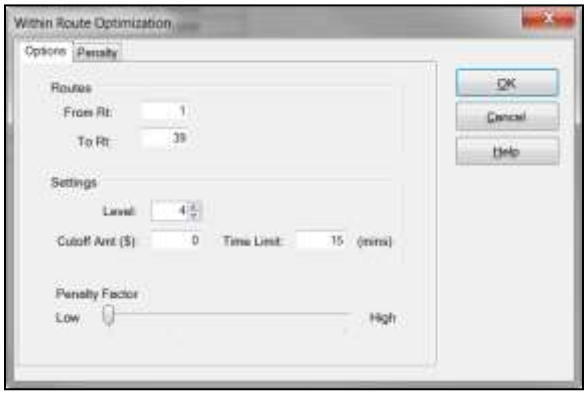

Figure 62 – Optimize Within Routes

- **From RT** – The first route to be optimized. While in the Route Book, the From/To Rt defaults to the route selected (if any), i.e. if Route 6 is currently selected and being viewed in the Route Book when the user selects *Modify→Optimize Routes*, the From/To Rt will prepopulated with the number 6.
- **To RT** – Last route to be optimized (only stops within each of the selected routes will be looked at for optimization).
- **Level** – the number of stops that will be reviewed at one time to determine if they can be moved to another position or another route (4 is the recommend Level).
- **Cutoff Amt** (Amount) – the minimum cost savings incurred to evaluate moving a stop or leaving it in its current order.
- **Time Limit** – the max amount of time you want the optimization routines to run.

Example: If '5' is entered as the Cutoff, DirectRoute will not change a route unless at least $5 will be saved by moving the stop

- **Penalty Amount** – This applies an arbitrary dollar amount to stops that are moved within a route (this dollar amount does not affect the cost of the route, but only counts as a penalty against the move). The Penalty factor allows more control over reasons for applied penalties. There are several options to choose from, but the application of a penalty on this tab has the same effect as the *Penalty Amount* slider on the previous tab.

See **Optimize Settings** for additional information.

6.4.4 Optimize Between Routes

Optimize Between Routes (shortcut: *Shift+CTRL+O*) evaluates the effects of moving a group of stops to other routes. The feature will move from depot to depot (if multi-depot version is in use), adjusting the stops between the routes within each depot. Moves are made when a lower cost alternative is identified.

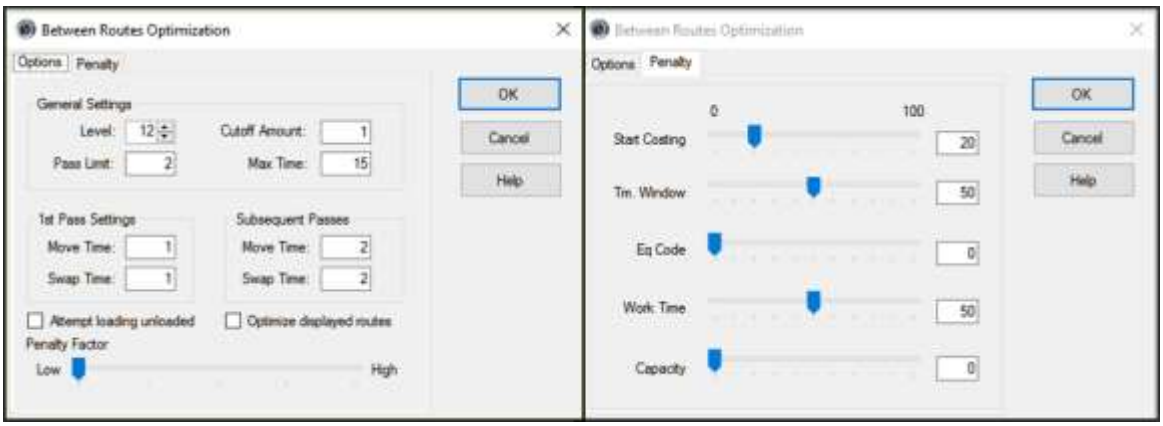

Figure 63 – Optimize Between Routes

See **Optimize Routes** for additional information.

6.5 Optimization Settings

Optimization settings control the basic parameters of the optimization process (between routes).

- **Level** – Level represents the number of stops that will be reviewed at one time to determine if they can be moved to another position or another route (4 is the recommend level).

Example: If DirectRoute is set to level four, it will evaluate moving a cluster of four stops to another route. If the level number is higher, then DirectRoute will review more than four stops at a time and will take longer to process. A lower level setting may result in fewer cost savings. In the diagram below, we see two routes. DirectRoute will evaluate moving stops #1, #2, and #3 from Route #1 to determine if there is a potential cost savings. If the level number were set to 1 or 2, then only the first two stops would be reviewed. Moving only one or two of the stops would save no incremental cost because all three stops are in the same area.

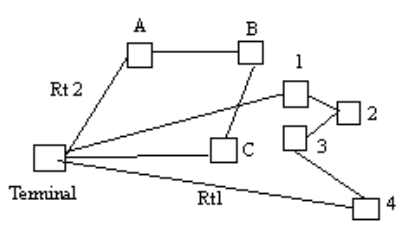

Figure 64 – Optimization Level

- **Cutoff Amt** (Amount) – The minimum cost savings incurred in order to evaluate moving a stop or leaving it in its current order (enter '5' as the Cutoff Amount, DirectRoute will not change a route unless at least $5 will be saved by moving the stop)

Example: DirectRoute determines if a stop is to be evaluated for movement to another position on the route or to a completely different route. There must be a savings of at least that number for the move to occur. If the amount of money saved for a stop or group of stops to be moved is equal to or greater than this value (the Cutoff Amount), DirectRoute will move the stop.

- **Pass Limit** – The Pass Limit option limits the number of times the routes will "pass" through the optimization process. The default is 2. Usually after going through the optimization routine twice, the process is about 95% complete.
- **Max Time** – Max Time is the maximum time that you want the optimization routines to run. This does not mean the optimization will always run the maximum time. Generally, DirectRoute will complete optimization before the maximum time has elapsed. DirectRoute reviews the highest marginal cost stops first. This means that most cost savings will occur early in the optimization process.
- **Pass Settings** – This setting allows the user to designate the amount of time that will be spent on each pass for making moves or swaps. These times are combined to make up the total time allowed for optimization. If these are less than the Max Time, optimization will halt when the pass settings are met.
- **1st Pass Settings** – Sets the parameters for the first pass of optimization.
- **Move Tm** – The time DirectRoute will attempt to make moves within the first pass (in minutes).
- **Swap Tm** – The time DirectRoute will attempt to make swaps between one route and another during the first pass (in minutes).
- **Subsequent Passes** – Sets the parameters for each pass following the first.
- **Move Tm** – The time DirectRoute will attempt to make moves for each pass following the first pass (in minutes).
- **Swap Tm** – The time DirectRoute will attempt to make swaps between one route and another for each pass following the first pass (in minutes).

Tip: To automatically perform both optimizations (within, between routes) after a new route has been loaded, select "Optimize after loading" within the Load Options, File→Preferences.

(Caution: Using this option may optimize routes when there are unloaded stops that have been assigned to a route).

- **Attempt Loading Unloaded** – This check box will attempt to load any stops that have appeared on the unloaded stops page in the Route Book.
- **Optimize Displayed Routes** – Much like Optimize Within Routes, this option also has the Penalty tab, and functions the same way. The check box will cause DirectRoute to only optimize routes that have been locked on the screen. Routes that have not been locked will be ignored.

6.5.1 Box Expand and Values

Box Expand is a parameter that defines which routes are considered for Between Route Optimization. During optimization, DirectRoute constructs the smallest box that will contain all the stops on a route. When DirectRoute considers making moves, the logic does not consider moving stops between routes, unless their boxes intersect. This includes routes that are in the same vicinity.

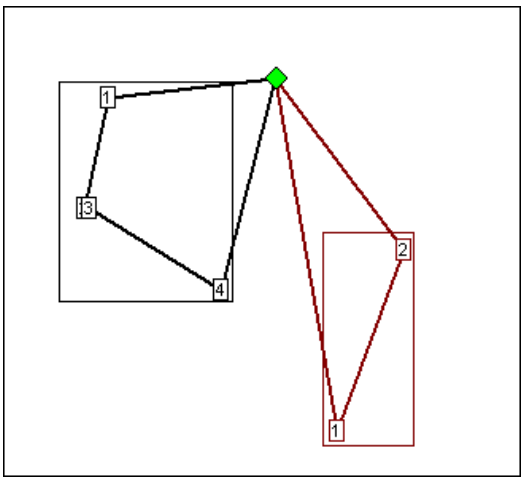

Figure 65 – Box Expand

The Box Expand value is represented in miles and determines how far to expand the box. Larger numbers increase time it takes for the system to complete optimization; adjusting the parameter allows the system to consider more routes during optimization. Depicted in this example are the results if Box Expand is increased to 25.

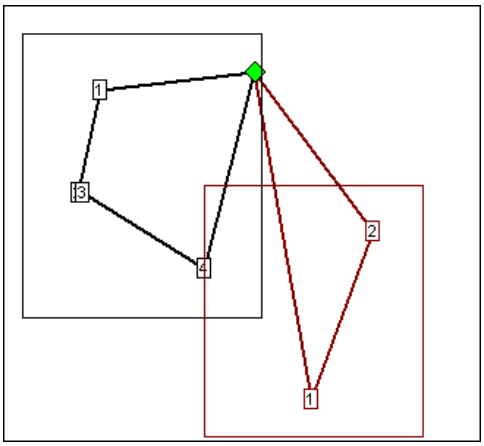

Figure 66 – Box Expand Results

The miles would be saved if Stop 4 (black route) was placed on the red route. By increasing the parameter to 25, the boxes now intersect, thus allowing more moves to be evaluated. The increased value of Box Expand will also increase the amount of time the system takes to complete the optimization process.

To edit Box Expand values, select from the DirectRoute menu: *File→Preferences→Other*.

- Enter the number of miles to identify how far to expand the box

6.6 Priority Routing Tool

Priority Routing Tool is a manual route building tool that provides greater control and flexibility when building routes, and provides a simple format from which edits and adjustments can be made during the building process.

Key components are:

- Route building options not normally available for selection (selected internally by the Algorithm).
- Stop Grid view of valuable information pertaining to each stop.
- 'Preview' the routing solution (statistics) prior to committing to changes.
- Import orders (stops) directly from DRTrack™ to create manual routes.

Priority Route Building can be accessed from the DirectRoute menu, or toolbar.

- From the menu, select *File→ New→ Priority Routi*ng, or
- Select the Priority Routing icon from the tool bar .

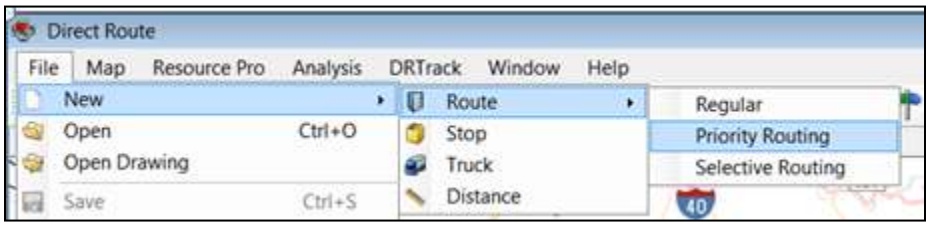

Figure 67 – Priority Route Building From the Menu

Figure 68 – Priority Routing Icon

Tip: If the Priority Routing Info box opens too large to see or access the action buttons on the bottom of the box, resize the box by using the mouse to drag the right side wall inward, or the top wall downward, then reposition the box on the screen, as needed.

6.6.1 Priority Routing File Selection

Select the Route Files to be used to build routes.

- Select the Stop, Truck, and Distance File by clicking on the dotted box next to each item.
- Edit the Dispatch Date or use the calendar icon to select a date.
- Select the Enable Preprocess box, to apply parameters already preselected in Routing Preferences, if desired.
- Select the Next button on the bottom of the box.

Figure 69 – Priority Route File Selection

In addition to using a Stop File from within the DirectRoute Data Directory, stops/orders can be imported directly from DRTrack, for use in building routes.

6.6.2 Import Records From DRTrack

To import orders from DRTrack to use in building routes:

- Select the *Import From DRTrack* button.
  - Select the *Branch, Shift*, and *Truck Profile* by using the drop-down arrow on each line.
  - Select the Distance File by clicking on the adjacent dotted box.
  - Edit the *Start/End Dates* or use the calendar icon to select a date.
  - Edit the Start/End Time.
  - Select *Enable Preprocess* to apply parameters already preselected in *Routing Preferences.*
  - Select the *Next* button on the bottom of the box.

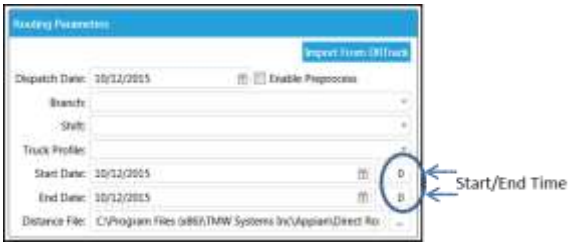

Figure 70 – DRTrack Import

6.6.3 Preview Selected Stop Records

After the appropriate files have been selected, available stops can be viewed from the Stop Grid, in the lower half of the screen of the info box.

Available trucks (routes) are viewed from the Route Grid, the upper half of the box.

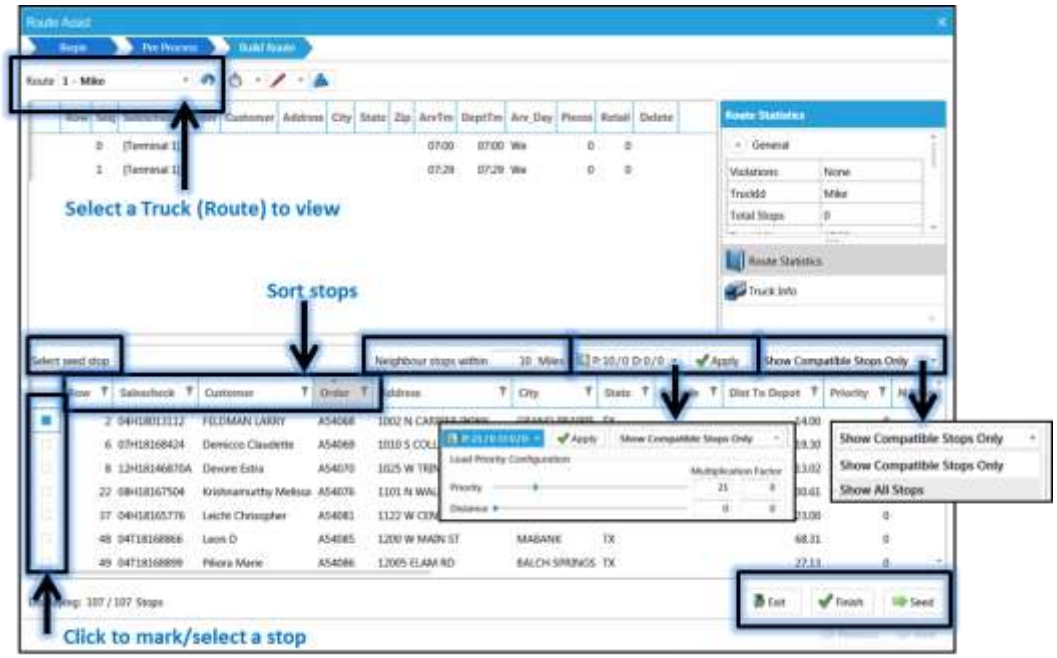

Figure 71 – Stop Grid

The Stop Grid provides a preview of valuable information on each stop, prior to selection for loading. Some Stop Fields included are not currently found in the Route Book (Nearest Neighbors, Dist. to Centroid, etc.). Use the scroll button on the bottom of the grid to reveal additional Stop Fields to the right or left.

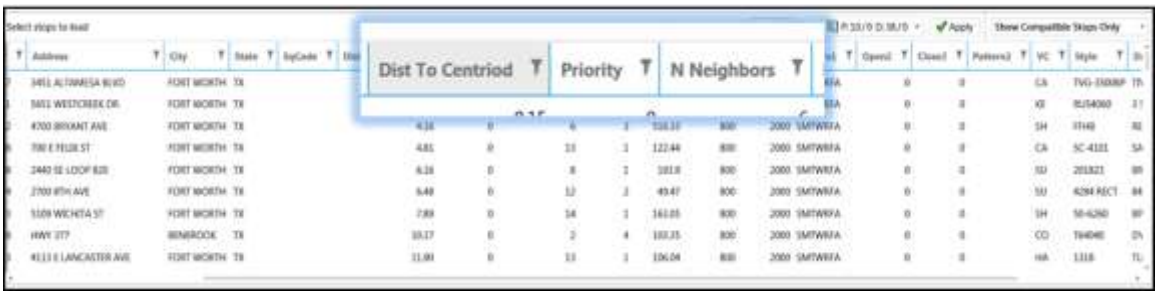

Figure 72 – Stop Fields

Stops in the grid can be filtered by any Stop Field listed; click on the Filter icon to activate and select the filter options. Additional Stop Fields can be viewed by sliding the scroll bar left/right, at the bottom of the grid.

Some of the key fields and functions available in the Stop Grid prior to loading stops:

- **Seed Stop** – A specific stop to build routes around, like a centroid.
  - Left click on the box to the left of the chosen stop.
  - Left click on the *Seed* button in the bottom left corner; the stop will move to the *Route Grid* box.
- **Neighbor Stops Within ( ) Miles** – Select the number of miles from the Seed Stop by which to consider neighboring stops for loading on the Route.
- **Load Priority Configuration** – Use the slide bars to apply appropriate weight factor for prioritization and/or distance, or edit the multiplication factor.
- **Apply Changes** – Select this button to apply the changes/selections to Load Priority.
- **Show Compatible/All Stops** – Use the drop-down arrow to show only compatible stops, or show all stops.

6.7 Priority Routing – New Routes

To build a new route, select the first Truck or Route to build, using the drop-down arrow in Route Grid.

- Select Seed Stop
  - Locate the specific stop in the *Stop Grid*; select the box to the left of the stop, then click on the *Seed* button, on the bottom of the screen (the stop will appear on the grid).

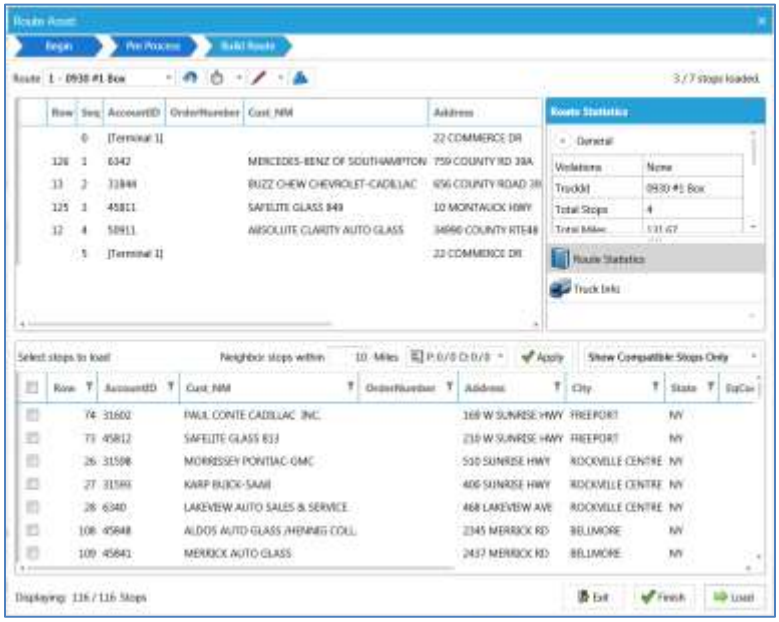

Figure 73 – Route Grid

To load available stops on a route, locate each stop (Stop Grid) and select the box to the left of the stop.

- Select one stop at a time and Load, select several stops then Load the group, or select ALL stops then Load
  - Use the *Load* button on the bottom of the screen.

Continue selecting and/or making changes to the route, as needed. As each stop is loaded, it will appear listed in the Route Grid.

- To unload a stop from the route
  - Select the red ***X***, to the right of the stop.
  - Select the *Unload* button.
- To insert a Refuel Point
  - **S**elect (highlight) the stop in the *Route Grid.*
  - Select Insert *Refuel Point*
  - Choose the *Refuel Point Name* from the Info box
  - Select *OK*

Use the toolbar icons at the top of the screen to set/change the Route Start Time, edit a leg/route, or invert a route.

- **Invert Route** will reverse the order of stops on the route
- **Set/Change Route Start Time** to edit or change the start time of a route (or group/range of routes)
- **Edit Leg/Route** to add/delete/edit any leg on the route
- **Build Routes** performs Initialize/Load function (loads unloaded stops)

When the build has been completed and no additional changes appear needed, left click on the Finish button on the bottom of the screen.

6.8 Priority Routing Results

Finished routes will open in the DirectRoute Route Book. If additional edits or changes are needed, they can be completed in the Route Book, or select the Priority Routing icon from the toolbar .

Unloaded Stops

To load or build routes for any remaining unloaded stops, select the *Build Routes* icon on the toolbar.

- The *Build Routes* icon performs the same function as *Initialize/Load* during the route building process in DirectRoute
- The DR Algorithm will attempt to load any unloaded stops on existing routes, if feasible, or build a new route(s).

Statistics

When using Priority Routing to manually build routes, statistic boxes are displayed for each route and truck, on the right side of the Route Grid. During the route building process, as changes are made to the route, the statistics will automatically update to reveal the effects of each change. In addition, any violations will also be displayed.

- Select the *Route Book* Icon to view *Route Statistics*
- Select the *Truck* Icon to view *Truck Statistics*

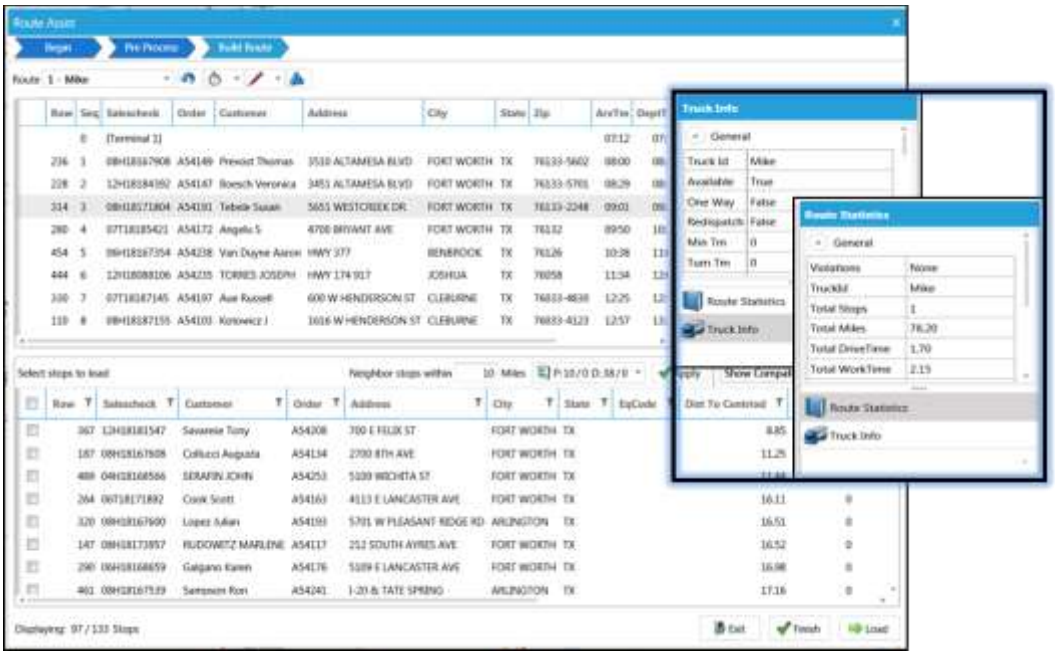

Figure 74 – Priority Routing Statistics Boxes

6.9 Selective Routing Tool

Similar to the Priority Routing Tool, the *Selective Routing Tool* provides an optional order selection filter that can be applied when selecting orders for routing, enabling greater control and flexibility of stop and vehicle selection when building routes manually. Key components:

- *Stop User Field* filter by which to select orders to route.

- Apply load adjustments to vehicles; sliding meter enables adjustment of vehicle *Capacities (Volumes), Work Time, Target Time*, and *Max Drive Time*.
- Import orders (stops) directly from DRTrack™ into *Selective Routing* to create manual routes.

Before using the Selective Routing Tool, *Stop User Fields* and *Order Criteria Fields* should be updated.

- Review and update *Stop User Fields* options (*Preferences→Configuration→Stop User Fields*)
  - Edit/add all *Stop User Fields* that are used in the *Stop File.*
- Review and update *Order Criteria* options (*File→Preferences→Other→Order Criteria→Query by User Field*).
  - Use the dropdown arrow to select a *Stop User Field* from the list; fields populated based on the inputs in *Configuration→Stop User Fields.*
- Review and update *Query by Values* option (*File→Preferences→Other→Order Criteria→Query by Values*).
  - Left click on *Collection* to see the available values.
  - Use the button to add/edit the *Values* for the *Stop User Field* (*Values* found in *Stop File*).
  - Select the button for each *Value* input.
  - Add as many *Values* as needed; use the button to delete *Values* if necessary.

Figure 75 – Order Criteria Preference Setting

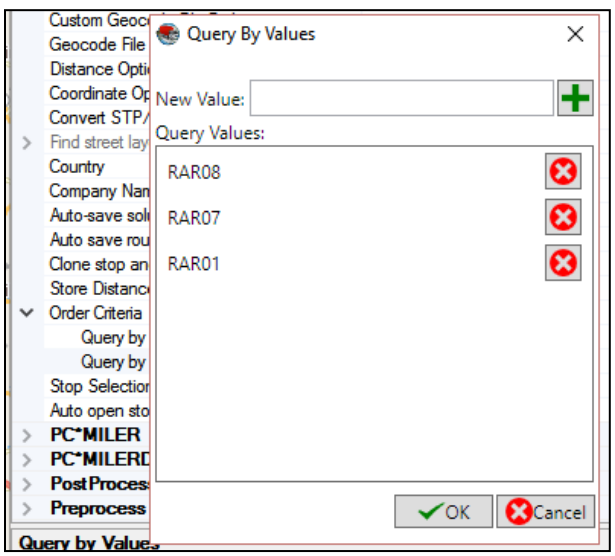

Figure 76 – Order Criteria Values

- Review and update the Stop Selection Color options (selected stop s will be color-coded on the map).
- After all updates have been completed, close the Preferences dialogue box.

Now the Selective Routing Tool can be initiated.

- Select *File→New→Route→Selective Routing*.

Figure 77 – Start Selective Routing

6.9.1 Selective Routing File Selection

Use the Stop and Truck buttons to select the appropriate files to use (Distance File is optional).

- Select *Enable Preprocess* settings to apply Preprocess settings (Preferences), if desired.
- Ensure *No Initialization* is selected.
- Edit the *Dispatch Date.*
- DRTrack Users: To import and use DRTrack orders/files, select the *Import from DRTrack* tab.
  - Select the *Branch* and *Truck File.*
  - Edit dates to select *ALL* orders within the date range.
  - After all selections have been completed, select the *OK* button.

Figure 78 – Selective Routing DRTrack Options

DRTrack Users: When using Order Criteria selection fields, only orders with matching values will be included in the download file. To remove the filter and enable download of ALL orders, simply clear these entries from Preferences.

DirectRoute will initialize the selected files automatically and when complete, the Selective Routing dialogue box will open.

The *Selective Routing* dialogue box contains two grids; Trucks in the top half of the box (Truck grid) and stops from the Stop File in the bottom half of the box (Stop Grid). Both grids will list the available resources and the number of each on the tab button {i.e. Empty Trucks (15), Unloaded Stops (138)}.

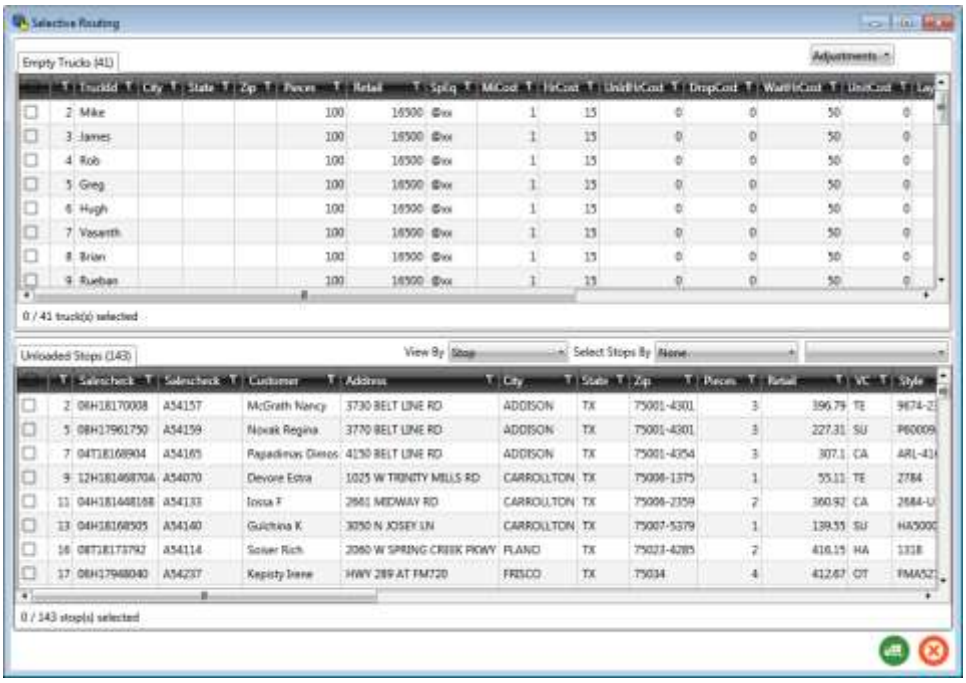

Figure 79 – Selective Routing Info Box

The columns in both grids can be sorted, filtered, and moved (re-ordered).

- To move a column, left click and hold on the column heading and drag/drop in the desired location.
- To sort a column, left click on the column heading title.
- To filter a column, left click on the filter icon adjacent to the column heading title, then select a field option from the Filter dialogue box.

6.9.2 Selecting Stops

There are several ways to select stops for use in the routing solution, but this section will focus on selecting stops during *Selective Routing*.

- To select stops individually, place a check mark (left click) in the box (left of the stop#), or
- Select *ALL*; check the box located in the very top row (with column headings), or

- Filter the list of stops by using the *Select Stops by Filter* in the top right corner of the stop grid (*Order Criteria* options must be set in Preferences).
  - When used, only those stops that meet that the selection criteria will be returned and shown in the stop grid.
  - Left click on the dropdown arrow to select the field.
  - Left click on the box to the right of the field to display and select from the list of values associated with this field (values displayed are those used in this column in the *Stop File*).

Example: Company A performs daily routing functions for shipment the next day. The availability status of each item ordered is annotated with a 'X' in the Stop File, in the column 'Available' (a Stop User Field). Using the Order Criteria settings, and the Selective Routing tool, orders can be filtered, and routes built to include only the orders with an 'X' in the 'Available' column.

Figure 80 – Selective Routing Stop Filter

- If any of the selected stops did not load, the grid will remain open and a message will display to indicate how many stops were not loaded.

Figure 81 – Selective Routing Stops Not Loaded

Additional stops can be selected from any remaining unloaded stops on the Unloaded Stops tab, repeating the steps to select and load, until all desired stops have been loaded.

From the *Unloaded Stops* list, a counter at the bottom of the grid keeps count of the number of stops selected. Sort stops in the grid by Stop, Order, or Line Item number.

- Use the *View By* box's dropdown arrow to make the selection option.
- *View by Stop* will return the fewest records in the Stop Grid, as orders are consolidated at the stop level.
- *View by Order* will show all orders (unconsolidated) for every stop.
- *View by Line Item* may return the most results, as one stop may include several orders, and each order may include multiple line items.
- Once selected, the records will sort automatically according to the option chosen.

Select stops by choosing any of the configured Stop User Fields.

- Use the *Select Stops by* box's drop-down arrow to select an option.

- Once a selection option has been made, use the dropdown arrow in the next box to choose from the list of data values found within the record's selected *Stop User Field*.

You can also edit any of the *Stop User Fields* in the grid.

- Locate the desired record and *Stop User Field* then double click on the box to edit.

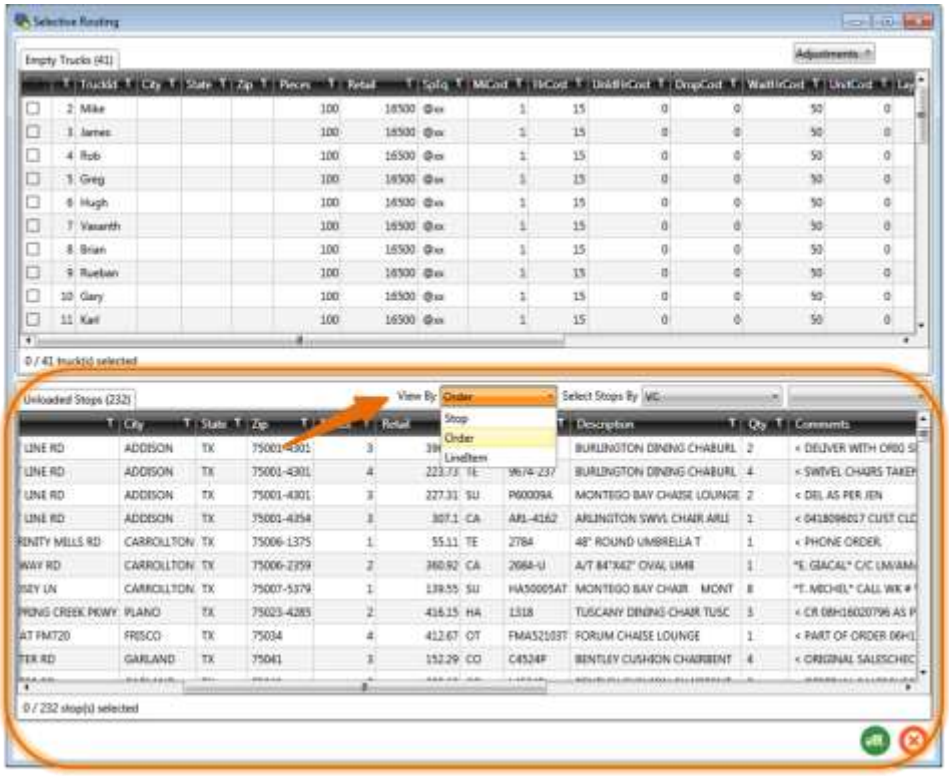

Figure 82 – Selective Routing Stop View

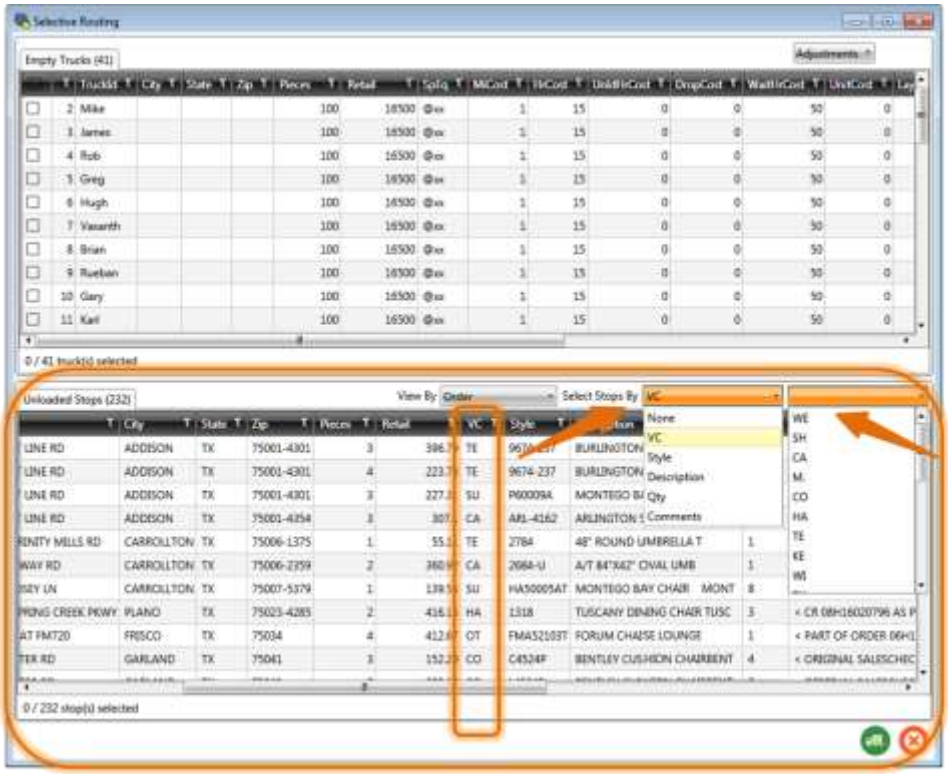

Figure 83 – Selective Routing Stop Selection

After stops are loaded/routed, the stops will be removed from the *Unloaded Stops* tab and will appear in the *Routed Stops* tab.

After the selection(s) have been made, left click on the *Load Stops* button in the bottom right corner next to the red **X**, to route the selections.

- *Routed Stops* tab will appear in the stop grid and list all stops that were routed.
- A message in the bottom left corner will indicate how many stops were routed.

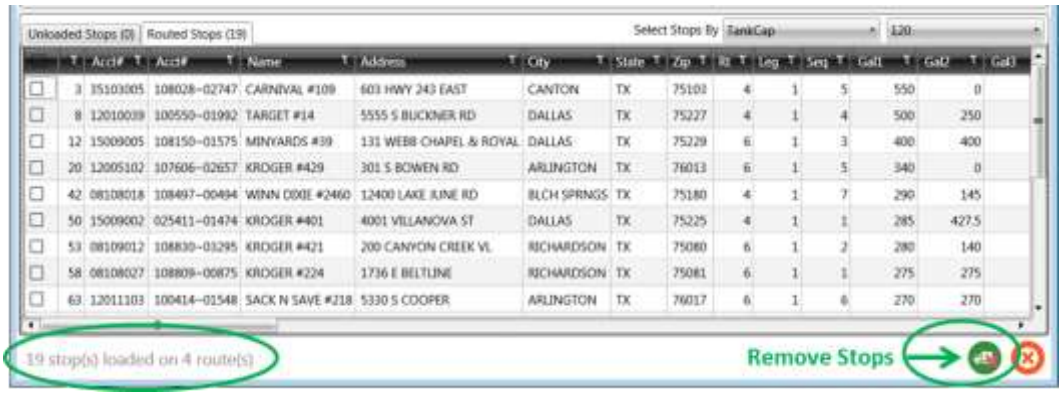

Figure 84 – Selective Routing Loaded Stops

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6.9.3 Loading Trucks

Trucks can be selected for routing using any of the methods listed below. After the stops are loaded, the loaded trucks will be removed from the *Empty Trucks* tab and reappear in the *Loaded Trucks* tab.

Selecting Trucks

Select the trucks to load from the list of *Empty Trucks*. A counter at the bottom of the Truck grid keeps count of the number as vehicles are selected.

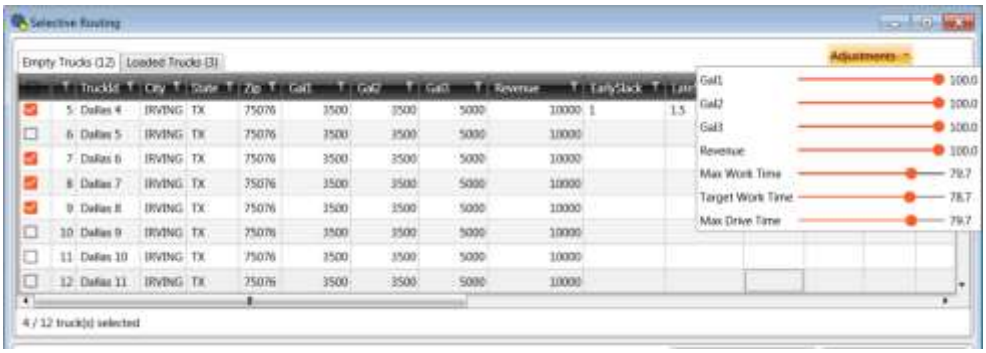


Figure 85 – Selective Routing Truck Grid

- To select vehicles individually, place a check mark (left click) in the box (left of the *Truck ID*), or select ALL; check the box located in the very top row (with column headings).
- *Truck Adjustments* enables adjusting vehicle load capacity or adjusting the level at which work rules are filled (default levels = 100%).
  - Left click and hold to drag the orange slider button to adjust levels {left (-), right (+)}, or
  - Left click once on the red dot and use the keyboard arrow keys (→) to move the slider left or right in small increments.

6.9.4 Using the Lasso to Select Stops

The *Lasso Tool* can also be used to select stops to load or unload.

- Select the *Lasso Tool* from the menu then use the mouse pointer to draw an image around the desired stops.

The Selective Routing dialogue box will open to display the selected stop(s) in the Stop Grid.

- If a stop is loaded on a route, it will appear on the *Routed Stops* tab.
- To unload the stop, select it (left click) from the list (*Routed Stops* tab) then select the button.
- If a stop is unloaded, it will appear on the *Unloaded Stops* tab.
- To load the stop, select it from the list (*Unloaded Stops* tab) then select the button.

Close the Selective Routing dialogue box to view the adjusted routes.

- The map screen will show the new routes, adjusted based on the changes made.
- The *Detail* and *Summary Reports* will show the refreshed route info.
- The *Differential Info* box will show the stats for the adjusted routes.

Additional route edits can also be completed using the traditional methods (*Modify* menu, or *Route Book* menu).

Note: For more information on using the Lasso tool, see** Using the Lasso Tool**.

6.9.5 Selective Routing Results

Routes created with the *Selective Routing Tool*, as well as any unloaded stops, can be viewed and modified in the Route Book.

- Both routed and unloaded stops are displayed on the map (red – unloaded, green – routed)
- In the *Unloaded Stops* section of the *Map Filter Info* box, will be a drop-down list of the *Stop User Fields*, and the number of unloaded stops remaining for each value.
- Check or uncheck the *Stop User Field* values to see or remove the stops form view on the map.
- In the Routes section of the *Map Filter Info* box, use the check mark to toggle on/off the view of the routes on the map.
- Selected stops and routes can be edited within the Route Book.
- *Unloaded Stops* can be viewed and/or loaded from the *Unloaded Stops* tab.

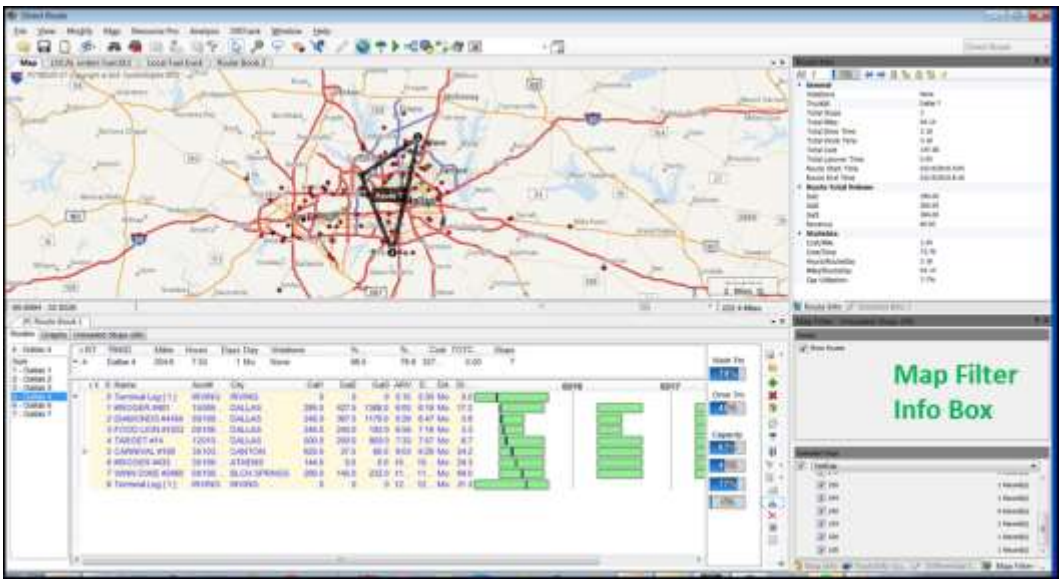


Figure 86 – Selective Routing Results

6.10 Apply Minimum Time Between Stops After Directions

DirectRoute enables the automatic addition of minimum time between stops during the route building process. When used, the *Apply Min Time Between Stops After Directions* option will tell DirectRoute to apply the designated time (*Minimum Time Between Stops*) during the route building phase, eliminating the need to add additional time to stops when needed. The result is more accurate planned stop arrival times. This new option can be used with any existing Route File or applied when creating new routes.

To enable the Apply Min Time Between Stops After Directions option, edit DirectRoute Preferences (Routing→General).

- Select *TRUE* and edit the designated time (minutes) in *Minimum Time Between Stops*, or
- Select *FALSE* and no other action is required.

Note: Minimum Time Between Stops (minutes) = The number of minutes DirectRoute should apply between stops. This is required when Apply Min Time Between Stops After Directions is set to TRUE.

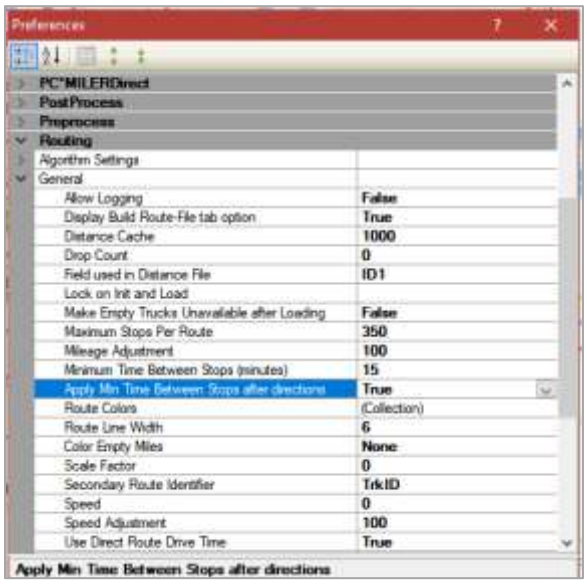


Figure 87 – Apply Min Time Between Stops

From the DirectRoute toolbar, select the *Get Directions* icon .

- In the Route Directions dialog box, left click on *Apply Min Time Between Stops*.
- To limit which routes this option is applied to, edit *From Route* and *To Route* with the appropriate route numbers.
- Select *OK* when all options have been chosen.

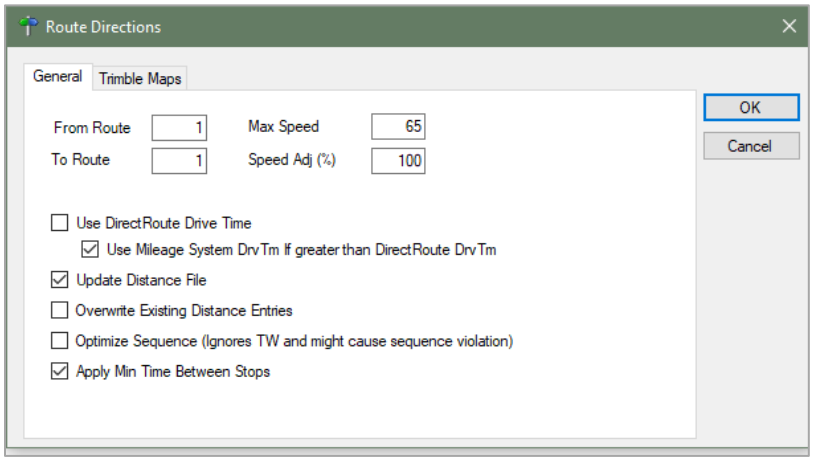


Figure 88 – Get Directions/Apply Min Time Between Stops

DirectRoute will recalculate the estimated arrival times for affected stops and update the Route Book accordingly.

When *Apply Min Time Between Stops* is not needed on every route all the time, but when it is needed, the amount of time (minutes) added is standard for all stops, the Preferences can be set in a manner

that will allow it to be turned 'on' within the Route Book, without needing to re-edit Preferences each time.

- Set *Apply Min Time Between Stops After Directions to FALSE.*
- Update *Minimum Time Between Stops* (minutes) with the number of minutes commonly (standard) used.

The next time the function is needed, all actions can be completed from within the Route Book.

- From the DirectRoute toolbar, select the *Get Directions* icon .
- In the *Route Directions* dialog box, left click *Apply Min Time Between Stops*.
- To limit which routes this option is applied to, edit *From Route* and *To Route* with the appropriate route numbers.
- Select *OK* when all options have been selected.

DirectRoute will recalculate the estimated arrival times for affected stops and update the Route Book accordingly.

7 The Route Book

A new Route Book is created each time a new routing solution is completed. It provides a detailed picture of each individual route, as well as summarized data (route report) for the entire routing solution.

- Customized summary information about the routing solution
- Customized view of individual routes and stops
- Modify routes by adding or deleting stops
- Display capacity, drive time, and work time gauges for each route
- Generate turn by turn directions for each route

The Route Book contains a summary of all routes, as well as detailed information for each individual route. The Route Book also provides the opportunity to review and experiment with making your own "what if" changes to the routes.

When the route building process completes, the Route Book becomes available for view.

- Select *View→Route Book* from the menu, or use CTRL+B.
- To open a previously saved Route Book (Route File), select *File→Open→Route*, and select the file name to open.

When the Route Book opens, the Route Book tab appears (just below the toolbar) adjacent to the Stop and Truck File tabs.

- The first Route Book opened will appear as (P) Route Book 1 (on the tab); this identifies it as the primary Route Book.
- If a second or subsequent Route Book(s) are opened at the same time, each additional Route Book will be numbered as Route Book 2, Route Book 3, etc.

Included in the Route Book view are the solution *Info boxes*. The Route Info, Stop Info, Truck Info, Solution Info, and Differential Info boxes all display various information pertaining to the individual routes and/or stops that are present in the Route Book.

7.1 Route Book Tools

The Route Book tool bar is located on the right side of the Route Book. It provides shortcuts to common route modification actions and tools to alter the Route Book views.

Show on Map
Show Unloaded to Map
Detail Grid Status
Show all expansion
Add Stop(s)
Delete Stop(s)
Move Stop(s)
Change Start Time
Show/Hide directions
Route Book Fields
Route Book Filter
Report List
Show/Hide Route Graph
Show Gauges
Delete Field
Show/Hide Order/Line Item Header

Figure 89 – Route Book Tool Bar

Use the Route Book filter to filter results in the Route Book. Let the filter tool help you select route info fields and field results to filter, or you can use free-form text, without navigating through the entire filter workflow.

The Route Book properties include settings for column width, font, and color; or adjust view by hiding or showing grid lines, etc.

- To adjust any of the settings, right click within the Route Book to open the Route Book menu.
- Select *RT Book Properties* then select the item that requires modification from the extended menu.

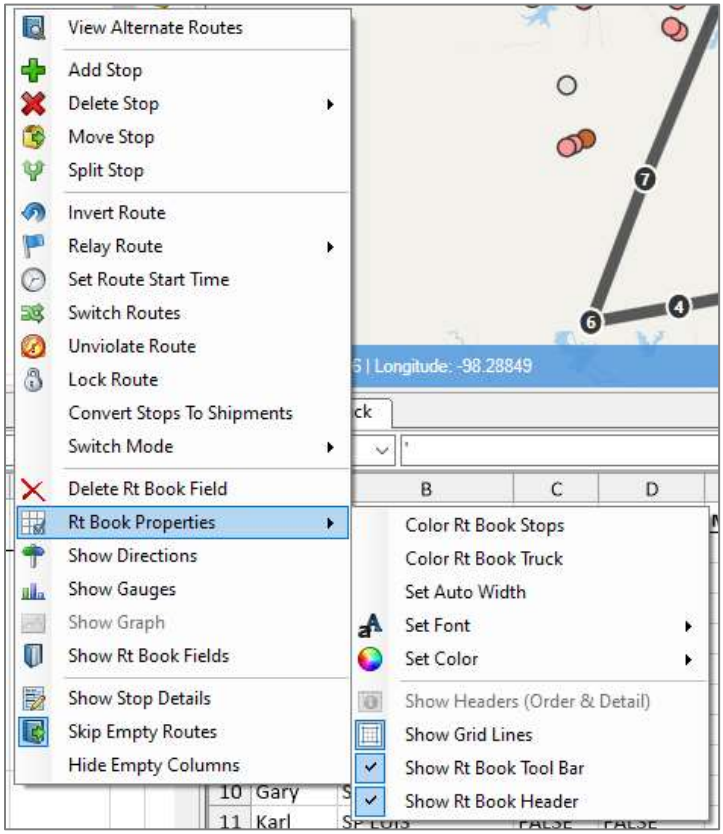


Figure 90 – Route Book Properties

Tip: The Route Book contains several tools to enable editing of the stops, routes, and final route results. Editing can be done within the Route Book, on the map, and even within the Solution Info panels. See **Route Modifications** for additional information and instructions on these options.

7.1.1 Show Gauges

Gauges are available to provide a quick view of total work time, drive time and capacity levels on each route. This can be useful when needing to add and/or delete stops, as you can quickly see when a vehicle and/or route are close to maximum capacity. If a route capacity is exceeded, the gauge color will immediately change from blue to red.

The gauges, when used, will appear adjacent to the Route Book toolbar on the right side of the screen.

- Right click anywhere in the Route Book and select Show Gauges from the menu, or
- Select the Show Gauges icon from the Route Book toolbar.

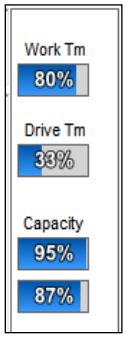


Figure 91 – Route Gauges

7.1.2 Show or Hide Details, Directions

Additional tools available for selection from the Route Book menu.

Skip Empty Routes – Dependent on the size of the fleet in your Truck File, the routing solution may include empty routes and vehicles that have not had any stops loaded on them. The empty routes/vehicles can be skipped so they are not visible. This is especially helpful when viewing and/or printing any of the route reports.

- Right click from within the Route Book to display the menu and select Skip Empty Routes

Show Stop Detail – Review detailed stop data for any stop, on any route.

- Select the specific stop in the Route Book to highlight the stop
- Right click and select Show Stop Detail from the Route Book menu

Show Directions – This command allows you to view the detailed turn by turn driving instructions for the route you have selected. See **Generate Driving Directions** for more information on generating directions.

When directions have been generated, select the Show Directions icon (located on both the DirectRoute toolbar and the Route Book toolbar). To remove the directions from view, select the Show Directions icon again.

7.2 Route Book Reports

DirectRoute provides a great deal of flexibility for presenting and viewing route information. The Route Book reports are broken down into three areas, each having different formats that can easily be customized.

- *Summary Report* – Pertains to the summary page of the Route Book.
- *Detail Report* – This is the body of the report, and lists all the individual route details
- *Header Report* – Contains the Column headings information
- *Solution Statistics* – Contains statistical data for the current routing solution
  - Select *View→Solution Statistics* from the main menu
  - This report can be exported (saved) to a .CSV, .TAB, or .XLS file
- *Miles by State* – Displays the total miles by state for all routes (requires *Generate Route Directions* be set to *TRU*E in *Preferences*)

The *Summary*, *Detail*, and *Header Reports* are offered in three separate pre-defined formats or may be customized. To view the formats for each report, select the *Report List* icon from the Route Book tool bar then select one of the reports listed.

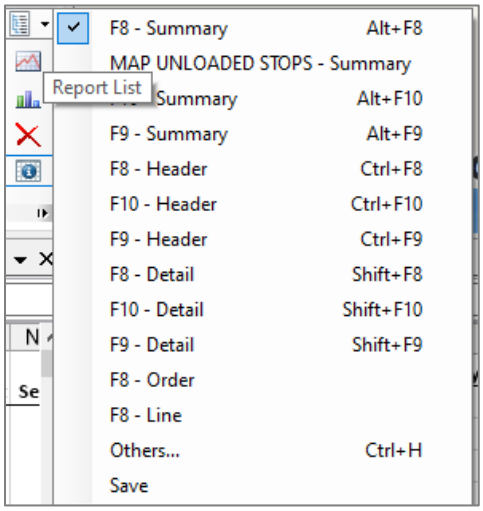


Figure 92 – Predefined Report Formats

7.2.1 Summary Report

To view the Summary Report, open the Route Book (*File→Open→Route*), or if still in the routing mode, select *View→ Route Book* from the menu, or use CTRL+B.

- Displayed when Sum is selected in the column on the left; when the Route Book opens it will usually open to this view
- The Summary Report displays a list of all the routes created in the project, route numbers, truck IDs, route totals (miles, hours, stops, etc.), cumulative totals, and averages
- Select the view format you want to use from the Report List on the Route Book toolbar

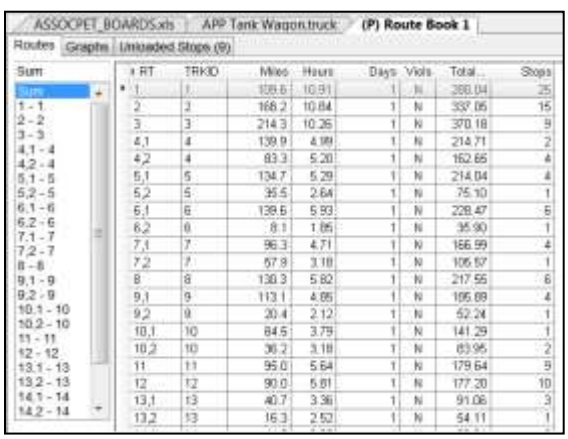


Figure 93 – Route Summary Report

7.2.2 Detail Report

To view the Detail Report for each route, select the Route # from the column on the left.

- Displayed when the route# is selected in the column on the left
- The Detail Report displays the individual route information

- Consolidated stops can be exploded to view by selecting the + adjacent to the stop

Figure 94 – Detail Report

7.2.3 Header Report

The Header Report appears above the Detailed Report in the Route Book.

- Displayed when the Detailed Report is displayed
- Contains the route totals for just that route, for each Stop Field column listed in the Detail Report

Figure 95 – Header Report

7.2.4 Miles by State Report

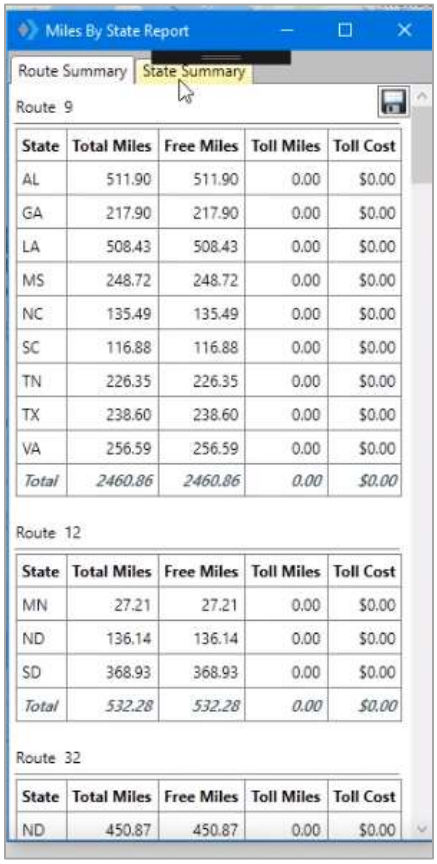
The *Miles by State* report is generated when *Generate Route Directions* is set to *TRU*E in Preferences. DirectRoute totals the miles by state when generating directions and displays the totals in report format.

The *Route Summary* tab lists the totals for each route separately, while the *State Summary* tab lists the totals by state.

- *Free Miles* – Free miles traveled (non-toll roads) for each state
- *Toll Miles* – Toll road miles traveled for each state
- *Toll Cost* – Toll costs for each state
- *Total Miles* – Total miles for each state

Ensure Generate Directions is enabled in Preferences→Preprocess→Generate Distance File→Generate Route Directions = TRUE.

- After creating a new routing solution with *Generate Directions* set to TRUE, select *View→View Miles by State* from the main menu
- This report can be exported (saved) to a .CSV, .TAB, or .XLS file



State	Total Miles	Free Miles	Toll Miles	Toll Cost
AL	511.90	511.90	0.00	$0.00
GA	217.90	217.90	0.00	$0.00
LA	508.43	508.43	0.00	$0.00
MS	248.72	248.72	0.00	$0.00
NC	135.49	135.49	0.00	$0.00
SC	116.88	116.88	0.00	$0.00
TN	226.35	226.35	0.00	$0.00
TX	238.60	238.60	0.00	$0.00
VA	256.59	256.59	0.00	$0.00
Total	*2460.86*	*2460.86*	*0.00*	*$0.00*

State	Total Miles	Free Miles	Toll Miles	Toll Cost
MN	27.21	27.21	0.00	$0.00
ND	136.14	136.14	0.00	$0.00
SD	368.93	368.93	0.00	$0.00
Total	*532.28*	*532.28*	*0.00*	*$0.00*

State	Total Miles	Free Miles	Toll Miles	Toll Cost
ND	450.87	450.87	0.00	$0.00

Figure 96 – Miles by State Route Summary

State	Total Miles	Free Miles	Toll Miles	Toll Cost
AL	1050.30	1050.30	0.00	$0.00
AR	273.56	273.56	0.00	$0.00
DC	0.09	0.09	0.00	$0.00
DE	25.95	25.95	0.00	$0.00
FL	578.84	577.76	1.07	$0.00
GA	651.87	651.87	0.00	$0.00
IA	2124.59	2124.59	0.00	$0.00
IL	2821.61	1656.08	1165.53	$136.50
IN	1430.03	1094.11	335.92	$20.90
KS	1308.92	904.51	404.41	$23.45
KY	695.18	695.18	0.00	$0.00
LA	853.89	853.89	0.00	$0.00
MD	254.70	212.71	41.99	$18.60
MN	4671.69	4671.69	0.00	$0.00
MO	1070.66	1070.38	0.28	$0.00
MS	873.75	873.75	0.00	$0.00
NC	1171.75	1171.75	0.00	$0.00
ND	1117.27	1117.27	0.00	$0.00
NE	565.26	565.26	0.00	$0.00
OH	1184.47	582.30	602.17	$46.75

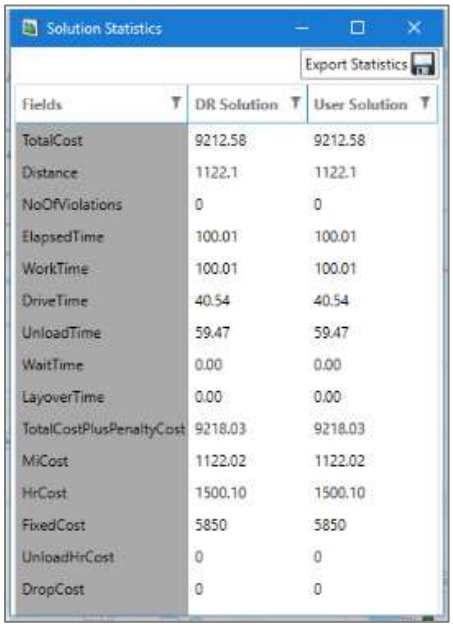
Figure 97 – Miles by State Route Summary

This report can also be downloaded and saved to a .CSV, .TAB, or .XSL file; click the *Save* button, then save the file to a location of your choice.

7.2.5 Solution Statistics

The Solution Statistics report contains statistical data for the routing solution that is current displayed/ open. The totals listed are calculated for all routes in the current solution.

This report can also be downloaded and saved to a .CSV, .TAB, or .XLS file; click the *Save* button, then save the file to a location of your choice.



Fields	DR Solution	User Solution
TotalCost	9212.58	9212.58
Distance	1122.1	1122.1
NoOfViolations	0	0
ElapsedTime	100.01	100.01
WorkTime	100.01	100.01
DriveTime	40.54	40.54
UnloadTime	59.47	59.47
WaitTime	0.00	0.00
LayoverTime	0.00	0.00
TotalCostPlusPenaltyCost	9218.03	9218.03
MiCost	1122.02	1122.02
HrCost	1500.10	1500.10
FixedCost	5850	5850
UnloadHrCost	0	0
DropCost	0	0

Figure 98 – Solution Statistics

7.3 Customizing Reports

Any of the formatted reports (*Summary Report, Detail Report,* and *Header Report*) can be customized by adding additional columns of information to display.

To add columns to reports:

- Select the Route Book Fields icon from the toolbar

Figure 99 – Route Book Report Fields

- Select the + key next to the Field Type to expand and show available columns
- Left click and hold the selected column and drag it into the header position on the Summary page

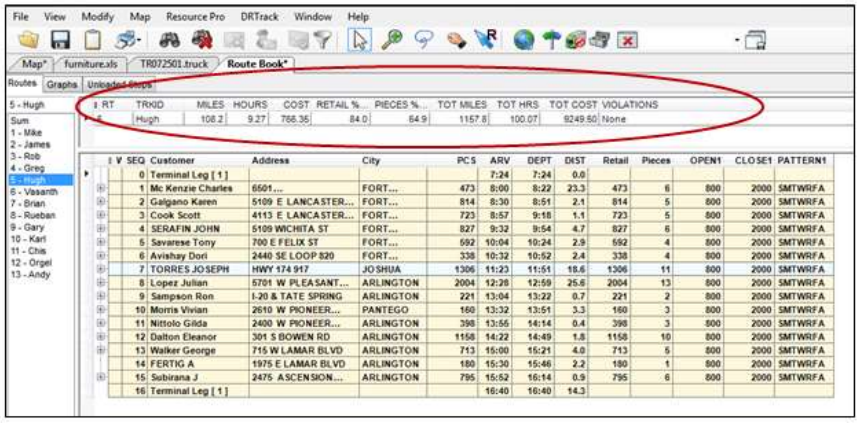


Figure 100 – Detail Report Customization

Once a column is inserted, the software will automatically populate the data into the columns.

- To delete any column, right click on the column to display the Route Book menu, then select *Delete RT Book Field*

Tip: Column order within the reports can also be changed by selecting a column and drag it to the position desired

7.3.1 Header Report Customization

Each column name can be customized to display any name.

- Left click on the column Header Title (to highlight); the Header Edit box should open at the bottom of the report
- Type the new Display Name in the Display Name box; adjust column width, if desired
- Select the Save button to save the changes
- Add a File Name to the Save Info box then select the Save button
- This will save the new format for use in other Route Books
- Select the Refresh button and the new Display Name will appear in the header

Figure 101 – Header Report Customization

7.3.2 Multiple Report Formats

When multiple report formats for the Route Book are necessary (for multiple DR Users), each differently formatted report can be saved to a User's specific Data Directory. If only the detailed report (F8.DRP) is altered, the SRP and HRP files, even if unchanged, must be copied to the DirectRoute Data Directory.

- Make changes to Route Book format, as required

- Save the new report to the appropriate user DirectRoute Data Directory
- Copy the other unchanged reports from the user's Folder, to the DirectRoute Data Folder (not User-specific)
- When a route is opened, the software will look in the DirectRoute Data Folder first

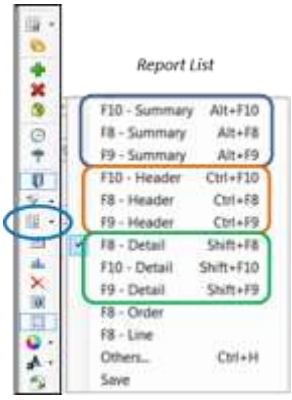


Figure 102 – Route Book Reports

Tip: The DirectRoute Data Directory refers to the location of the DirectRoute routing files and folders.
Tip: Even if only one report format is changed, all three reports must be copied to the data directory.

7.4 Route Book Info Boxes

The *Stop, Truck, Route, Solution, Differential*, and *User Field Values* info boxes can also be viewed from the on the right side of the screen, adjacent to the Route Book. The Info boxes contain valuable, at-a-glance information, without having to view the actual routing files.

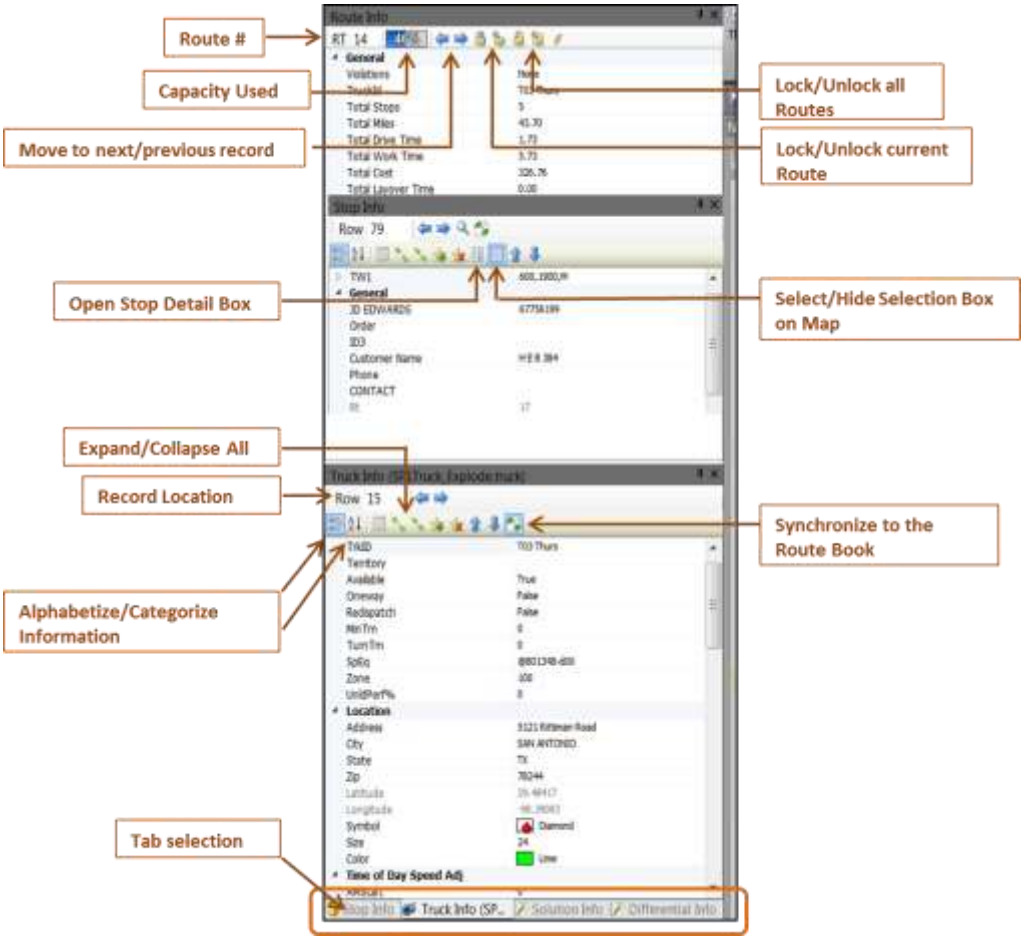


Figure 103 – Route Book Info Boxes

- The Stop Info box contains information pertaining to the specific stop record that has been selected
- The Truck Info box contains information pertaining to the truck used on the selected route and/or stop
- The Route Info box contains statistics pertaining to the route that is currently selected and displayed in the Route Book; use the lock icons to lock/unlock the route for editing.
- The Solution Info box contains statistical data for the routes. Statistics and totals listed are for all routes combine
- The User Field Info box displays results of the Order Criteria filter, when the Selective Routing tool is used
- The Differential Info box displays the differences in values (Miles, Work Time, Cost, etc.) when one or moves are made on a route
  - *DRStats* – Values achieved immediately after DR completes initial route loading
  - *Transactional* – The difference in values immediately following a move (differences between the last move and current move)
  - *Cumulative* – Adds the value differences of all moves

Example: The results displayed in Figure 97 below were received following two separate moves on a Route.

Figure 104 – Differential Info Box

Move 1 resulted in an increase of 26.4 miles to the Route, an increase of .58 hrs., and a cost increase of $39.90.

Move 2 resulted in an increase of 19.4 miles (from the total miles presented as of the last move), an increase of .52 hrs. (from the total hrs. presented as of the last move), and a cost increase of $71.24 (from the total cost presented as of the last move).

Tip: (Double) Left click on any stop or route in the Summary Report or on any stop on the map, to synchronize the Info boxes (Stop, Truck, Route), then select the desired Info tab located in the lower right corner

Tip: Solution Statistics can also be viewed in spreadsheet format by selecting View→Solution Statistics from menu at the top of the screen.

Tip: The info boxes can be repositioned to view on the top or bottom, right or left side of the screen. Just click and hold the box tab (bottom of the screen) then drag it to the desired location; look for the grey position guide to help place the box in the correct location.

Tip: Data can be edited from the Stop/Truck Info boxes; place the cursor in box on the line to edit, make necessary changes, and select the F9 key to apply/save updates to the Route Book.

7.5 Selecting Records for Display and Edit

To select a specific record for display and/or editing, use one of these three options to locate and select the record.

- Position the cursor over the top of any stop symbol on the map, hold the CTRL key down and (CTRL) left click the mouse, or
- Edit the row# in the Info box (type the row # from the spreadsheet of the Truck or Stop File for the desired record, or the route #), or
- Use the arrows adjacent to the Row# to move to the next or previous record in the spreadsheet and/or route

To edit a record from one of the info boxes:

- Locate the data in the info box to edit, and edit as necessary

- Press the F9 key to apply and save the updates to the Route File

The edits will carry/be applied to the spreadsheet column/cell immediately.

7.6 View Route Violations

The following violations are displayed in the Route Book Summary page, on the Route Page, and in the route info box.

- **Window** – Time Window violation; delivery was made outside of the times allowed for the stop
- **Drv Tm** – Drive Time violation; the Drive Time as set in the Truck File has been exceeded
- **Wrk Tm** – Work Time violation; the Work Time as set in the Truck File has been exceeded
- **Rtrn Tm** – The Return Time for a driver to return to the terminal, as set in the Truck File, has been exceeded
- **Wt Tm** – Wait Time violation; the vehicle has exceeded the time allowed to wait at a stop
- **Cap** – Capacity, as set in the Truck File, has been exceeded; check *File→Preferences* to ensure that another Capacity field has not been entered
- **EqCode** – EqCode violation; a stop has been loaded which does not meet the EqCodes for the truck.
- **Seq** – Sequence Code previously entered in the Stop File was not followed; check the EqCode field for Sequence Codes

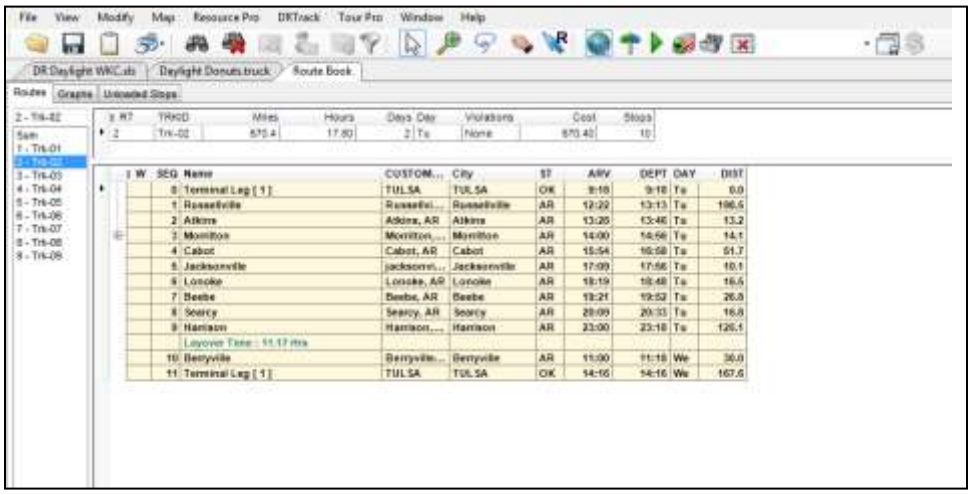


Figure 105 – Show Directions

7.7 Generate Directions

After a route has been created, turn by turn directions can be acquired through DirectRoute's mileage system that adhere to all routing options previously selected for the routing solution (time windows, min time between stops, etc.). When directions are generated, the route lines on the map will follow the road network as opposed to using straight lines to connect the stops.

If you normally optimize routes, it is important to do so prior to generating directions. Any directions that are generated prior to optimization will be overwritten by the optimization process and will need to be regenerated.

To generate driving directions, select the *Get Directions* icon from the main toolbar.
If your route has already been built and you plan to edit or modify the route, select the *Generate Directions on Route Edit* icon from the toolbar before editing your route. This will ensure directions are regenerated automatically as soon as your edits are made on your route.

7.7.1 Driving Directions Options

After selecting the Get Directions icon from the main toolbar, select the desired options by placing a check mark in the box next to it the General tab (Route Directions dialogue box).

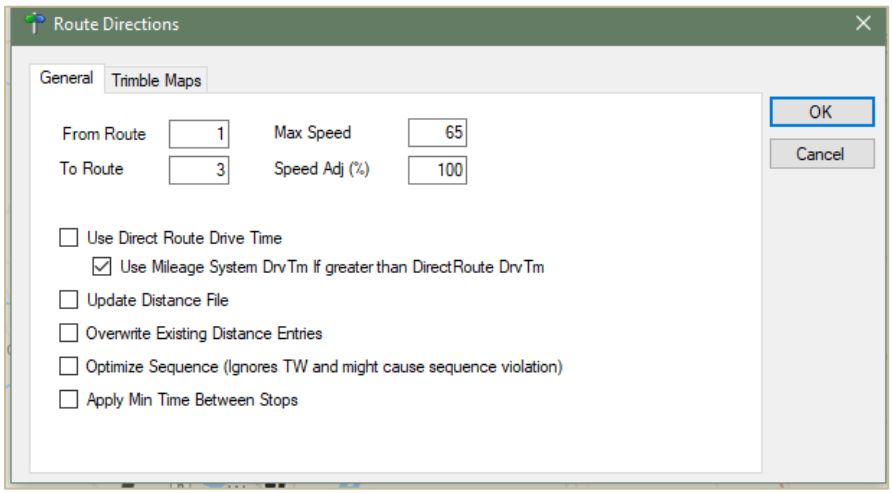


Figure 106 – Driving Directions Options

- Identify the route numbers for which directions are wanted in the From Route and To Route boxes. For example, choosing From Route = 1, To Route = 5 will generate directions for routes 1 thru 5 only.
- **Use DirectRoute Drive Time** – If TRUE, will generate distances and drive times using DirectRoute calculations (instead of any optionally installed Mileage System or Historic Traffic Data.
- **Use Mileage System Drv Tm if greater than DirectRoute Drv Tm** – Will use drive times and distances calculated by other mileage systems (Trimble MAPS, PC*MILER Direct, PC*MILER, MapInfo, etc.) if the drive time is greater than the time generated by DirectRoute.
- **Update Distance File** – Will add new distance entries for any stops in which no current distance entries already exist in the Distance File
- **Overwrite Existing Distance Entries** – Will overwrite the current Distance File entries, if different than those currently posted in the Distance File
- **Optimize Sequence** – Will optimize the sequence of stops on each route by the distance between stops and may rearrange stops so that each occur in order of their location (map point sequence), regardless of any time windows; may cause sequence violations

If using PC*MILER Web Services and Trimble MAPS mileage system, select the Trimble MAPS tab.

- Select a Vehicle profile from the drop-down menu (most data should auto-populate).

- Enter an Elevation limit (if applicable). The unit (Feet, Meters) should be the same unit of measure chosen for Distance Option (*Preferences→Other→Distance Options*) (if set to Meters, then set Elevation to Meters, etc.).
  - DirectRoute will look for an alternate route to avoid roads that would exceed the set limit.
- Select the *Route Type* and *Hazardous Materials* options that apply.
- At the bottom of the box, select all options that may apply.
  - **Avoid Tolls** – Will steer route away from using toll roads.
  - **Route Across National Borders** – Enables DirectRoute to plan a route in which one or more trucks may cross the US national borders in pursuit of a customer delivery.
  - **Highway Only** – Means local streets are not considered when running a route; vehicles are restricted to primary roads and/or Highways only, regardless of vehicle profile.

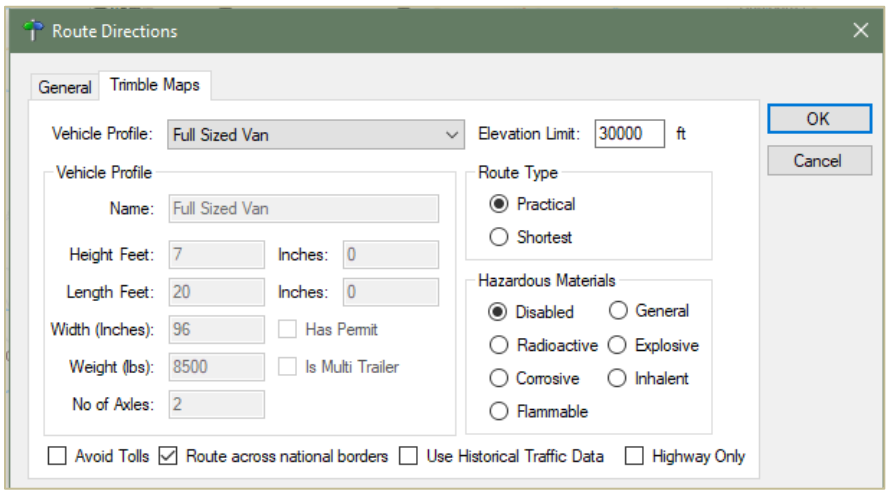


Figure 107 – Driving Directions Options

7.7.2 PC*MILER Direct Driving Directions Options

If using a PC*MILER license, select and change the PC*MILER Direct option, as necessary.

*Figure 108 – PC*MILER Driving Directions*

When all options have been reviewed and selected, left click on OK to generate the directions.

When the directions have been created, the Route File will include directions from the depot to each stop on the route.

- Select the *Show/Hide Directions* icon on the Route Book tool bar to remove the directions from view, or return them to view after hiding them, or
- Click on the Route Book and select *Show/Hide Directions*

When printing the Route File, you can choose whether or not to print turn by turn directions, as well. Save the Route Book with the directions, before selecting print options.

Tip: When a Route is saved, the driving directions are saved within the Route File. When the Route File is reopened, the driving directions will be restored.

Tip: When generating directions, if the option Use DirectRoute Drive Time is not selected in the General Tab, DirectRoute may not adhere to the default values and rules that were initially selected to produce the routes. This may cause a change in drive times and distances between stops, minimum times between stops, and other results initially received with the original routes.

8 Route Modifications

At times, it may be necessary to modify routes. There are many reasons in which already built routes may need to be modified, but some of the more common reasons include:

- Loading unloaded stops
- Optimizing routes
- Adding new, or deleting stops
- Changing route start times
- Moving stops from one route to another

As varied as the reasons are, the options by which to modify the routes and/or stops are just as varied. This section will cover many of the ways and means by which most of the modify options can be completed.

Within the Route Book, there are two ways to access the *Modify* menu when a Route File is open.

- From the menu, select *Modify.*
- While in the Route Book, right click the mouse to open the Route Book menu.

Both menus' offer the same modification options. The main difference is the Route Book menu offers additional tools to show details within the Route Book and tools to alter the fields displayed in the Route Reports.

8.1 Route Book Modify Menu

The *Modify* menu is available only while the Route Book is open. The options listed in this menu provide a means to perform additional actions on the route without having to repeat the entire routing process.

To access any of the modification options, select *Modify* from the DirectRoute menu, then select the appropriate action.

Figure 109 – Modify Menu

8.1.2 Undo / Redo

Undo or redo the last action performed on a route. For instance, if you manually move a stop onto a route and it causes a capacity violation, you can use *Modify→Undo* the move and return the route to its previous arrangement. If you have completed several actions within the Route Book and want to undo them all, you may have to select the Undo command several times.

Example: You completed three different delete actions, to remove three stops from a route, and then changed your mind. Select the Undo command three times to reload the stops onto the route.

Redo – Reverses the previous Undo action. This command may be used in conjunction with the Undo command to toggle changes.

8.1.3 Optimize Routes

During the route build phase, DirectRoute considers truck availability time, travel time, receiving time, unload time, and distance; all the parameters set within the Truck File, Stop File and Routing Preferences. When optimizing, DirectRoute is performing additional passes over the routing data, while considering penalty factors, time windows, work time, etc., to look for options that would allow stops to be moved either within each route, or between routes, in an effort to return a lower-cost routing solution. Additional options can be selected to attempt loading any unloaded stops at the same time.

- **Optimize Trucks After Loading** – Looks to minimize costs by moving stops between routes and within routes.
- **Optimize Stops After Loading** – Looks to minimize costs by moving stops between routes and within routes.
- **Optimize Within Routes** (SHIFT+CTRL+W) – Attempts to re-order the stops within a route to lower the overall cost.
- **Optimize Between Routes** (Shift+CTRL+O) – Evaluates the effects of moving a group of stops to other routes.
- **Optimization settings** can be chosen before the load/route process (*Preferences→Routing→Algorithm*) or choose and apply Optimization preferences to routes already built (*Modify→Optimize*).

See **Optimization Options** for more information.

8.1.4 Add, Delete, Move Stops

Add Stops – Enables the addition of unloaded stops to a route.

- Select *View* from the dialog box.
- After viewing the unloaded stops, select the *OK* button to return to the dialog box.
- Type in the stop number(s) that you wish to add.
- Type in the route number and position number where the stops are to be added.
- Select the *OK* button.

Figure 110 – Add Stop

Delete Stops – The *Delete* command allows you to delete stops from routes.

Figure 111 – Delete Stop Range

Delete Range – Allows deletion of a range of stops from one route.

- Type in the route number and the range of stops to be removed.
- Select the *OK* button and the stops will be removed from the route.

Delete All – Allows deletion all stops on one route or delete all stops on several routes.

- Type in the range of routes you wish to delete (type the same number in the *From Route* and *To Route* boxes if you wish to delete an individual route).
- Select the *OK* button and all the stops on the route(s) will be deleted.

Figure 112 – Delete Route

Move Stop (*Ctrl+M*)– The Move Stop command allows you to move a stop, or a range of stops.

- Type in the route number and the range of stop(s) that are to be moved.
- Type in the route number and stop number where the stops are to be moved.
- After entering all applicable information, select the *OK* button to move the stop(s).

Figure 113 – Modify Move Stop

See **Using the Lasso to Select Stops** for additional information.

8.1.5 Reload or Load Unloaded Stops

Modify Load Unloaded Stops allows DirectRoute to determine the best location to place Unloaded Stops.

- Enter the *From Stop* and *To Stop* record numbers in the dialog box.

Figure 114 – Modify Load Stop

- **Allow Rejection** – Shows a warning before the move is actually made indicating how much the move will cost; accept or decline the move.
- **Allow load on empty route (Truck)** – Allows the reloaded stop to be placed on an empty route; leave unchecked if you do not want the reloaded stop to load on an empty vehicle.
- **Allow load on displayed routes only** – Allows a stop to be reloaded only to routes that have been displayed and/or locked on the screen; routes that are not visible will be ignored during the reload sequence.

After selecting all applicable options and information, select the *OK* button to load the stops.

Modify Reload Stops – The *Reload Stops* command allows DirectRoute to take stops from an existing route and determine the next best route for the stop.

Figure 115 – Modify Reload

- Input Route Options.
  - *Rt #* – The route number to reload.
  - *Fr Stop* – The first stop number of the route to reload.
  - *To Stop* – The last stop number of the route to reload.

- Select Reload Options.
  - **Allow rejection** – Gives a warning before the move is made indicating how much the move will cost you; accept or decline the move.
  - **Allow load on empty route (truck)** – Allows the reloaded stop to be placed on an empty route; leave unchecked if you do not want the reloaded stop to load on an empty vehicle.
  - **Allow reload on displayed routes only** – Allows a stop to be reloaded to only look at routes that have been displayed and/or locked on the screen; routes that are not visible will be ignored during the reload sequence.

After selecting all applicable options, select *OK* to reload.

8.1.6 Edit Leg / Invert Route

Modify Edit Leg – Enables deletion or insertion of a leg into the routes. The insert option enables insertion before or after another route and leg.

Modify Invert Route – Reverse the sequence of stops on a route; the first stop will become the last, and the last stop will become the first.

- Type the route number you wish to invert.
- Select the *OK* button.

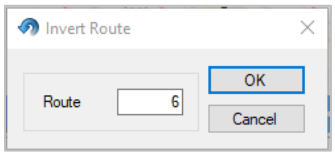


Figure 116 – Invert Route

8.1.7 Lock Routes

Select this option to lock the routes so stops cannot be moved by optimization actions. These options may also be selected in *Preferences→Routing→General* prior to loading (initializing) a route.

You can limit locking action to groups of routes by selecting on of the following:

- Select and enter the route numbers in *From Route/To Route*, to select a group of routes in sequential order
- Select *Lock Displayed Routes* to limit locking action to just those routes that are displayed on the map
- Filter the route book to meet certain criteria, then Select *Lock Filtered in Route Book* to limit locking action to just those routes that were filtered

Once the routes are selected, choose the type of locking action that should occur.

- **No lock** – Routes are available for adding, deleting, or sequencing again
- **Prevent Removal** – When optimizing, no stop will be removed from a route; only the re-sequencing and adding stops may take place
- **Prevent Addition** – Stop may be removed and re-sequenced, but new stops cannot be added
- **Prevent Removal and Addition** – Stop may only be sequenced again
- **Prevent Any Changes** – No changes will be made on the locked route

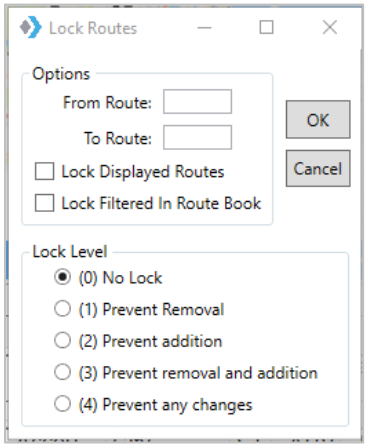


Figure 117 – Lock Routes

Additionally, routes can be locked from within the Route Info box (Route Book) individually or by groups, using the Lock Routes icons.

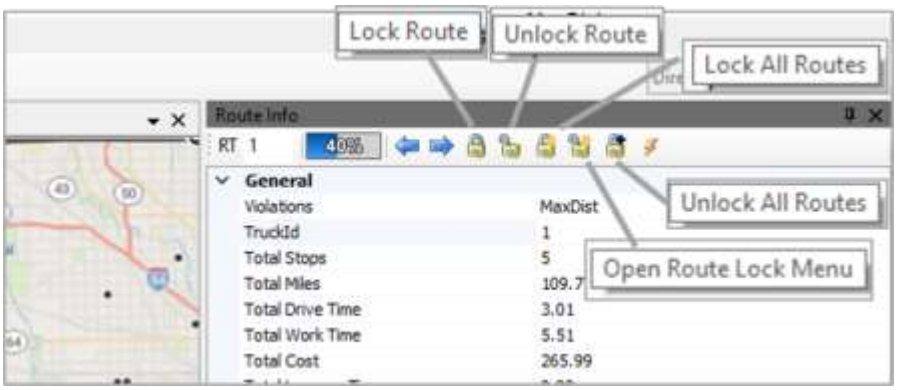


Figure 118 – Lock Routes (Route Info Box)

- **Lock Route** – Locks the current Rt number displayed
- **Unlock Route** – Unlocks the current Rt number displayed
- **Lock All Routes** – Locks all routes in the open routing solution
- **Unlock All Routes** – Unlocks all routes in the open routing solution
- **Open Route Lock Menu** – Enables selection of specific, non-sequential routes, to lock/unlock; separate route numbers by a comma (no space), i.e. 1,3,5

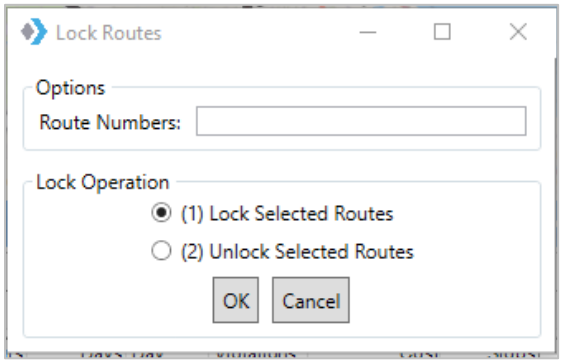


Figure 119 – Open Route Lock Menu

8.1.8 Switch Routes / Trucks, Set Route Start Time

Modify Set Route Start Time – Allows adjustment of the route start time for one or multiple routes.

- Type in the route number (or range of routes to change), new start time, and date for that route
- Select the OK button and the start time and date will update

Figure 120 – Modify Start Time

Modify Switch Routes – Switch trucks between routes.

- Type in the route# to switch from, and the new route#, then select the OK button

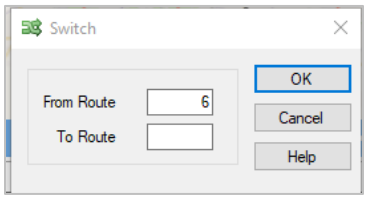


Figure 121 – Modify Switch a Truck

Modify Unviolate Routes – Removes violation flags from stops on a route.

For example, if a stop violates a time window by a short amount of time and you decide to deliver to the stop anyway, you can use the command to remove the violation flag.

- Type the From Route and To Route numbers to specify the range of routes you to modify
- Select the type of violation(s) to remove
- Select the OK button to unviolate the routes

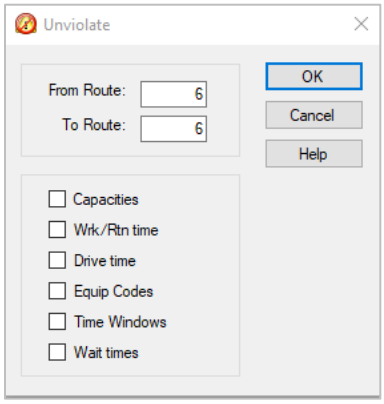


Figure 122 – Modify Unviolate

Tip: Modify Unviolate Routes can change previous setting, for example, Time Windows.

8.2 Change Stop Sequence

To change the sequence of a stop on a route (i.e. make Stop 2 be 4, instead)

- Control left click on the stop that needs to move (Stop 2) to place a circle around the stop.
- Hover the mouse over the location on the route where you want to move the stop (between Stops 3 and 4), then press Ctrl+shift and left click.

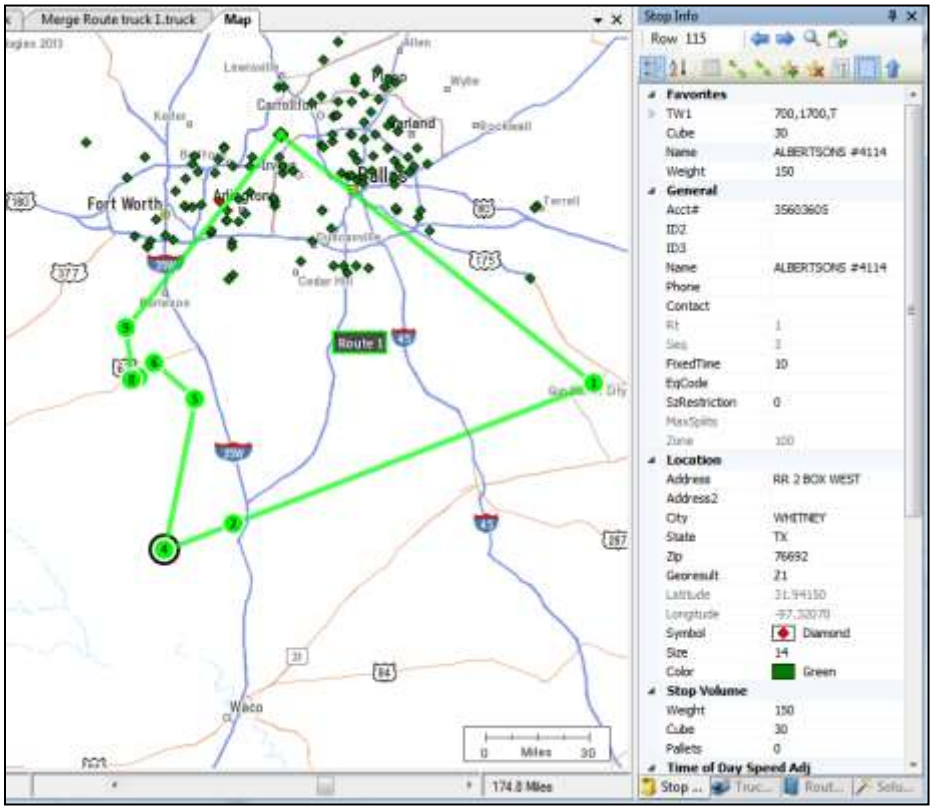


Figure 123 – Change Stop Sequence

8.3 Add Stops from the Map

You can add any unloaded stop to a route from the map screen.

- CTRL+ left click on the stop
- CTRL+shift + left click on the route line where the stop should be added

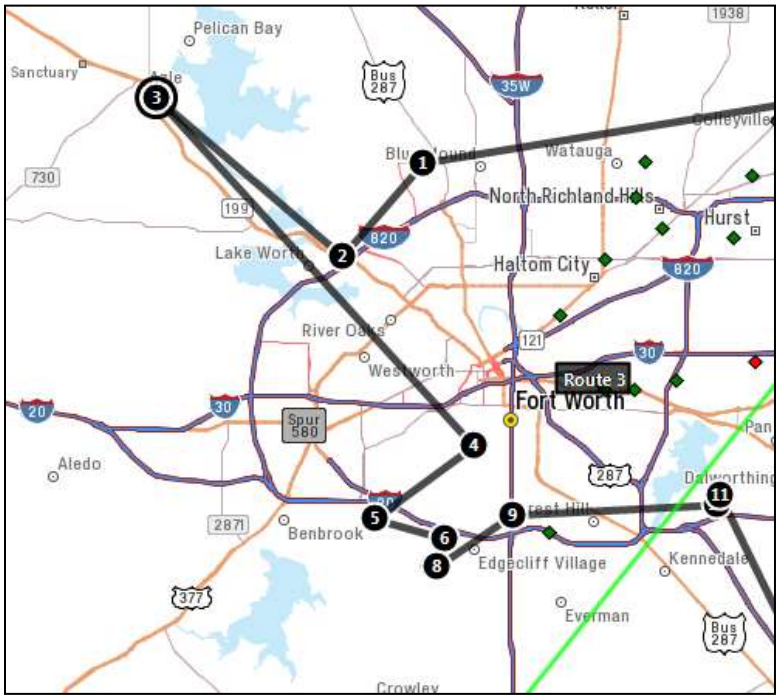


Figure 124 – Add Stop from Map

Note: While in the routing mode, unloaded stops can also be loaded using the Legacy Lasso tool (Modify→Lasso). For more info, see *Move, Delete, or Add Stops* ***and*** *Add, Delete, and Move Stops****.***

8.4 Working with Unloaded Stops

There are several reasons why a stop may not load, including restrictions to *Time Windows, Work Time, Drive Time, Capacity Constraints,* or *EqCodes.*

Before adding unloaded stops to a route, it is important to know why the stop did not load in the original load process. To help discover this, you will first need to view the list of unloaded stops then view each one individually.

Unloaded Stops can be viewed by selecting the Unloaded Stops tab within the Route Book.

- Select any stop listed to highlight it
- Select *View Reason*

Or, toggle the red pin on the route tool bar to show unloaded stops on the map.

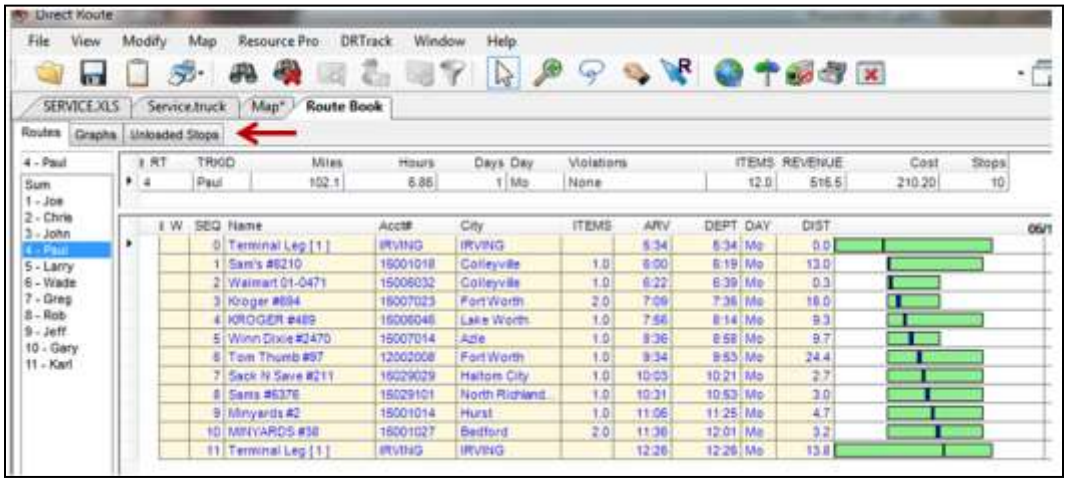


Figure 125 – Unloaded Stops Tab

Figure 126 – Unloaded Stops

The top half of the *Unloaded Stop Reason* dialog box lists all unloaded stops. The bottom half shows all available vehicles and current route assignments, that could possibly accept the unloaded stop. Additional information is provided for each vehicle and route:

- Leg and Sequence # the stop would be, if added to the current truck/route
- Any violations that would occur if the stop were added to the current truck/route
- Total stops for the listed route if the stop were added
- Estimated arrival date/time if the stop were added
- Added cost and miles to the route if the stop were added

These options enable choosing which candidate routes to consider for possible addition of the unloaded stops.

- Select one of the options at the top of the screen to restrict which candidate routes to view, or do not select any options to view and evaluate all routes (default)

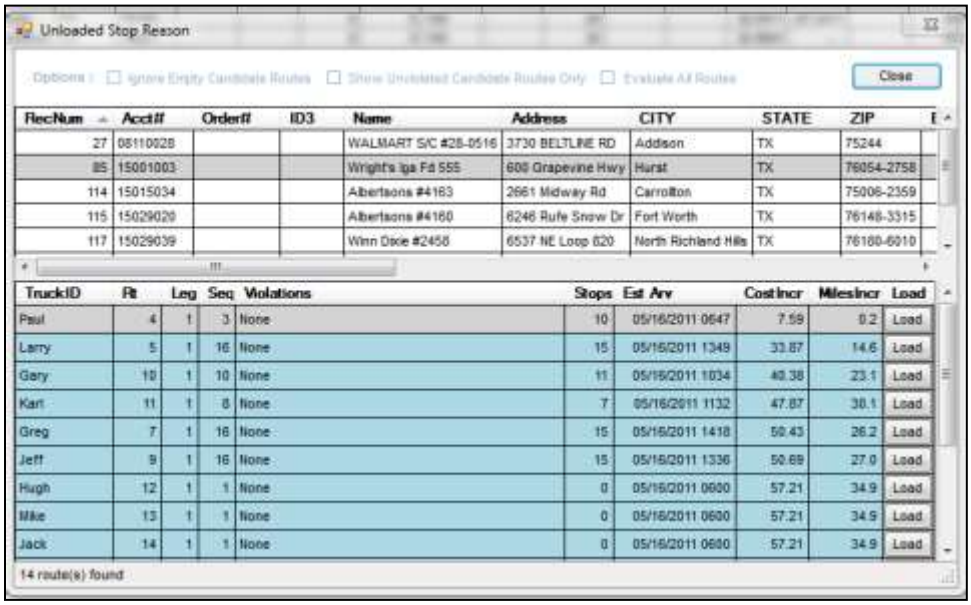


Figure 127 – Unloaded Stop Reason

8.4.1 Sort Unloaded Stops

You can sort unloaded stops before attempting to load/add them to existing routes. Examples of use: sort by cost to select the least costly vehicle/route option, or sort by estimated arrival date/time to find which possible route would deliver the earliest.

- Select the *Unloaded Stops* tab.
- Select which column to use as criteria for the sort.
- Select the column header to sort (alphabetically, numerically); notice the sort arrow appears on the right side of the column selected.
- To reverse the sort, select the arrow.

From the *Unloaded Stops* tab, you could also perform a sort by selecting more than one column of criteria. This may be helpful if necessary, to sort by customer and account number, or sort by zone and EqCode, or some other factors listed in the Stop File.

- Right click and select *Sort.*

Figure 128 – Unloaded Stop Sort Option

- Select the *1st Key* box, then use the dropdown arrow to select a field to sort.
- Choose a 2nd and 3rd Key and sort field, if desired.
- Select the *OK* button to initiate the sorting of the unloaded stops.

8.4.2 Sort from the View Reason Dialog Box

You could also perform a sort while viewing *Unloaded Stops Reason* dialog box.

- Select the *Unloaded Stops* tab.
- Right + click any stop and select *View Reason.*
- Select a column to use as criteria for the sort.
- Any column in top half of the dialog box (unloaded stops), or
- Any column in lower half of the dialog box (candidate vehicles/routes).
- Select the column header to sort (alphabetically, numerically).
  - Notice the sort arrow appears on the right side of the column selected.
  - To reverse the sort, select the arrow button.

8.4.3 Load Unloaded Stops

Load unloaded stops to a route using Unloaded Stop Reason.

- View candidate vehicles and routes to find a suitable position to add the stop.
- Locate and select the stop (ensure the stop shows as highlighted).
- Select the *Load* button.

Tip: It may be necessary to edit specific information about the vehicle or the stop to add the stop to the route or choose to accept the violation displayed and add the stop.

Unloaded stops can also be added without viewing the reason. This should only be done if you are certain as to which route and position the stop should be added.

- Select the unloaded stop you want to add.
- Select *Add.*
  - The stop number will prepopulate, corresponding to the Row number (record number) in the *Stop File* and the *Unloaded Stops* list.
- Type the Route and Position number to which to add the stop.
- Select the *OK* button.

Figure 129 – Adding Unloaded Stops to a Route

8.5 Scenario Manager

The Scenario Manager tool allows the user to run various route scenarios for analysis, without affecting the integrity of the original route or Route Files.

Scenario Manager allows temporary changes to Route Field values and Stop Field values within the Route Files, to determine what affects the changes would have to the overall Route solution.

- What is the impact if we reduce worktime from 9 to 8 hours?
- Is there a cost benefit in expanding delivery windows by 30 minutes?
- We found a way to reduce service time by 5%, how much would that save?

Numerous Scenarios can be built and saved, edited, and used repeatedly with any existing Route and corresponding Route Files. If, after running a Scenario, it is determined that the Scenario results are better than the results obtained with the original Route, the scenario results can be applied and saved as a new Route (and new Route Files), while still maintaining the integrity of the original Route and Route Files used to perform the Scenario.

8.5.1 Using Scenario Manager

- Open any existing Route File.
- Select *Analysis→ Scenario Manager* from the menu at the top of the screen.

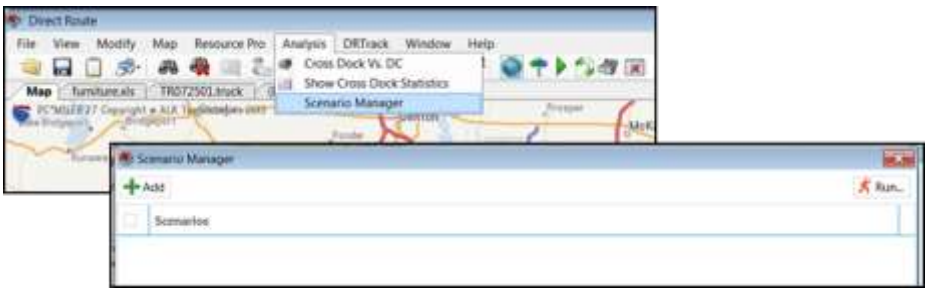


Figure 130 – Scenario Manager Build

- Select the *+Add* button.
- Select a field (to adjust data) using the dropdown arrow.
- To the left of the field, select how the Field should be adjusted (Increase/Decrease).
- To the right of the field, type the numerical amount by which the Field should be adjusted (number representing an amount).
- To the far right of the field, select the measurement type to apply to the numerical amount (Value/Percent); select Value when the number represents actual hours, miles, cost, etc.
- After selections have been made, edit the Name box to rename this Scenario, if desired.
- To add another field, select the +Add button (no limit to number of Fields that can be used in one scenario).
- To delete a field, select the red **X.**
- Click on the *Save* button to save the Scenario.
- To edit/change a Scenario, select the blue pencil icon to the right of the Scenario Name.
- To delete a Scenario, select the red **X** to the right of the Scenario name.

Example: Our current Routes are set with a Max Miles of 250. We want to see the cost results that may be achieved by increasing the Max Miles to 300. Select Max Miles→ Increase→ 50→Value (for actual miles).

Figure 131 – Scenario Manager Field Selection

After a scenario has been saved, it will appear by Name in the top block of Scenario Manager.

- For a quick reminder of the fields used, select the circled arrow left of the Scenario Name

8.5.2 Scenario Manager Time Windows / Buffers

When altering *Time Windows* and *Buffers*, additional parameter options are presented.

Figure 132 – Scenario Manager, Time Windows

Parameter options for Time Windows

- **Only If/Always** – Select when the Time Window should be increased or decreased
- **Gap** – Refers to the number of hours the Time Window is open

Parameter options for Buffers

- **Early/Late** – Enter the # hours to apply to either or both the Open (Early) and Close (Late) of current Time Windows
- **Penalty** – Enter a dollar amount to apply as a penalty when/if the buffer is applied

Example: Routes feature a mix of Time Windows with open periods of 4 and 6 hours. To see the effect if all the open periods were 6 hours, select: Time Window→Increase→2→ Value (actual hours) → Only If→ Gap (Less Than) →6.

8.5.3 Scenario Manager Results

After a Scenario has been built and saved, it is ready to run. All scenarios are ran from an open Route Book, so ensure the desired Route File is opened. If the Scenario Manager is not currently open, open it by selecting *Analysis→ Scenario Manager* from the menu at the top of the screen.

- To select a Scenario from a list of saved scenarios, left click on the box to the left of the Scenario Name to select it (box will appear colored when selected)
- Repeat to de-select any Scenario
- Select the *Run* button in the top right corner of Scenario Manager

Figure 133 – Run Scenario Manager

As the Scenario Manager is processing, a progress bar will appear. Once the process has completed, the results will be displayed in the bottom half of the Scenario Manager box. The results will include the

original values for the Route before it was adjusted (BaseResult), and the new values (ScenarioName), as well as the change value (+more or –less).

Example: The Max Drive Time on our current route is 6 hrs. and Max Work Time is 7 hrs. In the Scenario image above, we increased our Max Drive Time by 2 hrs. and our Max Work Time by 2.5 hrs. The results indicate our total cost decreased by ($1583.31), the Distance decreased by (277.87), and Elapsed Time decreased by (5.47).

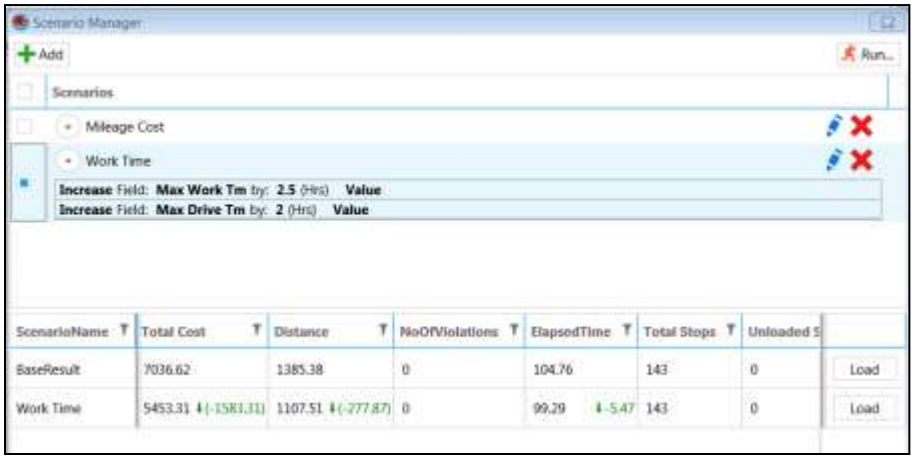


Figure 134 – Scenario Manager Results

Tip: Scenario Manager will apply Optimization if set to TRUE in Preferences→Routing→ Algorithm→Optimize Stops After Loading

If the Scenario results are determined to be optimal, the results can be applied (Load) and saved as a new Route/Route Files, while still maintaining the integrity of the original Route/Route Files used.

- Select the *Load* button adjacent to the Scenario results

Scenario Manager will save and close the original Route Files (unchanged), and then create and save duplicate files with the change applied. The new files will bear the Scenario Name as an extension to the original file names.

Example: Original file name = Phx1502, new file name = Phx1502-Mileage Cost.

9 Advanced Routing

Once you have mastered the initial building of routes and understand how the software reads your data to create the optimal solutions, you're ready to progress to more advanced methods of routing, as well as using other options to optimize the routing solution even further. Some of these methods may include:

- **Special Equipment Codes**
- **Consolidating stops**
- **Redispatching trucks**
- **Splitting stops**
- **Routing with Lasso Tool**
- **Creating inbound routes**
- **Refuel Points for Replenishment**
- **Creating Refuel Points**
- **Creating relay routes**
- **Tanker routing (Tanker Algorithm)**
- **Using External Utilities**

9.1 Special Equipment Codes

Special equipment codes provide a means to inform DirectRoute to load a stop on a vehicle. If you are routing using a fleet with various special equipment, or your customers require special equipment for delivery, there may be a need to use special equipment codes.

Below are seven special equipment codes that can be used to assist with specific routing scenarios, including:

- **Equipment Codes (Eq)**
- **Back Haul Codes (BH)**
- **Priority Codes**
- **Sequence Codes**
- **Sequence Preference Codes**
- **Territory Codes**
- **Exclusion Codes**
- **Origin-Destination Pairs**

The following section provides descriptions and uses for each of these special codes.

9.1.2 Equipment Codes (Eq)

EqCodes are alphanumeric, one to three characters, and user defined; the user determines what characters/numbers will be used to define any requirements that exists. These codes are entered in the EqCode column in the Stop File to identify the specific requirement for that stop. Any number of codes can be used together per stop and are separated by a dash between each.

Example: Sample EqCodes: LG = Lift gate, FB = Flatbed, X3 = 53ft Truck; two or more used = X3-LG-FB

When using an EqCode, one or more trucks in the Truck File must be designated with the same code in the SpEq field to identify it as compatible to load/deliver any stop with this code designation. As many codes as necessary can be added to any stop or truck; use a dash between each code to separate them (ex. X3-LG-FB).

- A stop that is coded in this manner can only be loaded on a truck designated with all three of these codes in the SpEq field in the Truck File.

It's important to remember that the use of SpEq codes on a truck does not preclude the truck from loading or servicing a stop without these codes, but simply identifies the truck as being able to meet the special requirements of some stops.

Example: Figure 125 indicates which trucks can service which stops.

EqCode	SpEqCode	Allowed / Not Allowed
FB	None	Not allowed; truck doesn't have matching SpEq code
FB-X3	FB	Not allowed; truck doesn't have both SpEq codes
FB-X3	FB-X3	Allowed; truck has both SpEq codes
None	FB-X3	Allowed; any truck can service any stop with no EqCode

Figure 135 – SpEq Codes

Tip: A truck without a SpEq Code can service any stop without an EqCode, but a stop with an EqCode can only be serviced by a truck with the matching SpEq code. Likewise, a stop without an EqCode can be serviced by any truck, with or without any SpEq code designation.

Tip: Place vehicles with Special Equipment Codes at the bottom of the Truck File. During the routing process, DirectRoute starts with the first available truck in the Truck File to start loading stops. Stops with no Equipment Codes may go on any vehicle. However, stops with Equipment Codes may only go on those vehicles coded to accept them. By placing vehicles with Equipment Codes on bottom of the Truck File, this ensures that the stops with codes will have vehicles available for loading.

9.1.3 Back Hauls (BH)

A Back Haul is a stop to be picked up (versus delivered) after the truck has been unloaded, and taken back to the terminal; it requires that the truck be empty before it arrives at the stop to be picked up. Back Hauls can be identified in the Stop File using an EqCode of BH. During the routing process, DirectRoute will place these stops at the end of the Route after all other stops have been delivered.

Tip: There does not have to be a corresponding BH code in the Truck File. Stops coded as Back Hauls can be loaded on any truck unless the stop has additional constraints, such as size restrictions or other EqCodes.

Tip: When shown in the Route Book, Back Hauls are shown with a negative capacity. A column heading for BH Totals may be added to the Header Report in the Route Book.

Back Hauls should not be confused with a regular pickup for delivery to the Depot. This type of pick up could be at any location between two delivery stops, anywhere on the route. The BH EqCode should not be used for this type of stop. For less than truckloads, set the stop quantity to 30,000 and DirectRoute will include it in the routing process.

9.1.4 Priority Codes

Priority Codes allow the user to change the order in which stops are loaded in the construction phase of route building. Priority Codes are identified using the exclamation symbol (!), followed by a sequence number between 1 and 9, entered in the EqCode field in the Stop File.

Typically, DirectRoute will load the farthest un-routed stop on an empty vehicle and proceed to load additional stops within the same vicinity on the vehicle. Using Priority Codes will change this behavior, giving priority loading, or preference, to stops with a Priority Code, over non-prioritized stops.

A Priority Code does not insure that a stop will be the first stop on a route, only that the stop gets loaded before all others without a Priority Code (to indicate priority delivery, see **Sequence Codes**. When assigning the sequence number, 1 is used to indicate the highest priority, and 9 the lowest.

Example: Priority Code!1 indicates a higher priority than !3.

Tip: There does not have to be a corresponding priority code in the Truck File. Priority stops can be loaded on any truck unless the stop has additional constraints, such as size restrictions or additional EqCodes.

9.1.5 Sequence Codes

When stops require priority delivery over other stops, the use of a Sequence Codes will force DirectRoute to build the route using the delivery sequence input for each stop.

A Sequence Code is a 2-digit number (01 thru 99) used in the EqCode field in the Stop File, to indicate delivery order. Stops with the lowest sequence number (00, 01, 02, etc.) will be loaded before stops with a higher number (10, 23, 99, etc.). Any numerical code (without alpha characters) entered in the EqCode field is assumed to be a Sequence Code.

When using Sequence Codes, all of the stops must have a Sequence Code; blank cells in the EqCode field will be given a null value (00), which will force a first delivery, while a value of 99 will force a last stop, or delivery. When combining sequence codes with another EqCode, separate the two with a dash.

Example: A stop requires an EqCode of LG (lift Gate), and Sequence Code of 02 (second delivery). Input in the EqCode field should be LG-02.

Example: The following represents coded stops in the Stop File. Can you determine when/how these stops will be loaded and/or delivered?

Name	EqCode
Stop A	LG-01
Stop B	2
Stop C	FL
Stop D	(blank)
Stop E	FL-LG-03
Stop F	(blank)
Stop G	1

Figure 136 – EQ Codes

Stops A and G must always be delivered before Stops B and E, since 01 takes precedence over 02 and 03. Stops C, D, and F have no numerical codes assigned. As a result, the software will assign a null value (00). Since 00 indicates the highest precedence, these stops will be forced to deliver first, ahead of stops A, B and E, which were designated for 1st, 2nd, and 3rd delivery by the sequence codes 01, 02, and 03.

To avoid this error, Stops *C, D*, and *E* should be assigned a numerical value that will ensure their delivery sequence in the proper order. Remember, the use of any sequence code in the Stop File requires that all stops be assigned a sequence code.

9.1.6 Sequence Preference Code

A Sequence Preference Code is a dollar amount assigned to be multiplied/added to any stop in which delivery preference is requested. The dollar amount is placed/used in the EqCode field, adjacent to any other special code, in the same way that any other special code is used.

Example: $3.25 is assigned for a stop in which preference is required. A stop already assigned an EqCode of RF and requires sequence preference would show the following in the EqCode field: RF-3.25.

When DirectRoute builds and optimizes routes, it will calculate a cost for the route (ref. cost fields in the Truck File). If 'sequence preference codes' are used in the Stop File, the system will add an additional cost to the routes, equal to the assigned value for the preference code multiplied by the stop sequence code number, minus 1.

Example: If the Sequence Preference Code is 3.25, and a stop's sequence code is 5, then the added cost to the route would be 3.25 x (5-1), or $13.00.

The earlier in the route the stop is sequenced, the lower the calculated cost; the later in the route, the higher the calculated cost will be. As a result, DirectRoute will attempt to reposition the stop to the first, or earliest position on the route. Additionally, it is possible DirectRoute will be able to re-sequence the route without increasing mileage.

Tip: It is important to always test values to ensure they do not have an adverse effect on operations.

9.1.7 Territory Codes

Territory Codes, used in both the Stop and Truck File in the EqCode and SpEq code fields, allow you to force routes to remain within a certain area. Territory Codes are identified by using the symbol @ with two alphanumeric characters (ex. @A2).

Territories can be as small as one truck, or have multiple routes assigned. If drivers are assigned to a specified territory and you do not want the route to cross territory lines, Territory Codes could be used in the Truck File to restrict which stops (Territories) can be loaded on the truck.

The main difference between a Territory Code and a normal EqCode is that the codes on a truck must be subset of the codes on a stop, whereas with normal EqCodes, the stop codes must be a subset of the codes on the truck.

Example: Customer X can be serviced by three specific drivers (salesmen) within three different territories (ex. territories 1, 2, or 3). The following Territory Codes would be used: @1-@2-@3. Could the following driver/truck service this customer?

Truck Code	Allowed
@1	Yes
@3	Yes
@2-@3	Yes
@4	No

Figure 137 – Territory Codes

Tip: Any truck can service a stop without a Territory Code. In most cases, if Territory Codes are used, they are placed on all stops and all trucks.

9.1.8 Exclusion Codes

Exclusion Codes are used to specify that two or more stops cannot be loaded on the same vehicle. These codes are identified by using the symbol ^ with two alphanumeric characters (ex. ^A2) in the EqCode field of the Stop File. Stops with the same Exclusion Code will not be loaded on the same vehicle.

Example: A beverage distributor delivers to customers receive who may receive as many as three deliveries per week. The Stop File used represents deliveries for a typical week. Each stop in the file represents one delivery, so for each customer receiving two, or three deliveries in the week, there are two, or three records in the Stop File. To ensure these deliveries are not all loaded on the same vehicle to deliver all on the same day/time, enter an Exclusion Code on each record so as to prevent it from loading with the others on the same vehicle.

Tip: There does not have to be a corresponding exclusion code in the Truck File.

Stops coded with an exclusion code can be loaded on any truck unless the stop has additional constraints such as size restrictions or additional EqCodes.

9.1.9 Origin-Destination (OD) Pairs

Origin-Destination Pairs (OD Pairs) can be used to force DirectRoute to load a pair of stops on the same route, in proper order, as an exception to standard Depot-to-Stop routing.

Example: An order must be picked up at one location and delivered to another location.

Tip: For best performance of the software, OD Pairs should account for less than 20% of the total Stops in one routing solution.

OD Pairs include both a pickup and a drop off and are identified by using the # symbol with a two-digit alphanumeric code and sequence number.

Example: #AA1 and #AA2; #AB1 and #AB2. The lower sequence number in the pair (#AA1) represents the Origin stop, while the higher sequenced number (#AA2) represents the Destination stop.

How it works:

- DirectRoute determines the first stop on a route during the construction phase of load building and looks for any stops with OD Pair codes
- If found, the stop coded with the lowest number is loaded first

Example 1: #AA1 would load before #AA2, as the number 1 is a lower than number 2.
DirectRoute then checks the capacity of the vehicle against the volume to be picked up, ensuring there is enough space on the vehicle when it leaves the terminal to pick up the Origin Stop.

Example 2: #AA1 and #AA2 are assigned for pickup and delivery.
Vehicle capacity is set at 17,000 pounds; 14,000 pounds are loaded at the terminal for various stops on the Route, and an additional 2,200 pounds must be picked up at another location before all deliveries can be made

This would be a valid use of OD Pairs. The stop with the matching OD Pairs code need only be loaded after the pick. The remainder of the route is built in the usual manner, with appropriate consideration given to other equipment or sequence codes.

Tip: OD Pairs must be used as a pair. If one stop lists an OD pairs code, there must be another stop at some point in the route with a matching code.

Tip: The first Stop of any OD pair in a route will always display itself in the Route Book as a negative number, representing the Stop as a pickup.

9.2 Consolidating Stops

Options exist in *Preferences→Routing→Consolidate Settings* to enable consolidation of stops. These settings are validated when they are updated.

Several options exist to consolidate orders, but only one option may be chosen:

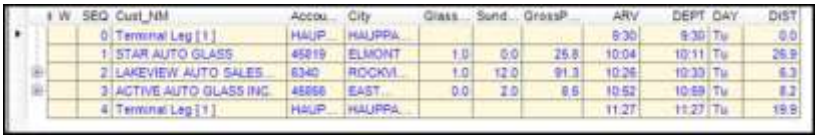
- Consolidate by ID1
- Consolidate by ID2
- Consolidate by Address
- Consolidate by Fixed Times
- Consolidate on Initialize

Example: Two orders, a Deli order, and a Hardware order, both with unique and separate order numbers, are to be delivered to the same Super Store location. If a consolidation option is not chosen, DirectRoute will consider these two orders as separate stops, and would appear in the Route Book as Rt 3/Stop 1 and Rt 3/Stop 2. However, if you tell DirectRoute to consolidate orders by address, the Route Book result would show both orders as Rt 3/Stop 1.

For the consolidation function to work properly, additional conditions must also exist. To consolidate by address or customer, each record must contain the following:

- Identical Time Windows
- Identical EqCodes
- Identical Size Restrictions
- Lat/Long must be within three decimal places

When one or more stops have been consolidated, they will appear as one stop on a route, designated with a + symbol, left of the sequence number.



	W	SEQ	Cust_NM	Accou...	City	Glass...	Sund...	GrossP...	ARV	DEPT	DAY	DIST
		0	Terminal Leg [1]	HAUP...	HAUPPA...				9:30	9:30	Tu	0.0
		1	STAR AUTO GLASS	45819	ELMONT	1.0	0.0	25.8	10:04	10:11	Tu	26.9
		2	LAKEVIEW AUTO SALES	6340	ROCKVI...	1.0	12.0	91.3	10:26	10:33	Tu	6.3
		3	ACTIVE AUTO GLASS INC	45866	EAST...	0.0	2.0	8.6	10:52	10:59	Tu	8.2
		4	Terminal Leg [1]	HAUP...	HAUPPA...				11:27	11:27	Tu	19.9

Figure 138 – Consolidated Stop

- Select the + symbol to explode (expand) the stop detail

Figure 139 – Unconsolidated Stop

- To return the view to Consolidated, select the dash (–) symbol

9.2.1 Consolidate by ID1 / ID2

ID1 is reserved for a unique identifier for the stop record (account number). If this option is set to TRUE, DirectRoute will consolidate all records with the same account number (ID1) into one stop record. This option is useful if you have several orders for the same customer.

- ID1 will be displayed as the alias if set in *File→Preferences→Configuration*
- If the ID1 field Account#, this option will read Consolidate by Account#
- To consolidate by ID2, the same rules apply

Tip: An error message will be generated if Consolidate by ID2 is set to TRUE and both Consolidate by ID1 & Consolidate by Address is set to FALSE. This setting must be corrected to save/close the dialog box; or select Cancel to exit without saving the erroneous setting changes.

9.2.2 Consolidate by Address

If this option is set to TRUE, DirectRoute will combine records that have identical addresses (Address1 fields match). This option is useful if you have several orders to be delivered to the same address, though the account numbers may be different.

Consolidate (Sum) Fixed times – If this option is set to TRUE, the fixed time for the consolidated stop will be equal to the sum of the fixed times for all the orders that are consolidated into one record. If it is unchecked, the fixed time will be equal to the fixed time of the first order in the consolidated group.

Consolidate on Initialize – If this option is set to TRUE, DirectRoute will consolidate fixed routes based on ID1, ID2, or Address, whichever option is set to TRUE, during the route building process if Initialize Routes is selected.

9.3 Redispatch

Redispatch is used in local delivery situations when the time to deliver a route is short in comparison with the maximum work time set for the truck. The short delivery time allows the truck to be sent out on multiple route legs during a day.

Redispatch is controlled in the Truck File, by the Redispatch column.

- If set to TRUE, the truck is available for Redispatch.

Tip: This field will be ignored if the column 'Oneway' is also set to TRUE.

Example: A distributor may deliver to customers in full truckload quantities. This may only require a couple of hours which would allow the driver to return to the depot, reload, and deliver another stop. This process would be repeated until the truck was out of work time.

Redispatch Minimum Time

This indicates the minimum amount of work time remaining (in hours) before considering Redispatching.

Example: If the max work time is set to 10 hours and the minimum time is set to 2 hours, Redispatching will cease if the route has already run more than 8 hours (10-2). If minimum time is set to zero, it is assumed that another driver will be taking the next leg of a route and work time statistics are reset to zero.

Redispatch Turnaround Time

Turnaround time is the amount of time it takes to reload the truck after it has returned to the depot (in minutes). With the Redispatch feature, all dialogs that require a route number (*Modify→Move, Modify→Delete*) also require a leg number. This information is entered into the route field, separated by a comma.

Example: 1, 2 would indicate Route 1, Leg 2. If the leg number is omitted, the system assumes it is Leg 1.

9.4 Splitting Stops

Split Stops allows the user to define where and by how much a stop is split, after the routes have been built. Splitting is based upon capacities that have been used in the Stop and Truck File.

- Open the Route Book
- Select the route containing the stop to split

- Select the stop to highlight it
- Right click on the stop, and select *Split Stop*
  - Select *Split by Percentage* to split by a percentage amount; enter the amount in the box to the right
  - Select *Split by Number* to split by a number (set in the *Stop File Field 'Split Size'*)
- Select OK

Tip: Stops must be Unconsolidated to split.

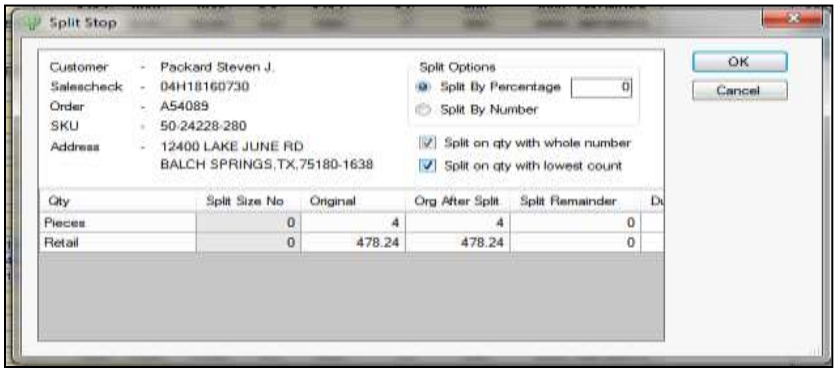


Figure 140 – Split Stops within Route Book

The split will create two stops, each with the selected split quantities. Each stop may be treated independent of each other; they can be moved to another route, unloaded, or any other action that might be necessary.

9.4.1 Dynamic Splitting

Dynamic splitting is intended to be used in routes that have low stop counts (typically 2 to 4 stops per route) and where the vehicle capacity is the primary constraint on the routing problem. For example, assume a truck has a capacity of 100 units and you have 5 stops that have a quantity of 40 units each. If dynamic splitting is not allowed this would produce three routes (two routes with two stops of 40 and one route with one stop of 40). If dynamic splitting is turned on, the system could load the stops on two routes by splitting one of the stops into two 20 unit stops and placing each of those stops on a route with two 40 unit stops.

Dynamic splitting parameters are selected and set in *Preferences→Routing→Dynamic Splitting*, before route building is initiated.

There are several factors that determine how dynamic splitting is executed. For example, reference the field in the Stop File called MaxSplits. If this field is set to '1' or higher, the stop can be considered for dynamic splitting, otherwise it will not be considered. Each stop will contain at least one order, and each order will contain at least one line item. If Split Orders is set to TRUE, the system will evaluate pulling some of the line items off an order to make a split, otherwise it will look at splitting full orders off the stop. Listed below are the parameters that dictate how dynamic order splitting is executed (*Preferences→Routing→Dynamic Splitting*).

- **Split stops while loading** – Dynamic splitting option is available if set to TRUE. If this parameter is set to FALSE, the remaining parameters under dynamic splitting section are inconsequential.

- **Split Orders** – If TRUE the system will consider splitting an order by placing some of the line items on one stop and placing the remaining line items for the order on the other stop. If this parameter is set to FALSE, the system will only split stops by placing full orders on the stops created by the split.
- **Split Line Items** – If TRUE the system will consider splitting the stop at the line item level. This option is only valid for stops that contain only one order and one line item on the order.
- **Splits-Max splits per stop** – Indicates the maximum number of times a stop can be split. This is typically 1 or 2 times. This value is only used if there is no entry in the Stop File for MaxSplits
- **Splits-Min split size** – The minimum size for a split order (based on quantity 1 field). When an order is split into two stops, each stop must have at least the min split size. For example, if the min split size is 2,000 and a stop has 10,000 units, possible splits could be: 2,000 and 8,000; 4,000 and 6,000; 5,000 and 5,000

Example: You could not have a split of 1,000 and 9,000 since one of the orders would be less than 2,000. This also places a limit on the size of an order that can be split. For example, if you had an order of 3,500, it could not be split since there is no way to split the order where both stops contain at least 2,000 units.

- **Splits-Truck Full** – This parameter determines if the system will try to split a stop based on the user's definition of what a full truck is. Let us take an example where Truck Full is set to 80%. The system will load stops on a route until it runs out of capacity. At that point we will check the capacity used by the route, if it is less than 80% it will try to find a stop to place on the route by splitting it. It should be noted that "Min split size" and the "Truck Full" parameter have an influence on each other. For example, let assume you have vehicles that have a capacity for 20 pallets, and you set the Truck Full to 90% and min split size to 4. If a route contains 17 pallets it will be at 85% capacity and will look at splitting a stop to fill the route. But because min split size is set to 4 it cannot fill the route any further because a 4-pallet stop would exceed the capacity of the vehicle.
- **Splits-Evaluate Split Options** – Setting this parameter to TRUE only comes into play if "Split Orders" is set to TRUE. When the system evaluates splitting a stop it will first attempt the split the stop by full order. If this is successful it will not evaluate the possibility of filling the vehicle further by looking at splitting the order if this parameter is set to FALSE. If it is set to TRUE, it will look at splitting orders then select the option which utilized the most capacity of the vehicle.

9.4.2 Stops That Should Not Be Split

For stops that should NOT be split dynamically by DirectRoute during the loading phase of Route building, use the *Stop User Field* in the Stop File to identify them.

- When used with Dynamic Splitting, orders/line items with a value of TRUE will not be split. When used with Static Splitting, orders/line items that DO NOT have a value of TRUE will be split first if the order/line item quantity is over the set Static Split size (*Preferences→Routing→Static Splitting→Split Size*).

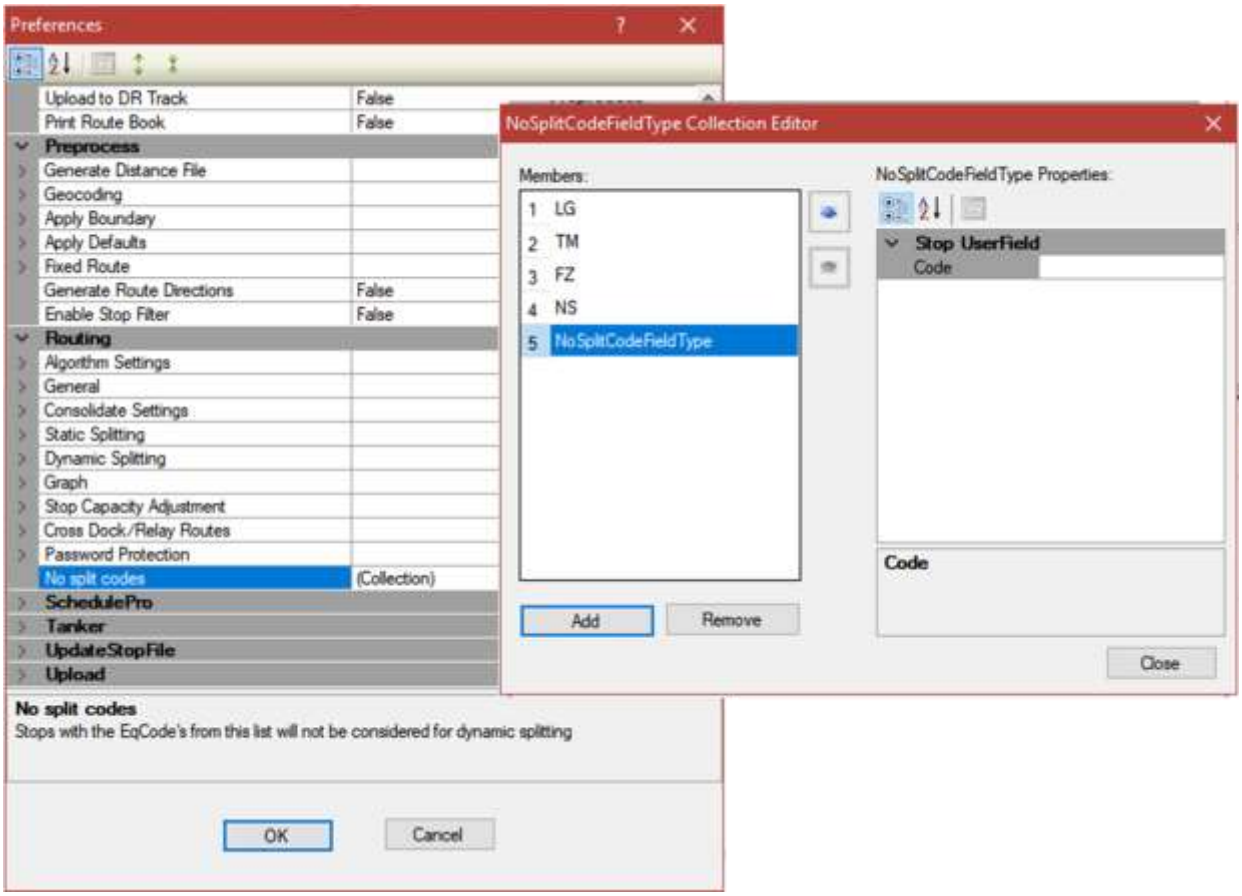


Figure 141 – DoNotSplit

- Use the Add button to add EqCodes and the Remove button to remove codes from the list
- Left click the Add button, then left click the Stop User Field code box and type in the EqCode
- Repeat to add each subsequent EqCode
- To remove an EqCode, left click the EqCode to select it, then left click the Remove button
- When all edits have been completed, left click the Close button

9.5 Using the Lasso Tool

The Lasso Tool enables the selection of a group of stops (records) from the map. The stops can be loaded or unloaded stops, and can be used to manually build new routes, moved to other routes, or loaded/unloaded to and from routes, all without leaving the map view.

To access the Lasso Tool option while in the routing mode, select the Lasso icon from the tool bar, or use the menu (*Modify→Lasso*) to select one of the actions mentioned above that you want to complete once the stops have been selected on the map.

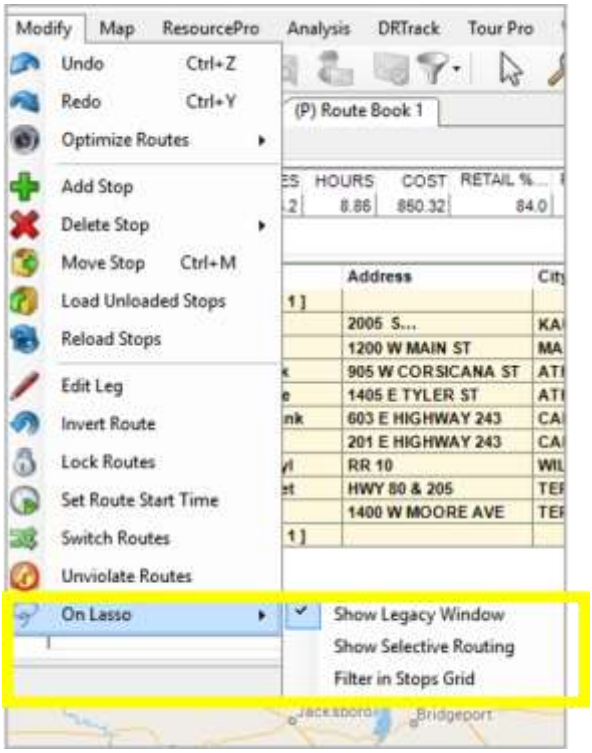


Figure 142 – Lasso Tool Options

- **Show Legacy Window** – When the Lasso tool is used to select stops on the map, the Lassoed Stops info box will open, enabling selection of an action to perform (load stops, delete stops, etc.)

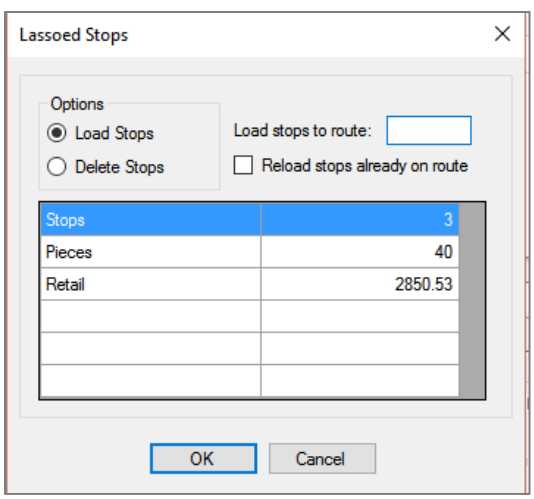


Figure 143 – Lassoed Stops Info Box

- **Show Selective Routing** – When the Lasso tool is used to select stops on the map, the Selective Routing info box will be opened and can be used to assign the selected stops

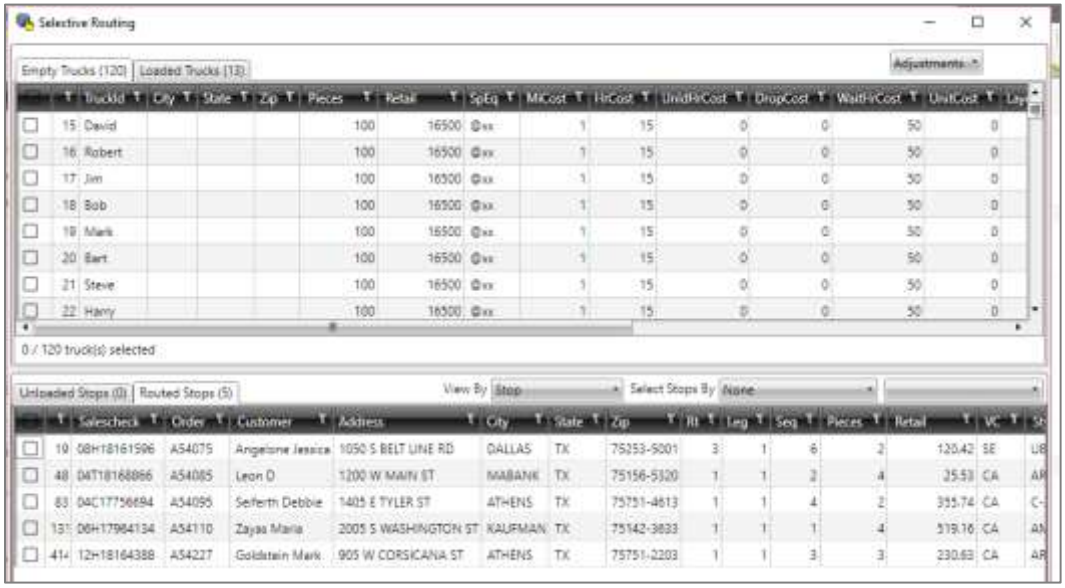


Figure 144 – Selective Routing Info Box

- **Filter in Stops Grid** – When the Lasso tool is used to select stops on the map, the Stops Grid (*Stop File.XLS*) will update to show only the stops selected, instead of all stops in the Stop File

See **Using the Lasso to Select Stops** for additional information.

9.6 Build Manual Routes on the Map

This action is completed in the same way as using the Manual Route Build Tool, except that the Lasso Tool is chosen instead.

To start, ensure the Stop and Truck Files are updated as needed and saved in the DirectRoute Data Folder.

- From the DirectRoute menu, select *File→New Route*
- Select the Stop File, Truck File, and Distance File (if used) to use in the routing scenario
- Select No Initialization and select the Dispatch Date (first day vehicles should depart)
- Select the OK button to launch the build process

When the build process has completed, select the Map tab from the top of the screen to view the stops on the map.

- From the toolbar, select the Lasso Tool; the mouse cursor will change to resemble a pen
- Left click and hold the mouse, and drag the pen to draw a perimeter around the group of stops to select them, then release the mouse

An info box will open to display the number of stops selected and the volume totals of the selected stops. These stops can now be loaded to a route.

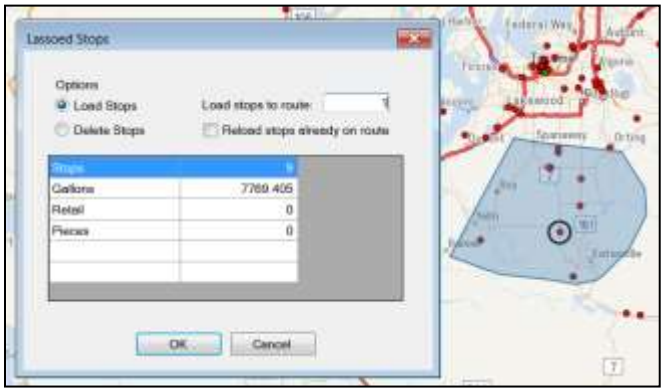


Figure 145 – Lasso Build Routes

- Type the Route# in the *Load Stops to Route* box
- Select the OK button to complete
- If the selected action will violate any constraints, a warning notice will be received

9.7 Move, Delete, or Add Stops

The Lasso Tool enables the selection of a group of stops (records) at one time, while viewing the stops on the map. Various actions can be applied to the selected records as a group. Some of these actions include adding stops to routes, deleting stops from routes, redistribute territories (ref. **TerritoryPro: Redistribute Territories**), or reassign resources (ref. **ResourcePro: Reassign Resources**).

While in the routing mode (Route File open), select the Lasso Tool from the toolbar.

- The mouse cursor will change to resemble a pen; left click and hold the mouse, and drag the pen to draw a perimeter around the group of stops to select them, then release the mouse

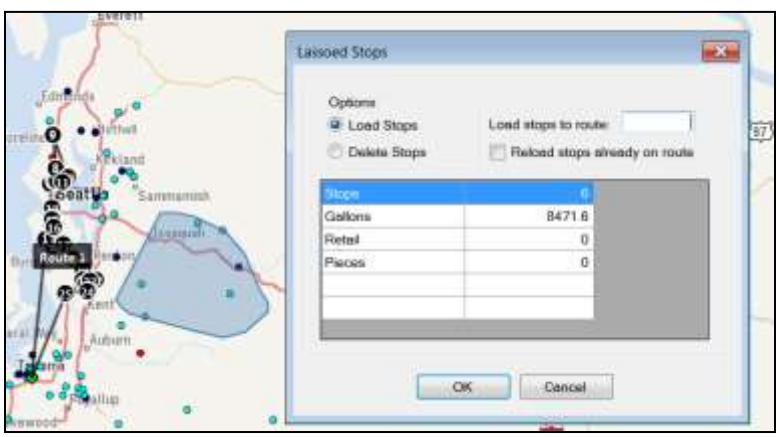


Figure 146 – Lasso Function

An info box will open to display the number of stops selected and the volume totals of the selected stops. These stops can now be loaded to a route, reloaded to another route, or deleted from a route.

- Select the action to desired
- Select OK to complete the action
- If the selected action will violate any constraints, a warning notice will be received

See **Using the Lasso to Select Stops** for additional information.

9.8 Inbound Routes

Inbound routes are routes that begin at the furthest stop and route back to the depot. The distance from the depot to the first stop (farthest stop) is not calculated. This mode of routing is an alternative to inverting a completed routing project.

The DirectRoute Algorithm will calculate and build Inbound Routes when the INBOUND option is selected in **Routing Preferences**.

- From the main menu, select *Preferences→Routing→Algorithm Settings*, and select INBOUND from the drop-down menu
- Ensure the Truck File column One Way remains set to False

When INBOUND is selected, all routes will be calculated as Inbound routes; standard routes cannot be completed within the same stop file. To return to building regular two-way routes, edit the Routing Preferences to return the Algorithm Setting to Regular.

9.9 Routing Dense Stops

When routing dense stops, DirectRoute may be slower as it searches for the next stop to load on a route.

During the routing process, as each stop is assigned a stop sequence, DirectRoute then looks thru each remaining stop in the Stop File to find and assign the next stop/stop sequence. This works well when stops are generally a few miles from each other. However, in metropolitan areas or areas with a high concentration of stops close to each other (dense stops), this can slow the routing process considerably.

To alleviate this problem, an entry can be made in **Routing Preferences** to limit the number of stops that DirectRoute attempts to sequence to the previous stop, to speed up the routing sequence. When used, DirectRoute will only look to the next (# entered) closest stops from the previous stop. This will prevent the routing sequence from reviewing all available stops for loading while routing very dense stops.

- From the main menu, select *Preferences→Routing→Algorithm Settings*
- Scroll down to the last item, *Max Closest Stops*, and enter a number to limit the number of stops, closest to the current stop, that DirectRoute should look at before assigning the next sequence number

9.10 Refuel Points for Replenishment

During the route building process, DirectRoute will determine when to insert the Refuel Points (Replenishment Point 1, Replenishment Point 2, etc.) in the route, based on the miles/distance traveled, proximity to a refueling point, and vehicle load factors.

Refuel Points are designated within the Truck File, to identify locations where fleet vehicles can refuel. For each refueling location, add a new Truck Record to the Truck File and edit the following fields as indicated:

- *SpEq* – Insert *REFUELPOINT*
- *Lat/Long* – Add coordinates, or
- *Address, City, and Zip* – Insert appropriate information

- *Available* – TRUE
- *One-way* – FALSE
- *Redispatch* – FALSE
- *Turn Time* – Add the number of minutes it will take to refuel
- *Optional Fields* – Symbol, Size, Color (to view refuel points on the map), and Cost fields

AX	AY	AZ	BA	BB	BC	BD
Longitude	Latitude	Address	City	State	Zip	Zone
-122.35490	47.58070		SEATTLE	WA	98134	100

AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG
Longitude	Latitude	Address	City	State	Zip	Zone	Symbol	Size	Color
-122.35490	47.58070		SEATTLE	WA	98134	100	Circle	24	Lime

Figure 147 – Refuel Point in Truck File

Once the fields have been completed, use the Geocode process to populate and (or) update Lat/Long (if necessary), then save the file.

Next, the Refuel Points will need to be added to the Distance File. If using Preprocess and generating new distance points during the route building process, DirectRoute will do this automatically. When not using Preprocess, be sure to run a new Distance File to include the Refuel Point locations before routing.

Additionally, options in *Preferences→Routing→ Algorithm* can be used to change the behavior on how the refuel points are inserted.

- *Original* – Default option, works using the existing algorithm
- *Distance Based* – Will keep track of route capacity and adds refuel points only when capacity is available and still 30% of work time left in a route; this option will also remove refuel points when not needed

Note: If Distance Based is selected, the Algorithm will insert the refuel point only when needed, based on distances traveled between stops and terminal, and work time.

Note: For more on Refuel Points, refer to the section **Sect. 4.6 Refuel Points (Replenishment)**

RT	TRKID	Miles	Hours	Days	Day	Violati...	Cost	Stops
2	2	168.2	10.84	1	Tu	None	337.05	15

W	SE	Name	ID1	City	ST	ARV	DEPT	DA	DIST
	0	Terminal Leg [1]	TACOMA	TACOMA	WA	5:13	5:28	Tu	0.0
	1	ALASKA AIRLINES INC	ALASAI01	KENT	WA	6:00	6:16	Tu	19.5
	2	CITY OF BELLEVUE	BELLFS1	BELLEVUE	WA	6:44	7:09	Tu	15.2
	3	NORTHWEST...	NORTCO34	Bellevue	WA	7:15	7:24	Tu	1.2
	4	CITY OF BELLEVUE	BELLCC01	BELLEVUE	WA	7:38	8:08	Tu	5.2
	5	UNIVERSAL LAND...	UNIVLA03	Redmond	WA	8:18	8:27	Tu	2.7
	6	FRUHLING INC	FRUHIN01	Kenmore	WA	8:51	9:13	Tu	12.3
	7	Replenishment Point - 1	Replenishment Point - 1	SEATTLE	WA	9:41	10:41	Tu	15.4
	8	MANSFIELD OIL CO	MANSUN01	KIRKLAND	WA	11:12	11:21	Tu	19.3
	9	UNIVERSAL LAND...	UNIVLA04	Bothell	WA	11:37	11:46	Tu	6.1
	10	UNIVERSAL LAND...	UNIVLA22	Bothell	WA	11:46	11:55	Tu	0.0
	11	HOS BROTHERS CONST INC	HOSBR05	WOODINV...	WA	12:11	12:20	Tu	5.9
	12	SEATTLE BOAT CO	SEATBO01	BELLEVUE	WA	12:50	13:53	Tu	18.2
	13	NORTHWEST ASPHALT INC	NORTAS01	Renton	WA	14:15	14:22	Tu	10.0
	14	RAINIER WOOD RECYCLERS	RAINWO01	KENT	WA	14:51	14:58	Tu	17.3
	15	MANSFIELD OIL CO	MANSUN02	FEDERAL...	WA	15:23	15:30	Tu	12.6
	16	Terminal Leg [1]	TACOMA	TACOMA	WA	15:48	16:03	Tu	7.3

Figure 148 – Refuel Point in Route File

9.11 Relay Routes

The *Cross-Dock* function was used to assign routes to an alternate dock, yard, or domicile. This functionality has been deprecated and replaced with *Relay Routes*. The Relay Route function (in the Route Book) allows the shipper to simulate warehouses where there may only be drop/hook trailer yards. The process creates a line-haul route from the warehouse to the selected drop/hook yard (remote domicile). Routes are run as a multi-depot project, with the remote domicile being the actual warehouse. The routes will be routed from the remote domicile to the delivery point.

Relay Settings

It is recommended that new entries in the Truck File be created to be used specifically for relay routes. For each location you will be creating the relay for, there should be an entry in the Truck File. Each truck should also have the City column populated. It is also recommended that the names of the trucks be such that they are noticeably relay trucks only.

Ensure the values for Edate/Ldate/EarlyStart/LateFinish allow for enough time for the relay to be completed. When the new trucks have been created, the Truck File should be geocoded.

9.11.1 Creating a Relay Route

Create routes using the Stop File and Relay Truck File. When the routing solution has been completed, open the Route Book to view.

- Select the route with the stop that will be relayed to another terminal
- Select the stop to select it
- Right click once and select *Relay Route* from the drop-down menu
- Select *Relay by Destination*, or *Relay by Truck*

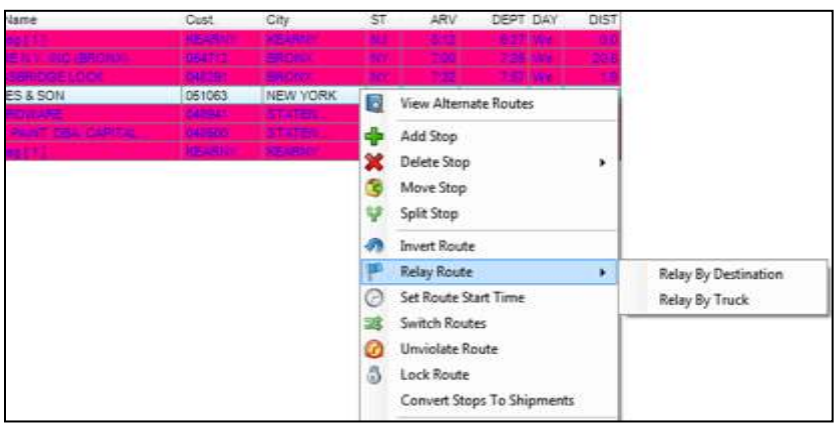


Figure 149 – Relay Routes

9.11.2 Relay by Destination

Relay by destination creates a line haul from the remote domicile to the main depot. The main depot is listed as the destination.

- Right click anywhere in the Route Book to open the Modify menu
- Select *Relay by Destination*
- Pick the relay point from *Relay Point 1*; default is the City location of the first truck in the Truck File that is different from the current truck location

- Edit *From Route No/To Route No*, if necessary; default is the current Route No
- Edit the *Transfer Time at Pickup/Drop-off* if necessary; default is 15 minutes
- Edit the *Maximum Speed* if necessary; default is 65 MPH
- Select OK

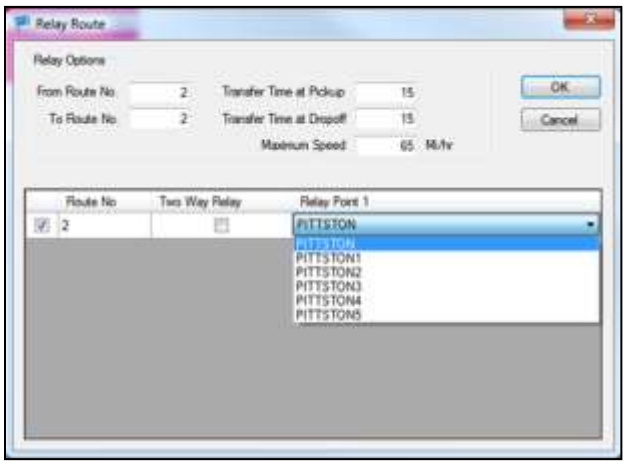


Figure 150 – Relay by Destination

DirectRoute will create a new relay route. The route number created will correspond to the truck's position in the Truck File (ex. if the eighth truck listed in the Truck File is used, Route 8 will be created).

9.11.3 Relay by Truck

Relay by Truck creates a line haul originating from a location other than the remote domicile, or depot. The line haul originates from the truck dispatch location.

- Pick your Relay Truck from the dropdown menu (Relay Truck); default is the first available truck in the Truck File
- Edit the *From Route/To Route No* if necessary; default is the current Route#
- Edit the *Transfer Time at Pickup/Drop-off* if necessary; default is 15 minutes
- Edit the *Maximum Speed* if necessary; default is 65 MPH
- Select OK

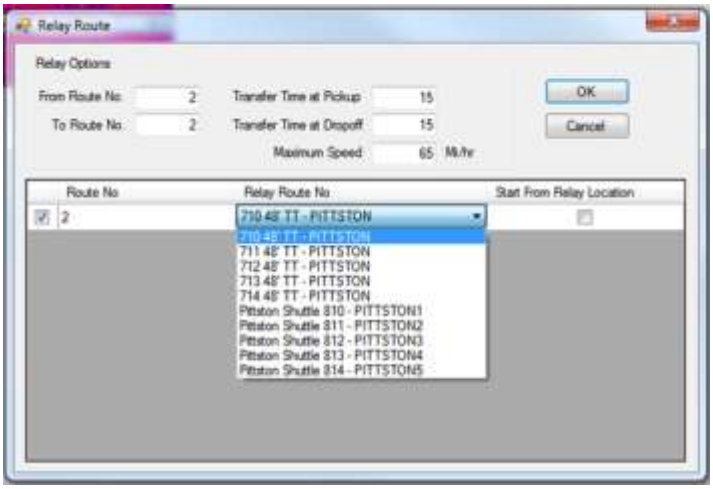


Figure 151 – Relay by Truck

DirectRoute will create a new relay route. The route number created will correspond to the truck's position in the Truck File (ex. if the eighth truck listed in the Truck File is used, Route 8 will be created).

9.12 Tanker Assignments

The Tanker Algorithm and assignment logic is intended to assist with optimized trailer compartment utilization when multiple products in various order quantities have to be planned on compartmentalized trucks together in a pickup or delivery route. The tanker logic considers, in part, volume and weight of loaded totes, tanks, and spaces, and is only applicable if the tanker algorithm is enabled.

The steps to building routes with the Tanker Algorithm are the same steps normally used to build routes in DirectRoute, regardless of the algorithm used. The differences lie in the Tanker Algorithm settings, and the use of two additional files: Tote File, and Product Ratio File. Both files are saved in an *.XLS* spreadsheet format, in the DirectRoute/Data Folder, with the Stop and Truck Files.

9.12.1 Tanker Algorithm Settings

The Tanker Algorithm settings identifies the options that should be updated to enable the use of the Tanker Algorithm.

To complete the updates, select *File→Preferences→Tanker* from the main menu.

TANKER	***LOAD BUILDING FOR COMPARTMENTS***	***EXPLAINATION***
Weight		Choose from Configuration/Volume Fields
Volume		Choose from Configuration/Volume Fields
Count		Choose from Configuration/Volume Fields
Tote File Name	C:\Program Files\Appian\DirectRoute\Data\Tote.XLS. File should contain columns: Totaled, Gallons, Weight, Cube, Pallets, and Available	Name and path of the Tote File, typically found in the DirectRoute Data Folder with the Stop and Truck Files.
Product Ratio File Name	C:\Program Files\Appian\DirectRoute\Data\Ratio.XLS. File should contain columns: ID, Product Code, Gallons, and quantity fields	Name and path of the Ratio File, typically found in the DirectRoute Data Folder
Use Tanker Algorithm For Product Assignment	TRUE/FALSE	Default is FALSE; if set to TRUE, will use the Tanker Algorithm for product assignment
Max Number of Totes Per Order		Max number of totes allowed on each order
Split Orders to Totes	TRUE/FALSE	Set to TRUE, will split orders down to tote level

Figure 152 – Tanker Algorithm Settings Table

In addition, the Configuration and Default options need to be updated.

- Select *File→Preferences→Configuration→Volumes.*

- Add quantity field *Gallons* as the first quantity type.
- Add quantity field *Tank*; as many (number/name of Tanks) as necessary.
- Add quantity field *Space*; as many (number/name of Spaces) as necessary.
- Add quantity fields *Weight* and *Volume.*

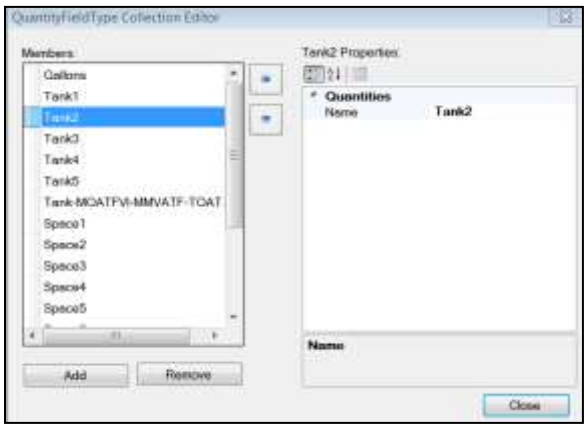


Figure 153 – Tanker Algorithm Volumes

- Select *File→Preferences→Defaults→Unload Rates.*
- Add the *Unld Rates* for each of the quantity field used in *Volumes.*
- Ensure the same *Volume Fields* for each item/product listed in the **Product Ratio File** are also used in the Stop File.

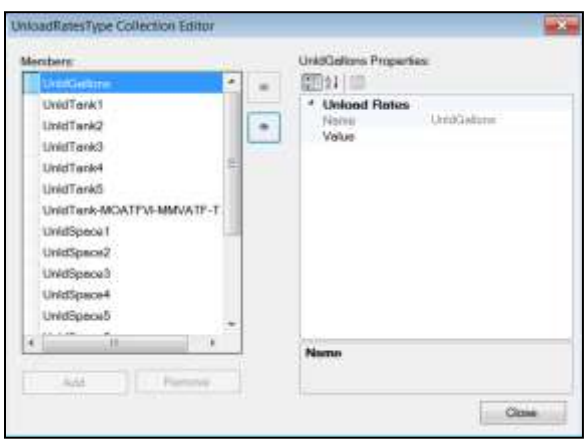


Figure 154 – Tanker Algorithm Unload Rates

L	M	N	O	P	Q	R	S	T	U	V
state	zip	COD	item	service code	itemcode	comments	weight	GALLONS	volume	pieces
AZ	86326	Y	WR520	WR520	WR520	WESTERN REF SAE 5W20 GF5 SN	412.5	0	15	1
AZ	86326	Y	COMPLIANCE	COMPLIANCE	COMPLIANCE	REGULATORY COMPLIANCE FEE	0	0	1	1
AZ	86326	Y	ENVFEE	ENVFEE	ENVFEE	ENVIRONMENTAL DRUM FEE	0	0	1	1
AZ	86326	N	MDEXOS020	MDEXOS020	MDEXOS020	AC DELCO DEX 1 SAE 0W20 GF5 SN	112.5	0	4.166669846	10
AZ	86326	N	MDEXOS530	MDEXOS530	MDEXOS530	AC DELCO DEX 1 SAE 5W30 GF5 SN	825	0	30	2
AZ	86326	N	MD1300CJ4	MD1300CJ4	MD1300CJ4	MOBIL D13 SUP SAE 15W40 CJ4 SM	412.5	0	15	1
AZ	85382	N	MSP520	MSP520	MSP520	MOBIL SPECIAL SAE 5W20 GF5 SN	0	55	0	0

Figure 155 – Tanker Stop File

9.12.2 Product Ratio File

The Product Ratio File is an *.XLS* spreadsheet that contains the product data (name or number) for items loaded in Totes, and the corresponding ratio for each (Gallons to Weight, Cube and Pallet, etc.) should be listed. The column headings/fields required in the file are listed below, and once complete, should be saved in same the DirectRoute/Data Folder with the Stop and Truck Files.

- **Product Code** – Code/name assigned to a specific product unit.
- **Gallons** – The number of gallons in one product unit.
- **Weight** – The weight of one product unit.
- **Cube** – The number of cubes in one product unit.
- **Pallet** – The number of pallets assigned to one product unit.

Map ProductRatio.xlsx

	A	B	C	D	E	F
1	Id	ProductCode	Gallons	Weight	Cube	Pallets
2	1	MOTE24	1	7.5	1	1
3	2	ACDFM	1	7.5	1	1
4	3	KGS530T5	1	7.5	1	1
5	4	KGS520T	1	7.5	1	1
6	5	DRUMPMPOFF	1	7.5	1	1
7	6	CHSB530	1	7.5	1	1
8	7	MJ2	1	7.5	1	1
9	8	MDEXOS020	1	7.5	1	1
10	9	MDSYNATF	1	7.5	1	1
11	10	TD020	1	7.5	1	1
12	11	TD530	1	7.5	1	1
13	12	KGDEXOS530	1	7.5	1	1
14	13	KGS530T	1	7.5	1	1
15	14	KGS530E	1	7.5	1	1
16	15	KGSB020T	1	7.5	1	1
17	16	KGS020T	1	7.5	1	1
18	17	KGHM520T	1	7.5	1	1
19	18	M1040	1	7.5	1	1
20	19	UTSLDO7590	1	7.5	1	1

Figure 156 – Product Ratio File

9.12.3 Tote File

The Tote File is an *.XLS* spreadsheet identifies each Tote in use, and its maximum capacity levels. The volume fields listed must be the same as the volume fields used in the *Product Ratio File*. This file, once complete, should also be saved in same the DirectRoute/Data Folder, with the Stop and Truck Files.

- **ToteID** – A number ID assigned to a specific tote.
- **Gallons** – The maximum gallon capacity of the tote.
- **Weight** – The maximum weight capacity of the tote.
- **Cube** – The maximum cube capacity of the tote.
- **Pallet** – The maximum pallet capacity of the tote.
- **Available** – Availability status of the tote, entered as TRUE or FALSE.

Map | Tote.xlsx

N24

	A	B	C	D	E	F
1	ToteId	Gallons	Weight	Cube	Pallet	Available
2	1	330	500	40	1	TRUE
3	2	330	500	40	1	TRUE
4	3	330	500	40	1	TRUE
5	4	330	500	40	1	TRUE
6	5	330	500	40	1	TRUE
7	6	330	500	40	1	TRUE
8	7	330	500	40	1	TRUE
9	8	330	500	40	1	TRUE
10	9	330	500	40	1	TRUE
11	10	330	500	40	1	TRUE
12	11	330	500	40	1	TRUE
13	12	330	500	40	1	TRUE
14	13	330	500	40	1	TRUE
15	14	330	500	40	1	TRUE
16	15	330	500	40	1	TRUE
17	16	330	500	40	1	TRUE
18	17	330	500	40	1	TRUE
19	18	330	500	40	1	TRUE
20	19	330	500	40	1	TRUE

Figure 157 – Tote File

9.12.4 Tanker Route Results

Tanker route results will be returned in the Route Book. Route totals and statistics can be viewed in the Summary page and individual route pages, as well as in the Info boxes (Route, Stop, Truck, Solution. In addition, a Tanker Chart is available, presenting a color-coded view of items loaded, including number of tanks and totes filled on each route, and remaining capacity levels. The Tanker Chart is opened in a separate window by selecting the chart icon in the top right corner of the Route Info box.

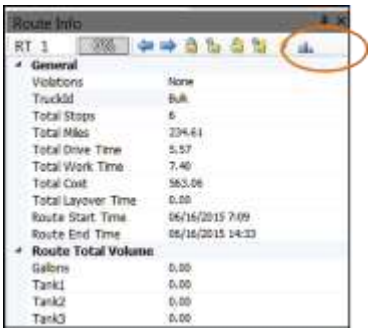


Figure 158 – Tanker Chart Icon

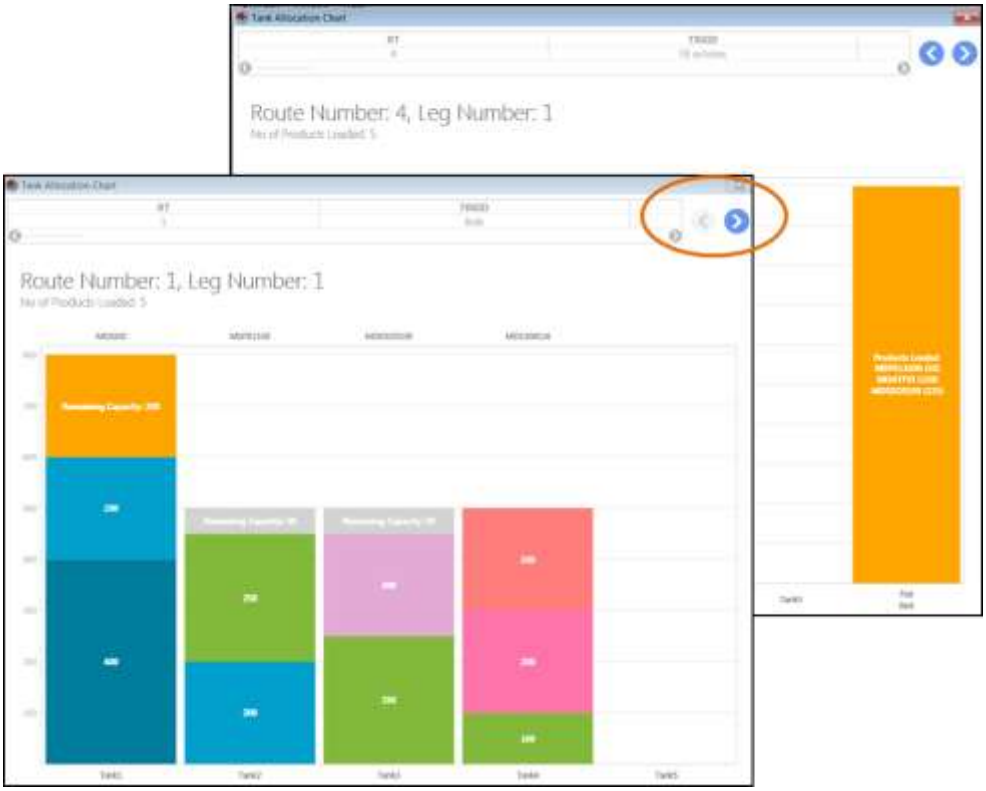


Figure 159 – Tanker Chart View

9.13 External Utilities (Merge Utility)

External Utilities contains an additional tool, the Merge Utility, that enables the merger of two or more Stop Files into one cohesive Stop File, even if all the columns are not the same or do not match. This tool can be extremely helpful, especially for those who use any of the additional add-on programs with DirectRoute (*SchedulePro, TerritoryPro, ResourcePro*).

To use the Merge Utility, the *Util.config* file (DirectRoute Directory) must be available and configured properly. If you do not have this file, or are not able to access it and would like to use this function, contact Trimble MAPS Support, **support@trimblemaps.com,** Phone: (800) 663-0626, Option 6 then Option 7.

The External/Merge Utility is accessed by using the icon on the DirectRoute toolbar. When the Utilities box opens, select the Merge Utility.

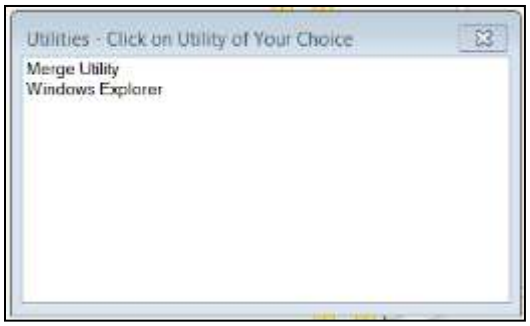


Figure 160 – External Utilities Menu

Tip: The Windows Explorer Utility simply provides a shortcut to the computer systems Explorer Window, enabling search/find of files or folders.

9.13.1 Using the Merge Utility

- Select Merge Utility from the listing in the Utilities box

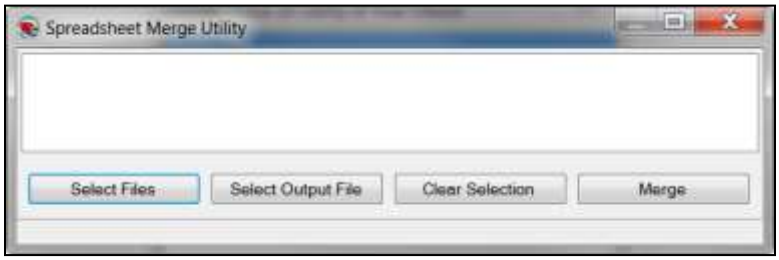


Figure 161 – Merge Utility

- Select the Select Files button to select both of files (one at a time) to be merged
- The file names will be listed in the white space of the box as they are selected
- If you select the wrong file, select the *Clear* button to remove it
- Next, select the *Select Output File* button and assign a name to the new merged file
- Select the *Merge* button, and the new file is created

Tip: The Merge Utility will create a new file by copying all the stops from the selected files. The original files used to create the merged file will remain intact and unchanged.

10 Drawings and Boundaries

DirectRoute contains a set of Drawing Tools that enables you to draw your own boundaries directly on the map, add borders around a group of stops or routes, and add text boxes or labels to shapes or areas on the map.

Drawings and boundaries can be used to define routes or territories, assign vehicles and/or drivers, or view statistical analysis for records within or outside the boundary. The map with drawings can be saved, printed, reused, and edited.

Drawings can be edited at any time on a new or saved drawing file.

Drawing Tools can be enabled in DirectRoute without any files open, or directly within a Stop or Truck File, or a Route File. If you are going to be working with a previously saved Drawing File, open it before attempting to activate the tool bar.

The Drawing Tools tool bar contains several line tools, as well as shape tools, shading tools, and color options for each. These tools can be used for various effects on the map, as well as within any Routing File, and all are detailed further in this section.

To activate the toolbar, select *Map→Tools→Draw* from the menu, or select the Drawing Tools icon from the menu .

The gold padlock icon on the screen enables locking Territories on the map, preventing them from moving during the planning phase, but still enabling them to be edited. When the mouse hovers over the gold padlock, an info box will open and advise whether the current item (s) have been stocked.

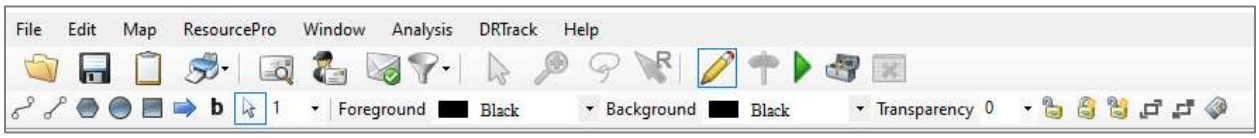


Figure 162 – Drawing Tools Menu

While the tool bar is activated, items from the DirectRoute menu may not available. To deactivate the tool bar and access the DirectRoute menu or any additional files, select the Drawing Tools icon from the menu.

10.1 Text Tool

The Text Tool enables placement of a text box on the map, similar to a text box on a presentation. It can be used to label territories, areas, or regions. Select and change font, style, size, color, and patterns, and chose borders around the text box.

- Select the *Text Tool* from the tool bar
- In the text dialog box that appears, type the text you want to appear on the map

- Select *Draw Borders*, to outline the box if desired
- Choose the font type, style, and size
- If you want the size of the text to change with the change in map size (zoom in/out), left click on *Scalable*
- Select the *Fixed Size* if you want the size to remain the same regardless of the map position/size

Figure 163 – Text Tool Dialog Box

- When all options have been chosen, select OK
- Position the mouse cursor over location on the map to place the text and left click once, then type the text
- To reposition the text, left click and hold the text box and move to desired location; release the mouse button to set in place

To clear the text box from the map, select *Map→Tools→Clear Drawings* from the tool bar and left click once on the text box.

10.2 Line Tools

Line tools can be used to draw your own boundaries directly on the map, add borders around a group of stops or routes, or define routes or territories.

Figure 164 – Line Tools

After drawing a line, the total distance can be displayed on the map. This can be useful to determine the distance between two or more points.

- Select the normal cursor icon (arrowhead) from the tool bar
- Position the mouse pointer over the line and left click (frame handles surround the line that is selected)
- The status bar, located in the lower left part of window, will display the total distance of the line

10.2.1 Polyline Tool

The Polyline Tool enables drawing multiple connecting line segments on the map. As each line segment is drawn, the status bar shows the length of the current line segment and the total length of

the polyline. After drawing the line, the total distance of the polyline can be displayed. This tool is also especially useful for displaying cumulative distances between areas on the map.

- Select the *Polyline Tool* from the tool bar.
- Select the map to indicate your start point.
- Move the mouse to the next point and left click; a drawn line will appear.
- Move the mouse to the next point and left click again.
- Continue repeating until your drawing is complete.
- Lines can reconnect at another point in the drawing and/or cross another.
- To end the polyline, press CTRL+ left click.
- To stop the *Polyline Tool* and return to the normal cursor, select the arrowhead icon on the tool bar.

To clear the drawing and start new, select *Map→Tools→Clear Drawings* from the menu and select the drawn object.

10.2.2 Line Tool

The Line Tool enables drawing a single line segment on the map. This tool can also be used to display the distance between two areas on the map.

- Select the *Line Tool* from the tool bar.
- Left click on the map to indicate your start point.
- Left click and hold to move the mouse towards your endpoint; notice the distance is displayed in the status bar as you move the line.
- When you reach the point at which you want to end the line, left click again.
- To stop the *Line Tool*, select the normal cursor icon (arrowhead) from the tool bar.

To clear the drawing and start new, select *Map→Tools→Clear Drawings* from the menu and select the drawn object.

10.2.3 Arrow Tool

The Arrow Tool enables drawing a line with an arrowhead at the end, or drop a triangle on the map to mark a spot. The arrow line is useful in pointing to objects or areas on the map. The distance of the arrow (line) is also displayed in the status bar.

- Select the *Arrow Tool* from the tool bar.
- left click on the map to indicate your start point, or drop point.
- If dropping a triangle to mark the spot, left click one more time to set.
- If drawing an arrow line, left click, hold and drag to the end of your line.
- To end the arrow line, left click again.
- To stop the Arrow Tool, select the normal cursor icon (arrowhead) from the tool bar.

To clear the drawing and start new, select *Map→Tools→Clear Drawings* from the menu and left click once on the drawn object.

10.3 Boundary Tools

A boundary is a completely enclosed shape. The boundary tools available include a circle, rectangle, and a polygon, and displayed with various patterns and colors. Boundaries can be used to:

- Denote a special attribute about an area using colors and patterns.
- Calculate the statistics of records within an area.
- Select records within a boundary for analysis.

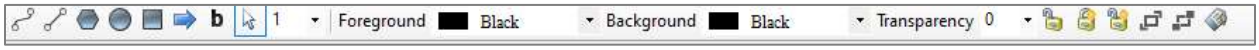


Figure 165 – Activate Boundary Tools

10.4 Polygon

The Polygon Tool enables drawing a boundary of any shape on the map. In addition, the polygon can be edited and sized by dragging the frame handles on the polygon.

- Select the *Polygon Tool* from the tool bar
- left click on the map to indicate your start point
- Move the mouse to the next point and left click; the drawn line will appear
- Move the mouse to the next point and left click again
- Continue repeating until your drawing is complete
- Press CTRL+ left click to end drawing the lines and your drawn shape will appear on the map
- To add a pattern inside the shape, left click inside the shape once, then left click on the chosen pattern
- To add or change background and/or foreground color, left click inside the shape once
- Select a Foreground/Background color using the drop-down arrow to choose
- Select the Color drop down arrow to choose color
- To end the Polygon Tool, select the normal cursor icon (arrowhead) from the tool bar.

To clear the drawing and start new, select *Map→Tools→Clear Drawings* from the menu and select the drawn object.

10.4.1 Circle Tool

The Circle Tool enables drawing a circle on the map. The circle can be drawn to a specific radius, which is displayed, on the status bar at the bottom of the screen.

- Select the *Circle Tool* from the tool bar.
- left click on the map to indicate your start point.
- left click and hold while moving the mouse outward to expand the size of the circle; release when the desired size is achieved.
- To add a pattern inside the shape, left click inside the shape once, then left click on the chosen pattern.
- To add or change background and/or foreground color, left click inside the shape once.
- Select a Foreground/Background color using the drop-down arrow to choose.
- Select the color drop down arrow to choose color.
- To adjust the position of the circle, left click, hold and drag to correct position location; release the mouse button to set in place.

- To end the Circle Tool, select the normal cursor icon (arrowhead) from the tool bar.

To clear the drawing and start new, select *Map→Tools→Clear Drawings* from the menu and select the drawn object.

Tip: Display The Radius of a Circle. Once a circle is drawn, you can display the radius in the status bar on the bottom left side of the map. Select the normal cursor icon (arrowhead) from the tool bar, then left click once within the shape.

10.4.2 Rectangle Tool

The Rectangle Tool enables drawing a rectangle on the map. As the rectangle is drawn, the width and length of the boundary is shown on the status bar at the bottom of the screen. These dimensions can also be displayed later.

- Select the *Rectangle Tool* from the tool bar
- Left click on the map to indicate your start point
- Left click and hold while moving the mouse outward to expand the size of the rectangle; release when the desired size is achieved
- To add pattern inside a shape, left click inside the shape, then left click on the chosen pattern
- To add/change background and/or foreground color, left click inside the shape once
- Select a Foreground/Background color using the dropdown arrow to choose
- To adjust the position of the rectangle, left click, hold and drag to correct position location, then release to set in place

To end the *Rectangle Tool*, select the normal cursor icon (arrowhead) from the tool bar.
To clear the drawing and start new, select *Map→Tools→Clear Drawings* from the menu and select the drawn object.

Tip: Display Dimensions of a Rectangle. Once a rectangle has been drawn on the map, you can display the dimensions in the status bar on the bottom left side of the map. Select the normal cursor icon (arrowhead) from the tool bar, then left click once within the shape.

10.4.2 Lock Tool

The Lock Tool provides the ability to lock and unlock shapes on the map to prevent them from being moved while working with stops on the map. When the mouse hovers over the lock icon on the tool bar, a dialog box will open and indicate whether the drawings can be locked or unlocked. The three locking tools available are Lock Selected Shape, Lock All Shapes, and Unlock All Shapes.

Figure 166 – Territory Lock Tool

10.4.3 Hide Labels

While working in the Drawing File, toggle the Hide Labels icon to show or hide the labels or text boxes attached to drawn objects on the map.

10.5 Using Boundaries

Boundaries can be used to analyze the information in a data table and view the results on the map. The three main functions used with boundaries include:

- **Template Overlay** – Denote a special attribute about an area using colors and patterns
- **Statistics Calculation** – Calculate the statistics of records within an area
- **Build to Value** – Select records within a boundary for analysis

To use boundaries for any analytical function, the boundary must first be drawn (**Boundary Tools**). Ensure the file to be analyzed is open as well.

10.5.1 Overlay Template

The Template function enables pasting data into records that exist either inside, or outside of the boundary.

Example: The boundary may represent a sales territory. By using the template overlay, you can change the symbol of all the customers within that sales territory, and not affect any records outside of that territory.

To select all the records within a boundary:

- Select the *Drawing Tools* icon from the menu
- Select the *Normal Cursor* icon (arrowhead) from the tool bar
- Left click within the drawn boundary
- Select *Edit→Template* from the menu

Figure 167 – Template Dialog Box

Select the Template Options to apply.

- **Overlay** – Selection status refers to records marked as TRUE in the Stop File; to select records within the boundary regardless of their selection status, check *Ignore Selection Status*

- **While Overlaying** – To change the selection status of the chosen records in the Stop File, choose *Select Records*
- Select OK

Select the Stop File tab and review the selection status of the records (should now reflect TRUE in the column labeled Selected).

- Select the F8 key to display statistical data for the selected records

To unselect and begin a new template overlay, select *Edit→Template* from the menu.

- Select *Selected Records Only*
- Select *Unselect Records*
- Select OK

Repeat the process to select new records for any further analytical review.

10.5.2 Statistics Inside a Boundary

View summary statistics for records inside a selected boundary.

- Open the spreadsheet
- Position the cursor over the drawn boundary and left click once to select it
- Select *Edit→Statistics* from the menu, or press the F8 key

The Statistics Info box will include two additional columns, *In Boundary* and *Out Boundary*, with the applicable statistical results displayed in each.

Use the Drawing Tools to define or alter the boundaries, as needed.

10.6 Build to Value

The Build to Value function color-codes locations based upon the geographical area and a volume criterion. DirectRoute will search in concentric circles from the starting point and apply a color and symbol to locations that fall within the criteria you establish.

The *Build to Value* function can be used for a variety of applications, including:

- Building a skeletal route based upon area and delivery quantities
- Build a sales territory based upon area and sales quantities
- Site location analysis (which customers can be serviced based upon warehouse capacity)

To use the *Build to Value* function:

- Review the Stop File and ensure that all stops are of the same symbol, color, and size
- Select the map tab to active the window if not already
- Zoom to the desired geographical area
- Select *Map→Tools→Build to Value* from the menu
- left click on the map where the geographical center of the territory will be located
- Select *Build by Symbols*

Figure 168 – Build to Value Dialog Box

- Select the *Search* button; ensure *Symbol, Color*, and *Size* are the same as the current selections
- Select the *Replace* button; select *Symbol, Color*, and *Size* to apply to locations in the new territory
- Select the applicable boundary option: *Within, Outside, Ignore*
- Use the *Criteria* drop-down button to select the column from the Stop File from which to choose
- Select the *Max Volume* the territory will contain (volume of the criteria chosen)
- Select the *Max radius* that the search will include
- Select OK to begin the *Build to Value* function

Tip: If the radius field contains a value, DirectRoute will search records in concentric circles until it reaches the first of the two value limitations; if the radius field is blank, DirectRoute will continue to search records until the maximum volume value is reached, or until boundary limitations are reached.

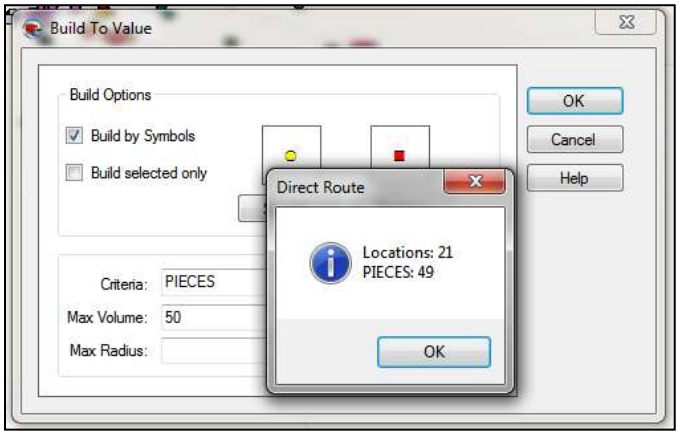


Figure 169 – Build to Value Results

DirectRoute marks all selected records with the color and symbol chosen with the Replace Option.

11 Exporting Route Info To ERP / WMS / OMS

When a routing solution has been completed, the results can be exported to your ERP/WMS/OMS for processing. The primary options used to retrieve this data are:

The primary options used to retrieve this data are:

- **Web Services** – Automatically pull order and account information from our software applications (DRTrack) in real time or in a daily/batch process.
- **XML File** – A simple, standard text file that contains a specific set of data fields, enables sharing pertinent information that multiple interchanges can.
- **Upload File (UPL)** – An Upload File (UPL) in standard text format, customizable to allow selection of desired data fields, while omitting data not needed. (Requires an Upload Format File (URP) be created)

11.1 Export with Web Services

Exporting a routing solution from DirectRoute using web services requires the use of DRTrack, our web-based GPS tracking program. The info is exported and then uploaded to DRTrack from DirectRoute, where DRTrack can automatically send the info via web services to your ERP/WMS/OMS when a request is received for the info. The request/response via systems can be scheduled to occur automatically on a recurring basis.

Before attempting to export the routing solution, ensure **Preferences** have been updated to include all necessary information.

Figure 170 – DRTrack Preference Settings

DRTrack URL – Your DRTrack URL address, to which routes and/or Master Accounts will be uploaded.
Company Name – Your Company name.
DRTrack Username – Your DRTrack username.
DRTrack Password – Your DRTrack password.
DRTrack Proxy Server – (If applicable)
DRTrack Proxy Port – (If applicable)
DRTrack Proxy Username – (If applicable)
DRTrack Proxy Password – (If applicable)
DRTrack Timeout – Set timeout value in minutes.
Branch – Use the drop down menu to select Branch name (add names, as necessary; requires at least one)
Default Branch – Select the Default Branch name from the drop down menu (Branch names entered in **Branch**).
Profiles – Leave blank for all, or use the drop down menu to select (add Profile names, if used).
Route Upload Version – Enter the number 5, or other number for older versions of DRTrack
Master Profiles – Leave blank or select from the drop down menu (add Profile names, if used).
Shift – Leave blank or select from the drop down menu (add Shift info, if used).
Account Master Upload Version – Select 1.0 or 2.0
Use LoadID from Stop File – Select TRUE or FALSE
Compression Method – Select none or GZip
Manage Master Profile Routes – Leave blank or select from the drop down menu (add Profile names, if used).
Skip Empty Routes – Select TRUE or FALSE to skip empty routes on upload.

To export a routing solution to DRTrack you will need to be in the routing mode.

- With the routing solution open, click on the menu item **DRTrack** and then click **Export to DRTrack**.

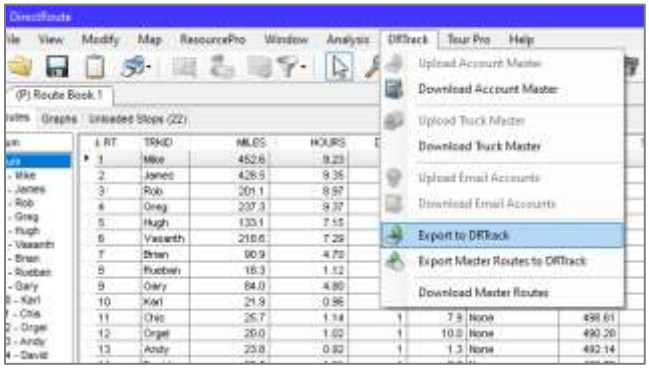


Figure 171 – Export to DRTrack

- Click to add a check mark to select **Skip Empty Routes** and/or **Overwrite Existing Entries** and then click on the **Export** button.
- When the Export info box opens indicating a successful export, click on **OK**.
- Click on **Yes** or **No** to close the routing files when the next info box opens.

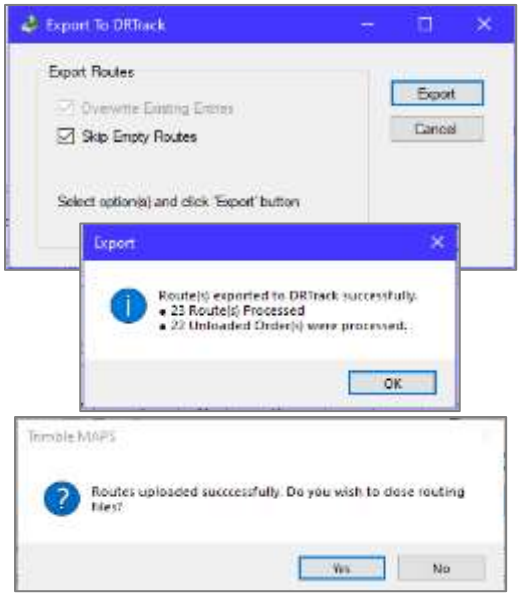


Figure 172 – Successful Export to DRTrack

11.2 Export an XML or Upload (UPL) File

DirectRoute can export an XML file or Upload (UPL) file to relay order and route information directly to your ERP/WMS/OMS. Both files are created in simple text format and can easily be consumed by most applications.

The primary difference between an XML file export and a UPL file export is that the XML file is a fixed-data field file, and it will contain all data fields available with no ability to limit the amount of data passed, whereas a UPL file can be customized to limit the fields passed by selecting only the information needed. The UPL file also requires the creation and use of a Format file (UPF), to determine which data fields will be relayed during the export.

- XML File
  - Fixed-data fields; includes all available order, account, and route fields.

  - Cannot be customized to limit the type of data passed in the export.

- UPL Upload File
  - Can be customized to include only the fields of data needed, while excluding unwanted data.
  - Can be created/saved in various file formats, including UPL, XLS, CSV, TXT, and XML.
  - Requires the use of a Format (UPF) file, to determine which fields of information to include.

When creating an XML or UPL file, you will first need to ensure that **Preferences** have been updated and set to specify upload and export options.

From the main menu, select

- *File → Preferences → Upload*

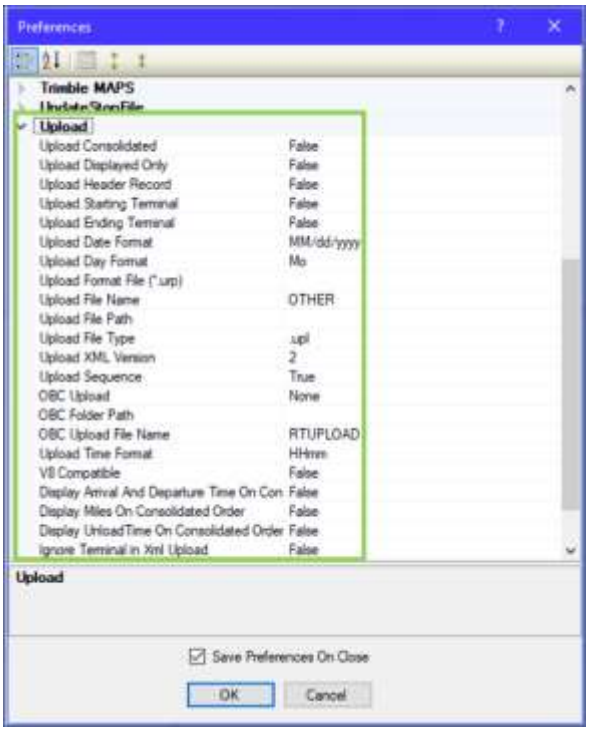


Figure 173 – Upload Options

The following options should be reviewed and selected as needed.

Upload Consolidated – By default, the UPL file will list each order separately regardless of whether or not consolidate stops (Load tab) is chosen. If **Upload Consolidated** = TRUE, the orders/stops will be passed in a consolidated format in the UPL file. This is most useful when you do not require each order to be listed separately.
Upload Displayed Only – Set this option to TRUE to include only those routes that are displayed on the map (locked). If FALSE, the file will include all routes for that routing session.
Upload Header Record – Places a header row at top of the UPL file, with the number of routed orders.
Upload Starting Terminal – If TRUE, the starting terminal/distribution center will pass in the UPL file.
Upload Ending Terminal – If TRUE, the ending terminal/distribution center will pass in the UPL File.
Upload Date Format – Select the date format to be used, i.e. MM/DD/YYYY.

Upload Day Format – Select how the day of the week should be displayed; (ex. Monday, Mo or Mon).
Upload Format File (URP) – Enter the file name and path of the Format (URP) file that will be used; when updated here, the software will not ask for this during the upload process, it will only ask for the Upload File name. (Leave blank if using the XML upload file option)
Upload File Name – The default file name is RTUPLOAD, or use the drop-down arrow to select another name for the file (the file name can be changed after it is created).
Upload File Path – Enter the location (Path) to save the UPL file, if different from the current DirectRoute Data folder location.
Upload File Type – Choose the file type you would like produced (UPL, XML, TXT, CVS, or XLS)
Upload XML Version – Enter the XML version number (2 or 5).
Upload Sequence – If TRUE, the UPL will display orders by route and stop sequence numerically, same as it is displayed in the Route Book.
OBC Upload – Enables Onboard Computer System Upload File (OBC Upload File) format for PeopleNet, XATA, etc.
OBC Folder Path – The path to the OBC File.
OBC Upload File Name – OBC Upload File name.
Upload Time Format – Select the time format to be used (ex. H:mm).
V8 Compatible – TRUE or FALSE; enables backwards compatibility with DirectRoute Version 8.
Display Arrival and Departure Time on Consolidated Order – When TRUE, will display the same arrival/departure date for each order on the same stop (consolidated order).
Display Miles on Consolidated Order – When TRUE, will display the same miles for each individual order on the same stop (consolidated order).
Display Unload Time on Consolidated Order – When TRUE, will display the same unload time for each individual order on the same stop (consolidated order).
Ignore Terminal in XML Upload – When TRUE, will ignore the terminal, and only display orders.
Display Drive and Work Time on Consolidation – When TRUE, will display **Drive Time** and **Work Time** on consolidated orders.
Abbreviate Rt Violation – When TRUE, will abbreviate all route violations.
Display Total Distance on Consolidated Orders – When TRUE, will display the total distance on consolidated orders.

After all options have been reviewed and/or selected, ensure the file names/paths have also been updated in *File →Preferences →File Names/Paths.* This information will normally pass automatically when entered under the Upload options, but it's a good idea to check anyway.

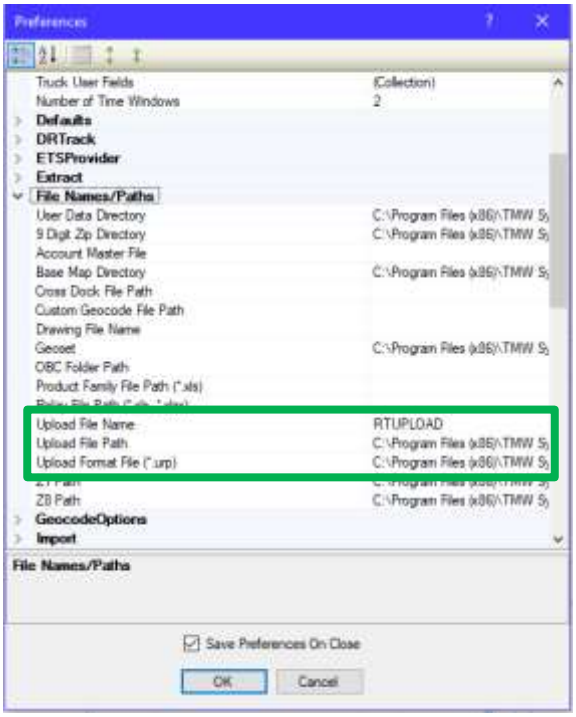


Figure 174 – Upload File Name/Path

11.2.1 Create an XML Upload File

An XML upload file is created while in the routing mode, after the routing project has been completed and saved. The data fields passed in the file is fixed, and cannot be customized.

- With the Route Book open, select *File→Run Post Process* from the menu.

Figure 175 – Run Post Process

If you did not previously enter a file name/path in the **Upload** section of *Preferences*, you will be prompted to select a file name and path, and then click the **Save** button.

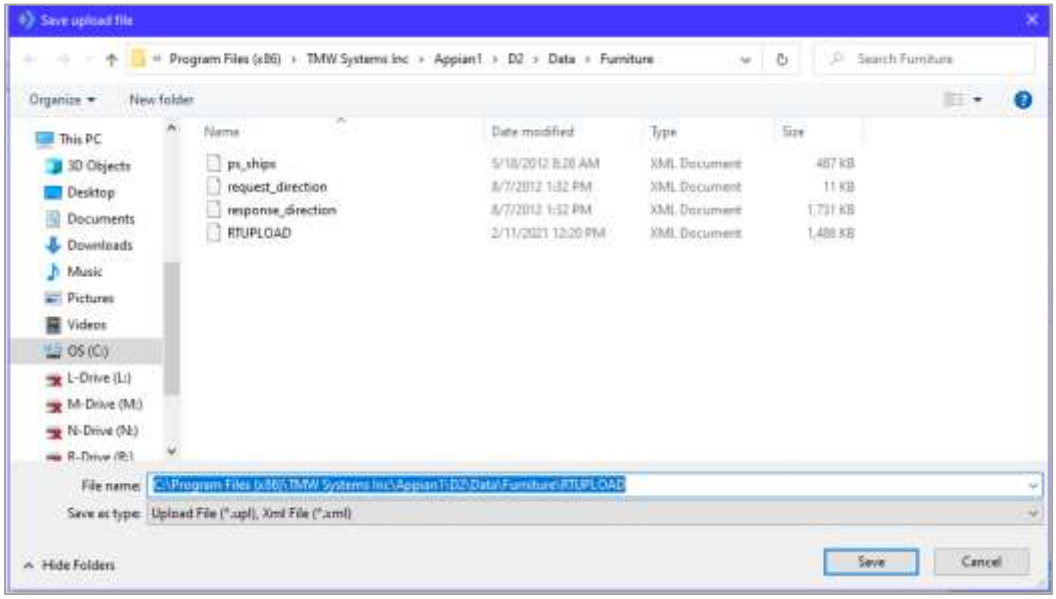


Figure 176 – File/Upload

When the file has been created successfully, an info box will appear with the file name and location of the saved file. If a previously produced upload file already exists, the info box that appears will ask if you want to overwrite the one that exists already.

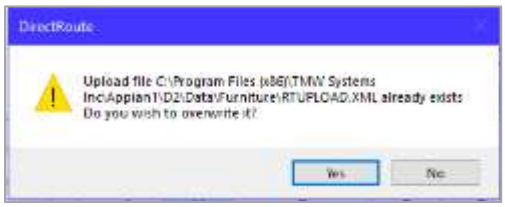


Figure 177 – Overwrite Existing Upload File

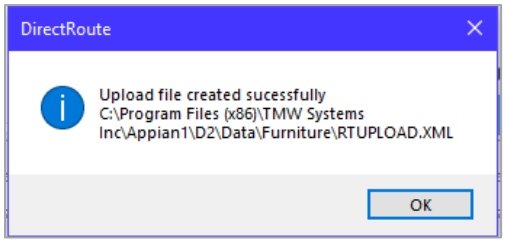


Figure 178 – XML File Created Successfully

You can open and view the saved export file at the path specified. The file is now ready to copy over to the ERP/WMS/OMS.

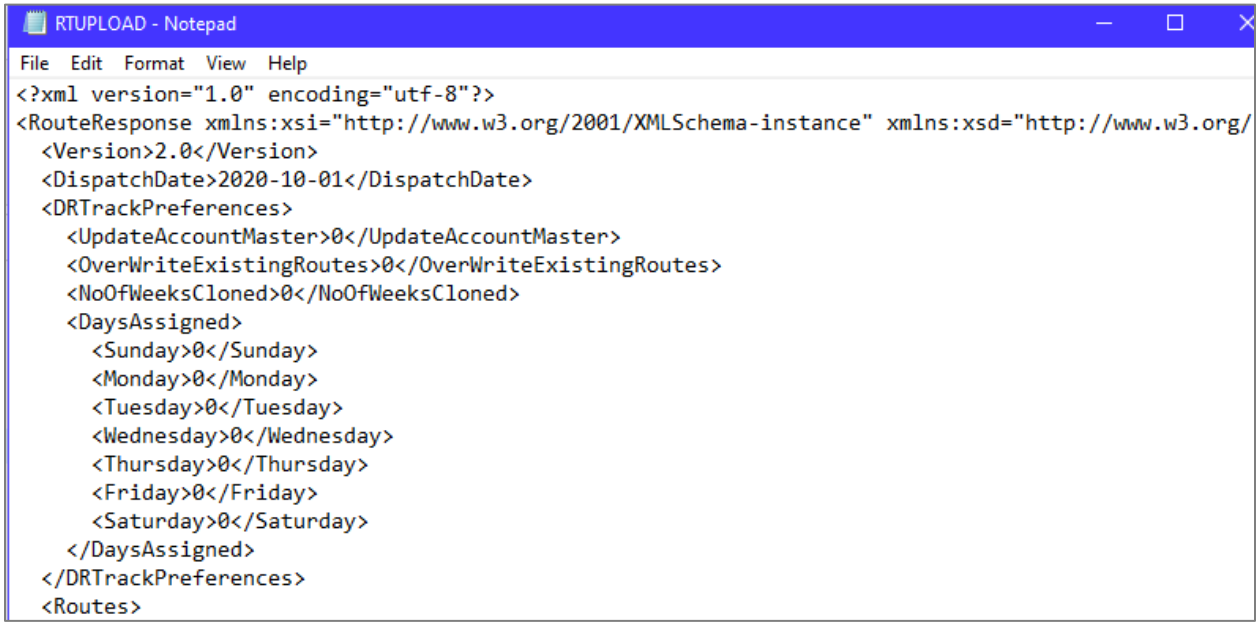


Figure 179 – Sample XML File Sample

11.2.2 Create a URP Format File

The URP file is a text formatted file that lists the data fields that should be exported in the Upload file. Using a URP file enables customization of the output data that will be in your export file; you get only the information you want, while excluding all other unnecessary data.

The URP file requires a specific header line, with the data fields listed below it. Each data field parameter is separated by a comma with no spaces. List each field in the order in which you want it produced, the same order in which it will be passed to the ERP/WMS/OMS.

To create a customized URP file, it's probably easiest to ask for a sample file and then edit that file to include/exclude the fields you want. However, you can create one from using Notepad or similar text program

- Open a new file and type the header line (including brackets): [Detail Section]
- Open the **URP Field Names Table** and copy/paste each field you want, directly below the header line
- Add an equal sign (=) after each one, no space between.

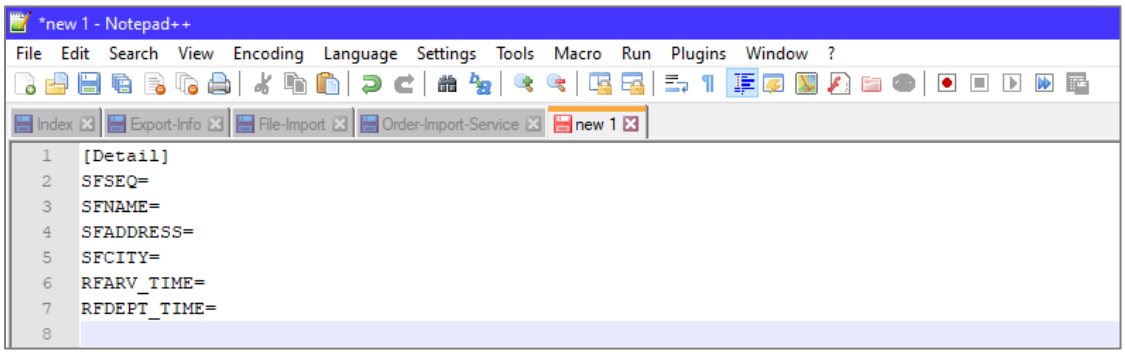


Figure 180 – Sample URP File

After you've copied all of the fields you want, add the five parameters for each field. Each parameter should be separated by a comma with no spacing between.

For example:
[Detail Section]
SFSEQ=1,2644,4,L,0
SFNAME=1,2356,30,L,0
SFADDRESS=1,1775,30,L,0
SFCITY=1,1839,30,L,0
RFARV_TIME=1,16,5,L,0
RFDEPT_TIME=1,172,5,L,0

Here is the same example, with a breakdown of the five parameters:

URP Field	Column#	Position#	# of characters	Left/Right justified	# of decimals
SFSEQ=	1	2644	4	L	0
SFNAME=	1	2356	2356	L	0
SFADDRESS=	1	1775	30	L	0
SFCITY=	1	1839	30	L	0
RFARV_TIME=	1	16	5	L	0
RFDEPT_TIME=	1	172	5	L	0

Figure 181 – URP Field Entry Format

- Field names must be **capitalized** (all letters)
- The first and second entries reflect the starting **Column** and **Position** of the data
- The third entry is the **Number of Characters** used for data in the field
- The fourth position is for **Text Justification** within the cell (L = Left, R = Right)
- The last entry number is the **Number of Decimals** allowed to follow any given number in the field

Once all the entries have been added, save the file as **.URP* in the DirectRoute Data Folder, and then update Preferences with the URP file name/path (*Preference→File Names/Paths*, and *Peference→Upload)*.

11.2.3 Create a UPL Upload File

When creating a UPL file, you will first need to ensure that **Preferences** have been updated and set to specify upload options, and that you have created and saved an URP Upload Format File. Follow the directions for option entries in **Section 11.2** and **Section 11.2.2** to create a format file.

To create the UPL Upload file,

- With the Route Book open, select *File→Run Post Process* from the menu.

Figure 182 – Run Post Process

You may be asked if you want to upload displayed routes only (versus all routes in the Route Book)

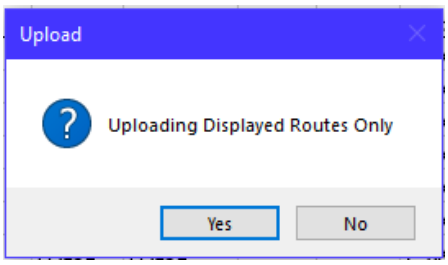


Figure 183 – Upload Displayed Routes Only

You should receive a notification box when the UPL has been created successfully.

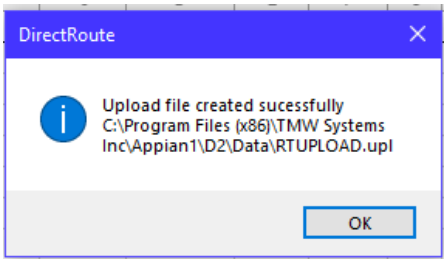


Figure 184 – UPL Created Successfully

To view the newly created UPL file, navigate to the location where the file was saved.

Below is a sample UPL file output. A few things to note:

- Header information will not be passed in the upload information.
- If there are ### in any field, there was an error in the processing.
  - Ensure a period has not been placed in the parameters, in the place of a comma.
- If there are *** in the UPL, the fields are too small to hold the requested data.

1	1	06H17964134	Zayas Maria	KAUFMAN	TX	0829	0829	04/08/2013
1	1	06H17969133	Zayas Maria	KAUFMAN	TX	0829	0829	04/08/2013
1	1	06H17964117	Zayas Maria	KAUFMAN	TX	0829	0853	04/08/2013
1	2	04T18168866	Leon D	GUNBARREL	TX	0930	0954	04/08/2013
1	2	04T18168866	Leon D	GUNBARREL	TX	0930	0954	04/08/2013
1	3	12H18164388	Goldstein Mark	ATHENS	TX	1025	1025	04/08/2013
1	3	12H18164388	Goldstein Mark	ATHENS	TX	1025	1025	04/08/2013
1	3	12H18164388	Goldstein Mark	ATHENS	TX	1025	1025	04/08/2013
1	3	12H18164388	Goldstein Mark	ATHENS	TX	1025	1058	04/08/2013
1	3	12H18164388	Goldstein Mark	ATHENS	TX	1025	1058	04/08/2013
1	3	12H18164388	Goldstein Mark	ATHENS	TX	1025	1058	04/08/2013
1	4	04C17756694	Seiferth Debbie	ATHENS	TX	1106	1106	04/08/2013
1	4	04C17756642	Seiferth Debbie	ATHENS	TX	1106	1106	04/08/2013
1	4	04C17756642	Seiferth Debbie	ATHENS	TX	1106	1106	04/08/2013
1	4	04C17756642	Seiferth Debbie	ATHENS	TX	1106	1106	04/08/2013
1	4	04C17756642	Seiferth Debbie	ATHENS	TX	1106	1141	04/08/2013
1	4	04C17756642	Seiferth Debbie	ATHENS	TX	1106	1141	04/08/2013
1	4	04C17756642	Seiferth Debbie	ATHENS	TX	1106	1141	04/08/2013

*Figure 185 – Sample *.UPL Upload File*

11.2.4 URP Field Names Table

ROUTE FIELDS	***DESCRIPTION***
RFARV_DATE	Arrival date at delivery location
RFARV_DAY	Arrival day at delivery location
RFARV_TIME	Arrival time at delivery location
RFARVTM_WITH_TZ	Arrival time at delivery locale w/Time Zone
RFBREAKTM	Break time for driver
RFCUM_DRV_TM	Cumulative drive time
RFCUM_WRK_TM	Cumulative work time on route
RFCUMQTY001	Cumulative Quantity1 of Order
RFCUMQTY002	Cumulative Quantity2 of Order
RFCUMQTY003	Cumulative Quantity3 of Order
RFCUMQTY004	Cumulative Quantity4 of Order
RFCUMQTY005	Cumulative Quantity5 of Order
RFCUMQTY006	Cumulative Quantity6 of Order
RFCUMQTY007	Cumulative Quantity7 of Order
RFCUMQTY008	Cumulative Quantity8 of Order
RFCUMQTY009	Cumulative Quantity9 of Order
RFCUMQTY010	Cumulative Quantity10 of Order
RFDEPDAY	Day of departure/dispatch day
RFDEPT_DATE	Route departure date
RFDEPT_TIME	Time of route departure
RFDEPTTM_WITH_TZ	Time of route departure with Time Zone
RFDIST_TO_PREV_STOP	Distance from previous stop
RFINCR_COST	Incremental cost of a stop. Calculates difference in miles, drvtm; if stop was added, applies mileage and hr cost
RFLAYOVER_TM	Overnight layover time within a route
RFREMAINCAP001	Remaining Capacity1
RFREMAINCAP002	Remaining Capacity2
RFREMAINCAP003	Remaining Capacity3
RFREMAINCAP004	Remaining Capacity4
RFREMAINCAP005	Remaining Capacity5
RFREMAINCAP006	Remaining Capacity6

ROUTE FIELDS	DESCRIPTION
RFREMAINCAP007	Remaining Capacity7
RFREMAINCAP008	Remaining Capacity8
RFREMAINCAP009	Remaining Capacity9
RFREMAINCAP010	Remaining Capacity10
RFSEQ_NO	Sequence number of stop within a route
RFTIME_TO_PREV_STOP	Time to Previous Stop
RFUNLOAD_TIME	Unload Time
RFWAIT_TM_AT_STOP	Wait time at stop
RFWINDOW_VIOLATION	Window Violation
RT_NUM	Route Number
RT%_ABSCAP001_USED	Absolute value of Qty1 for each stop on route divided by Trk capacity * 2 (pickup, delivery)
RT%_ABSCAP002_USED	Absolute value of Qty2 for each stop on route divided by Trk capacity * 2
RT%_ABSCAP003_USED	Absolute value of Qty3 for each stop on route divided by Trk capacity * 2
RT%_ABSCAP004_USED	Absolute value of Qty4 for each stop on route divided by Trk capacity * 2
RT%_ABSCAP005_USED	Absolute value of Qty5 for each stop on route divided by Trk capacity * 2
RT%_ABSCAP006_USED	Absolute value of Qty6 for each stop on route divided by Trk capacity * 2
RT%_ABSCAP007_USED	Absolute value of Qty7 for each stop on route divided by Trk capacity * 2
RT%_ABSCAP008_USED	Absolute value of Qty8 for each stop on route divided by Trk capacity * 2
RT%_ABSCAP009_USED	Absolute value of Qty9 for each stop on route divided by Trk capacity * 2
RT%_ABSCAP010_USED	Absolute value of Qty10 for each stop on route divided by Trk capacity * 2
RT%_CAP001_USED	Percent of cap1 used on route (10 cap fields avail)
RT%_CAP002_USED	Percent of cap2 used on route
RT%_CAP003_USED	Percent of cap3 used on route
RT%_CAP004_USED	Percent of cap4 used on route
RT%_CAP005_USED	Percent of cap5 used on route
RT%_CAP006_USED	Percent of cap6 used on route
RT%_CAP007_USED	Percent of cap7 used on route
RT%_CAP008_USED	Percent of cap8 used on route
RT%_CAP009_USED	Percent of cap9 used on route (
RT%_CAP010_USED	Percent of cap10 used on route
RTCAP001_USED	Route capacity1 used (10 cap fields avail)
RTCAP002_USED	Route capacity2 used
RTCAP003_USED	Route capacity3 used
RTCAP004_USED	Route capacity4 used
RTCAP005_USED	Route capacity5 used
RTCAP006_USED	Route capacity6 used
RTCAP007_USED	Route capacity7 used
RTCAP008_USED	Route capacity8 used
RTCAP009_USED	Route capacity9 used
RTCAP010_USED	Route capacity10 used

ROUTE FIELDS	DESCRIPTION
RTBACKHAUL001	Backhaul1
RTBACKHAUL002	Backhaul2
RTBACKHAUL003	Backhaul3
RTBACKHAUL004	Backhaul4
RTBACKHAUL005	Backhaul5
RTBACKHAUL006	Backhaul6
RTBACKHAUL007	Backhaul7
RTBACKHAUL008	Backhaul8
RTBACKHAUL009	Backhaul9
RTBACKHAUL010	Backhaul10
RTCOSTPERSTOP	Cost per Stop
RTDEL001	Total value of Qty1 delivered (Non negative quanties and excludes backhauls)
RTDEL002	Total value of Qty2 delivered
RTDEL003	Total value of Qty3 delivered
RTDEL004	Total value of Qty4 delivered
RTDEL005	Total value of Qty5 delivered
RTDEL006	Total value of Qty6 delivered
RTDEL007	Total value of Qty7 delivered
RTDEL008	Total value of Qty8 delivered
RTDEL009	Total value of Qty9 delivered
RTDEL010	Total value of Qty10 delivered.
RTCOSTPERQTY001	Cost per Quantity1
RTCOSTPERQTY002	Cost per Quantity2
RTCOSTPERQTY003	Cost per Quantity3
RTCOSTPERQTY004	Cost per Quantity4
RTCOSTPERQTY005	Cost per Quantity5
RTCOSTPERQTY006	Cost per Quantity6
RTCOSTPERQTY007	Cost per Quantity7
RTCOSTPERQTY008	Cost per Quantity8
RTCOSTPERQTY009	Cost per Quantity9
RTCOSTPERQTY010	Cost per Quantity10
RTEARLIESTLATEDATE	Shows the critical latest delivery date when Earliest/Latest Date is used.
RTENDDATE	End date of route
RTENDDAY	End day of route
RTENDTIME	Time route ends
RTSTARTDATE	Date route starts
RTSTART_DAY	Day route starts
RTSTARTTIME	Time route starts
RTFARTHESTSTOP	Distance to the farthest stop on the route
RTJULIANPLUSRT	Generate rt # for PeopleNet day of year +Rt# i.e. 050012 is rt 12 on the 50th day of the year
RTNONSTEMDIST	Non-Stem distance
RTPENALTYCOST	Penalty Cost
RTPICKUP001	Total value of Qty1 delivered (shown as negative quantities)
RTPICKUP002	Total value of Qty2 delivered
RTPICKUP003	Total value of Qty3 delivered
RTPICKUP004	Total value of Qty4 delivered
RTPICKUP005	Total value of Qty5 delivered

ROUTE FIELDS	DESCRIPTION
RTPICKUP006	Total value of Qty6 delivered
RTPICKUP007	Total value of Qty7 delivered
RTPICKUP008	Total value of Qty8 delivered
RTPICKUP009	Total value of Qty9 delivered
RTPICKUP010	Total value of Qty10 delivered
RTQTYPERHR001	Quantity1 per hour
RTQTYPERHR002	Quantity2 per hour
RTQTYPERHR003	Quantity3 per hour
RTQTYPERHR004	Quantity4 per hour
RTQTYPERHR005	Quantity5 per hour
RTQTYPERHR006	Quantity6 per hour
RTQTYPERHR007	Quantity7 per hour
RTQTYPERHR008	Quantity8 per hour
RTQTYPERHR009	Quantity9 per hour
RTQTYPERHR010	Quantity10 per hour
RTQTYPERMI001	Quantity1 per mile
RTQTYPERMI002	Quantity2 per mile
RTQTYPERMI003	Quantity3 per mile
RTQTYPERMI004	Quantity4 per mile
RTQTYPERMI005	Quantity5 per mile
RTQTYPERMI006	Quantity6 per mile
RTQTYPERMI007	Quantity7 per mile
RTQTYPERMI008	Quantity8 per mile
RTQTYPERMI009	Quantity9 per mile
RTQTYPERMI010	Quantity10 per mile
RTSTEMDIST	Route stem distance
RTSTOPSPERHR	Stops per hour on route
RTSTOPSPERMI	Stops per mile on route
RTTOAT_UNLD_TM	Route total unload time
RTTOT_DAYS	Total number of days on a route
RTTOT_DIST	Total distance of a route
RTTOT_DROPCOST	Total drop cost of a route
RTTOT_ELAPSED_TIME	Total elapsed time of a route
RTTOT_FIXEDCOST	Total fixed cost of a route
RTTOT_HRCOST	Total hourly pay cost of route
RTTOT_LAYOVERCOST	Total cost of layovers on a route
RTTOT_MICOST	Total mileage cost of a route
RTTOT_OTCOST	Total overtime cost of a route
RTTOT_PREPOST	Total pre and post time for a route
RTTOT_UNITCOST	Total unit cost on a route
RTTOT_UNLDHRCOST	Total unload hour cost on a route
RTTOT_WAITHRCOST	Total wait hour cost of a route
RTTOTAL_COST	Total cost of a route
RTTOTAL_DRV_TM	Total drive time
RTTOTAL_STOPS	Total stops serviced
RTTOTAL_WAIT_TM	Total wait time on a route
RTTOTAL_WRK_TM	Total work time on a route
RTVIOLATIONSYN	Violations yes or no
RTVIOLATIONSFULL	Violations (equip/capacity) on a route-Full
RTVIOLATIONSBRIEF	Violations (equip/capacity) on a route-Brief
RFEMPTYMILES	Empty Miles
RTTOTAL_HOURS_PERROUTEDAY	Total hours per route day

ROUTE FIELDS	DESCRIPTION
RTTOT_LAYOVERTIME	Total layover time of a route
RTTOTAL_MILES_PERROUTEDAY	Total miles per route day
RTTOT_LAYOVERS	Total no of layovers on a route
RTTOLLCOST	Toll cost per route
RTQTY001	Total Qty1 per route
RTQTY002	Total Qty2 per route
RTMILESPERQTY001	Route miles per QTY1
RTMILESPERQTY002	Route miles per QTY2
Stop Fields	Description of Field Info
SFADDRESS	Address of stop
SFADDRESS2	Extra address information
SFAMADJ	AM Rush Hour Speed Adjustment
RFBUFFERUSED	Total untilized buffer time
SFCITY	City the stop is located in
SFCOLOR	Color of stop displayed on the map
SFCONTACT	Contact name for stop
SFOPEN1	Earliest time for 1st delivery Time Window
SFCLOSE1	Latest time for 1st delivery Time Window
SFPATTERN1	Avail Del Days for first set of Time Windows
SFOPEN2	Earliest time for 2nd delivery Time Window
SFCLOSE2	Latest time for 2nd delivery Time Window
SFPATTERN2	Avail Del Days for 2nd set of Time Windows
SFDELQTY001	Quantity1 delivered to stop
SFDELQTY002	Quantity2 delivered to stop
SFDELQTY003	Quantity3 delivered to stop
SFDELQTY004	Quantity4 delivered to stop
SFDELQTY005	Quantity5 delivered to stop
SFDELQTY006	Quantity6 delivered to stop
SFDELQTY007	Quantity7 delivered to stop
SFDELQTY008	Quantity8 delivered to stop
SFDELQTY009	Quantity9 delivered to stop
SFDELQTY010	Quantity10 delivered to stop
SFEQCODE	Equipment code
SFFIXEDTIME	Fixed time for stop
SFEARLIESTDATE	EarliestDate for stop
SFID1	First Identifier for Customer/Acct (Account#)
SFID2	Second Identifier for Customer/Acct (Order#)
SFID3	Third Identifier for Customer/Acct (LineItem)
SFLATITUDE	Latitude coordinates of stop
SFLONGITUDE	Longitude coordinates of stop
SFLATESTDATE	LatestDate
SFNAME	Customer name
SFOUTPFROUTECOST	Out of Route cost for Stop
SFPHONE	Customer phone number
RFPENALTYCOST	Cost incurred for utilizing Early/Late Buffer
SFPICKUPQTY001	Pickup quantity1 (negative number)
SFPICKUPQTY002	Pickup quantity2 (negative number)
SFPICKUPQTY003	Pickup quantity3 (negative number)
SFPICKUPQTY004	Pickup quantity4 (negative number)

ROUTE FIELDS	DESCRIPTION
SFPICKUPQTY005	Pickup quantity5 (negative number)
SFPICKUPQTY006	Pickup quantity6 (negative number)
SFPICKUPQTY007	Pickup quantity7 (negative number)
SFPICKUPQTY008	Pickup quantity8 (negative number)
SFPICKUPQTY009	Pickup quantity9 (negative number)
SFPICKUPQTY010	Pickup quantity10 (negative number)
SFQTY001	Quantity1 of order
SFQTY002	Quantity2 of order
SFQTY003	Quantity3 of order
SFQTY004	Quantity4 of order
SFQTY005	Quantity5 of order
SFQTY006	Quantity6 of order
SFQTY007	Quantity7 of order
SFQTY008	Quantity8 of order
SFQTY009	Quantity9 of order
SFQTY010	Quantity10 of order
SFROW	Row # in the spreadsheet for the stop
SFRT	Route number
SFRTONLY	Displays only the Rt#, not Rt and Leg
SFSELECTED	Stop selected
SFSEQ	Sequence number of stop
SFSIZE	Size restriction
SFSTATE	State where stop is located
SFSYMBOL	Symbol assigned to the Stop
SFUNLDRATE001	Unload rate1
SFUNLDRATE002	Unload rate2
SFUNLDRATE003	Unload rate3
SFUNLDRATE004	Unload rate4
SFUNLDRATE005	Unload rate5
SFUNLDRATE006	Unload rate6
SFUNLDRATE007	Unload rate7
SFUNLDRATE008	Unload rate8
SFUNLDRATE009	Unload rate9
SFUNLDRATE010	Unload rate10
SFUSERFLD001	Stop File user field1 (20 fields available)
SFUSERFLD002	Stop File user field2
SFUSERFLD003	Stop File user field3
SFUSERFLD004	Stop File user field4
SFUSERFLD005	Stop File user field5
SFUSERFLD006	Stop File user field6
SFUSERFLD007	Stop File user field7
SFUSERFLD008	Stop File user field8
SFUSERFLD009	Stop File user field9
SFUSERFLD010	Stop File user field10
SFUSERFLD011	Stop File user field11
SFUSERFLD012	Stop File user field12
SFUSERFLD013	Stop File user field13
SFUSERFLD014	Stop File user field14
SFUSERFLD015	Stop File user field15
SFUSERFLD016	Stop File user field16
SFUSERFLD017	Stop File user field17
SFUSERFLD018	Stop File user field18

ROUTE FIELDS	DESCRIPTION
SFUSERFLD019	Stop File user field19
SFUSERFLD020	Stop File user field20
SFZIP	Zip code where stop is located
SFZONE	user defined zone of stop
SPDISTTODEPOT	dist from stop to depot
SPDISTTODEPOTSUM	sum of distance from stops to depot
SFDAYSBETWEENROUTES	Days between routes
SFFREQUENCY	Frequency for stop
SFGEORESULT	Geocode results
SFLEG	Leg number for stop
SFLTLCOST	LTL cost for the stop
SFMAXSPLITS	Max number of splits allowed per stop
SFAMSTART	Specifies start time of AM rush hour
SFAMEND	Specifies end time of AM rush hour
SFPMSTART	Specifies start time of PM rush hour
SFPMEND	Specifies end time of PM rush hour
SFPMADJ	Amount to adjust PM drive time
SFAMADJ	Amount to adjust AM drive time
RFTOLLCOST	Cost of toll for a stop
TW_GRAPH	Time window graph
RFCAPUSED001	Capacity1 used per stop (10 cap fields avail)
RFCAPUSED002	Capacity2 used per stop
RFCAPUSED003	Capacity3 used per stop
RFCAPUSED004	Capacity4 used per stop
RFCAPUSED005	Capacity5 used per stop
RFCAPUSED006	Capacity6 used per stop
RFCAPUSED007	Capacity7 used per stop
RFCAPUSED008	Capacity8 used per stop
RFCAPUSED009	Capacity9 used per stop
RFCAPUSED010	Capacity10 used per stop
Truck Fields	Description of Field Info
TFCAP001	Vehicle capacity1
TFCAP002	Vehicle capacity2
TFCAP003	Vehicle capacity3
TFCAP004	Vehicle capacity4
TFCAP005	Vehicle capacity5
TFCAP006	Vehicle capacity6
TFCAP007	Vehicle capacity7
TFCAP008	Vehicle capacity8
TFCAP009	Vehicle capacity9
TFCAP010	Vehicle capacity10
TFDROPCOST	Drop Cost
TFEARSTART	Earliest time vehicle can be dispatched
TFEDATE	Earliest date vehicle may be dispatched
TFFIXEDCOST	Fixed cost for operating vehicle
TFHRCOST	Cost per hour to operate the vehicle
TFLATFINISH	Latest time vehicle can finish the route
TFLAYOVERCOST	Cost per layover of vehicle
TFLDATE	Latest date vehicle may be dispatched
TFLOCK	Lock route
TFMAXDRIVETM	Maximum drive time for the vehicle/driver
TFMAXLAYOVER	Maximum layover allowed

ROUTE FIELDS	DESCRIPTION
TFMAXWORKTM	Maximum work time for vehicle/driver
TFMICOST	Cost per mile to operate the vehicle
TFMINLAYOVER	Minimum layover required
TFOTCOST	Over time cost
TFSPEQ	Special equipment identifier (corresponds to equipment code in Stop File)
TFSTATUS	Vehicle utilized (Y or N)
TFTRKID	Unique identifier for vehicle
TFUNITCOST	Cost per unit on vehicle
TFUSERFLD001	user defined field1
TFUSERFLD002	user defined field2
TFUSERFLD003	user defined field3
TFUSERFLD004	user defined field4
TFUSERFLD005	user defined field5
TFUSERFLD006	user defined field6
TFUSERFLD007	user defined field7
TFUSERFLD008	user defined field8
TFUSERFLD009	user defined field9
TFUSERFLD010	user defined field10
TFUNLDHRCOST	Unload hour cost
TFWAITHRCOST	Wait time cost per hour
TFBREAKTM	Break time for driver
TRDIST	Total distance driven (all routes)
TRDROPCOST	Total drop cost
TRDRV_TM	Total drive time
TRELAPSED_TIME	Total elapsed time
TRFIXEDCOST	Total fixed cost
TRHRCOST	Total hourly pay cost
TRLAYOVERCOST	Total layover cost
TRMICOST	Total mileage cost
TROTCOST	Total over time cost
TRSTOPS	Total stops serviced
TRTOTCOST	Total overall cost
TRTOTTM	Total time used
TRUNITCOST	Total unit costs
TRUNLD_TM	Total unload time
TRUNLDHRCOST	Total unload hour cost
TRWAIT_TM	Total wait time
TRWAITHRCOST	Total wait time cost
TRWRK_TM	Total work time
TFCITY	City the truck is located in
TFLATITUDE	Truck latitude
TFLONGITUDE	Truck longitude
TFPRETRIP	Pre Trip
TFPOSTTRIP	Post trip
TFUNLDPERF	Unload performance
ResourcePro Fields	Description of Field Info
RPDRIVER	Driver assigend to route in ResourcePro
RPTRUCK	Truck assigned in ResourcePro
RPTRAILER	Trailer assigned in ResourcePro
RPSTARTINGDRIVETIME	Drive Time Start in ResourcePro
RPSTARTINGWORKTIME	Work Time Start in ResourcePro

ROUTE FIELDS	DESCRIPTION
RPWORKHOURSBEFORE	Work Hours Before Next Route (Hours Between Routes)

Figure 186 – URP Field Names Table

12 Custom Road Edits

PC*MILER provides a number of ways to customize routing, including avoid and favor preference designations, that can be saved and used while generating routes and/or Distance Files in DirectRoute. To use these road edits in DirectRoute, the saved file (flattened_af.dat) can be copied from PC*MILER to the user's DirectRoute Data folder (ex. Program Files (x86)\TMW Systems Inc.\Appian\ALK\Data\File Name), where DirectRoute can access it.

Additionally, if PC*MILER Tolls was purchased with PC*MILER, you can generate accurate, up-to-date toll costs for U.S. and Canadian lanes with these costs integrated directly into the routing database and reported turn-by-turn per trip. Columns for toll costs appear in the PC*MILER Detailed Route Report, the State/Country Summary Report, and the Comparison Report, and tolls can be reported in either U.S. or Canadian dollars – using the current conversion rate.

For more information on using PC*MILER customized road edits, visit the PC*MILER Solutions web page, **PC*MILER User Guide**.

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13 ResourcePro Module

ResourcePro ™ is an optional, separately licensed strategic planning tool for use specifically with DirectRoute fleet routing and load optimization software. RP optimizes drivers and power units required for a weekly route schedule, and will help to reduce under-utilized fleet equipment and non-value-added driver hours, minimizing the fleet size required to operate a piece of dedicated business.

ResourcePro (RP) allows the user to look at routes in several different ways. It's designed to string routes together utilizing rolling **Hours of Service (HOS)** rules and slip-seating to optimize schedules of drivers and power units required for weekly routes. Reviewing the results of the ResourcePro output will show the user where routing may be optimized by moving a route to another Driver, vehicle, or to another day, if constraints allow.

The use of Gantt charts and detailed reports give ready use of information generated by the ResourcePro process, enabling the user to see where resources may be optimized by moving a route to another driver, another vehicle or even another day, if allowed by scheduling parameters.

13.1 ResourcePro Menu

Licensed users of ResourcePro can access the RP menu options directly from the DirectRoute main menu.

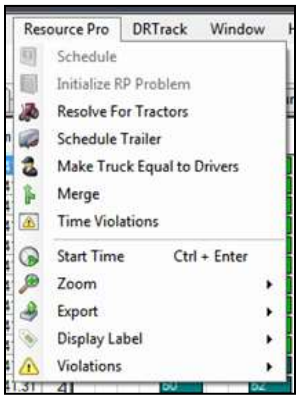


Figure 187 – ResourcePro Module Menu

- **Schedule** – This option launches the RP build that assigns trucks and drivers to selected routes.
- **Initialize ResourcePro Problem** – Allows for display of the current driver/truck assignments to be utilized. With this option, you can simulate the way the fleet is currently running.
- **Resolve for Tractors** – Will resolve for tractors only, without changing any of the route start times, unless manually overridden. This function is primarily used as a last step after routes have been manually reassigned and start times changed.
- **Schedule Trailers** – Recalculates the solution, scheduling trailers independent from drivers and/or tractors, with requested minimum hours between routes.
- **Make Trucks Equal to Drivers** – Recalculates the solution, making the number of Trucks used equal to the number of drivers used. The new solution is written to a file named Temp.Res saved in the current data folder.

Tip: Make Trucks Equal to Drivers is utilized on a solution that has already been computed.

- **Merge** – Allows two Route Files (daily routes) to be merged into one. To run an entire week of daily routes through RP, multiple merge functions may need to be performed
- **Time Violations** – Selecting Time Violations will turn the display to green. Any time violations in the routes will appear as red (wait time, return time, time window).
- **Start Time** – Change the Start Time on a route.
- **Zoom** – Zoom in or out of the Truck or Driver Gantt Charts.
- **Export** – Exports driver and truck statistics to a spreadsheet file (Driverstats.XLS, Truckstats.XLS); saved in the data folder.
- **Display Label** – Allows users to choose which labels are displayed on the Gantt charts; options include Truck Number, Start Time, Truck ID, Route Number, or None.
- **Violations** – If truck and/or driver violations occur when manually reassigning resources, you may choose to ignore specific violations rather than correcting them.

13.2 Create a New ResourcePro Schedule Solution

Once the Route Files have been created and initialized in DirectRoute, they can be used to build the ResourcePro schedule solution.

It is important to first review the Truck File MinLayover/Max Layover columns and MaxDriveTm and edit the hours to reflect the recommended settings for single drivers and/or driver teams. This will ensure necessary layovers are scheduled to provide drivers with required rest periods prior to taking more routes.

- Single Drivers: MinLayover = 10, MaxLayover = 18
- Driver teams: MinLayover = 0, MaxLayover = 0, MaxWorkTm = 24, MaxDriveTm = 24

Be sure to select Save before closing the Truck File if updates were made.

Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
EarStart	EDate	LatStart	LatFinish	LDate	MaxWorkTm	TargetWrkTm	MaxDriveTm	MinLayover	MaxLayover
0	1		2400	7	14		11	10	18
0	1		2400	7	14		11	10	18
0	1		2400	7	14		11	10	18
0	1		2400	7	14		11	10	18
0	1		2400	7	14		11	10	18
0	1		2400	7	14		11	10	18

Figure 188 – Truck File

To create the RP schedule solution, select *ResourcePro→Schedule* from the menu**.**

- Select the Route File that was created and initialized in DirectRoute
- Select *Open*

RP will now rename the Route File with a *.RESPRO* extension.

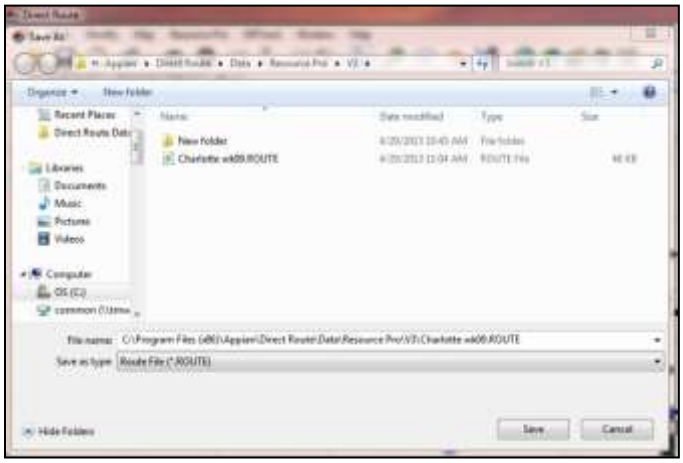


Figure 189 – Assign .RESPRO File Name

- Select *Save*

Once the **.RESPRO* file extension has been assigned and the file has been saved, the Scheduling Parameters dialog box will open.

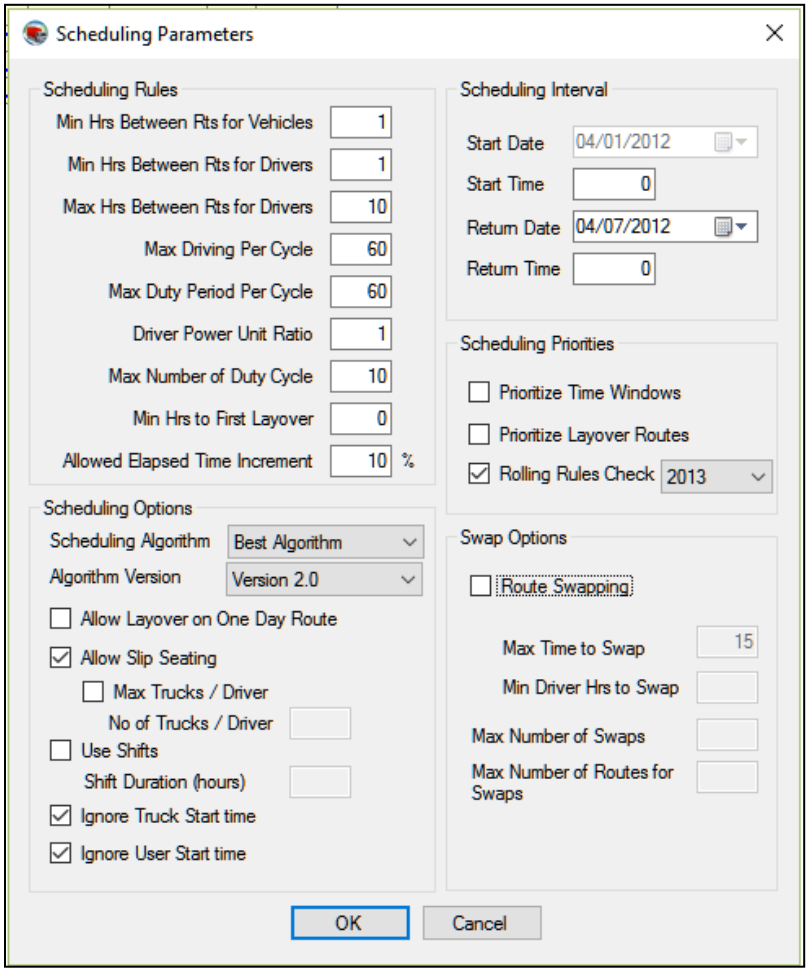


Figure 190 – Scheduling Parameters

13.2.1 Scheduling Parameters

- **Min Hours Between Routes for Vehicles** – This value is set to the minimum hours that are to be allowed between routes for a vehicle. It can be a decimal, as in .5, if only a half-hour is to be allowed. It can also be set to zero if no break is needed between the routes.
- **Min Hours Between Routes for Drivers** –This value is much like the previous option but is designed to set the minimum hours between routes for the driver.
- **Max Hours Between Routes for Drivers** – This value will set the maximum hours between routes for drivers. If a route assigned to the driver exceeds this amount, the route will be assigned to another driver.
- **Max Driving Per Cycle** – This value will assign the maximum number of hours that a driver may drive in the scheduling period. The number should be set to the maximum driving time allowed for the driver(s). Default is 60 based on current DOT rules.
- **Max Duty Period Per Cycle** – This value will assign the maximum number of hours that a Driver may work in the scheduling period. The number should be set to the maximum duty time allowed for the driver(s). Default is 60 based on current DOT rules.
- **Driver Power Unit Ratio** – Driver Power Unit Ratio is used when Best Algorithm is selected in the algorithm. The parameter attempts a solution with Drivers First, then Vehicles (Power Units), and then a solution with a combination of drivers and vehicles together. It then selects the best solution.
- **Max Number of Duty Cycles** – This option gives the user the ability to specify the max number of duty cycles for the scheduling period.
- **Min Hours to First Layover** – This option allows the user to specify the minimum number of work hours before the driver will take his first layover. Used to control the scenario where the route is dispatched immediately after another route and the driver is only on the clock for a couple of hours before he must take a layover.
- **Allowed Elapsed Time Increment** – Max increase in overall elapsed time, from the minimum, that can be scheduled; prevents RP from extending a route with one layover into 2 layovers or incurring a significant amount of wait time.
- **Scheduling Algorithm** – This option defaults to Best Algorithm, but may be changed to either Drivers First or Tractors First.
  - ***Best*** – This option will run *Tractors First,* then *Drivers First* option, and then a combination of *Tractors First/Drivers First;* selects the best result using the *Driver Power Unit Ration.*
  - ***Tractors First*** – If limiting Tractors is a priority, selecting *Tractors First* will try to limit the number of power units used; also a good option to run if you want to see how much the time windows are constraining the solution.
  - ***Drivers First*** – Selecting *Drivers First* will attempt to reduce the number of Drivers required; because it assigns the drivers and then the power units, it should not be used if slip seating opportunities are desired.
- Algorithm Version – Vers 2.0 should be used for all routing solutions.
- **Allow Layover on One Day Route** – This option will either allow or deny layovers on one-day routes; not checked by default.
- **Allow Slip Seating** – This option will allow or deny the use of slip seating power units; when checked (default), power units will be more fully utilized.
- **Max Trucks/Driver, No of Trucks/Driver** – The algorithm attempts to find driver schedules that are most compatible for sharing the same Truck; if Max Trucks/Driver is selected, input the number of trucks that can be assigned to any one driver in the No of Trucks/Driver box.

- **Use Shifts/Shift Duration (hours)** – This option attempts to schedule the drivers within the same shift for the entire week; using this option can cause an increase in number of drivers used. Route Swapping must be unchecked to use this option.
- **Ignore Truck Start Time** – Ignores Start Time displayed in the Truck File (LStart), allowing for optimal solution results.
- **Ignore User Start Time** – Ignores manually set (by user) start times. If not selected, manually set start times can be altered after the solution has been generated.
- **Start Date** – Not editable; default is the Dispatch Date.
- **Start Time** – The Start Time for the scenario; default is 0.
- **Return Date** – The date that the routing solution should end, with the last route being completed. Defaults to 7 days out from the Start Date.
- **Return Time** – Default is midnight (2400).
- **Prioritize Time Windows** – Checked by default. When using Version 2.0, RP will automatically comply with this rule, so no action to check/uncheck is necessary. If using Algorithm Version 1.0, use when:
  - *Earliest/Latest Date* or edited time windows are used to restrict (by time or date) when deliveries may be made; will schedule the restricted routes first before scheduling routes that have no restrictions on delivery time/date.
  - When this option is not used (*Version 1.0*) and restricted routes are present, ResourcePro may generate a solution that creates trucks with many routes and other trucks with only the restricted routes.
- **Prioritize Layover Routes** – This option attempts to group layover routes together to minimize the total number of Drivers that will require a sleeper. Checking this box will force the algorithm to prioritize layover routes, thus assigning them first before assigning one day routes.
- **Rolling Rules Check** – When not checked, will schedule a set of routes for each driver, up to 60/70 hours on duty in 7/8 consecutive days, then restart a 7/8 consecutive day period after taking the layover scheduled by DirectRoute (based on Min/MaxLayover in the Truck File).
  - ***The Rolling Rules Check (2012)*** – When checked, will schedule a set of routes for each Driver, up to 60/70 hours on duty in 7/8 consecutive days, then restart a 7/8 consecutive day period after taking 34 or more consecutive hours off duty
  - ***The Rolling Rules Check (2013)*** – When checked, will schedule a set of routes for each Driver, up to 60/70 hours on duty in 7/8 consecutive days, then restart a 7/8 consecutive day period after taking 34 or more consecutive hours off duty. Routes will include two periods from 1 a.m. to 5 a.m. home terminal time, once per week/168 hours, measured from the beginning of the previous restart
- **Route Swapping** – When this option is selected, will attempt swapping routes, much like Between Route Optimization in DirectRoute. The objective is to take a second pass at reducing the number of Drivers. Use Shifts must be unchecked to use this option.
- **Max Time to Swap** – Defaults to 15.
- **Min Driver Hrs to Swap** – If a driver has a number of hours equal or greater than the number entered, RP will not look to swap any of these routes. The value defaults to 45 but may be raised or lowered; a lower number will result in less drivers being candidates for swapping.
- **Max Number of Swaps** – The maximum number of swaps that can be made during the calculation of the solution. Default is 25 but can be raised or lowered.
- **Max Number of Routes for Swaps** – This entry will prevent adding routes to the least utilized resources.

Once you have selected the appropriate Scheduling Parameters, RP will launch into the routing solution. The Solution Files will open once the process has completed.

The Solution Files consists of the Route File, Truck File, Stop File, Driver Gantt Chart, and Truck Gantt Chart. To view each file, left click on the tabs at the top of the screen.

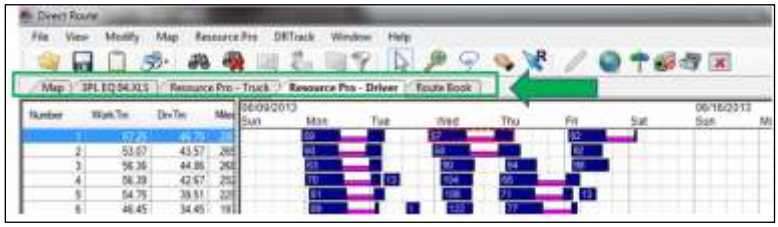


Figure 191 – ResourcePro Solution File Tabs

13.3 Gantt Charts

RP provides a detailed Gantt Charts and spreadsheet reports by Truck and Driver Files, across the routing week. The Gantt Charts are the main components of a solution; they display graphic events and statistics for each route and driver in two separate charts. Either of the charts can be saved to file and/or printed.

- The Truck Gantt Chart shows the number of trucks used in the routing solution
  - The left side panel displays the Truck ID numbers, as well as the work time, drive time, miles, and volume of each truck
  - The center panel consists of the actual chart, indicating each truck and the corresponding route assignment
- The Driver Gantt Chart shows the number of drivers used in the routing solution
  - The left side panel displays the driver ID numbers, as well as the work time, drive time, miles, and volume of each Driver
  - The center side panel consists of the actual chart, indicating each driver and the corresponding route assignment

Colors displayed on the charts are chosen from the Truck File color field. By default, the route's color is set to Lime.

The labels displayed on the Gantt Charts can be customized (changed) to indicate Route #, Truck ID, Truck #, Start Time (Route), Hours, Miles, or Drive Time.

Example: The label used in this Truck Gantt Chart is the Route#.

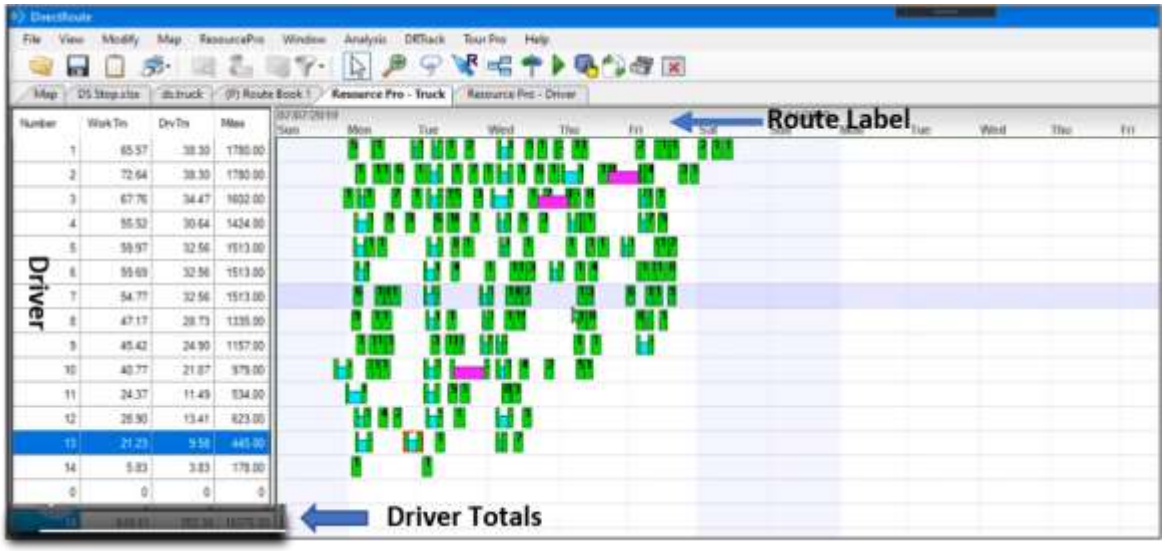


Figure 192 – ResourcePro Gantt Chart Labels

- To change the label, select *ResourcePro→Display Label* from the menu
- Select the label option you want displayed
- To change the font size of the label, choose *Display Label Font*
- Choose Font, Font Style, and/or Size, then click on the *OK* button

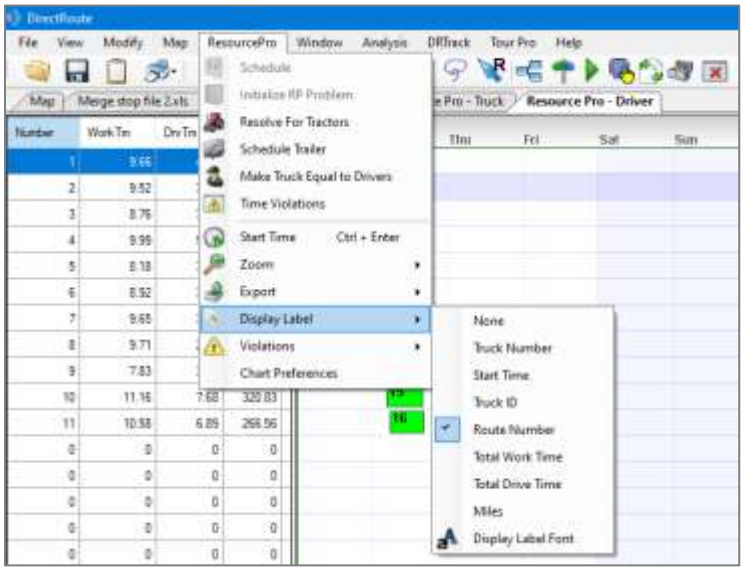


Figure 193 – Customize Gantt Chart Label

Figure 194 – Change Gantt Chart Label Font

You can also insert or delete a row, or asset directly on the Gantt Chart.

- Pick the desired location on the chart, then right-click and select *Insert Above/Below* or *Delete Row*

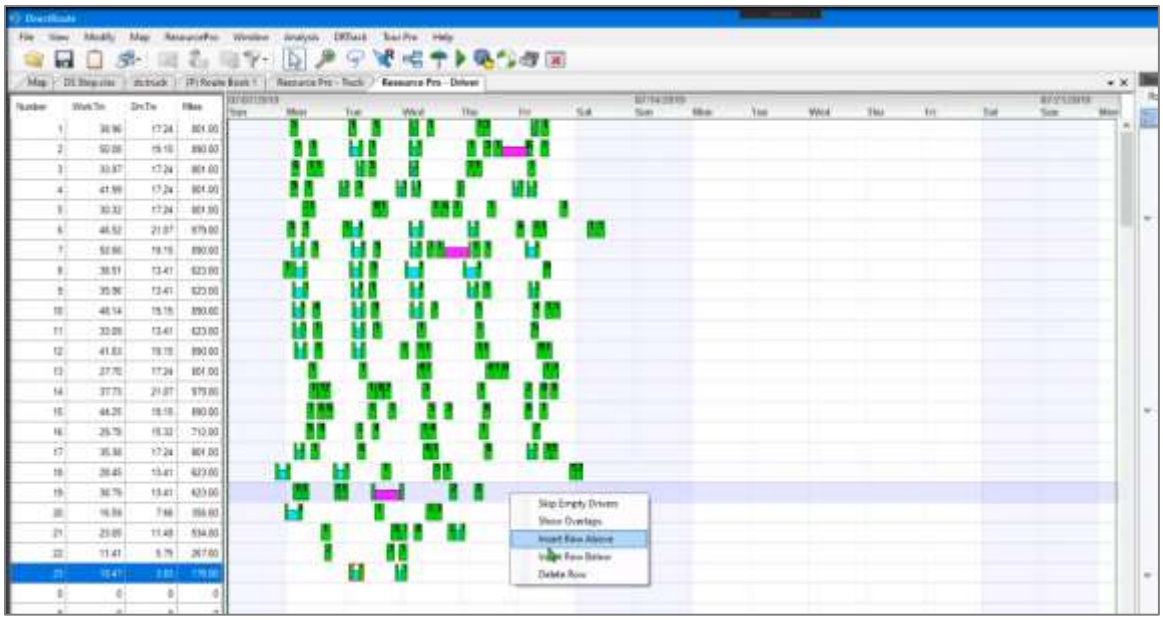


Figure 195 – Insert/Delete Rows

If attempting to delete a row (Route or Truck) with routes assigned to it, you will receive a message that indicates that all routes must first be removed before the record can be deleted.

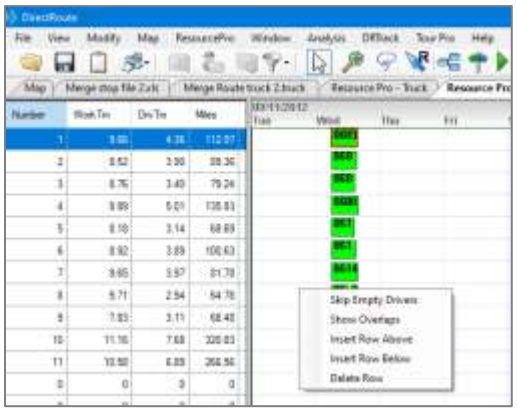


Figure 196 – Insert/Delete a Row on the Gantt Chart

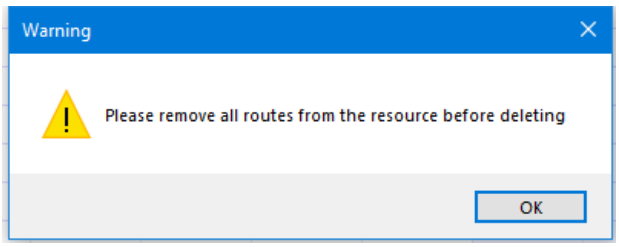


Figure 197 –Delete a Row with Routes Assigned

13.3.3 Info Display Box

To the right of the Gantt Charts are additional info boxes; Stop Info, Truck Info, Route, Solution and ResourcePro.

The Stop, Truck, Route, and Solution info boxes are identical to the info boxes provided in DirectRoute and can be viewed and used in the same way. The ResourcePro info box provides route specific DOT log data.

Select any route number in the Gantt Charts, or any truck or driver number in the Truck/Driver File, to populate and view the corresponding data in the Info box.

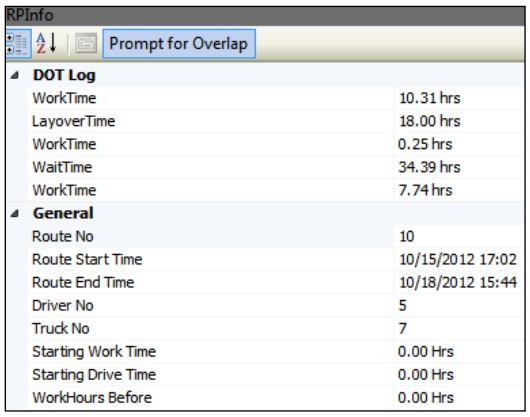


Figure 198 – ResourcePro Info Box

13.4 Reassign Resources

As you fine tune your routes and resources, it may be necessary to reassign trucks and/or drivers from one route to another.

In the left panel of either the Truck or Driver Gantt Chart, select the truck or driver number to reassign, or select the corresponding route number in the Gantt Chart to highlight the route.

- Click CTRL Enter and the route reassignment box will open

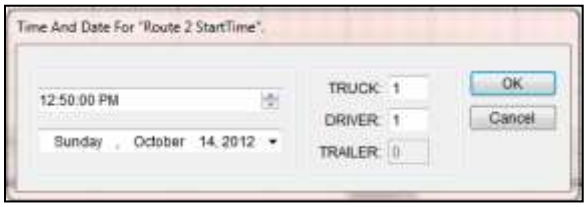


Figure 199 – ResourcePro Reassignment Info Box

- Change the Truck# or Driver# to the new number for this route
- If the reassignment will cause an overlap of resources, a warning box will appear

Figure 200 – Overlap Warning Dialog Box

13.4.1 Dragging Routes

You can slide or drag routes up and down on the Gantt Chart to reassign to a different truck or driver.

- Select and hold the route number in the Gantt Chart
- While holding, drag the route number to the position you want
- A Route Detail box will appear while you have hold of the route

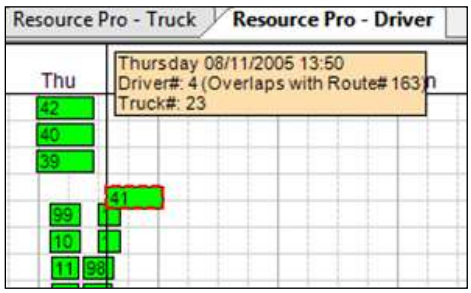


Figure 201 – Route Detail Box

If the move will cause an overlap of resources, a warning will show (Overlap Warning Dialog Box)**.** To ensure the route start time does not adjust during the reassignment of the resource, lock the Start Time/Day by holding the CTRL key while the drag/slide is in motion.

13.4.2 Lasso Routes

The Lasso can be used to move several routes at one time. Before beginning the lasso function, ensure there are no violations on any of the routes.

Left click once within the Truck or Driver Gantt chart to ensure the operation will be performed on the intended file, and then select the Lasso function from the toolbar above.

Figure 202 – Lasso Function

When the Lasso is selected, a gray double arrow will appear on the screen and will follow your cursor.

- Place cursor over the first route to be moved on the Gantt Chart and left click once
- Slide the cursor left or right to the last route to be moved, then left click once
- The gray arrow on this chart indicates the intended movement (based on the cursor movement and CLICKS)

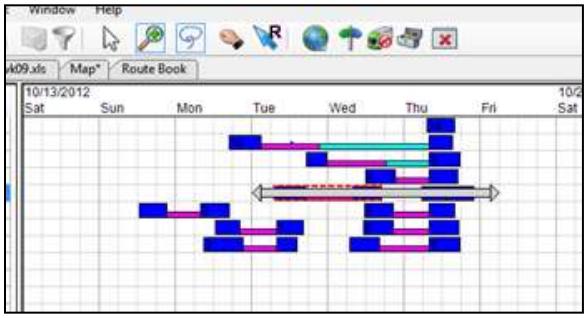


Figure 203 – Lasso Route Selection

The Lasso info box will appear with the selected routes listed and checked.

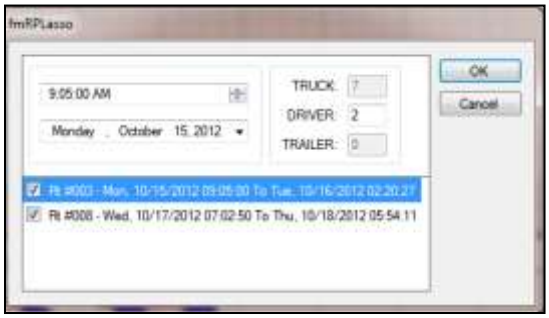


Figure 204 – Lasso Info Box

The *Start Time/Day* for the first checked route populates automatically.

- Select the checked box to deselect any of the routes
- Type in the new truck and driver# for the highlighted route in the info box
- Repeat for the next route, and so on
- Once all your changes have been made, select OK

Tip: The first route listed is the basis for the time stamp.

In this example, the routes were selected from the Driver Display. The truck number box is grayed and cannot be changed. If the routes had been selected from the truck display, then the driver number box would be grayed and unchangeable.

13.5 Reviewing and Resolving Violations

If violations do occur when scheduling routes with RP, they should be identified and resolved before proceeding.

- While viewing the Truck or Driver Gantt Chart, select *ResourcePro→Time Violations* from the menu

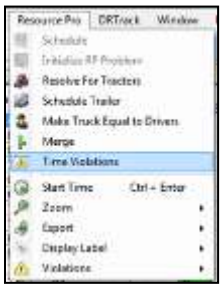


Figure 205 – ResourcePro Time Violations

The routes on the Gantt chart will change color and indicate where the violations exist.

- **Green** = No violations
- **Red** = Violations

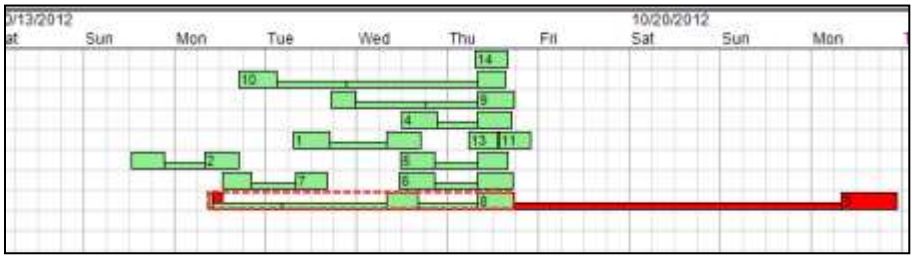


Figure 206 – Active Violations

Violations can also be viewed in the Route Info box or in the Route Book.

Figure 207 – Viewing Violations

Violations can be resolved either by drag/drop or by changing the Start Time/Day.

Often, moving the Start Time as little as one second is enough to remove the violation from the route, but other factors may have to be considered.

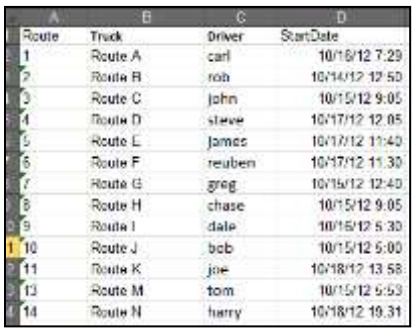
Each time the Start Time is changed, the Gantt Chart display will alter. If violations are still selected in the View menu, changes may be watched to check for correction of the violation. When the violation is corrected, ensure that it has not violated other parameters set for that route, such as layover, or wait time, etc.

13.6 Initialize a ResourcePro Problem

RP provides a tool to display current driver/truck assignments. Using this tool, you can simulate the way the fleet is currently running.

Create a Spreadsheet File using data from the current Route File.

- Open a new spreadsheet
- Create four columns and label as Route, Truck, Driver, and StartDate
- Copy the same data from the Route File and past into the spreadsheet
- Save the file in your data folder (save as *.XLS* file)



	A	B	C	D
1	Route	Truck	Driver	StartDate
2	1	Route A	carl	10/16/12 7:29
3	2	Route B	rob	10/14/12 12:50
4	3	Route C	john	10/15/12 9:05
5	4	Route D	steve	10/17/12 12:05
6	5	Route E	james	10/17/12 11:40
7	6	Route F	reuben	10/17/12 11:30
8	7	Route G	greg	10/15/12 12:40
9	8	Route H	chase	10/15/12 9:05
10	9	Route I	dale	10/16/12 5:30
11	10	Route J	bob	10/15/12 5:00
12	11	Route K	joe	10/18/12 13:58
13	13	Route M	tom	10/15/12 5:53
14	14	Route N	harry	10/18/12 19:31

Figure 208 – Initialize Spreadsheet

From the ResourcePro menu, select *File→Initialize RESOURCEPRO Problem*.

- Select the spreadsheet *.XLS* file that was just created
- Select the Route File containing the original data
- Select Initialize

Figure 209 – Initialize RP Problem

The display will then reflect the current Route, Driver, and Truck utilization information in the Gantt Chart.

13.7 Export ResourcePro Statistics

Statistics from the Truck and Driver Files can be exported into a spreadsheet. These statistics include total work hours, drive hours, stops, miles, dates and times for each driver and truck.

To export the statistics, select *ResourcePro→Export→Driver and Truck Statistics* from the menu.

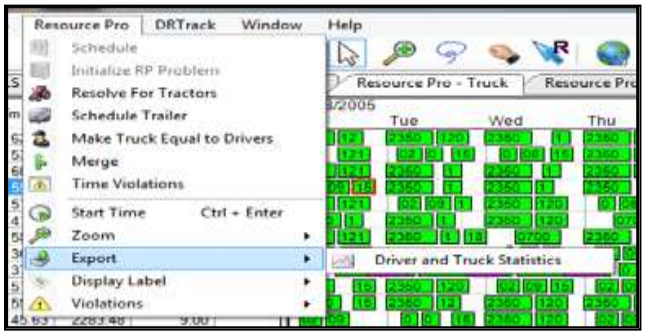


Figure 210 – Export ResourcePro Statistics

Two files are created upon export: *Truckstats.XLS* and *Driverstats.XLS*.

When the export has been successfully completed, a dialog box will appear to advise where the files can be located. Both files can be edited, saved, and/or used outside of RP.

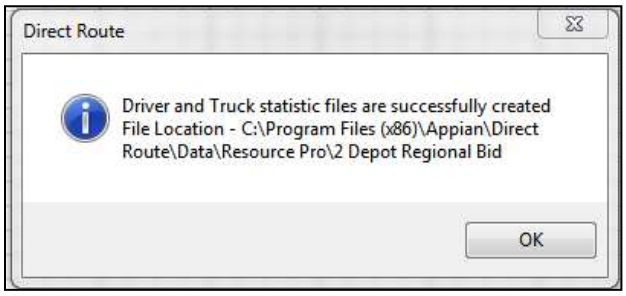


Figure 211 – Statistics File Created

A	B	C	D	E	F	G	H	I	J
Truck	WorkHours	DriveHours	Miles	Stops	Routes	StartDate	StartTime	EndDate	EndTime
1	70.63	62.63	3239.9	8	8	8/8/2005	0000	8/10/2005	2023
2	64.89	53.89	2688.0	11	11	8/10/2005	2350	8/10/2005	0736
3	68.92	60.92	3145.7	8	8	8/8/2005	0019	8/9/2005	1800
4	64.37	55.37	2817.4	9	9	8/8/2005	2350	8/9/2005	1800
5	67.30	57.30	2898.9	10	10	8/8/2005	0000	8/11/2005	0736
6	54.33	47.33	2425.2	7	7	8/11/2005	0700	8/8/2005	1248
7	67.92	58.92	3036.2	9	8	8/8/2005	2350	8/11/2005	1800
8	44.62	36.62	1825.7	8	7	8/8/2005	0000	8/10/2005	1800
9	46.11	37.11	1877.0	9	6	8/9/2005	0740	8/11/2005	1800
10	67.68	57.68	2919.6	10	10	8/8/2005	0000	8/11/2005	2034
11	68.58	59.58	3048.5	9	9	8/9/2005	2350	8/8/2005	1248
12	54.63	45.63	2283.5	9	9	8/9/2005	2350	8/9/2005	1248
13	52.54	42.54	2089.7	10	10	8/10/2005	0916	8/11/2005	1248
14	30.30	24.30	1186.6	6	6	8/9/2005	1209	8/11/2005	0736
15	54.83	44.83	2227.6	10	9	8/8/2005	0241	8/10/2005	0736

Figure 212 – Truck Statistics

14 Transportation Modeler Module

Transportation Modeler™ is a stand-alone application for exploring freight network scenarios and does not require integration with a TMS to offer value. It provides strategic analysis and decision-support for use specifically with DirectRoute fleet routing and load optimization software. It

Transportation Modeler (Trans Mod) includes powerful, last-mile routing capabilities that other modeling solutions lack to provide detailed insight to distribution and delivery plans. It uniquely considers the cost and size of any dedicated or private fleet when evaluating overall mode decisions, so it is perfect for asset-based 3PLs, dedicated carriers and distribution companies with their own trucks.

Trans Mod delivers multi-modal, what-if scenarios perfect for:

- Analyzing and preparing for freight network changes
- Responding to shipper RFP/RFQ with accurate bids
- Comparing multiple transportation plans
- Evaluating cost benefits with outside carriers and company fleets
- Exploring transportation mode shifts (LTL to TL) for cost savings
- Exploring business expansion and investment options

Features include modeling orders and shipments, dynamic and/or zone-based routing, one-way inbound or outbound routing, mixed delivery/pickup, backhauls, single- and multi-day routing, and LTL-to-TL and multi-stop consolidation.

14.1 Transportation Modeler Menu Items and Tools

The Trans Mod module is incorporated within the DirectRoute software and works in a similar fashion to DirectRoute but provides a more efficient routing solution. If you've previously generated routing solutions with DirectRoute, the use of this module will not be difficult.

The Trans Mod module is incorporated within DirectRoute. To use, select Transportation Modeler from the Module Menu in the top right corner of the screen.

Figure 213 – Module Menu

All the basic DirectRoute menu and toolbar options remain available for use while working in Trans Mod, in addition to a few unique items. If a menu or toolbar icon is gray and faded rather than colored and

clear, it means the item is not accessible at that time. You may need to have specific files open, be in the routing mode, or it may be accessible only when using another module.

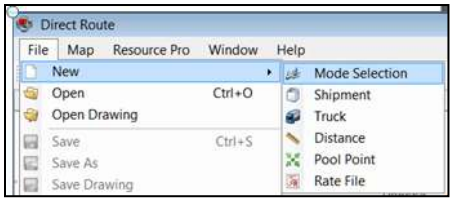


Figure 214 – Transportation Modeler File Menu

Selecting the menu item *File→New or File→Open* displays the types of files used in Trans Mod.

- **Mode Selection** – Select *New* to create a new Shipment Solution, or select *Open* to view an existing Solution File
- **Shipment** – Select *New* to create a new Shipment File, or select *Open* to view an existing Shipment File
- **Truck** – Select *New* to create a new Truck File, or select *Open* to view an existing Truck File
- **Distance** – Select *New* to create a new manual Distance File, or select *Open* to view an existing Distance File
- **Pool Point** – Select *New* to create a new *Pool Point File*, or select *Open* to view an existing Pool Point File
- **Rate File** – Select *New* to create a new Rate File, or select *Open* to view an existing Rate File

14.1.1 Rate Orders Tool

The Rate Orders Tool icon is located on the right end of the toolbar, directly below the main menu, and is only available when a Shipment File is currently open. The Rate Orders Tool will apply transportation rates (from a saved *Rate File*) to each shipment listed in an open Shipment File.

Figure 215 – Rate Orders Tool Icon

14.1.2 When to Use Transportation Modeler

Use the **Transportation Modeler vs. DirectRoute Spreadsheet** to identify when to use Transportation Modeler and when to use DirectRoute instead.

14.1.3 Transportation Modeler vs. DirectRoute

DirectRoute	***Transportation Modeler***	
Multi-Stop Routing	Multi-Shipment Routing	
OD Pairs is ≤ 10% of the problem set	OD Pairs is ≥ 10% of the problem set	
	DC Centric	***REMOTE SHIPMENT Centric***
	Shipments Originate from DC	Shipments Originate from any location
	LTL consolidation, or multi-stop consolidation	Determine mode type (LTL, TL) for shipments

	One-way inbound or outbound routing	Evaluate costs of outside carriers/fleets
	Dynamic and/or zone-based routing	Mixed delivery/pickup (backhauls, single-day, multi-day)
	Algorithm Fields Used	***Algorithm Fields Used***
	Uses same routing parameters as DirectRoute, in addition to ability to handle separate Origin and Destination stops (OD)	Does not use the DirectRoute algorithm; uses specific fields within the user Routing Preferences to calculate the Shipment Solution
	Turn Time	Depot Terminate Radius
	Lambda	Prevent Loading Pickup After Delivery On TL Routes
	Depot Service Radius	Depot Service Radius
	Cone Angle	Cone Angle
	Depot Radius	Depot Radius
	Max Out of Route Miles	Mode Select PF Max out of Route Miles
	Max Out of Route Miles Percent	Mode Select PF Max out of Route Percent
	Redispatch Iterations	Mode Select PF Max Allowed Empty Miles
	Max Wait Time	Mode Select PF Max Allowed Empty Miles Percent
	Max Distance Between Stops	Max Distance Between Stops
	Max Work Time in DOT Cycle	Max Work Time In DOT Cycle
	Box Expand	
	Max Closest Stops	
	Max Stops per Route	

Figure 216 – Transportation Modeler vs. DirectRoute

14.2 Create a New Transportation Modeler Project

A completed Trans Mod project results in a multi-shipment routing solution that considers shipment origination, mode type (LTL, TL), method (delivery or pickup), duration and distance, and costs of dedicated fleets vs. outside carriers. The steps used to create a new Trans Mod project is like creating a new routing project using DirectRoute.

Each new project consists of four primary steps:

- **Step 1 – Update/Set Mode Selection Settings**: Mode Selection settings are part of the software's **Routing Preferences**, and help the software determine how to build each shipment
- **Step 2 – Create/Update Transportation Modeler Files**: The three primary files used are a *Shipment File*, *Truck File*, and *Rate File*; these files will contain all the information needed by the software to calculate a shipment solution
- **Step 3 – Rate Shipments**: The Rate File contains the costs associated with the various methods of shipment (LTL, TL, etc.); used by the software in tandem with the Algorithm to determine the most efficient and lowest-cost network that satisfies all user-defined requirements and objectives for each shipment
- **Step 4 – Build a Shipment Solution**: Generates a multi-shipment routing solution

14.3 Step 1 – Update / Set Mode Selection Settings

Mode Selection settings, as well as a few other key setting fields, help the software determine and calculate the most efficient mode of transportation (Private Fleet, LTL, Common Carrier, etc.) based on mode types made available. The **Mode Selection Settings Table** lists the various fields and descriptions to help determine the best settings for each project. These settings can be found and updated in **Routing Preferences**, accessible from the main men Prior to beginning any new shipment project, it's important to review these settings and make any adjustments necessary based on the type of results expected from the software.

From the main menu, select *File→Preferences* and review/update the following items:

- **Configuration** – Add or update unique identifiers, volume types, and optional user fields
- **File Names/Paths** – Identify the path to the DirectRoute Data Folder, where the Shipment Files are maintained (Shipment File, Truck File, Rate File, etc.)
- **Mode Selection** – Determines the most efficient mode of transportation based on available mode types (see the **Mode Selection Settings Table** for a list of fields and descriptions to help determine the best settings for each project)
- **Other** – Update any/all other fields within **Routing Preferences**, that may be needed
- **Routing** – Identify shipment constraints and desired software behavioral actions

14.3.1 Mode Selection Settings Table

PREFERENCES / MODE SELECTION		
MaxRoutesPerShipment	3	Maximum number of routes per shipment. Default value is 3
Rate File	C:\Program Files (x86)\ Appian\DirectRoute \Data\RateTable	Path to location of the Rate File that should be used; normally located in the data file where the customers Shipment File and Truck File are maintained.
Distance File	C:\Program Files (x86)\ Appian\DirectRoute \Data\Distance.dist	Path to location of the Distance File that should be used; normally located in the data file where the customers Shipment File and Truck File are maintained.
Default TLRate	1.50	Default truckload rate
Weight	Weight	Select the primary quantify field used
Volume	Cube	Select the volume field used
Count	Skids	Qty to count (weight, cube, skids, etc.)
Security Credentials		Enter security credentials if using Rateware XL or UPS
FedEx Configuration		If using FedEx shipment modes, enter preferred service type
Wait cost in LTL shipments	150.50	Enter wait cost for LTL shipments; costs per hour
Border crossing delay	90	Enter any border crossing delay, in minutes

Max Allowed Work Hours in DOT Cycle	60	Enter the max allowed work time on a multi-day route
Team Rate Premium	890.00	Enter the dollar amount
Aggregate LTL Cost on Consolidation	(TRUE, FALSE)	If TRUE, will sum LTL cost on consolidation

Figure 217 – Mode Selection Settings Table

14.4 Step 2 – Create/Update Transportation Modeler Files

The Trans Mod files are used to provide the software specifics concerning shipment volumes, fleets available, shipment modes and rates, shipment rules, pickup locations and destinations, volumes, and availability. Creating and/or updating these files are key to generating the best possible shipment solution. The program utilizes data from the following files:

- **Shipment File** – The Shipment File is normally a tab delimited text file (*.XLSX* or *.XLS*) or a comma delimited file (*.CSV*). It is a composite list of all customers, order volume and frequency, typically created from an Order File.
- **Transportation Modeler Truck File** – The Truck File contains information relating to the delivery fleet, including driver and truck assignments, availability, start and end times, vehicle capacities, work rules, distribution centers or pool points, etc.
- **Transportation Modeler Distance File** – The Distance File contains distances and drive times from each pickup point to each stop, and/or distances from stop to stop
- **Rate File** – The Rate File contains transportation rates by mode of transport and volume, used to help calculate transportation costs for the shipments listed in the Shipment File

14.4.1 The Shipment File

The Shipment File identifies the specific shipments that need to be scheduled, where the shipments will originate (Origin Point), deliver or pickup (Destination point), volumes to be shipped, time/date limitations or expectations, etc.

If you already have a Shipment File, or a spreadsheet with the required information, it can be used in the project as long as it contains the required data columns, or a new Shipment File can be created that will automatically populate the necessary header columns and allow manual input of all data. Use the **Shipment File Fields Table** to assist in completing the required columns. Additional (optional) data fields can also be included in the Shipment File, if needed (ref. **Stop File Fields and Descriptions Table**).

Create/Update a Shipment File

- From the menu, select *File→Open→Shipment,* or *File→New→Shipment*.
- Enter the required data directly into the spreadsheet, or (double) left click on the first cell to open the Shipment Dialog box, allowing entry of all necessary data per shipment in one window.
- Geocode the Shipment File to locate the correct Lat/Long for each record listed in the file (Ref. **Geocoding Records**).

When completed, the file should be saved in the project folder (DirectRoute Data Directory).

14.4.2 Shipment File Fields Table

*Designated fields have entries for origin and destination	
REQUIRED FIELDS	***DESCRIPTION***
ID1	Primary unique identifier for the customer/stop. Example: Account#, Customer#.
Quantity/Volume	The volume type/quantity for the order (weight, cases, units, pallets, cubes, skids, etc.); should be the same as type used in the Truck File.
ClosedTW*	TRUE or FALSE. When set to TRUE, a vehicle must be at the point of origin/destination and complete loading/unloading before the Time Window closes.
Open1*	(0000-2400), enter the earliest time of day the stop can be serviced
Close1*	Latest time of day a stop can be serviced
Pattern1*	Days of the week in which to apply Open1/Close1
Longitude*	Longitude coordinates for the stop
Latitude*	Latitude coordinates for the stop
RECOMMENDED FIELDS	***DESCRIPTION***
ID2	Secondary unique identifier for the customer/stop, if drilling down to order level. Example: Store#, Stop#.
ID3	Tertiary unique identifier for the customer/stop, if drilling down to line item level. Example: Line Item, SKU.
Rt1	Origin Route assignment
Seq1	Origin Sequence assignment
Rt2	Destination Route assignment (must be same as Rt1)
Seq2	Destination Sequence assignment
Forced Mode	Assign specific shipment mode (TL, LTL), if/when necessary
{Volume Fields}	Amount of product that is being picked up at origin and delivered at destination
USEFUL FIELDS	***DESCRIPTION***
FreightClass	Freight class code
ID*	ID designation for Origin/Destination Point
Name*	The name of the customer/business
Contact*	Contact name
Phone*	Phone
Address*	Address
Address2*	Additional address info
City*	City of address used
State*	State of address used
Zip*	Zip code of address used
FixedTime*	Required time a truck will spend at the Origin/Destination Point, in addition to unload time
Symbol*	Symbol type to appear on the map, represents Origin/Destination Point
Size*	Size of symbol to appear on the map
Color*	Color of symbol to appear on the map
Earliest Date*	Earliest calendar date that origin can be picked up/destination can be delivered
Latest Date*	Latest calendar date that origin can be picked up/destination can be delivered
FIELDS TO USE IF DATA DICTATES	***WHEN TO USE***
Open2*	Second time window open, if needed
Close2*	Second time window close, if needed
Pattern2*	Days of the week in which to apply Open2/Close2, if used.

EarlyBuffer*	Allow loading/unloading before the Open1 Time Window; penalty cost is counted against the uses of the buffers.
LateBuffer*	Allow loading/unloading after the Close1 Time Window; penalty cost is counted against the use of the buffers.
PenaltyCost*	Used in conjunction with the EarlyBuffer/LateBuffer, to calculate and apply a penalty cost to stops that uses the buffers.
Drop Charge	Drop charge for each shipment; if used (File→Preferences→Routing→General Drop Count), will subtract drop cost from an equal number of stops on each route.
SzRestriction	Maximum size or volume for a vehicle that may deliver to this stop; limits truck size the load can be put on. Example: A quantity of 20,000 would mean that the customer load could only be put on trucks with a capacity of 20,000 or less in (Volume 1 field) the Truck File.
EqCode	An alphanumeric code used to designate special equipment or requirements for a stop (lift gate, refrigerated compartment, etc.). Corresponding Truck File field: SPEqCode.
FIELDS POPULATED BY RATE ORDERS FUNCTION	***DESCRIPTION***
TLMinCharge	Minimum charge applied for shipment by truckload
TLRate	The truckload rate per mile. Example: $2.5/mile, is input as 2.5
TLTeamMinCharge	Minimum charge applied for shipment by a driver team
TLTeamRate	The team rate per mile. Example: $2.5/mile, is input as 2.5
LTLCost	Cost per pound to ship via LTL
LTLTransitTime	Minimum time required to transport via LTL (in hours). Example: 72.00 = three days (72 hrs)
Distance	The distance in miles between Origin Point and Destination Point
FIELDS POPULATED BY GEOCODE FUNCTION	***DESCRIPTION***
AddressErr*	Error description, if any
GeoResult*	Indicates level of accuracy match to the address
FIELDS POPULATED BY THE SOLUTION	***DESCRIPTION***
Rt1 (Leg)	The Origin Route#
Seq1	The Origin Sequence# at Origin Point (order of loading)
Rt2 (Leg)	The Destination Route#
Seq2	The Destination Sequence# on Destination Route (order of loading)

Figure 218 – Shipment File Fields Table

14.4.3 The Transportation Modeler Truck File

The Truck File is a spreadsheet that contains all the information about the fleet (s) that could be used to make deliveries. Each row in the file represents a truck on which the shipments could be loaded. Some of the key fields in this file include vehicle Origin point, type, capacity, availability, work rules, and cost factors.

A new Truck File can be created in that will automatically populate the necessary header columns and allow manual input of all data. Use the **Transportation Modeler Truck File Fields Table** to assist in completing the required columns.

Create/Update a TM Truck File

- Select *File→New→Truck* from the menu
- A new spreadsheet will display with the required column headings

- Enter the vehicle data directly into the spreadsheet, or (double) left click on the first cell to open the Truck Dialog box, allowing entry of all necessary data per vehicle
- Geocode the completed file to locate the Lat/Long, if needed (Ref. **Geocoding Records**)

When completed, the file should be saved in the project folder (DirectRoute Data Directory).

Note: Address fields should only be used for Private Fleet vehicles but should remain blank/empty for Common Carrier vehicles. Address, City, State and Zip are optional if Latitude/Longitude is known, however, if geocoding is to be used, then at least one field (City, State or Zip) must be populated.

Note: If using Common Carrier Vehicles – Cost factors do not need to be included in the Truck File, as this information will be listed in the Rate File.

Note: If using Private Fleet Vehicles – After the Shipment and Truck Files have been prepared, a Distance File should be generated to be used in the Solution build (not used with C

Common Carrier vehicles). (Ref. *Generate a Distance File****)***

14.4.4 Transportation Modeler Truck File Fields Table

REQUIRED FIELDS	***DESCRIPTION***
TrkID	Truck ID entry may be a number, truck name, driver name, or vehicle name; any type of entry is acceptable
Available	TRUE or FALSE; must be set to TRUE to make the vehicle available for to use
One-way	TRUE or FALSE. Set to TRUE for vehicles that terminate at the last stop, not returning to the depot (Common Carrier); set to FALSE if the vehicle will return (Private Fleet).
Redispatch	TRUE or FALSE. Set to TRUE if vehicle will be re-dispatched if time remains in the workday; set to FALSE if Redispatching is not used
Capacity/Volume	The maximum capacity/volume that a vehicle may carry. Should be the same as the Volume1 type used in the Shipment File (weight, cases, units, pallets, cubes, etc.) to determine when the vehicle is full.
EDate	The earliest day, from the dispatch date, a vehicle may depart (date of Dispatch is DAY 1). One day vehicles may have an Edate of 1-7, depending on which day of the Dispatch cycle they are released to proceed.
LDate	The latest date a vehicle must return to the terminal; calculated from the dispatch date. A one day route may have an Edate of 1, but also an Ldate of 1, while a weekly route may have an Edate of 1 and an Ldate of 7.
WorkDay	Sets the hours in a normal work day; overtime rates begin after the work day has been completed.
NormalStart	The normal start time of the work day for the vehicle
MaxWorkTm	The maximum time a vehicle may be out before returning to the depot.
MaxDriveTm	The maximum drive time per shift before a layover is implemented.
Longitude	leave blank if using Common Carrier
Latitude	leave blank if using Common Carrier
RECOMMENDED FIELDS	***DESCRIPTION***
MinLayover	The minimum number of hours a vehicle can layover.

MaxLayover	The maximum number of hours a vehicle can layover.
MaxLayovers	The maximum amount of layovers allowed per route.
City	City of the address (leave blank if using Common Carrier)
State	State of the address (leave blank if using Common Carrier)
Zip	Zip code of the address (leave blank if using Common Carrier)
USEFUL FIELDS	***DESCRIPTION***
Symbol	Symbol type to appear on the map
Size	Size of symbol to appear on the map
Color	Color of symbol to appear on the map
USE IF DATA DICTATES	***WHEN TO USE***
MinTm	If redispatch is set to TRUE
TurnTm	If redispatch is set to TRUE
SpEq	If implementing territories, zone routing, special equipment needs, custom sequencing, or backhauls
EarStart	The earliest time (Military Time) vehicle may leave the terminal to begin a route.
LatStart	The latest time (Military Time) vehicle must be out of the terminal.
LatFinish	The latest time (Military Time) vehicle must return to the depot. Violation of the return time will result in a Return Time Violation.
Brk1Start	The break start refers to how far into the shift/route the break should start. If driver should take a break four hours into the route, enter the number 4. Note: Up to five break fields can be used.
Brk1Duration	The break duration for driver break times. Enter times in decimal or whole number format. Example: Half-an-hour = .5, 15 minutes would be .25, etc.
PreTrip	Used in accordance with DOT rules; time (minutes) added to start of each trip.
PostTrip	Used in accordance with DOT rules; time (minutes) added to the end of each trip.
POPULATED BY RATE ORDERS FUNCTION	***DESCRIPTION***
TLMinCharge	Minimum charge applied for shipment by Truckload
TLRate	The Truckload rate per mile. Example: $2.5/mile, is input as 2.5
TLTeamMinCharge	Minimum charge applied for shipment by Team
TLTeamRate	The Team rate per mile. Example: $2.5/mile, is input as 2.5
LTLCost	Cost per pound to ship via LTL
LTLTransitTime	Min time required to transport via LTL (hours). Example: 72.00 = three days
Distance	The distance in miles between Origin and Destination
POPULATED BY THE SOLUTION	***DESCRIPTION***
Rt1 (Leg)	The Origin Route#
Seq1	The Origin Sequence# (order of loading) at Origin
Rt2 (Leg)	The Destination Route#
Seq2	The Destination Sequence# (order of loading) on Destination Route

Figure 219 – Transportation Modeler Truck File Fields Table

14.4.5 Transportation Modeler Distance File

The Distance File contains a record of distances and drive times between the pick-up point (terminal, DC, etc.) and every city in the Stop File (stem distance), and/or pick-up point to every stop, and from stop to stop. When a Distance File is used in the routing process, DirectRoute will calculate the distances and drive times between each stop location based on the entries in this file.

If a Distance File is not used, DirectRoute will calculate distances and drive times using an adjusted straight-line distance (as the crow flies) between locations. When there is a Distance entry for a pair of Stops, the software will use the Distance and Drive Time listed in the file, instead of calculating distances based on Lat/Long Coordinates, or other barriers that may be present. A Distance File can also be generated to record Stem mileage, the Distance between the terminal and each city listed in the Stop File.

Before beginning any type of routing project, or generating a new Distance File, it is a good idea to review and edit, if necessary, the current Distance File settings in use by the software.

- From the menu, select File→Preferences→PreProcess→Generate Distance File
- Use the **Distance File Settings Table** to assist in updating each item, as necessary
- Select the OK button when all selections are completed

For more information or instructions on generating a Distance File, see **Generate a Distance File**.

14.4.6 The Rate File

The Rate File is a comma delimited file with a .rate extension, that contains the costs associated with shipments for each mode or type of transportation between two points (Origin and Destination). The file will be called upon by the software to apply rates and determine the best mode of transportation for each shipment listed in the Shipment File.

The information used in the Rate File should be updated from time to time to ensure the most accurate, current rates are reflected. The sources of rate information for this file vary, and may come from carrier bids, contract costs already sourced, Private Fleet cost records, and/or whichever means are normally employed.

A new Rate File can be created that will automatically populate the necessary header columns and allow manual input of all data. Use the **Rate File Fields Table** to assist in completing the required columns.

- Select *File→New→Rate File* from the menu
- To edit or update an existing Rate File, select *File→Open*, then select the file's name from the list of available files
- The file will open with the required column headings listed at the top
- Enter the necessary data directly into the spreadsheet under each column listed

When completed, the file should be saved in the project folder (DirectRoute Data Directory).

14.4.7 Rate File Fields Table

FIELD NAME	DESCRIPTION	REQUIRED OR OPTIONAL
Mode	Type of transport. TL = Truckload, LTL = Less than Truckload, PF = Private Fleet	Required
Origin	The point from which a shipment starts. Enter the two-letter state abbreviation if using Origin Type State; enter the Zip Code if using Origin Type Zip, enter the City name if using Origin Type City.	Required
Origin Type	The field type describing point of origin (City, State, or Zip)	Required

Destination	Where the shipment is going. Enter the two-letter state abbreviation if using Destination Type State; enter the Zip Code if using Destination Type Zip, enter the City name if using Destination Type City.	Required
Destination Type	The field type describing point of origin (City, State, or Zip)	Required
FgtClass	Freight Class; enter the numerical freight class code for the shipment. Example: 60 = car parts, 110 = cabinets, 85 = crated machinery, etc.	Required
Tariff	Input tariff information for CZARLITE. When used, the system will pull rates from CZARLITE instead of using pre-defined rates from the Rate File.	Optional
AdjustmentFactor	Adjustment allowance, if any. Used by rateware to adjust rates/apply discounts or can be used to off-set pre-defined rates in the Rate File.	Optional
Minimum	Minimum charge, if any, the carrier may charge.	Optional
FSCType	Fuel Service Charge. User defined code used to designate the type of Fuel Service Charge to be assessed. Example: Mileage based, percent based, etc.	Optional
FSCRate	Fuel Service Charge rate. An amount added to the freight invoice, above the starting point of the base freight rate.	Optional
RateType	Value used to calculate the rate. For LTL (based on weight) = $/Weight For TL (based on miles/distance) - $/Distance	Required
Rate1/ UpperRange1	Used to input incremental rate charges, up to 10 increments (Rate2, Rate3, etc.); enter the rate and rate type. Example: A carrier presents a price list based on distance. 0 – 500 miles = $3/mile, enter Rate1 = 3, UpperRange1 = 500 501 – 750 miles = $2.5/mile, enter Rate2 = 2.5, UpperRange2 = 750	Optional
DropStopCount1	The stop count number at which the carrier begins to assess additional fees for subsequent stops. Enter subsequent incremental stop counts as DropStopCount2, DropStopCount3, etc.	Optional
DropCost1	The fee assessed for DropStop1. Each subsequent DropStopCount in the record should also have a corresponding DropCost field (DropCost2, DropCost3, etc.).	Optional
Service Time	Minimum time required to transport via LTL, in hours. Example: 72.00 is three days, or 72 hrs. Adds the time to the LTL Transit Time field in the Shipment File.	Optional
Rating Error	System generated error message	System Generated

Figure 220 – Rate File Fields Table

Note: SMC^3 Rateware XL is required needed to rate LTL shipments in Transportation Modeler.

14.5 Step 3 – Rate Shipments

Once the Rate File has been completed, the rates for the available modes of transport need to be applied to each record in the Shipment File. The available modes and applicable rates will be used by the software to determine the best mode of shipment for each record.

Open the Shipment File.

- From the main menu, select the *Rate Orders Tool*
- The first shipment listed in the *Shipment File* will be the first shipment to appear in the *Rate Orders Info box*
- To rate just the one shipment shown, select the *Rate* button
- To rate ALL shipments listed in the file, select the *Process All* button

Figure 221 – Rate Orders Info Box

Once completed, the Rate File data will automatically populate the Rate Fields in the Shipment File. Any data preexisting in these fields will be overwritten/updated during the Rate Orders function.

- **TLMinCharge** – Minimum charge applied for shipment by Truckload
- **TLRate** – Truckload rate, per mile (ex. $2.5/mile is input as 2.5)
- **TLTeamMinCharge** – Minimum charge applied for shipment by team
- **TLTeamRate** – Team rate per mile
- **LTLCost** – Cost per pound to ship via LTL
- **LTLTransitTime** – Minimum time required to transport via LTL, in hours (ex. 72.00 is three days, or 72 hrs.)
- Distance – The distance, in miles, between the Origin point and Destination point

After reviewing the Shipment File with the updated Rate Fields, save the file again.

14.6 Step 4 – Build a Shipment Solution

Building a shipment solution is the final stage in a TM project. During the build, the software will use the selected algorithm along with the selected *Load Options*, available vehicles, fleets, and constraints to consider the shipments prepare the best possible shipment solution.

To start the building process, select *File→New→Mode Selection* from the menu.

- Select the files that will be used in the project
  - **Shipment** – Select the name and location of the Shipment File
  - **Truck** – Select the file name and location of the Truck File
  - **Distance** – Select the name and location of the Distance File (Private Fleet)
  - **Boundaries** – Select the name and location of the Drawing File (Private Fleet)

- Select the Load Options to use in the build
  - **Dispatch Date** – Enter the dispatch date, or select the Calendar icon to select the date
  - **No Initialization** – If manual loading of each shipment is preferred
  - **Initialize** – Use previously loaded Rt/Seq settings (Rt/Seq have already been identified in the Shipment File)
  - **Load** – Allows the software to build routes utilizing all parameters that have been chosen/input
  - **Init and Load** – Use a Shipment File with some fixed Rts/Seqs, as well as new shipments not previously loaded

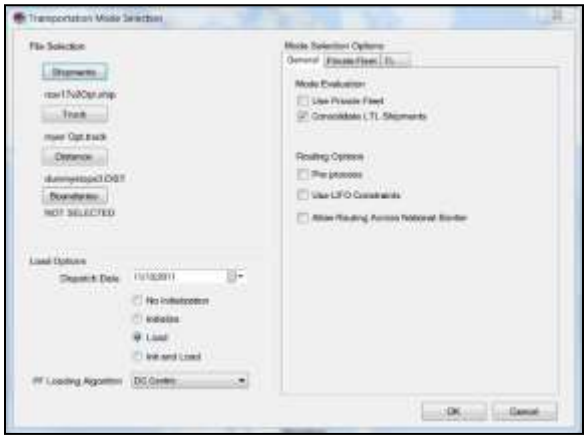


Figure 222 – Mode Selection

Tip: Generally, Initialize Route for baseline/fixed routes, or Load Routes to have TM utilize all input parameters.

- Select the Loading Algorithm to use in the build
  - Remote Shipment Algorithm does not use the DirectRoute algorithm; uses the parameters set within the Routing Preferences to calculate the solution
  - DC Centric Algorithm uses same routing parameters as the DirectRoute routing algorithm, in addition to ability to handle separate origin and destination stops
- Select any *General Options* (General Options tab) that should be applied to the build and/or Shipment Files
  - **Use Private Fleet** – Select if using Private Fleet (see Private Fleet Options Tab)
  - **Consolidate LTL Shipments** – Check to consolidate LTL shipments (Common Carriers)
  - **Preprocess** – Applies the Preprocess parameters set in **Routing Preferences**
  - **Use LIFO Constraints** – Generates a solution respecting 'last in, first out' constraints
  - **Allow Routing Across National Borders** – Applies parameters set **Routing Preferences** (*File→ PC*MILER Direct→ Route Across Borders*) for routing across US borders
- Select any Private Fleet Options that may need to be applied (Private Fleet Options tab)
  - **Service Radius in Miles** – This field is solely used to filter shipments to be considered for Private Fleet (PF) routing. The software draws a geofence around the depot and considers only the shipments that are within the service radius; this means both origin and destination must be within service radius.
  - **Route Termination Radius** – Used to limit the truck from going out once it enters into the radius. However, the system will attempt to load more shipments if both origin and destination locations are within the radius.

- **Max Allowed Empty Mileage OR Percentage** – Used to limit the system from building routes with more than X empty miles. The system will first build a route with X number of shipments and then look at these settings to decide if it needs to leave the route or tear it down. If it decides to tear down the route, then the system will not attempt to route the shipments on that route again.
- **Max Out of Route Mileage OR Percentage** – The system uses these fields during the route building process. Once the system seeds a route with a shipment, it then uses these settings to decide the next shipment.

Example: If the Max out of Route Miles is set to 100 and the system loaded a 500-mile outbound shipment on a route, it will not load any shipment that would cause the routes' total distance to go over 1100 miles (1000 round trip miles + 100 out of route miles), thus preventing the loading of two shipments on the same lane back to back.

- Select any Truck Load (TL) Options that may need to be applied (TL Options tab).
  - **Max Out of Route Mileage OR Percentage** – The system uses these fields during the route building process. Once the system seeds a route with a shipment, it then uses these settings to decide the next shipment.

Example: If the Max out of Route Miles is set to 100 and the system loaded a 500-mile outbound shipment on a route, it will not load any shipment that would cause the routes' total distance to go over 1100 miles (1000 round trip miles + 100 out of route miles), thus preventing the loading of two shipments on the same lane back to back.

- Prevent Loading Pickup After Delivery On TL Routes – Used to prevent pickup of new stops after the last delivery
- **Min Distance for Teams** – Input the minimum distance (in miles) to limit selection
- **Max Stops on TL Routes** – Input the maximum number of unique stops to limit selection of Truckload scheduling
- **Min dollar savings to consolidate LTL** – Input the minimum dollar savings that should be realized to consolidate LTL shipments
  - **Max Distance Between Origin on TL Routes** – Enter the max distance, in miles

After all options have been reviewed/selected, select the OK button to begin the build process.

14.7 Shipment Solution Results

When the build is complete, the software will return a Shipment Solution in the Route Book.

The Route Book is created upon completion of each Shipment Solution and provides a detailed picture of each route, as well as summarized data for the entire routing solution.

- Customized summary information about the routing solution
- Customized view of individual routes and stops
- Modify routes by adding or deleting stops
- Display capacity, drive time, and work time gauges for each route
- Generate turn by turn directions for each route

The Route Book provides three separate reports, each having different formats that can easily be customized.

- **Summary Report** – Pertains to the summary page of the Route Book
- **Detail Report** – This is the body of the report, and lists all the individual route details
- **Header Report** – Contains the column Header names information

Included in the Route Book are the project Info boxes. The Route Info box, Stop Info box, Truck Info box, Solution Info box, Differential Info box, and Map Filter Info box all display various information pertaining to the individual routes and/or stops that are present in the Route Book.

Tip: The info boxes can be repositioned to view on the top or bottom, right or left side of the screen. Just Click and hold the box tab then drag it to the desired location; look for the grey position guide to help place the box in the correct location.

The newly created route schedules can be modified and/edited using any of the tools available in the Route Book. For additional information on edit options, see **Route Modifications**.

14.8 TourPro

TourPro is a tool within Trans Mod that is designed to create multi-leg tours out of truckload or multi-stop shipments. Using a set of user defined parameters, the system uses brute force optimization to check each shipment against others that match the criteria to see if a tour objective is met. At that point, users are given the ability to merge individual or all the tours the system created. Tours are shipments paired together into a multi-leg move.

TourPro is used on a solution that has already been created; either through TransMod, or the initialization of a group of shipments.

The TourPro menu is launched after a Trans Mod solution has been generated.
With the solution files open, select TourPro from the main menu.

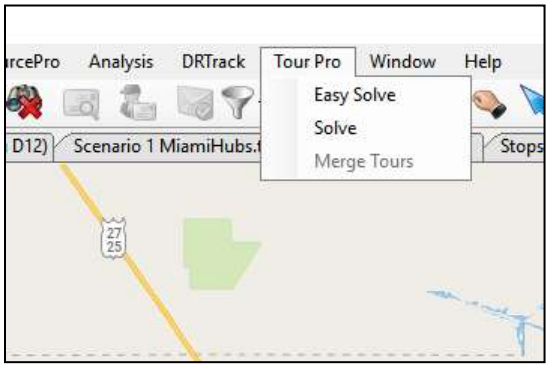


Figure 223 – TourPro Menu Selection

- Easy Solve – Choose if multiple modes of transportation are not an issue

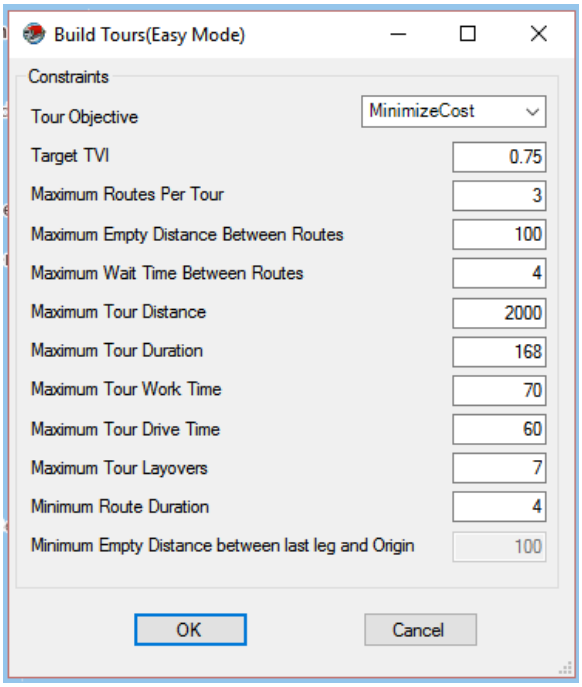


Figure 224 – TourPro Easy Solve Menu

- Solve – Enables additional option to define mode type (PF or TL) and trip type (roundtrip or one-way)

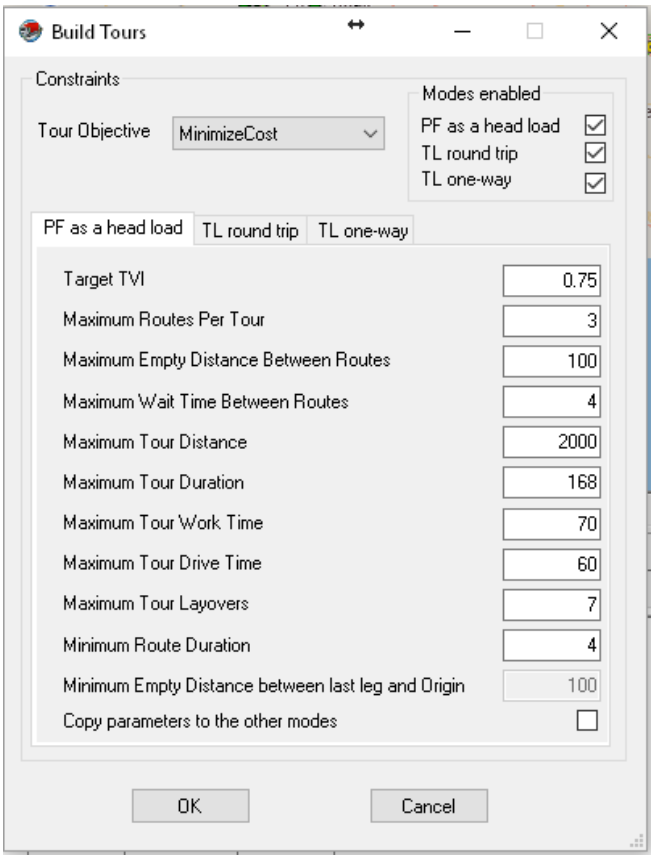


Figure 225 – TourPro Solve Menu

14.8.1 Tour Objectives

Users are presented with a choice of objectives from which to select. Choose the option that best describes the desired results sought; cost savings, reduce empty miles, or use available private fleet trucks.

- **Minimize Cost** – The minimize cost tour objective sets the system up to combine routes that provide the low-cost solution. Tours are evaluated based on potential cost savings; this savings is calculated by adding the cost of the individual shipments together and then subtracting the cost of the created tour.
- **Minimize Empty Miles** – The minimize empty miles objective sets the system up to reduce overall empty miles of the solution. The system evaluates all feasible combinations in different orders and picks the one that generates a higher TVI (Tour Value Index). TVI is the percentage of Loaded Miles to Total Miles. The higher the TVI, the fewer the empty miles.
- **Optimize Private Fleet** – The optimize private fleet objective attempts to move tours that are currently on common carrier trucks to empty, available private fleet trucks. This objective also looks at the TVI as calculated in the minimize empty miles objective.

Mode Selection (PF as head load, TL round trip, TL one-way) – Allows the user to select which mode of transportation they want TourPro to consider. User will get to define different parameters for different modes of transportation. If user does not have a problem with multiple modes of transportation, they can use the Easy Solve TourPro menu instead of the regular TourPro menu.

14.8.2 TourPro Parameters

These parameters act as disqualifiers during the tour creation process. If a group of shipments do not meet the criteria set by the users, they will not be presented as potential candidates for merging into tours. The wider the parameters set, the more shipments that will be included in the tour creation process.

- **Target TVI** – Sets the minimum threshold for TVI (Tour Value Index). In Minimize Empty Miles Mode, this corresponds to a load ratio, loaded miles divided by total miles. The higher the TVI set, the more efficient tours are created (default = 0.75).
- **Maximum Routes per Tour** – Allows the user to designate how many individual shipments can make up a tour. (Set in # of Shipments, Default = 3). Maximum is 4. If a number greater than 4 is entered, system defaults to 4.
- **Maximum Empty Distance Between Routes** – Sets the maximum distance the destination of a shipment and the origin of the next shipment can be to be considered candidates for tour creation (set in Miles, default = 100).
- **Maximum Wait Time Between Routes** – Sets the maximum wait time that the system can create between shipments on a created tour (set in hours, default = 4).
- **Maximum Tour Distance** – Maximum distance that a created tour can traverse. This includes all mileage associated with the shipments on the tour (set in Miles, default = 2000).
- **Maximum Tour Duration** – Maximum length of time that can elapse during a created tour. This includes load/unload time, drive time, breaks, layovers, and pre/post trip time (set in Hours, default = 168).
- **Maximum Tour Work Time** – Maximum on-duty time that can elapse during a created tour (set in Hours, default = 70).
- **Maximum Tour Drive Time** – Maximum drive time that can elapse during a created tour (set in Hours, default = 60).

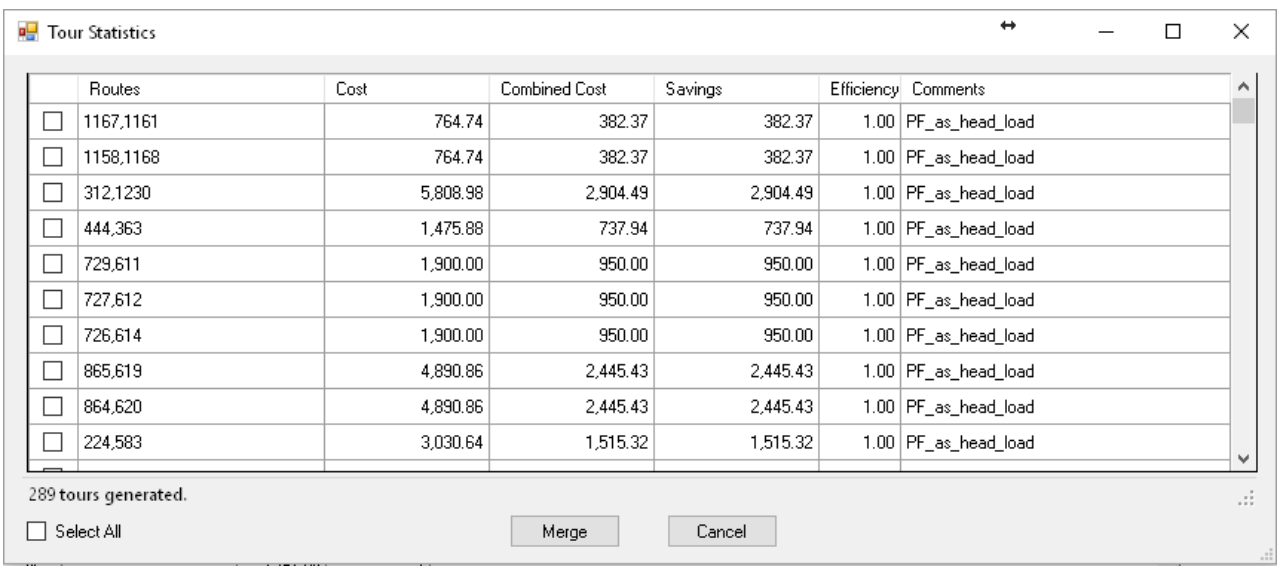
- **Maximum Tour Layovers** – Number of layovers that can be created during a tour creation. Layover rules are setup in the truck file (set in # of Layovers, default = 7).
- **Minimum Route Duration** – This parameter sets up the shortest (in hours) shipment that can be considered for the tour creation process. This parameter is used to exclude short, local runs from the tour creation process (set in Hours, default = 4).
- **Minimum Empty Distance between last leg and Origin** – Sets the minimum distance the destination of a shipment and the origin of the next shipment can be to be considered candidates for tour creation (set in miles).

14.8.3 Merging TourPro Results

Once TourPro has run, the user is presented with a results tab. The results are sortable by selecting the column header. Each column provides users information regarding the tours that have been created.

- **Routes** – Route numbers of shipments being combined in the presented tour.
- **Cost** – Total cost of each shipment run separately
- **Combined Cost** – Total cost of the created tour
- **Savings** – Cost minus combined cost; dollars the created tour saves to the total solution
- **Efficiency** – Tour Value Index (TVI) result for the created tour (higher numbers equal fewer empty miles, or higher savings depending on Tour Objective selected).
- **Comments** – Selected mode (PF as head load, TL round trip, or TL one-way)

The user can select individual tours via the boxes on the left or can select all. Once Merge is selected, the tours are created and can be viewed in the route book.



Routes	Cost	Combined Cost	Savings	Efficiency	Comments
1167,1161	764.74	382.37	382.37	1.00	PF_as_head_load
1158,1168	764.74	382.37	382.37	1.00	PF_as_head_load
312,1230	5,808.98	2,904.49	2,904.49	1.00	PF_as_head_load
444,363	1,475.88	737.94	737.94	1.00	PF_as_head_load
729,611	1,900.00	950.00	950.00	1.00	PF_as_head_load
727,612	1,900.00	950.00	950.00	1.00	PF_as_head_load
726,614	1,900.00	950.00	950.00	1.00	PF_as_head_load
865,619	4,890.86	2,445.43	2,445.43	1.00	PF_as_head_load
864,620	4,890.86	2,445.43	2,445.43	1.00	PF_as_head_load
224,583	3,030.64	1,515.32	1,515.32	1.00	PF_as_head_load

Figure 226 – Tour Statistics

Sometimes the savings presented in the merge screen may be negative; this indicates that the tour may be more efficient in terms of empty miles percent but may end up being more expensive than the sum of the individual shipments.

15 SchedulePro Module

SchedulePro™ is a fleet scheduling tool for use with the DirectRoute™ that optimizes customer appointment days and balances volume over a planning period of 1 – 12 weeks at a time.

The SchedulePro (SP) module is fully incorporated within DirectRoute. All the basic DirectRoute menu and toolbar options remain available for use while working in SchedulePro. If a menu or toolbar icon is gray and faded rather than colored and clear, it means the item is not accessible at that time. You may need to have specific files open, be in the routing mode, or it may be accessible only when using another module.

To begin using SchedulePro, open DirectRoute and select SchedulePro from the Module Menu in the top right corner of the screen.

Figure 227 – SchedulePro Menu and Toolbar

15.1 Create a New SchedulePro Project

Create a new SchedulePro project for each new planned routing scenario. A completed project results in a planned route schedule that considers a customer's volume and delivery pattern (frequency, requested delivery days) to plan scheduled stops over the planning period (1 – 12 weeks).

Each project involves four primary steps. Follow each link for specific information and instructions to complete each step.

- **Step 1 – Review Preference Settings** – Review Routing Preferences and choose the appropriate Algorithm for your project, dependent on how much consideration should be given to delivery pattern and volume, when building route schedules
- **Step 2 – Create/Update SchedulePro Files** – The primary files used are the Stop File, Truck File, and Pattern File; these files contain all the information needed by the software to build an optimal delivery schedule for each customer
- **Step 3 – Build a Schedule** – The software utilizes the routing files to create routes for the first week of the planning period
- **Step 4 – Review Schedule and Build Routes** – Review the results of Step 3 before building the routes for the entire planning period

15.2 Step 1 – Review Preference Settings

Preferences are used to supply the software with necessary information about your routing environment and the type of results expected in the solution. These settings help the software identify specific data fields, volume types, and delivery windows used in the Truck File and Stop File, and direct specific actions, behaviors, or special considerations that the software should perform or consider when building a solution.

In addition to the general Routing Preferences, SchedulePro provides a choice of Algorithms to use when building a schedule of routes, to determine which factors are of most importance in the project.

Choose the appropriate Algorithm based on how much consideration should be given to delivery pattern and volume, to schedule stops.

- **Volume Allocation Algorithm** – Considers a customer's Delivery Pattern (frequency and delivery days) and Volume to schedule stops over a specific time frame, from 1 week up to 12 weeks, in any one period
- **DirectRoute Algorithm** – Considers distance (closest to farthest, or reverse), and/or pre-existing Rt/Seq assignments in the Routing Files.

Example: Customer #1: Delivery pattern is WF (Wednesday, Friday), Volume Allocation = .5 (half on Wednesday, half on Friday); Customer #2: Delivery pattern is MWF (Monday, Wednesday, Friday), Volume Allocation = .333 (Monday, Wednesday) and .334 (Friday)

Routing Preferences and Options Table identifies and explains each Preference setting and available options, more completely.

- To review and update Routing Preferences, select *File→ Preferences* from the menu
- To review and update the chosen Algorithm, select *File→ Preferences→ SchedulePro→ Algorithm Type*

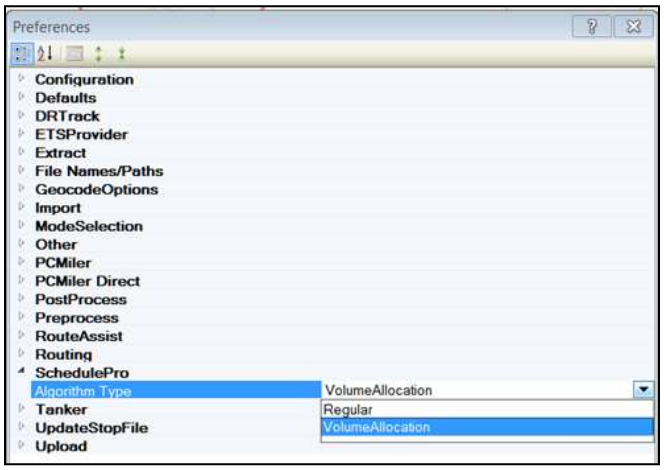


Figure 228 – SchedulePro Algorithm Option

15.3 Step 2 – Create / Update SchedulePro Files

The Routing Files are used to provide the software specifics concerning your customers and fleets. Creating and/or updating these files are key steps that must be done to initiate any scheduling project.

- **SchedulePro Stop File** – The Stop File is normally a tab delimited text file (.XLSX, .XLS, .STP) or a comma delimited file (.csv), typically created from a Customer Master File, and contains order information for each customer, i.e. address, time windows, expected delivery days, volume, loading instructions, etc.
- **SchedulePro Truck File** – The Truck File contains information relating to the delivery fleet, including driver and truck assignments, availability, start and end times, vehicle capacities, work rules, etc.
- **SchedulePro Pattern File** – The Pattern File lists the Days and Frequency that may be assigned to the customer throughout the planning period

15.3.1 SchedulePro Stop File

The Stop File is a spreadsheet that contains the customers' order and delivery information. Key fields represented in the Stop File include order ID1, Volume, Delivery Date, Address, and any special delivery rules. Optional data fields can also be used to manage customer schedules and territories, provide statistical data, or generate reports, and/or generate additional Route Files.

If you already have one, or a spreadsheet with the required customer information, it can be used in the SchedulePro project if it contains the required data columns. If you do not already have a Stop File, a new one can be created that will automatically populate the necessary header columns and allow manual input of all customer data. Use the **SchedulePro Stop File Fields Table** to assist in completing the required columns. Additional (optional) data fields can also be included, if needed (ref. **Stop File Fields and Descriptions Table**).

Create/Update the SchedulePro Stop File

- From the menu, select *File→Open→Stop*, or *File→New→Stop*
- Update, or enter each customer's data directly into each column of the spreadsheet, or (double) left click on each row to launch the Stop Dialog box and update/enter all the data for each customer in one window
- Geocode the Stop File to locate the correct Lat/Long for each record listed in the file (Ref. **Geocoding Records**)

When completed, the file should be saved in the project folder (DirectRoute Data Folder).

15.3.2 SchedulePro Stop File Fields Table

FIELD	*DESCRIPTION*	*REQUIRED, OPTIONAL, OR RECOMMENDED*
Account Name	Name of the Customer (stop).	Required
ID1	Primary unique identifier for the stop (Account#, Customer#, etc.)	Required
ID2	Secondary unique identifier for stop (Order#, Store#, etc.)	Recommended

Address	Street Address of the stop; used to geocode.	Required
City	City where address is located; used to geocode, and in the Distance File.	Required
State	2 letter state abbreviation for the address; used to geocode.	Required
Zip	Zip Code of the address; used to geocode.	Required
FixedTime	Mandatory time that all vehicles must spend at the stop; typical range is 15 to 45 (minutes).	Recommended
EqCode	Alphanumeric code used to designate special equipment or requirements for the Stop (lift gate, refrig, etc.); used with Truck File field SpE.	Optional
Volume1	The quantity of volume to be delivered; can be any quantity type (weight, cube, pallets, cases, etc.).	Required
UnldRate (UnldVol1)	Amount of time it takes to unload Volume1 (hours). Example: Volume1 = Cases (UnldCases), and 1 hr = unload 1000 cases, and Veh Capacity = 2000 cases then the unload rate would = 2 (2000 ÷ 1000/per hr.) Note: SchedulePro will add UnldRate to Fixed Time, to determine how long the truck will be at the stop.	Recommended
Open1	Earliest time of day delivery can be made to the stop (0000 - 2400).	Required
Close1	Latest time of day a delivery can be made to the stop (0000 - 2400).	Required
Pattern1	Days of the week the stop can accept delivery (SMTWRFA); used with Open1 and Close1 to determine days/times that deliveries can be made.	Required
Rt ID	The route number to which the stop is assigned; discovered during the build.	Required
Seq	The sequence in which the stop is loaded on the route; discovered during the build.	Required
Longitude	Longitude of the stop, discovered during the geocode process.	Required
Latitude	Latitude of the stop, discovered during the geocode process.	Required
Symbol/Size/Color	The symbol (size and color) displayed on the map to represent the stop. Symbols are chosen from the stop File; Double+Click on the customer record to open the dialog box; select the symbol, size and color, then select OK.	Recommended
MinDaysBetween Deliveries	The minimum number of days required between deliveries to the stop. Example: Customer requires deliveries no more than once a week, then input 7 (number of days).	Required
MaxDaysBetween Deliveries	The maximum number of days allowed between deliveries. Example: Customer requires deliveries at least every two weeks, then input 14 (number of days).	Required

Frequency	The number of times a stop is serviced during the planning period (enter the number conversion)
	#Conversion = Frequency Pattern
	1 = 1x a week
	2 = 2x a week
	3 = 3x a week
	5 = 5x a week (daily, weekdays)
	0.5 = 1x every 2 weeks (14 day cycle)
	0.33 = 1x every 3 weeks (21 day cycle)
	0.25 = 1x every 4 weeks (28 day cycle)
	0.125 = 1x every 8 weeks (56 day cycle)
		Required

Figure 229 – SchedulePro Stop File Fields Table

15.3.3 SchedulePro Truck File

The Truck File is a spreadsheet that contains all the information about the fleet that will be used to make deliveries. Each row in the file represents a Truck on which the stops can be loaded.

If you already a Truck File, or a spreadsheet with the vehicle and depot information, it can be used in the SchedulePro project if it contains the required data columns. If you do not already have a Truck File, a new one can be created that will automatically populate the necessary header columns and allow manual input of all customer data. Use the **SchedulePro Truck File Fields Table** to assist in completing the required columns. Additional (optional) data fields can also be included, if needed (ref. **Truck File Fields and Descriptions Table**).

Create/Update the SchedulePro Truck File

- From the menu, select *File→Open→Truck*, or *File→New→Truck*
- Update, or enter (copy/paste) each vehicle's data directly into each column of the spreadsheet; or (double) left click on each row to open the Truck Dialog box and update/enter all the data for each vehicle in one window
- Geocode the Truck File to locate the correct Lat/Long for each record listed in the file (Ref. **Geocoding Records**)

When completed, the file should be saved in the project folder (DirectRoute Data Folder).

15.3.4 SchedulePro Truck File Fields Table

FIELD	***DESCRIPTION***	***REQUIRED, OPTIONAL, OR RECOMMENDED***
TrkID	Truck ID may be a number, a name, or whatever is used to identify each vehicle	Required
Available	This must be set to TRUE in order to make the vehicle available for use in the route build	Required
OneWay	Set to TRUE for vehicle which will routed out, but not returned to the depot. Set to FALSE if the vehicle will return to the depot upon completion of the route	Required
SpEq	Special Equipment Codes, along with Equipment Codes in the Stop File, are used to identify special designations for the vehicle; i.e Lift Gate, Refrig compartment, etc.	Optional
Volume1	The max quantity of Volume1 (Stop File) that the vehicle can carry (Capacity); the same Volume1 type used in the Stop File	Required
MiCost	Cost per mile to operate this vehicle	Required
HrCost	Hourly Cost is the hourly cost of the driver for this vehicle.	Required
OTCost1	The cost per hour added if the time to complete the route exceeds the time set for WorkDay. Example: If the cost for the first two hours of overtime is $5, then OTCost1 = 5.	Optional
OTHrs1	The level at which overtime hours are calculated; used with OTCost1. Example: If OT costs are paid in 2hr increments, then OTHrs1 = 2	Optional

FixedCost	Costs that do not change; tractor rental, maintenance, etc.	Optional
Origin	Name of the Depot	Optional
Address	Address where the vehicle (Depot) is located	Required
City	City where address is located; used to geocode	Required
State	2 letter state abbreviation for the address; used to Geocode.	Required
Zip	Zip Code of the address; used to geocode.	Required
Longitude	The Depot's longitude coordinate discovered during the Geocode process	Required
Latitude	The Depot's latitude coordinate, discovered during the Geocode process	Required
Symbol/Size/Color	The symbol (size and color) that is displayed on the map, to represent the truck; Double+Click on the truck record to open the dialog box; select the symbol, size and color	Optional
EarStart	The earliest time a vehicle may leave the terminal to begin a route (military time format), ex. 2230	Optional
NormalStart	The normal daily start time of the vehicle	Required
LatStart	The latest time a vehicle can leave out of the terminal	Optional
LatFinish	The latest time a vehicle should return to the depot	Optional
WorkDay	The number of hours in a normal work day; OTCosts are incurred if the Workday hours are exceeded to complete the route (required if OTCost1 is used)	Optional
Brk1Start	How far into the shift/route a mandatory break should start; if the driver should take a break four hours into the route, then Brk1Start = 4. Note: Up to five break fields can be used.	Optional
Brk1Duration	The duration of the break; entered in decimal or whole number format (30 min = .5, 15 minutes = .25, etc.).	Optional
MaxWorkTm	The max time a vehicle can be out before returning to the depot.	Required
TargetWrkTm	The target work time for each vehicle.	Optional
MaxDriveTm	The max drive time per shift on a route before a layover is implemented; entered in hours.	Optional
MinLayover	The minimum number of hours a vehicle can layover.	Optional
MaxLayover	The maximum number of hours a vehicle can layover.	Optional
MaxDrvTmB4Layover	Used by the software to determine how long a vehicle must drive before a layover can be implemented.	Optional
MaxLayovers	The maximum amount of layovers allowed per route.	Optional
PreTrip	In accordance with DOT rules; time added to the start of each Rt.	Optional
PostTrip	In accordance with DOT rules; time added to the end of each Rt.	Optional

Figure 230 – SchedulePro Truck File Fields Table

15.3.5 SchedulePro Pattern File (.txt)

The *Pattern File*, sometimes referred to as a *Pattern Library*, is a text file that details the number of times that a stop may be serviced (Frequency) and when (Day) that stop may be serviced. This is done by assigning a pattern to the various frequencies used.

Create/Update the Pattern Data File

The Pattern Data File is created as a spreadsheet file (.XLS) with eight (8) columns. Once the file has been completed, it should be saved and stored in the DirectRoute Data Folder, where it can be used for multiple SchedulePro projects.

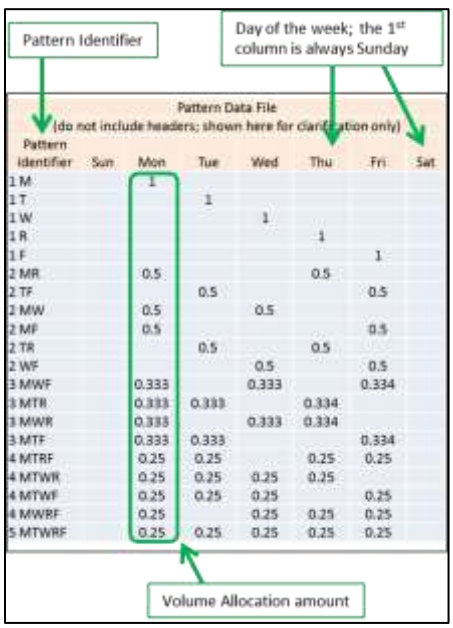
- **First Column** – Pattern Identifier, identifies the Frequency and Day (of the week)

Example: 1M = 1X a week (Monday), 2MW = 2X a week (Monday, Wednesday)

- **Second and subsequent columns** (total of 8) – Each column represents a Day of the week, beginning with Sunday; enter the Volume Allocation (weekly volume divided by Frequency) for each Pattern Identifier.

Example: Pattern Identifiers
1M = 1X a week (Monday)
2MF = 2X a week (Monday, Friday)
3MWF = 3X a week (Monday, Wednesday, Friday)

Example: Volume Allocation
1 = 100% weekly volume
0.5 = $^1/_2$ (one half) the weekly volume
0.25 = $^1/_4$ (one quarter) the volume
0.333 = $^1/_3$ (one third) the volume (with 0.333 and 0.334 = 100%)



Pattern Identifier	Sun	Mon	Tue	Wed	Thu	Fri	Sat
1 M		1					
1 T			1				
1 W				1			
1 R					1		
1 F						1	
2 MR		0.5			0.5		
2 TF			0.5			0.5	
2 MW		0.5		0.5			
2 MF		0.5				0.5	
2 TR			0.5		0.5		
2 WF				0.5		0.5	
3 MWF		0.333		0.333		0.334	
3 MTR		0.333	0.333		0.334		
3 MWR		0.333		0.333	0.334		
3 MTF		0.333	0.333			0.334	
4 MTRF		0.25	0.25		0.25	0.25	
4 MTWR		0.25	0.25	0.25	0.25		
4 MTWF		0.25	0.25	0.25		0.25	
4 MWRF		0.25		0.25	0.25	0.25	
5 MTWRF		0.25	0.25	0.25	0.25	0.25	

Figure 231 – SchedulePro Pattern Data File (txt)

Remember to save the file and store it in the DirectRoute Data Folder, where it can be used again for multiple SchedulePro projects.

15.4 Step 3 – Build a Schedule

Once all the files have been updated and completed, Schedule Build will use those files to create routes for the first week of the planning period. The first week's routes will be the base from which routes for the remaining weeks in the planning period will be built.

To begin the Schedule Build and select all input parameters, select *File→ New→ Schedule* from the menu.

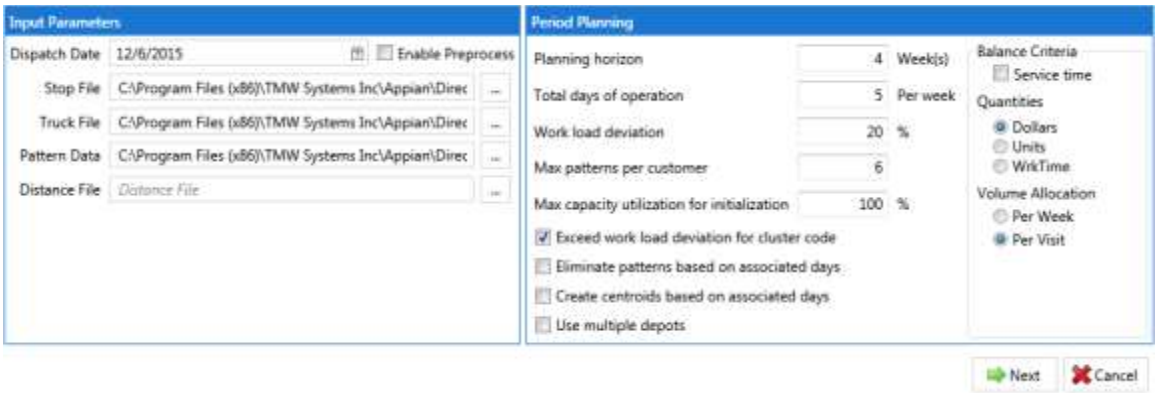


Figure 232 – SchedulePro Build New Schedule

Input Parameters

- **Dispatch Date** – Select earliest date to dispatch/schedule vehicles; default is 'Sunday'.
- **Enable Preprocess** – Uses Preprocess settings from Routing Preferences.
- **Stop File** – Select the Stop File (.STP, .XLS, .XLSX, etc.).
- **Truck File** – Select the Truck File (.Truck, .TRK, .XLS, .XLSX).
- **Pattern Data File** – Select the Pattern Data File (.TXT).
- **Distance File** – Select the Distance File (.DIST).

Period Planning Parameters

- **Planning Horizon** – Number of weeks the scheduling solution will cover.
- **Total Days of Operation** – The number of days the solution will cover in a week (ex: 2 = 2 days per week).
- **Workload Deviation** – Used with Max Capacity Utilization, an amount (%) by which the truck Capacity can be adjusted.

Example: 20% would allow Capacity to be increased by 20%

- **Max Patterns Per Customer** – The number of Delivery Patterns in use by a customer (set to a minimum of Total Days of Operation).
- **Max Capacity Utilization for Initialization** – The percentage of Max Capacity that SchedulePro can assign (load) on a truck, before considering another truck; used with Work Load Deviation during the optimization process.

Example: If Workload Deviation = 20%, then Max Capacity Utilization for Initialization = 80%

- **Exceed work load deviation for cluster code** – Selection allows SchedulePro to ignore the Max Capacity Utilization, if required, to honor Cluster Codes.
- **Eliminate patterns based on associated days** – If the Day column was imported, will eliminate all patterns for a customer that doesn't include the appropriate day assignment.
- **Create centroids based on associated days** – If the Day column has been imported, SchedulePro will create route centroids based on the provided days.
- Use multiple depots – Select if starting locations vary.

Balance Criteria Parameters

- **Service Time** – Considers Fixed Time, in addition to Capacity, when assigning customers.

- **Quantities** – Select the Capacity field which will be used for balancing purposes; default is the quantity field used in the Stop File.
- **Volume Allocation** – Choose how customer volume should be allocated per week or per visit.

Select the Next button after all selections have been made. When the build is complete, the results will appear on the next screen.

15.5 Step 4 –Review and Build Routes

The Schedule Build results will appear on the next screen; the map with planned stops appears on the top half, and the results are listed on the bottom half, in four separate tabs. These can all be used to analyze the results of the chosen parameters prior to building routes.

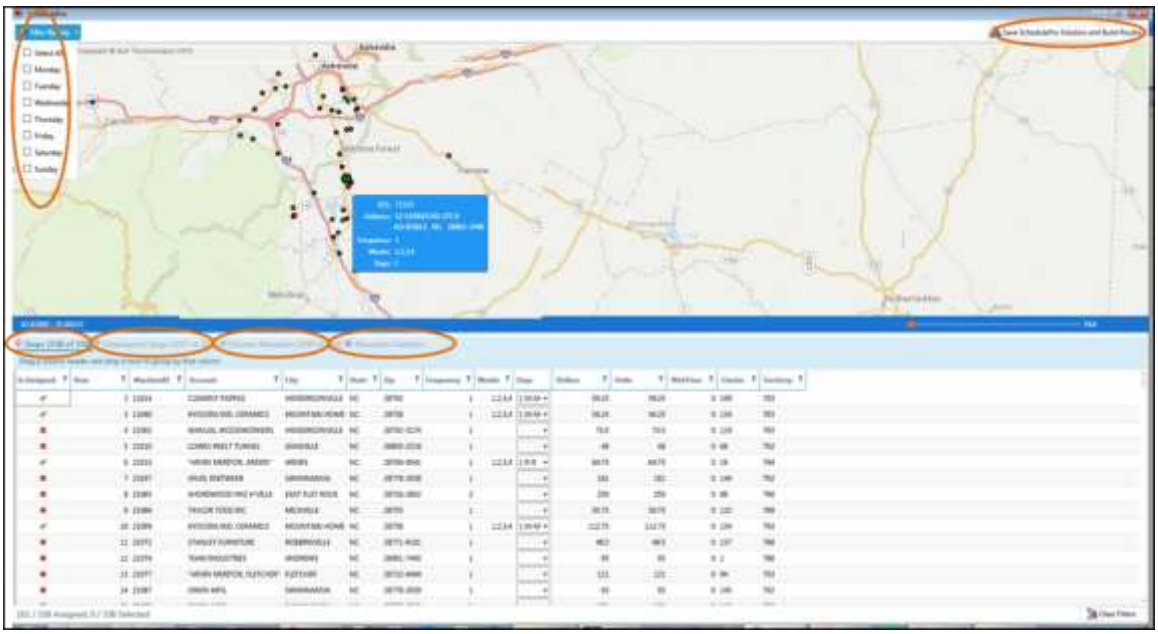


Figure 233 – Schedule Build Results Tabs

15.5.1 Map Results

The map screen displays all the selected stops for the chosen tab.

- Use the *Filter by Day* button in the top right corner of the screen to filter the stops shown.
- Left click on any stop in the Assigned Stops results tab to select/locate the stop on the map.
- Position the cursor over the stop symbol on the map to blow up the Stop Details info box.
- Map can be zoomed in/out by rolling the mouse scroll button or Click and hold the slider bar to zoom in/out.

Figure 234 – Schedule Build Results Map Screen

15.5.2 All Stops Results

All Stops lists all stops contained within the records.

- Can be sorted and/or filtered by column.
- Stops marked by ✔ indicates selected stop, while X indicates unassigned stop.
- The Days column presents a drop-down box by which the user can select to assign a new pattern from assigned days/weeks; on change, the stop will be assigned to the selected days and the quantities will be allocated based on the pattern chosen.
- Use the Filter button for any column to filter records; filters can be cleared in the Filter info box or by selecting the Clear Filters button at the bottom of the screen.
- Counter in the bottom left corner shows the number of assigned stops, number of all stops, and number of selected stops.

Figure 235 – Schedule Build All Stops Results

15.5.3 Unassigned Stops Results

Unassigned Stops lists all stops that were not assigned (loaded).

- Can be sorted by column and/or filtered by column data.
- To assign a stop, use the Days column drop-down arrow to select a day pattern.
- View immediate results from changes/selections for any number of stops.
- To commit the changes made, select the Assign Days button in the bottom right corner (newly assigned stops will move out of the Unassigned Stops tab).

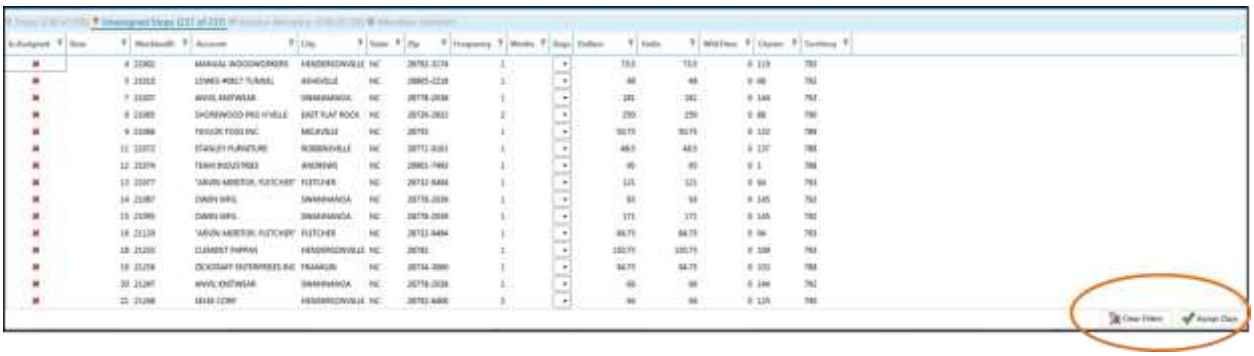


Figure 236 – SchedulePro Unassigned Stops Results

15.5.4 Volume Allocation Results

Volume Allocation provides a snapshot of scheduled volume; includes volume totals for each stop, and total volume for each day of the week.

Is Assigned	Row	MachineID	Account	City	State	Zip	Frequency	Weeks	Days	Wk1Sun	Wk1Mon	Wk1Tue	Wk1Wed	Wk1Thu	Wk1Fri	Wk1Sat
✔	2	21014	CLEMENT PAPPAS	HENDERSONVILLE	NC	28792	1	1	M	0	58.25	0	0	0	0	0
✔	3	21040	KYOCERA IND. CERAMICS	MOUNTAIN HOME	NC	28758	1	1	R	0	0	0	0	56.25	0	0
✔	4	21002	MANUAL WOODWORKERS	HENDERSONVILLE	NC	28792-0174	1	1	W	0	0	0	735	0	0	0
✔	5	21010	LOWES #0617 TUNNEL	ASHEVILLE	NC	28805-2218	1	1	W	0	0	0	48	0	0	0
✔	6	21013	"ARVIN MERITOR, ARDEN"	ARDEN	NC	28704-9541	1	1	M	0	64.75	0	0	0	0	0
✔	7	21017	ANVIL KNITWEAR	SWANNANOA	NC	28778-2034	1	1	W	0	0	0	161	0	0	0
✔	8	21063	SHORENWOOD PKG H'VILLE	EAST FLAT ROCK	NC	28726-2832	2	1	TF	0	0	62.5	0	0	62.5	0
✔	9	21006	TAYLOR FOODS INC	MICAVILLE	NC	28755	1	1	R	0	0	0	0	50.75	0	0
✔	10	21049	KYOCERA IND. CERAMICS	MOUNTAIN HOME	NC	28758	1	1	R	0	0	0	0	112.75	0	0
✔	11	21072	STANLEY FURNITURE	ROBBINSVILLE	NC	28771-9101	1	1	W	0	0	0	48.5	0	0	0
		Total Stops: 338								0	11831.73	7887.24	6963.48	8232.18	10081.64	0

Figure 237 – SchedulePro Volume Allocation Results

15.5.5 Allocation Statistics Results

Allocation Statistics provides statistical charts for assigned versus unassigned stops.

- Choose statistics to display by Pattern, Frequency, or Week; select the W (Week), F (Frequency), or P (Pattern) in the upper right corner; current view identified by ✔ .
- Choose which week, or all weeks to display by selecting the Week # on the right side of the screen.

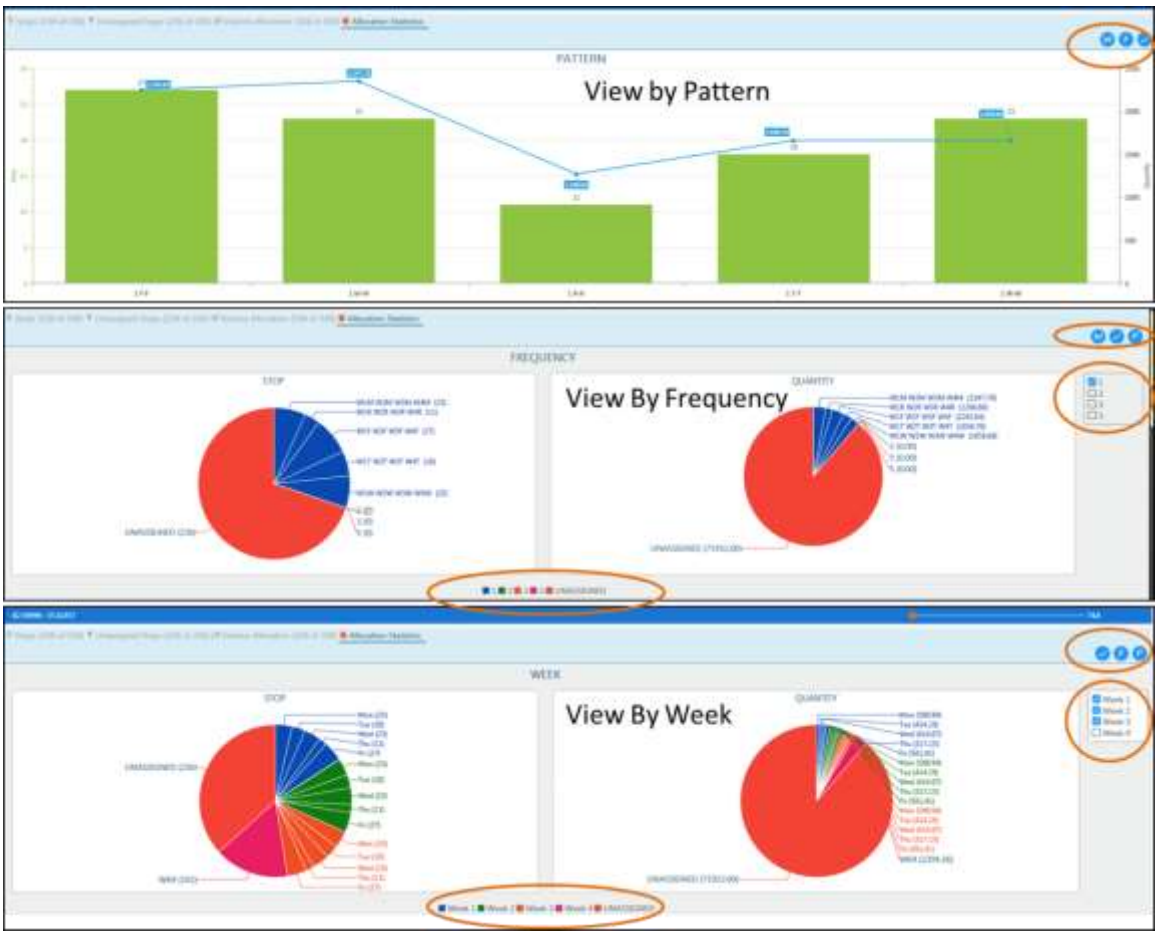


Figure 238 – SchedulePro Allocation Statistics Results

After viewing the Schedule Build results, select the Save Solution and Build Routes button in the top right corner of the screen. The next screen returned will be the new files created from the saved solution.

- The saved solution files are saved in the DirectRoute Data Folder, with .SCHPRO file extension.
- The Stop File is copied and renamed to include *ExportShip.stp* (the original file will be left intact and unchanged); the new name(s) appear in the top right corner of the screen.
- A message in the bottom left corner indicates the solution was saved successfully.
- To exit from the saved solution without building the routes, click the X in the upper right corner to close the solution.
- To continue and build the routes, select the *Continue Build Routes* button in the bottom right corner of the screen.

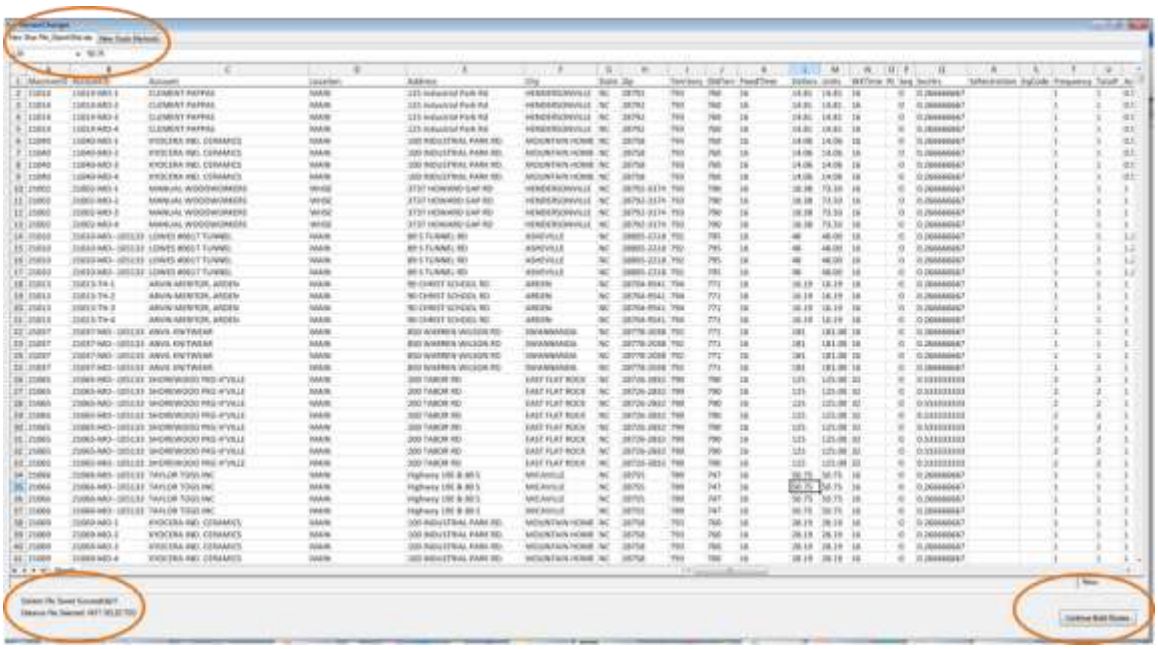


Figure 239 – SchedulePro Saved Solution

If **Continue Build Routes** is selected, the routing solution will complete, and the results will be returned in the Route Book on the next screen.

15.6 SchedulePro Project Results

The Route Book is created for every routing scenario. It provides a detailed picture of every route, and summarized data for the entire routing solution.

- Customized summary information about the routing solution
- Customized view of individual routes and stops
- Modify routes by adding or deleting stops
- Display capacity, drive time, and work time gauges for each route
- Generate turn by turn directions for each route

The Route Book provides three separate reports, each having different formats that can easily be customized.

- **Summary Report** – Pertains to the summary page of the Route Book
- **Detail Report** – The body of the report, listing all the individual route details
- **Header Report** – Contains the column headings information

Included in the Route Book are the project Info boxes. The Route Info, Stop Info, Truck Info, Solution Info, Differential Info, and Map Filter Info boxes all display various information pertaining to the individual routes and/or stops that are present in the Route Book.

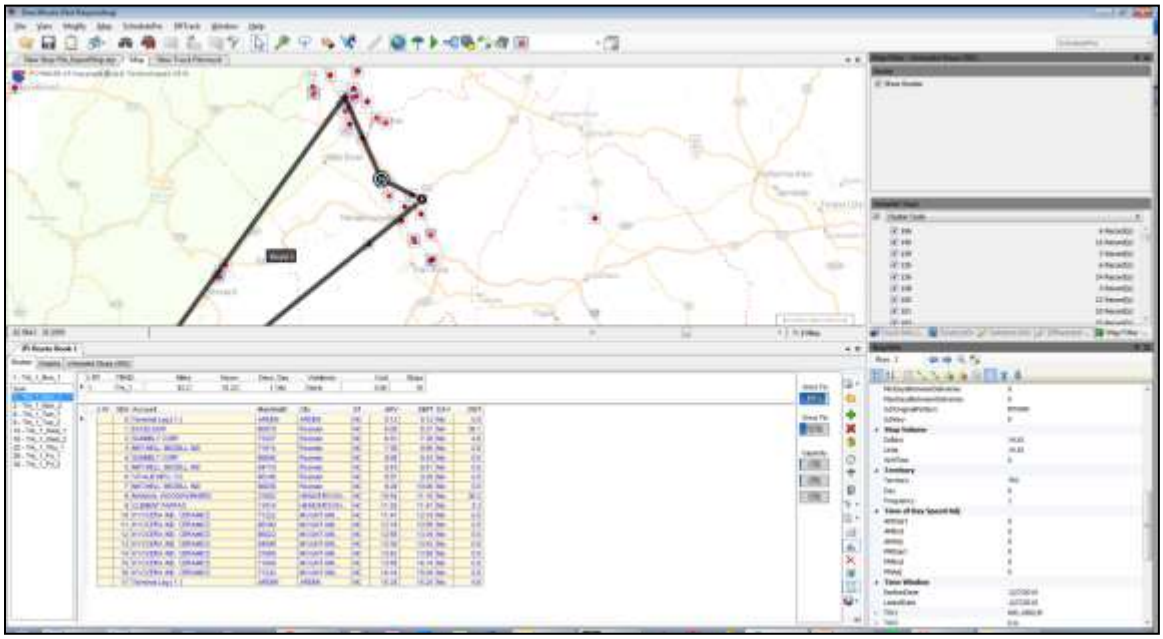


Figure 240 – SchedulePro Completed Routes/Route Book

Tip: The info boxes can be repositioned to view on the top or bottom, right or left side of the screen. Click and hold the box tab, then drag it to the desired location. Look for the grey position guide to help place the box in the correct location.

The newly created route schedules can be modified and/edited using any of the tools available in the Route Book. For additional information on edit options, see **Route Modifications**.

16 TerritoryPro Module

TerritoryPro™ is territory planning software that automatically builds territories that meet your criteria or allows you to review current territories with lasso type editing for re-assignment and automatic updating of statistics. TerritoryPro adjusts and designs Route Territories based on constraints such as sales volume, service time and/or coverage area.

With TerritoryPro, you can see different symbol displays for each representative's accounts with statistics for each area including sales volume and workload for servicing the accounts within each Territory.

The TerritoryPro (TP) module is incorporated within DirectRoute. To use, select TerritoryPro from the Module Menu in the top right corner of the screen.

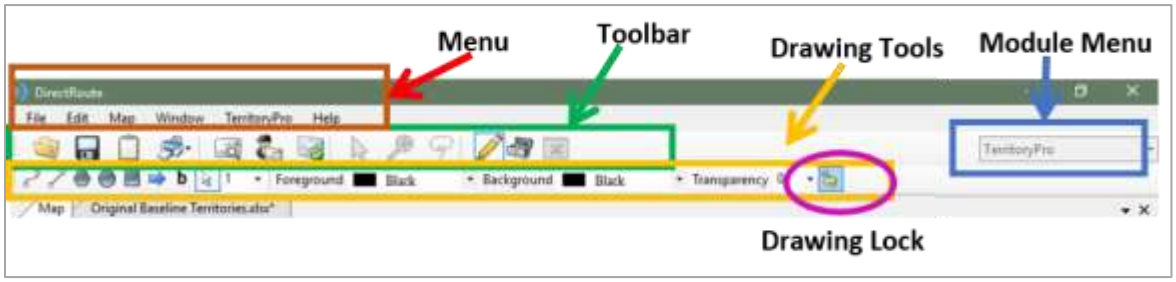


Figure 241 – TerritoryPro Toolbar

All the basic DirectRoute menu and toolbar options remain available for use while working in TerritoryPro, in addition to a few items specific to this module. Also available is the ability to *Undo/Redo* an immediate previous action by using the shortcut *Ctrl+Z*.

If a menu or toolbar icon is gray and faded rather than colored and clear, it means the item is not accessible at that time. You may need to have specific files open, be in the routing mode, or it may be accessible only when using another module.

Figure 242 – TerritoryPro Menu

- **Build Days** – After the initial territories have been built, use Build Days to build Sub territories by delivery day, within current territories.
- **Redistribute Territory** – Redistribute (move) all stops within one selected territory, to the next nearest (as determined by TerritoryPro) territory.

- **Show/Hide Territory** – Select territories to be hidden or displayed.
- **Add New Accounts to Territory** – New accounts added to the Stop File, that have not been assigned to a territory and/or are not reflected on the map, can be assigned to a Territory using this option.
- **View** – Select Territory Mode, Day Mode, or Show Sequence; switches the map view and Summary Report view to show primary territory results only (Territory Mode), Day (Day Mode) results only, or Stop Sequence (only available if Optimize Stop Sequence has been performed).

16.1 Create a New TerritoryPro Project

Territories can be built using predetermined criteria or using previously assigned territories. The process to build territories is relatively quick, once the necessary files needed to build the Territories have been prepared.

Each new TerritoryPro project consists of a few basic steps:

- **Step 1 – Review Preference Settings** – Identify the location of files being used, and select parameters that determine how the software should behave while creating a solution, as well which constraints (work rules, travel restrictions, delivery windows, available equipment, etc.) should be followed.
- **Step 2 – Create/Update TerritoryPro Files** – The three primary files used are Stop File, Truck File, and Distance File. These three files, sometimes referred to as the Routing Files, will contain all the information needed by the software to build a territory schedule for each customer, including delivery requirements and volumes, addresses, fleet information, and distances between stops and the DC.
- **Step 3 – Build New Territories** – The software utilizes the TP Files to create new territories
- **Step 4 – Build Days** – Break down the new territories into schedules for each day of the week
- **Step 5 – Review and Modify Results** – Review the new territory schedules and modify as needed (i.e. redistribute stops, move stops, etc.)

16.2 Step 1 – Review Preference Settings

Preferences are used to supply the software with necessary information about your routing environment and the type of results expected in the solution. These settings help the software identify specific data fields, volume types, and delivery windows used in the Truck File and Stop File, and direct specific actions, behaviors, or special considerations that the software should perform or consider when building a solution.

Routing Preferences and Options Table identifies and explains each setting and available options more completely.

- To review and update Routing Preferences, select *File→Preferences→TerritoryPro* from the main menu.

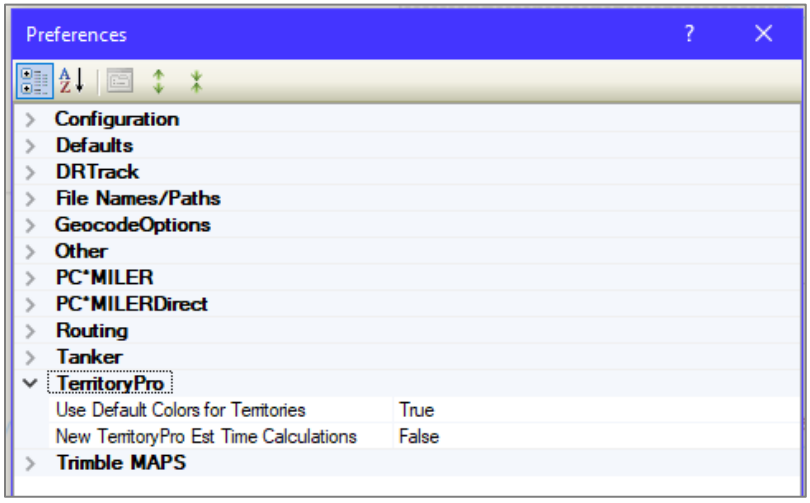


Figure 243 – TerritoryPro Routing Preferences

- **Use Default Colors for Territory** – Set to FALSE to ensure the territories will pull color and symbol from the Truck File when viewing in Territory Mode; in Day Mode, the first Subterritory color will be pulled from the truck; the rest will be pulled from the color wheel.
- **New TerritoryPro Est Time Calculations** – When set to TRUE and a TP Solution is initialized, the **Drive Time Between Stops** will be calculated using sequential order of stops to determine nearest neighbors; set to FALSE, the **Drive Time Between Stops** will be calculated using actual distance (geography).

16.3 Step 2 – Create / Update TerritoryPro Files

The Routing Files are used to provide the software specifics concerning your customers and fleets. Creating and/or updating these files are key steps that must be done to initiate any scheduling project. The primary Routing Files used in most projects are the Stop File, Truck File, and Distance File

- **TerritoryPro Stop File** – The Stop File is normally a tab delimited text file (.XLSX or .XLS) or a comma delimited file (.csv), typically created from a Daily Order File, and contains order information for each customer including address, time windows and expected delivery days, order quantities, loading instructions, etc.
- **TerritoryPro Truck File** – The Truck File contains information relating to the delivery fleet, including driver and truck assignments, availability, start and end times, vehicle capacities, work rules, etc.
- **TerritoryPro Distance File** – The Distance File contains distances and drive times from each pickup point to each stop, and/or distances from stop to stop

16.3.1 TerritoryPro Stop File

The Stop File is a spreadsheet that contains the customers' order and delivery information. Key fields represented in the Stop File include order volume, required delivery dates, customer address, and any special delivery rules; all critical information the software needs to build the routes. Optional data fields can also be used to manage customer schedules and territories, provide statistical data, or generate reports, and/or generate additional Route Files.

If you already have one, or a spreadsheet with the required customer information, it can be used in the TerritoryPro project if it contains the required data columns. If you do not already have a Stop File, a new one can be created that will automatically populate the necessary header columns and allow manual input of all customer data. Use the **TerritoryPro Stop File Fields Table** to assist in completing the required columns. Additional (optional) data fields can also be included, if needed (ref. **Stop File Fields and Descriptions Table**).

Create/Update the TerritoryPro Stop File

- From the menu, select *File→Open→Stop*, or *File→New→Stop*.
- Enter each customer's data directly into each column of the spreadsheet, or (double) left click on each row to launch the Stop Dialog box and enter all the data for each customer in one window.
- Geocode the Stop File to locate the correct Lat/Long for each record listed in the file (Ref. **Geocoding Records**).

When completed, the file should be saved in the project folder (DirectRoute Data Directory).

16.3.2 TerritoryPro Stop File Fields

FIELD	***DESCRIPTION***	***REQUIRED, OPTIONAL, OR RECOMMENDED***
Account Name	Name of the Customer (Stop).	Required
ID1	Primary unique identifier for the stop; Account#, Customer#, etc.	Required
ID2	Secondary unique identifier for the Stop; Order#, Store#, etc.	Recommended
Address	Street Address of the stop; used to geocode, and by Address Cleanup.	Required
City	City where address is located; used to geocode, and in the Distance File.	Required
State	2 letter state abbreviation for the address; used to geocode.	Required
Zip	Zip Code of the address; used to geocode.	Required
FixedTime	Mandatory time that all vehicles must spend at the Stop; typical range is 15 to 45 (minutes).	Recommended
EqCode	Alphanumeric code used to designate special equipment or requirements for the Stop (lift gate, refrig, etc.); used with Truck File field 'SpE'.	Optional
Volume1	The quantity of volume to be delivered; can be any quantity type (weight, cube, pallets, cases, etc.).	Required
UnldRate (UnldVol1)	The amount of time it takes to unload Volume1 (hours). Example: Volume1 = cases (column 'UnldCases'). If it takes one hour to unload 1000 cases, and a truck can carry 2000 cases, then the unload rate would = 2 (2000 ÷ 1000/per hr.). Note: TerritoryPro will add UnldRate time to Fixed Time, to determine how long the truck will be at the Stop.	Recommended
Open1	Earliest time of day delivery can be made to the Stop (0000 - 2400).	Required
Close1	Latest time of day a delivery can be made to the Stop (0000 - 2400).	Required
Pattern1	Days of the week the Stop can accept delivery (SMTWRFA); used with Open1 and Close1 to determine days/times that deliveries can be made.	Required

<table>
<tr><td>Rt ID</td><td>The route number to which the Stop is assigned; discovered during the build.</td><td>Required</td></tr>
<tr><td>Seq</td><td>The sequence in which the Stop is loaded on the route; discovered during the build.</td><td>Required</td></tr>
<tr><td>Longitude</td><td>Longitude coordinate of the Stop, discovered during the geocode process.</td><td>Required</td></tr>
<tr><td>Latitude</td><td>Latitude coordinate of the Stop, discovered during the geocode process.</td><td>Required</td></tr>
<tr><td>Symbol/Size/Color</td><td>The symbol (size/color) displayed on the map to represent the Stop. Symbols are chosen from the Stop File; Double+Click on the customer record to open the dialog box; select the symbol, size and color, then select OK.</td><td>Recommended</td></tr>
<tr><td>Day</td><td>Day of week. Territories can be divided into Days, representing days of the week that the Territory is serviced. If a Territory covers five days, then five Days may be created to reflect each day’s Routes.</td><td>Required</td></tr>
<tr><td>OrgDay</td><td>Used to list previous Day designations, if already included in the data file. If not used, leave blank</td><td>Required</td></tr>
<tr><td>Territory</td><td>Name or Number designation of the Territory. When the Territories are built, TerritoryPro will assign the Territory designation based on the TrkID field in the Truck File.</td><td>Required</td></tr>
<tr><td>OrgTerritory</td><td>Used to list previous Territory designations, if already included in the data file. If not used, leave blank.</td><td>Required</td></tr>
<tr><td>StemTm</td><td>Calculated value of Distance File field (FromDrvTm/To Dist/NumStops), Frequency, and Cycle; populated automatically when the Schedule is built</td><td>Required</td></tr>
<tr><td>EstTime</td><td>The sum of StemTm, DrvBtwnStop, and ServTm; populated automatically when Territories are built</td><td>Required</td></tr>
<tr><td>ServTm</td><td>Calculated sum of FixedTime, UnldRate, Frequency, and Cycle; populated automatically when Territories are built</td><td>Required</td></tr>
<tr><td>EQ Code</td><td>An alphanumeric code (unlimited number of characters) used to designate the Territory assignment. This field will be populated automatically when the Territories are built</td><td>Required</td></tr>
<tr><td>Frequency</td><td>The number of times a stop is serviced in a week; enter # conversion for the frequency pattern.
<table>
<tr><th>#Conversion</th><th></th><th>Frequency Pattern</th></tr>
<tr><td>1</td><td>=</td><td>1x a week</td></tr>
<tr><td>2</td><td>=</td><td>2x a week</td></tr>
<tr><td>3</td><td>=</td><td>3x a week</td></tr>
<tr><td>5</td><td>=</td><td>5x a week (daily, weekdays)</td></tr>
<tr><td>0.5</td><td>=</td><td>1x every 2 weeks (14 day cycle)</td></tr>
<tr><td>0.33</td><td>=</td><td>1x every 3 weeks (21 day cycle)</td></tr>
<tr><td>0.25</td><td>=</td><td>1x every 4 weeks (28 day cycle)</td></tr>
<tr><td>0.125</td><td>=</td><td>1x every 8 weeks (56 day cycle)</td></tr>
</table></td><td>Required</td></tr>
</table>

Figure 244 – TerritoryPro Stop File Fields Table

16.3.3 TerritoryPro Truck File

The Truck File is a spreadsheet that contains all the information about the fleet that will be used to make deliveries. Each row in the file represents a Truck on which the stops can be loaded. Key fields represented in the Truck File include Capacity, Availability, and Costs. Use the **TerritoryPro Truck File Fields Table** to assist in completing the required columns. Additional (optional) data fields can also be included, if needed (ref. **Truck File Fields and Descriptions Table**).

Create/Update the TerritoryPro Truck File

- From the menu, select *File→Open→Truck, or File→New→Truck*
- Update, or enter (copy/paste) each vehicle's data directly into each column of the spreadsheet; or (double) left click on each row to open the Truck Dialog box and update/enter all the data for each vehicle in one window
- Geocode the Truck File to locate the correct Lat/Long for each record listed in the file (Ref. **Geocoding Records**)

When completed, the file should be saved in the project folder (DirectRoute Data Folder).

16.3.4 TerritoryPro Truck File Fields Table

FIELD	*DESCRIPTION*	*REQUIRED, OPTIONAL, OR RECOMMENDED*
TrkID	Truck ID may be a number, a name, or whatever is used to identify each vehicle.	Required
TerritoryID	The Territory ID represents the name of each territory, and can be any number, alpha name, or alphanumeric name. When territories are built, this ID will be passed to the Stop File column named Territory, to identify the territory that each stop has been assigned. The number of unique Territory IDs used in the Truck File will determine how many territories will actually be built.	
Available	This must be set to TRUE in order to make the vehicle available for use in the route build.	Required
OneWay	Set to TRUE for vehicle which will routed out, but not returned to the depot. Set to FALSE if the vehicle will return to the depot upon completion of the route.	Required
SpEq	Special Equipment Codes, along with Equipment Codes in the Stop File, are used to identify special designations for the vehicle; Lift Gate, Refrig. compartment, etc.	Optional
Volume1	The maximum quantity of Volume1 (Stop File) that the vehicle can carry; the Vehicle Capacity. Use the same Volume1 type used in the Stop File.	Required
MiCost	Mileage Cost is cost per mile to operate this vehicle.	Required
HrCost	Hourly Cost is the hourly cost of the driver for this vehicle.	Required
OTCost1	Overtime Costs is the cost per hour added if the time to complete the route exceeds the time set for WorkDay. Example: If the cost for the first two hours of overtime is $5, then OTCost1 = 5.	Optional

OTHrs1	The level at which overtime hours are calculated; used with OTCost1. Example: If OT costs are paid in 2hr increments, then OTHrs1 = 2.	Optional
FixedCost	Costs that do not change; tractor rental, maintenance, etc.	Optional
Origin	Name of the Depot	Optional
Address	Address where the vehicle (Depot) is located.	Required
City	City where address is located; used to geocode, and used in the Distance File.	Required
State	2 letter state abbreviation for the address; used to geocode.	Required
Zip	Zip Code of the address; used to geocode.	Required
Longitude	The Depot's longitude coordinate, discovered during the geocode process.	Required
Latitude	The Depot's latitude coordinate, discovered during the geocode process.	Required
Symbol/Size/Color	The symbol (size and color) that is displayed on the map, to represent the Stop. Symbols are chosen from the Stop File; Double+Click on the customer record to open the dialog box; select the symbol, size and color, then select on OK.	Optional
EarStart	The earliest time a vehicle may leave the terminal to begin a route; enter in military time format (2400).	Optional
NormalStart	The normal daily start time of the vehicle	Required
LatStart	The latest time a vehicle can leave out of the terminal; enter in military time format (2400).	Optional
LatFinish	The latest time a vehicle must return to the depot; enter in military time format (2400).	Optional
WorkDay	The number of hours in a normal work day; OTCosts are incurred if the Workday hours are exceeded to complete the route (required if OTCost1 is used)	Optional
Brk1Start	How far into the shift/route a mandatory break should start; if the driver should take a break four hours into the route, then Brk1Start = 4. Note: Up to five break fields can be used.	Optional
Brk1Duration	The duration of the break; entered in decimal or whole number format (30 min = .5, 15 minutes = .25, etc.).	Optional
MaxWorkTm	The max time a vehicle can be out before returning to the depot.	Required
TargetWrkTm	The target work time for each vehicle.	Optional
MaxDriveTm	The max drive time per shift on a route before a layover is implemented; entered in hours.	Optional
MinLayover	The minimum number of hours a vehicle can layover.	Optional
MaxLayover	The maximum number of hours a vehicle can layover.	Optional
MaxDrvTmB4Layover	Used by The software to determine how long a vehicle must drive before a layover can be implemented.	Optional
MaxLayovers	The maximum amount of layovers allowed per route.	Optional
PreTrip	In accordance with DOT rules; time added at the start of each route.	Optional
PostTrip	In accordance with DOT rules; time added at the end of each route.	Optional

Figure 245 – TerritoryPro Truck File Fields Table

16.3.5 TerritoryPro Distance File

The Distance File contains a record of distances and drive times between the pick-up point (terminal, DC, etc.) and every city in the Stop File (stem distance), and/or pick-up point to every stop, and from stop to stop. When a Distance File is used in the routing process, DirectRoute will calculate the distances and drive times between each stop location based on the entries in this file.

If a Distance File is not used, DirectRoute will calculate distances and drive times using an adjusted straight-line distance (as the crow flies) between locations. When there is a Distance entry for a pair of Stops, the software will use the Distance and Drive Time listed in the file, instead of calculating distances based on Lat/Long Coordinates, or other barriers that may be present. A Distance File can also be generated to record Stem mileage, the Distance between the terminal and each city listed in the Stop File.

Before beginning any type of routing project, or generating a new Distance File, it is a good idea to review and edit, if necessary, the current Distance File settings in use by the software

- From the menu, select *File→Preferences→PreProcess→Generate Distance File*
- Use the **Distance File Settings Table** to assist in updating each item, as necessary
- Select the OK button when all selections are completed

For more information or instructions on generating a Distance File, see **Generate a Distance File**.

16.4 Step 3 – Build New Territories

Once all the files have been updated, the territory build process can be start.

From the menu, select *File→ New→ Territory.*

- Select the Stop button and select the Stop File name
- Select the Truck button to select the Truck File name
- Edit and/or select the appropriate *Build Parame*ters, then select the *Advance Options* tab and complete as necessary

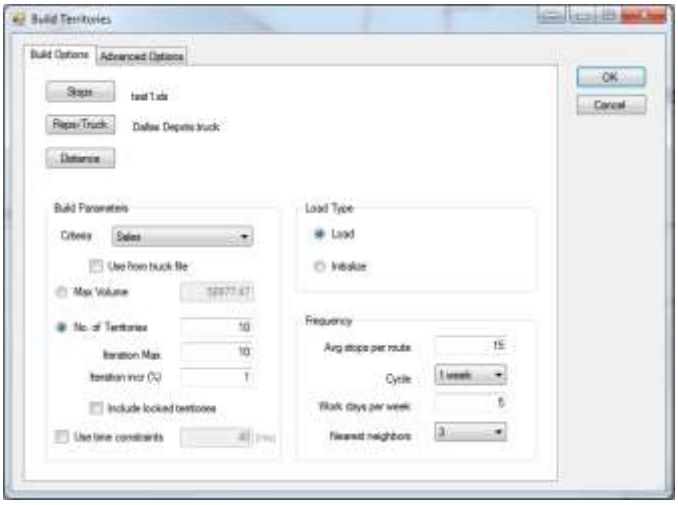


Figure 246 – Build New Territories

16.4.1 Build Parameters

BUILD PARAMETERS

- **Criteria** – Select the volume type to use. Only the volume types previously defined in Routing Preferences (*File→Preferences→Configuration→Volumes*) will be available to choose.
  - **Use From Truck File** – Build Territories using *Max Vehicle Capacity/MaxWorkTm* allowed for each vehicle in the Truck File; use if vehicle capacity and/or *MaxWorkTm* will vary by vehicle. When selected, additional build parameter options Max Volume and Use Time Constraints should be set to zero; these options, when selected and not set to zero, will be applied to ALL vehicles, regardless of constraints listed in the Truck File.

Example: Vehicles listed in the Truck File have varied Max Volume capacity. Three vehicles can carry a Max Volume of 40000 lbs., while three others can carry a Max Volume of 25000 lbs. Territories will be built until the Max Volume and/or MaxWorkTm is reached for each vehicle. As a result, some stops may not load.

- **Max Volume** – Build territories equal to the max volume determined by the Cycle Period; adds the values from the volume/criteria column until it reaches the maximum value
- **No. of Territories** – Build territories equal to the number of vehicles available in the Truck File. If more Stops exist than can be loaded on the available trucks/territories, the stops will be returned as Unloaded Stops
  - *Iteration Max* – The number of times to run the solution for optimal performance
  - *Iteration Incr (%)* – The incremental percentage of Max Volume (Truck) per Iteration considered when building each route (sum of the volume divided by the number of territories).
  - *Include Locked Territories* – Including locked territories allows you to see your existing locked Territories and build new territories for new stops that lay outside of these Boundaries.
- **Time Constraint** – Select if the territories have a max time constraint (MaxWorkTm); enter the Max Hours for the cycle being built (40 hrs./week, 80 hrs./two weeks, etc.).

LOAD TYPE

- **Load** – Select to build new territories for all stops.
- **Initialize** – Select if the Stop File has predetermined territories.

FREQUENCY

- **Avg Stops Per Route** – Enter the average number of stops that should be considered on a route within a territory.
  - *Cycle* – Select the number of weeks to build (1 – 4 Weeks).
  - *Workdays per W***eek** – Select the number of workdays in a week (1 – 7).
  - *Nearest Neighb***ors** – Select the number of nearest stops to consider in the build; used to calculate Drive Time (default = 3).
- **Advanced Options** – *Left click* on the *Advanced Options* tab to select additional adjustments and boundary options.

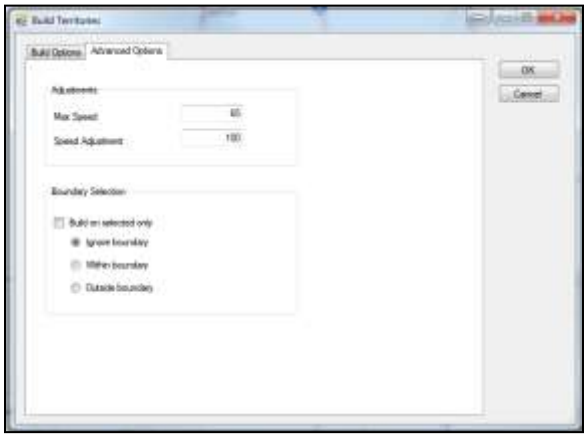


Figure 247 – Build Territories Advance Options

- *Max Speed* – (Optional, for use with a Distance File) Enables override of speed limit settings on specific road segments; setting is provided in the event that company/ regulatory policies exist to prevent vehicles loaded with certain types of cargo from exceeding a set speed limit.

Example: Setting the speed at 45 mph will cause the mileage system to calculate all road segments that are greater than 45 mph to only go 45 mph.

- *Speed Adj* – (Optional, for use with a Distance File) Enables adjustment of normal speed limits assigned to each road segment by a percentage to increase or decrease drive times, dependent on the percentage adjustment; default is 100% (normal rate of speed) (increase to 110 would decrease speed 10%, increasing drive time by 10%; a decrease to 90 would increase speed by 10%, decreasing drive time by 10%).

Tip: Any Speed Adj made here will supersede any Speed Adj settings used in Preferences (Routing/General).

If a Boundary has been defined using Drawing Tools, the following options will also be available on the Advance Options tab.

- *Build on Selected Only – Builds territories based only selected boundaries (from Drawing File), and Ignore/Within/Out*side Boundary selection options
- *Ignore Boundary* – Searches all records regardless of whether they are inside or outside the selected boundary
- *Within Boundary* – Searches only records in the selected boundary
- *Outside Boundary* – Searches only records out of the selected boundary

After selecting all build parameters, left click on the OK button to start the build process.
When complete, the territories will be displayed on the map with each territory number displayed.

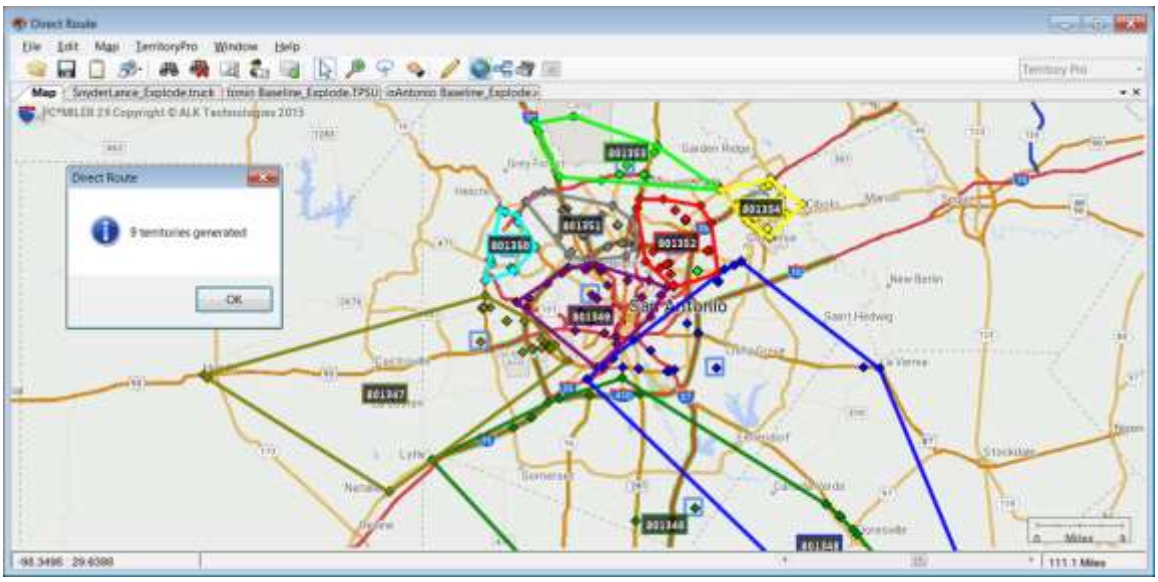


Figure 248 – Territory Build Map Results

16.5 Step 4 – Build Days

Build Days enables additional break down of one or more built territories into days of the week. If a current territory build covers a planning period of five days, then five separate schedules can be created to reflect the routes for each of those five days.

Build Days can be initiated immediately after a new territory build has been completed (Step 3).

- From the menu, select *TerritoryPro→ Build Days*.

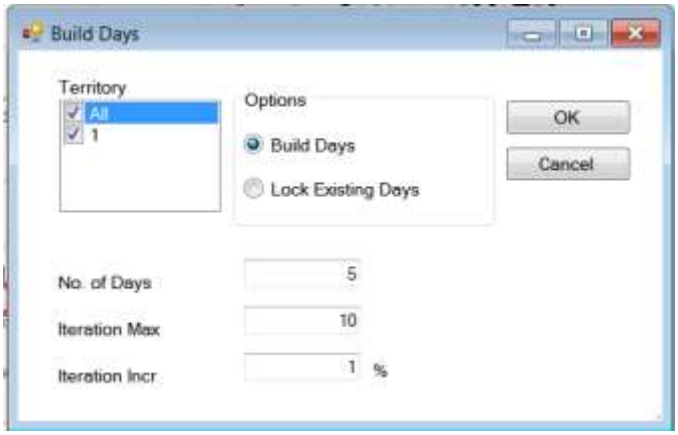


Figure 249 – Build Days

Select each build option that should be applied:

- *Territory* – Select the territory (one or more) to use.
- *Options* – Select either or both:
  - *Build Days* – Will build separate routes for each day of the week, for each *territory* chosen
  - *Lock Existing Days* – When checked, any existing days already listed in the Stop File will not be altered.
- *No. of Days* – The number of days of the week to build for the selected territories.

- *Iteration Max* – The number of times to calculate routes, using the Iteration Incr (to reach optimal results).
- *Iteration Incr* – Value used to increase the Max Volume (Truck) per iteration, when calculating routes (allows several attempts at a routing solution to return best results).
- When all options have been reviewed and chosen, select the OK button.

Example: Suppose Iteration Max was set at 10, and Iteration Incr was set at 1%. The software construct routes 10 times using, increasing Max Volume by an additional 1% each time, to calculate a solution that yields the best results.

When route construction is completed successfully, the software will return an info box indicating that Sub-territories have been generated.

Figure 250 – Day Sub-territories Generated

16.6 Step 5 – Review and Modify Results

The new routes will be displayed on the map, with a number tag indicating the day# of the week. Additionally, the Stop File column *Days* will be populated with the assigned day of the week, and the Route Summary Report will reflect the updated summary data for the new routes.

Drawing Tools can be used to highlight routes, territories, vehicles, and/or drivers, and the map and/or files with drawings can be saved, printed, and/or edited (Ref. **Drawings and Boundaries**).

16.6.1 TerritoryPro Summary File

The Summary File (*StopFileName.TPSum.XLS*) contains a summary of data totals from key fields used in the Stop File to help build the Territories, and is created each time a new Territory build is completed.

To view the Summary File, select the tab *StopFileName.TPSum.XLS* at the top of the map screen.

Territory	Day	Lock	Volume	Util%	#Cust	#Visits	EstTime	ServTime	EstTime/Week	ServTime/Week	ServiceViol	Latitude
00	0		36743	2500	375	248.25	98.78	77.66	98.78	77.66	0	35.208
01	0		36673	2500	211	168.25	88.34	62.93	88.34	62.93	0	34.953
02	0		36679.5	2500	189	135.5	76.53	61.22	76.53	61.22	0	35.070
03	0		36403.75	2500	362	267.5	98.19	76.34	98.19	76.34	0	35.201
04	0		36745.75	2500	278	179.25	89.02	69.13	89.02	69.13	0	35.264
05	0		36763.25	2500	226	127	72.9	64.37	72.9	64.37	0	35.313
06	0		36672.5	2500	329	211.75	88.53	72.92	88.53	72.92	0	35.385
07	0		36785.5	3000	252	195.75	95.37	67.42	95.37	67.42	0	35.371
08	0		36668	2500	320	234.25	95.36	73.28	95.36	73.28	0	35.459
09	0		16936.25	3000	108	81.25	43.56	29.56	43.56	29.56	0	35.601

Figure 251 – TerritoryPro Summary File

Some of the more common data fields used are:

- *Volume* – Total volume of each territory, using the criteria selected to build territories
- *Util%* – Total volume divided by Max Volume.
- *EstTime* – Estimated time to service the territory for the entire cycle.
- *ServTm* – Service time for the territory for the entire cycle.
- *EstTime/Week* – Estimated time to service the territory by week.
- *ServTm/Week* – Service time for the territory by week.
- *Stop User Fields* – Stop User Fields contained in the Stop File, summed at each level (week/cycle).

Within the TerritoryPro Summary File, you can:

- Filter all the items in the grid
- When the grid is filtered, it will remove the territories/days from the map if it is not on the grid
- If you have days on the map and you filter by day, but want to still see the territory boundary, there is another option to always show the territory boundary
- Show/Hide territories/days
- You can save the new *TerritoryPro Summary* as a .CSV, .TAB, or .XLS file
- When you double click on the grid, it should open the T*erritoryPro Summary* info Box for the territory summary that was selected
- The columns can be organized, and the order saved when closing, and in the same order when reopening

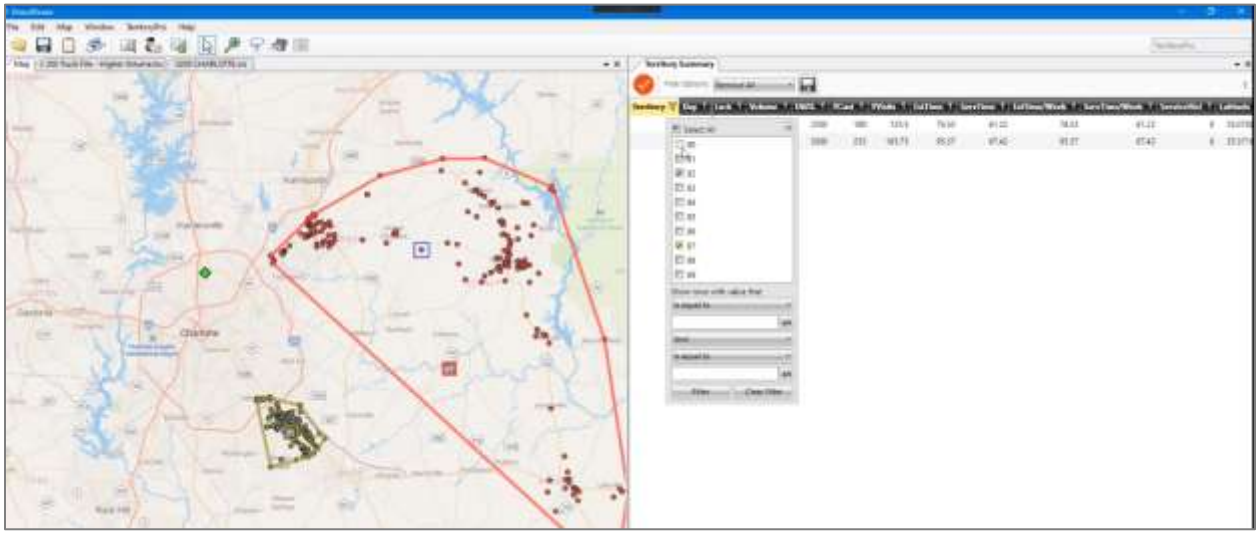


Figure 252 – Filtered TerritoryPro Summary File

16.6.1 Territory / Day Colors

If *Preferences→TerritoryPro→Use Default Colors for Territories* = TRUE, DirectRoute will use the color palette defined in *Preferences→Routing→General→Route Colors (Collection)*. The shape defaults to circle, and size defaults to 12.

If *Preferences→TerritoryPro→Use Default Colors for Territories* = FALSE, Direct Route will use the colors, shapes, and sizes defined in the truck file. If no colors are defined, the color will default to Lime, the shape will default to diamonds, and the size will default to 24.

When viewing *Day Mode*, the first Subterritory color will be pulled from the truck; the rest will be pulled from the color wheel.

To change/edit the colors or add/delete a day, select *TerritoryPro→Select Day Color*.

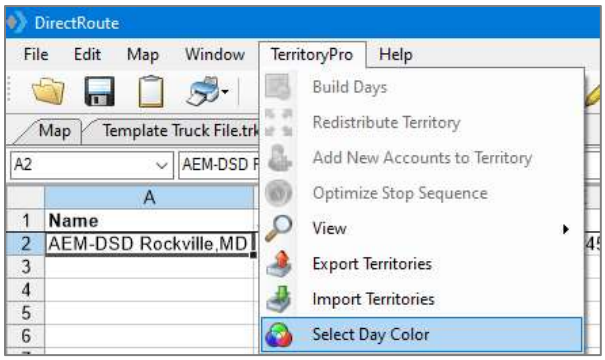


Figure 253 – Day Mode/Select Colors

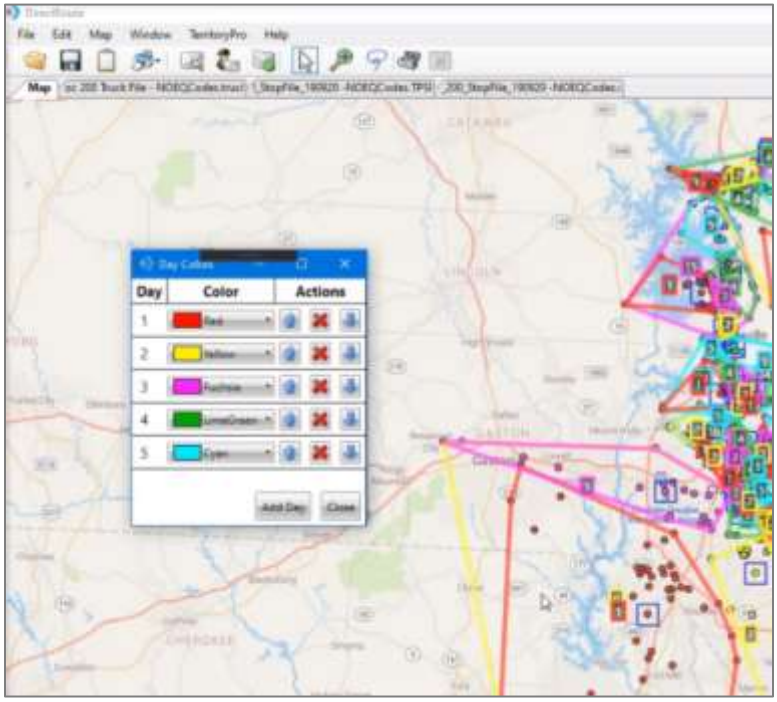


Figure 254 – Day Mode/Colors Displayed on the Map

16.6.2 View Territories or Days

Territory results can be displayed on the map by the *Day* that stops are scheduled, or by *Territory*. *Territory Mode* will display the stops within the assigned territory, with each territory designated by a colored outline and matching territory tag number and stop color. *Day Mode* will display the stops within the assigned Day and Territory. Days are outlined in a different color within each territory and designated by a matching Day# tag and same color stops.

You can change the view to focus on either Territories, or Days. Or, choose to view both at the same time. You can also choose to show the sequence of all stops for each Territory and Day by choosing *Show Sequence*.

- From the menu, select *Territory→View.*
- Select *Territories, Days*, and/or *Show Sequence.*
- Click on each item to activate it and show on the map or click on the item again to deactivate and hide it.

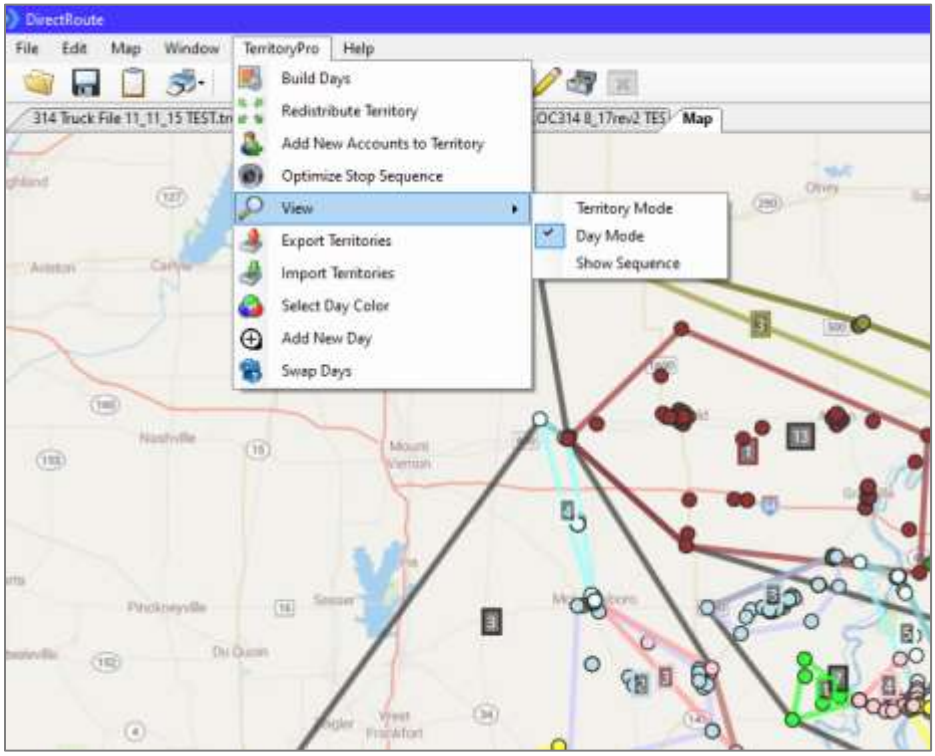


Figure 255 – Show Days

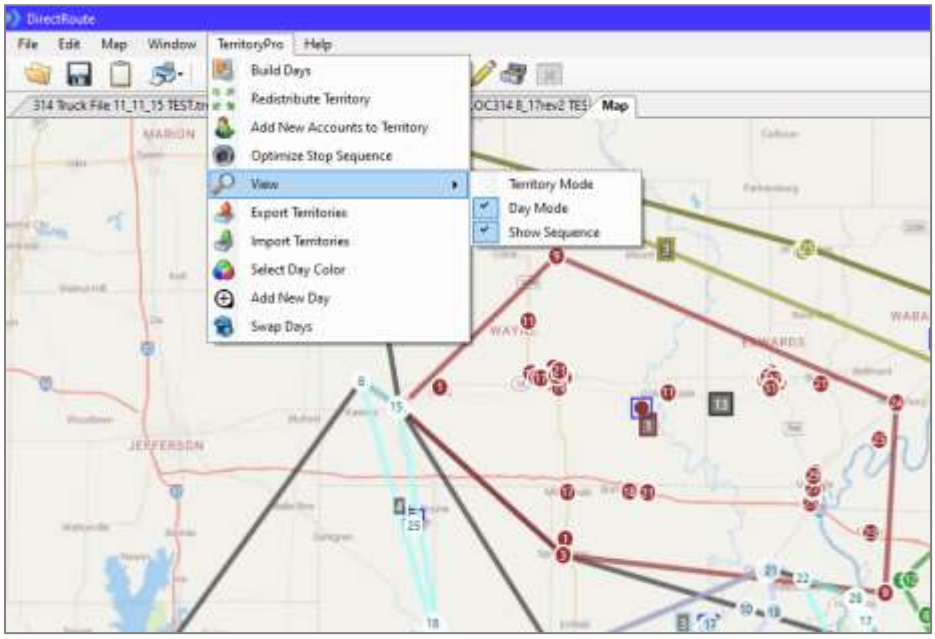


Figure 256 – Show Sequence

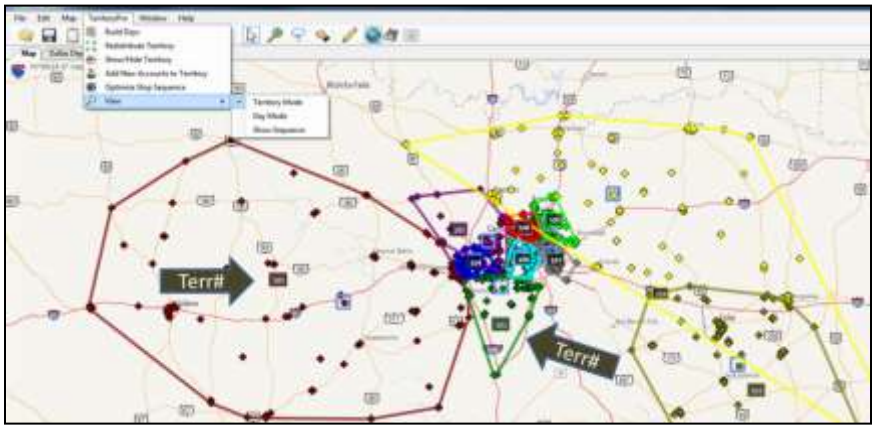


Figure 257 – View Territory Mode

16.6.3 Redistribute Territories

Use *Redistribute Territories* to select a less utilized territory then redistribute to the next nearest territory without any constraints.

- From the menu, select *TerritoryPro→Redistribute Territory*
- Using the drop-down arrow, select the territory to redistribute
- Select the OK button

Figure 258 – Redistribute Territories

The newly revised territories will be displayed on the map, and the Route Summary File will reflect the new updated summary data.

16.6.4 Add Days to Territories

You can easily add a new Day to any Territory while working on the map. Stops can be selected and moved to the new Day using the *Lasso Tool.* When stops are moved to a new day, all info for the affected stops is automatically updated. The account(s) for the moved stops are added to the new Day, the Stop File is updated with the changes, and the new Territory will appear on the map.

- Select *Territory→Add New Day* from the menu.
- Select the Territory and the new Day number and then click the Add button.
- Lasso the stop(s) that you want to move/add to the new day.
- Right click on the lassoed area and then click the Move Stops button.
- Select the Territory and new Day number to which the stops are going; click the Move button.

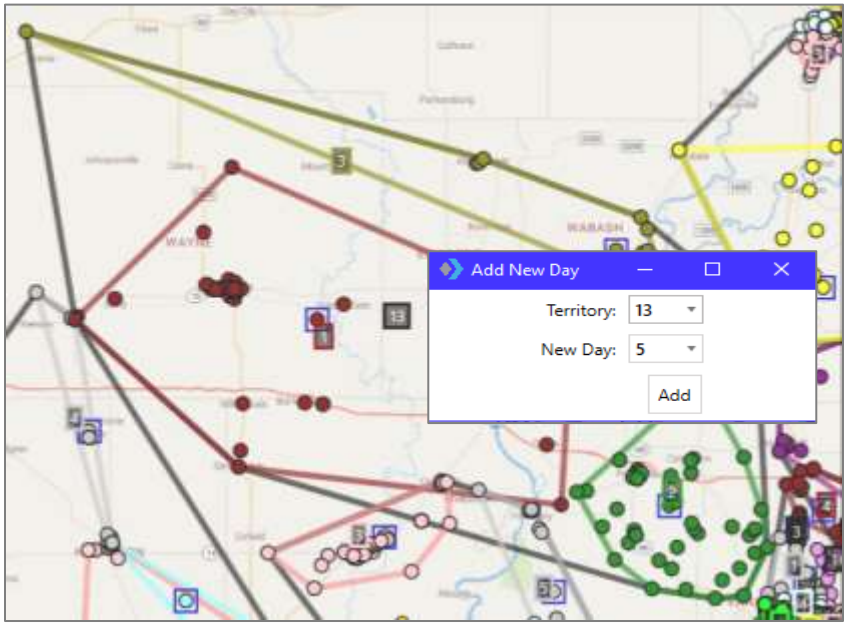


Figure 259 – Add New Day

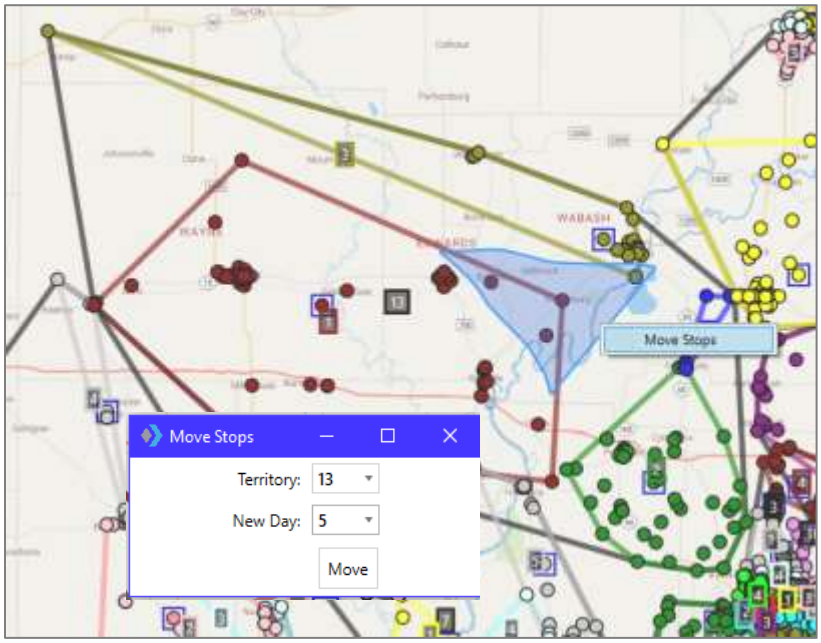


Figure 260 – Move Stops

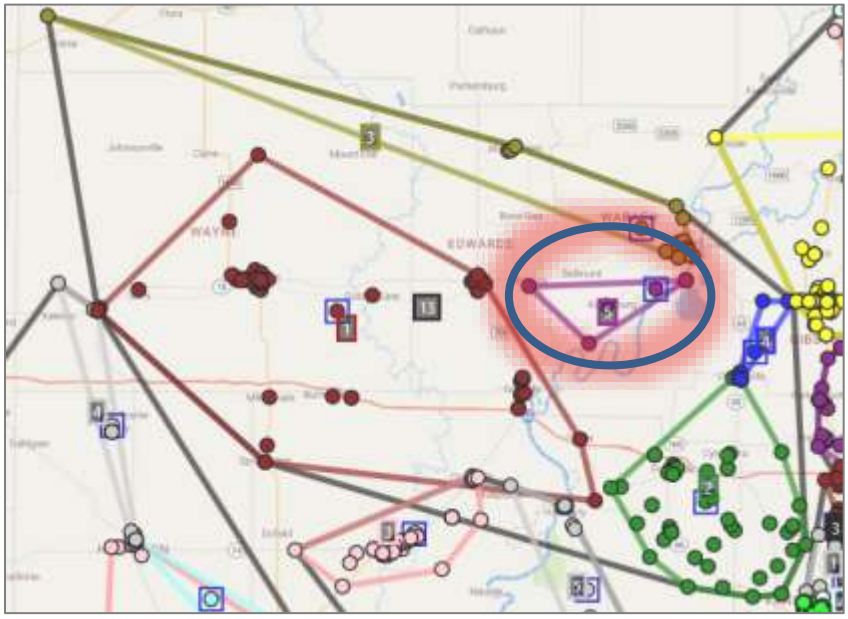


Figure 261 – Add New Day Results

16.6.5 Move Stops to Another Territory

There are several ways that stops can be moved from one territory, to another. Regardless of the method used, each option will update the Stop File and Summary File to reflect the new data.

Option 1 – Lasso Move (most common)

- Select the Lasso icon from the toolbar .
- Place the cursor adjacent the stop(s) to be selected; left click and hold down the mouse button to draw a line with the pen around the stop(s) you want to move, then release the mouse and the cursor will return to normal.
- Place the cursor inside the new territory (where the stop is to be moved) and press Alt+left click.

Option 2 – Click and Drop Move

- Select the stop to be moved by placing the cursor over the stop and press CRTL+left click.
- Place the cursor over an area within the new territory and press Alt+left click.

Option 3 – Stop File Move

- In the Stop File, scroll to the row and Territory column for the selected stop.
- Type the new territory number in the column.
- Press the F9 key

Option 4 – Info Box Move

- Use CRTL+left click to select the stop on the map and open the Stop Info box.
- From the Stop Info box, scroll down to the line that displays the current Territory number and type in the new Territory number, and Day number, if applicable, then left click anywhere outside of the data field.
- Press the F9 key.

16.6.6 Optimize Territory Stop Sequence

Optimize Stop Sequence will sequence all Stops within the selected Territory/Day. Each stop will be displayed on the map with a Sequence number tag, and the Stop File column Seq will be updated automatically to reflect the sequence number assigned to each of the Stops.

- From the menu, select *Territory→Optimize* Stop Sequence.
- Select the Territory # and Day (what to optimize) or select ALL.
- Click on OK.

Figure 262 – Optimize Stop Sequence

Tip: If selected territories contain a large quantity of Stops, Optimizing Stop Sequence may take an extended time to complete.

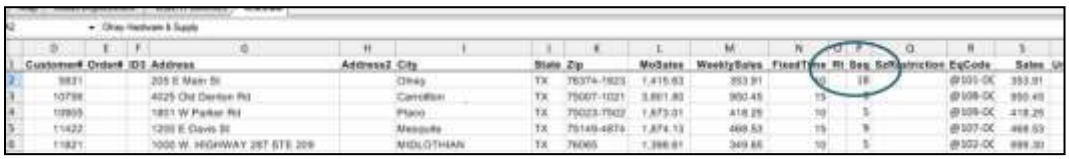


Figure 263 – Stop File Stop Sequence Update

16.6.7 Swap Territories or Days

You can move all accounts in bulk from any Day or Territory to another Day or Territory using *Swap Days* and *Swap Territories*. When swaps are completed, all affected accounts are updated automatically; all statistics are updated in the Territory Summary, and all corresponding fields are updated in the Stop File.

- From the menu, select *Territory→Swap Days*.

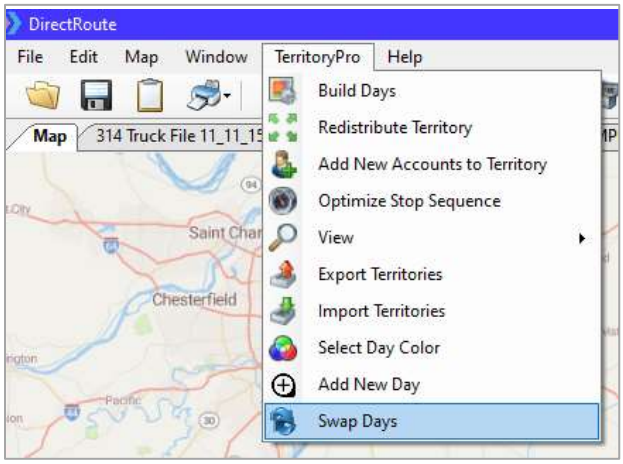


Figure 264 – Swap Days

- In the *From* boxes, select the Territory and Day that you want to move.
- In the *To* boxes, select the new Territory and Day.
- Click on the *Swap* button.

Use the *Compare* boxes to see how the change will affect the statistics for each Territory/Day. The metrics displayed are from the statistical user Stop Fields, used in the Stop File.

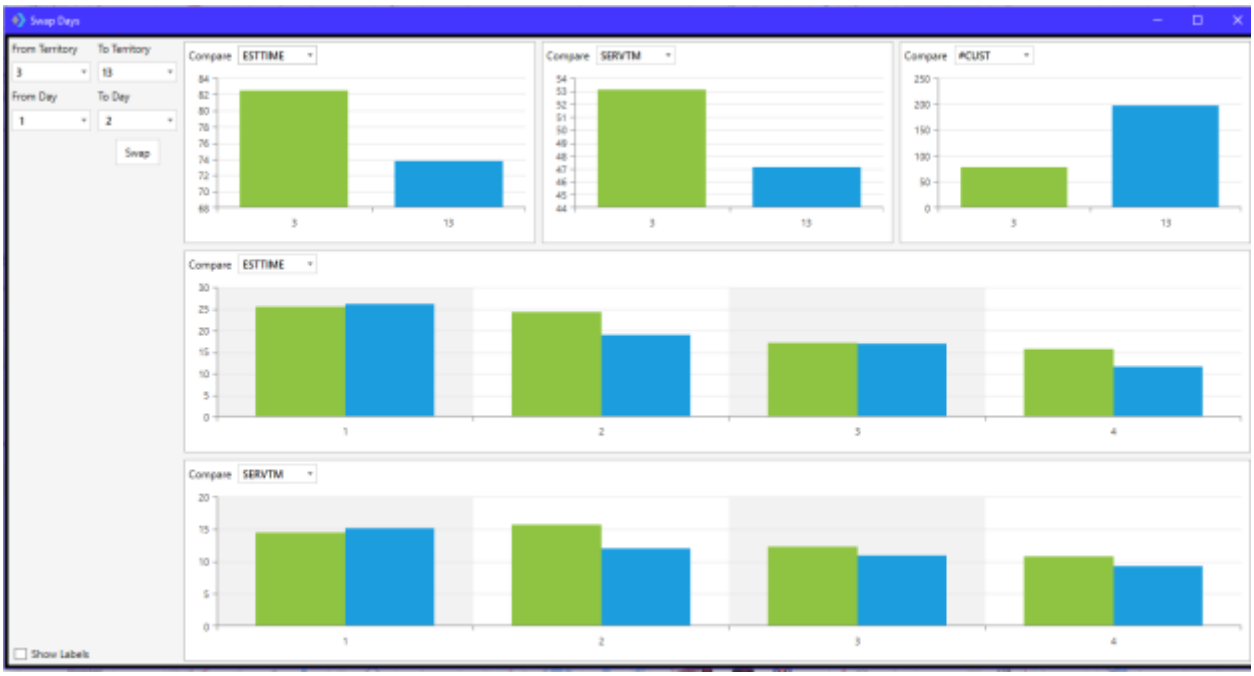


Figure 265 – Swap Territories/Days

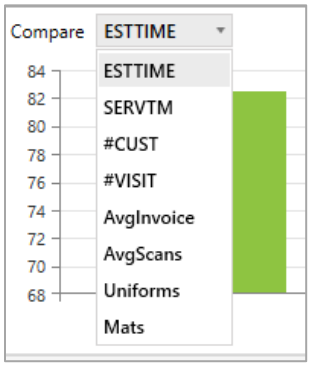


Figure 266 –Review Effects of Swaps

Appendix A – DOT Hours of Service

The following is a summary of the U.S. Department of Transportation **Hours of Service (HOS) Regulations**. Most drivers must follow the HOS Regulations if they drive a commercial motor vehicle, or CMV.

In general, a CMV is a vehicle used as part of a business, is involved in interstate commerce, and fits any of these descriptions:

- Weighs 10,001 pounds or more.
- Has a gross vehicle weight rating or gross combination weight rating of 10,001 pounds or more
- Is designed or used to transport 16 or more passengers (including the Driver) not for compensation
- Is designed or used to transport 9 or more passengers (including the Driver) for compensation

A vehicle that is involved in Interstate or intrastate commerce and is transporting hazardous materials in a quantity requiring placards is also considered a CMV.

Hours of Service of Drivers Final Rule

The **Hours-of-Service Rules** were published in the Federal Register on December 27, 2011. The effective date of the Final Rule was February 27, 2012, and the compliance date of selected provisions was July 1, 2013.

What is the 34-hour restart rule?
Per the HOS rule, commercial motor vehicle drivers can reset their 60-hour or 70-hour clocks. In some circumstances, this enables drivers to get back on the road quickly. Drivers can take advantage of the rule by taking at least 34 consecutive hours in the sleeper berth, off-duty, or by using a combination of both.

Enforcement of the 34-hour rule was suspended by enactment of the *Consolidated and Further Continuing Appropriations Act of 2015* on 16 December 2014 but was later restored.

Only that portion of the rule that called for two off-duty periods of 1:00am to 5:00am in Section 395.3(C) of the agency's Hours-of-Service Rules will not be enforced, nor will the Once-Per-Week limit on use of the restart in 395.3(D). References: **FMCSA Summary of Hours of Service Regulations**, and **FMCSA Hours of Service Final Rule for Truck Drivers**

Summary of HOS Regulations

The following table summarizes the HOS regulations for property-carrying and passenger-carrying drivers. Reference: **https://www.fmcsa.dot.gov/regulations/hours-service/summary-hours-service-regulations**)

Summary of Hours of Service Regulations	
PROPERTY CARRYING DRIVERS	PASSENGER CARRYING DRIVERS
11 Hour Driving Limit – May drive a maximum of 11 hours after 10 consecutive hours off duty.	10 Hour Driving Limit – May drive a maximum of 10 hours after 8 consecutive hours off duty.
14 Hour Limit – May not drive beyond the 14th consecutive hour after coming on duty, following 10 consecutive hours off duty. Off-duty time does not extend the 14-hour period.	15 Hour Limit – May not drive after having been on duty for 15 hours, following 8 consecutive hours off duty. Off-duty time is not included in the 15-hour period.
Rest Breaks – May drive only if 8 hours or less have passed since end of driver's last off-duty or sleeper berth period of at least 30 minutes. Does not apply to drivers using either of the short-haul exceptions in 395.1(e). [49 CFR 397.5 mandatory "in attendance" time may be included in break if no other duties performed]	60/70 Hour Limit – May not drive after 60/70 hours on duty in 7/8 consecutive days.
60/70 Hour Limit – May not drive after 60/70 hours on duty in 7/8 consecutive days. A driver may restart a 7/8 consecutive day period after taking 34 or more consecutive hours off duty.	Sleeper Berth Provision – Drivers using a sleeper berth must take at least 8 hours in the sleeper berth, and may split the sleeper berth time into two periods provided neither is less than 2 hours.
Must include two periods from 1 a.m. to 5 a.m. home terminal time, and may only be used once per week, or 168 hours, measured from the beginning of the previous restart. Suspended NOTICE: The Consolidated and Further Continuing Appropriations Act of 2015 was enacted on Dec 16, 2014, suspending enforcement of new requirements for use of the 34-hour restart, pending a study. Based on the findings from the study, **the 34-hour restart rule in operational effect on Jun 30, 2013, is restored to full force and effect.** The requirement for two off-duty periods of 1:00am to 5:00am in Section 395.3(C) of the agency's Hours-of-Service Rules will not be enforced, nor will the Once-Per-Week limit on use of the restart in 395.3(D).	
Sleeper Berth Provision – Drivers using the sleeper berth provision must take at least 8 consecutive hours in the sleeper berth, plus a separate 2 consecutive hours either in the sleeper berth, off duty, or any combination of the two.	

Figure 267 – DOT HOS Rules

Appendix B – Working With Spreadsheets

DirectRoute enables use of several common spreadsheet and keyboard shortcuts, as well as various mouse/keystroke shortcuts for accessing various menu and map options.

DirectRoute uses a spreadsheet format to create and use the various Route Files needed required for routing projects. These files (spreadsheets) function much the same as any other spreadsheet would, using many of the same shortcuts, functions and behaviors, and most of the Route Files can also be opened, viewed and/or modified independent of DirectRoute using a spreadsheet, workbook or XML sheet (**.XLS, *.XLSX, *.xml*, etc.).

The DirectRoute files that are accessible in spreadsheet format include:

- Route Files (.RTE, .ROUTE)
- Stop Files (.STOP, .XLS, .STP)
- Truck Files (.TRUCK)
- Distance Files (.DIST)
- Route Book

The **DirectRoute Keyboard Shortcuts Table** lists common shortcuts that can be used while working within the DirectRoute program (and files), and the **Mouse Enabled Shortcuts Table** lists common shortcuts created using the mouse and various keystrokes.

While most of these shortcuts may be familiar to those who work with spreadsheets on a regular basis, some users may not be as familiar with them.

Spreadsheet Queries

Selecting records in DirectRoute is a way of performing queries on your data based on criteria you specify. For example, you may want to select all customers on one route to calculate the quantity delivered or you may want to find all customers receiving more than 50 cases.

Inside the spreadsheet, DirectRoute attaches a column titled Selected. This column contains a TRUE or FALSE data element that populates upon selection of the records to indicate if the record is/is not selected.

Records can be selected for identification/view on the map from this column.

- In the spreadsheet column Selected, type TRUE in each record to select.
- Type FALSE in the same column of any record to deselect/not select.

Left click on the Map tab and all the selected records will have a blue box displayed around their symbol.

To select specific records by spreadsheet column while viewing the map, select *Map→Point Field Displayed* from the menu.

- Choose the field (column) to display.

- Choose the display options.
- Select OK when complete.

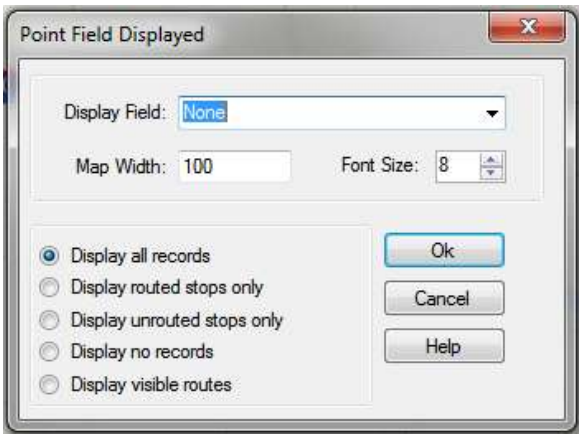


Figure 268 – Select Records with Point Field Displayed

To select specific records by value contained in a spreadsheet column, select *Map→Tools→Select* from the menu.

- Select the columns you want to use.
- Enter the selection criteria or combination of selection criteria
  - Greater Than (>=)
  - Less Than (<=)
  - Contains

Tip: The 'Greater Than' and 'Less Than' fields can contain either alpha (text) or numeric (number) data. The 'Contains' field can only read text data.

Figure 269 – Select Records in Spreadsheet

- From the Options drop down arrow, choose one of the selection methods
- Choose the Select button, then choose Select All, Unselect All, or Reverse

The number of selected records is displayed in the upper left corner of the dialog box

- On the map, the selected records will be encircled by a box around their symbol
- On the spreadsheet, TRUE will be listed in the Selected column

Spreadsheet Statistics

DirectRoute provides a statistics spreadsheet that will allow you to see relative statistics about numeric data columns within a spreadsheet. This can be particularly handy if you need to see volume totals such as quantities delivered and average quantity for a selected route or geographic area.

The statistics spreadsheet automatically shows quantity statistics for:

- All records
- Selected records
- Unselected records
- Records inside and outside of a selected boundary

While the statistics worksheet in DirectRoute cannot be saved as an independent file, the data can be copied and pasted into a spreadsheet outside of DirectRoute, and then saved.

View Statistics for All Records

- Open any of the Routing Files spreadsheets (Stop File, Truck File, etc.)
- Select *Edit→Statistics* from the menu, or press the F8 key

Statistics for Selected Records

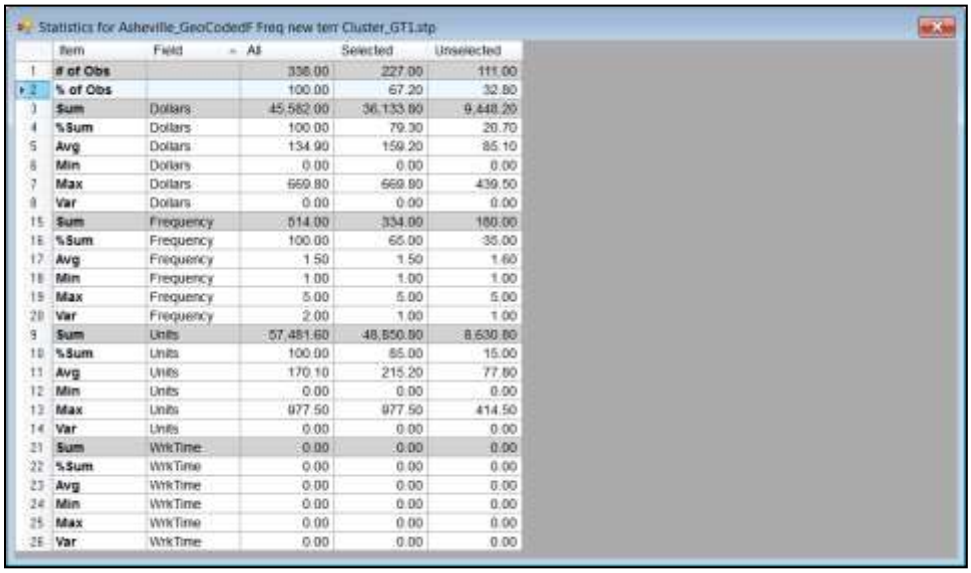
- Open the spreadsheet
- Select the records
  - Type *TRUE* in the spreadsheet column *Selected, or*
  - Use the *Lasso Tool* to select records
- Select *Edit→Statistics* from the menu or press the F8 key

The results will be displayed in separate columns (All, Selected, and Unselected).

Statistics Inside/Outside a Boundary

- Open the spreadsheet (Stop File or Truck File)
- Select the map tab to view the stops on the map
- Select the icon to activate the Drawing Tools, then select the icon to activate the Polygon Tool
- Draw the boundary around the stops on the map to select the records
- Position the cursor over the drawn boundary, then left click
- Select *Edit→Statistics* from the menu, or press the F8 key

The statistics info box will include two additional columns, *In Boundary* and *Out Boundary*, with the applicable statistical results displayed in each.



Statistics for Asheville_GeoCodedF Freq new terr Cluster_GT1.stp

	Item	Field	All	Selected	Unselected
1	# of Obs		338.00	227.00	111.00
2	% of Obs		100.00	67.20	32.80
3	Sum	Dollars	45,582.00	36,133.80	9,448.20
4	%Sum	Dollars	100.00	79.30	20.70
5	Avg	Dollars	134.90	159.20	85.10
6	Min	Dollars	0.00	0.00	0.00
7	Max	Dollars	669.80	669.80	439.50
8	Var	Dollars	0.00	0.00	0.00
15	Sum	Frequency	514.00	334.00	180.00
16	%Sum	Frequency	100.00	65.00	35.00
17	Avg	Frequency	1.50	1.50	1.60
18	Min	Frequency	1.00	1.00	1.00
19	Max	Frequency	5.00	5.00	5.00
20	Var	Frequency	2.00	1.00	1.00
9	Sum	Units	57,481.60	48,850.80	8,630.80
10	%Sum	Units	100.00	85.00	15.00
11	Avg	Units	170.10	215.20	77.80
12	Min	Units	0.00	0.00	0.00
13	Max	Units	977.50	977.50	414.50
14	Var	Units	0.00	0.00	0.00
21	Sum	WrkTime	0.00	0.00	0.00
22	%Sum	WrkTime	0.00	0.00	0.00
23	Avg	WrkTime	0.00	0.00	0.00
24	Min	WrkTime	0.00	0.00	0.00
25	Max	WrkTime	0.00	0.00	0.00
26	Var	WrkTime	0.00	0.00	0.00

Figure 270 – Spreadsheet Statistics

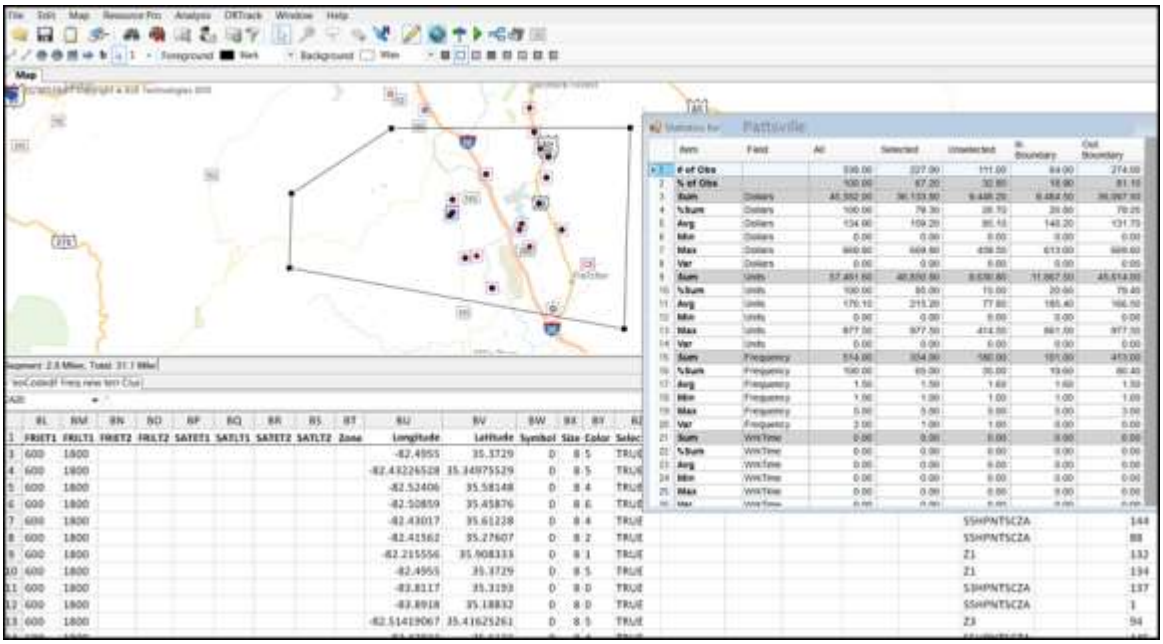


Figure 271 – Statistics Inside/Outside a Boundary

Appendix C – DirectRoute Shortcuts

Several keystroke shortcuts can be used while working in DirectRoute. While working in the Truck and Stop Files, most Excel shortcuts can be used. Other shortcuts apply only to functions on the map or in the Route Book. The table below lists the most common shortcuts available.

Keyboard Shortcuts

KEYBOARD (SPREADSHEET) SHORTCUTS	
CTRL+C	Copy.
CTRL+F	Opens the Find dialog box.
CTRL+H	Opens the Find/Replace dialog box.
CTRL+V	Paste.
CTRL+X	Cut.
CTRL+Z	Undo.
Left Arrow	Moves the cursor one cell to the left; in the edit mode, moves one character to the left.
Right Arrow	Moves the cursor one cell to the right; in edit mode, moves one character to the right.
Up Arrow	Moves the cursor one cell up.
Down Arrow	Moves the cursor one cell down.
Page Up	Moves the cursor one page up.
Page Down	Moves the cursor one page down.
CTRL+Left Arrow	Moves the cursor to the last cell (left) containing text, or to the next cell (left) containing text.
CTRL+Right Arrow	Moves the cursor to the last cell (right) containing text, or to the next cell (right) containing text.
CTRL+Up Arrow	Moves the cursor to the first cell (up) containing text, or to the next cell (up) containing text.
CTRL+Down Arrow	Moves the cursor to the last cell (down) containing text, or to the next cell (down) containing text.
CTRL + Home	Moves the cursor to the first cell in the first row.
CTRL + End	Moves the cursor to the last cell in the last row.
Shift +Left Arrow	Highlights the current cell and next cell left.
Shift + Right Arrow	Highlights the current cell and next cell right.
Shift + Up Arrow	Highlights the current cell and the next cell up.
Shift + Down Arrow	Highlights the current cell and next cell down.
Shift + Page Up	Highlights current cell and all cells one page up.
Shift + Page Down	Highlights the current cell and all cells one page down.
Shift + Home	Highlights the current cell and all cells left.
CTRL+Shift+End	Highlights the current cell and all remaining cells thru the last row/cell.
Shift+Tab	In edit mode, accepts the current entry; when a range is selected, accepts the current entry and moves the active cell horizontally to the previous cell in the selection.
Shift+Enter	In edit mode, accepts the current entry; when a range is selected, accepts the current entry and moves the active cell vertically to the previous cell in the selection.

Escape	Cancels current data entry or editing operation.
Home	Moves the cursor to the first cell in the row.
Delete	Deletes cell contents or selected drawn object.
F1	Help.
F2	Edit Cells.
F5	Initiate the Go To command.
F8	Calculate statistics in the active spreadsheet.
F9	Recalculate statistics in the active spreadsheet.
MENU SHORTCUTS	
ALT+E	Edit Menu.
ALT+F	File Menu.
ALT+F+N	Open New File.
ALT+H	Help Menu.
ALT+M	Map.
ALT+W	Window Menu.
ALT+F4	Exit Program.
CTRL+O	Open File.
CTRL+P	Open the Print menu.
ALT+F+P	Print File.
CTRL+S	Save the current file.
CTRL+F6	Switch between windows.
F1	Open Help Contents.
MAP SHORTCUTS	
CTRL+R	Restore the map to the Default view.
CTRL+U	Restores the map to full USA view.
CTRL+Shift+A	Zoom to all stops on route.
CTRL+Shift+R	Toggle Route# on/off.
CTRL+Shift+T	Zoom to a route.
"+" Key	Zooms in on the area where the mouse is pointed; the degree of zoom is determined in Zoom Settings (*Map→Zoom→Settings*).
"-" Key	Zooms out of the current focus area; the degree of zoom is determined by the Zoom Settings (*Map→Zoom→Settings*).
CTRL+ALT	Starts the Lasso tool while in the routing mode.
CTRL+Shift+S	Turn on/off stem lines pointing to and from terminal.
ROUTE BOOK SHORTCUTS	
ALT+F8	Summary Report 1.
ALT+F9	Summary Report 2.
ALT+F10	Summary Report 3.
CTRL+B	Route Book.
CTRL+M	Move Stop.
CTRL+Z	Undo previous action.
CTRL+F8	Header Report 1.
CTRL+F9	Header Report 2.
CTRL+F10	Header Report 3.
CTRL+Shift+W	Opens the Within Route Optimization menu.
CTRL+Shift+O	Opens the Between Route Optimization menu.
Shift+F8	Detailed Report 1.
Shift+F9	Detailed Report 2.
Shift+F10	Detailed Report 3.
CTRL+Page Up	Moves the route tabs one page to the left.
CTRL+Page Down	Moves the cursor one page to the right.
ALT+D	Opens Route Modify Menu.

Figure 272 – DirectRoute Keyboard Shortcuts Table

Mouse Enabled Shortcuts Table

MOUSE ENABLED SHORTCUTS	
Hover over any stop on the map	Displays the selected stop info (ex. name, address).
CTRL+Left click	In the Stop File, places the focus on the selected stop; a circle surrounds the point and the stop record info appears in the info box.
CTRL+Left click	When in the routing mode, Ctrl+Left click on any column header in the Route Summary report, will sort the selected column alphabetically.
CTRL+Left click	When drawing a polygon or polyline with Drawing Tools, this will complete the last line segment.
CTRL+Left click	When in the routing mode, places a circle around the stop on the map and displays the selected record in the stop Info box.
Shift+Left click	In the Route Book, use to select multiple stops within the report.
Shift+Left click, hold and drag	Draw a box on the map and zoom into the boxed area
CTRL+Shift+Left click	In the Stop File, moves the selected stop from its current position to the position the mouse cursor is placed on the map. In the routing mode, moves the selected stop from one position on the route to another position.
Left click x 2	In the Route Book Summary Report, opens the route page of the selected record. On the route page, displays the selected stop info box.
Left click x 2	In the Truck File, opens the selected truck record dialog box for editing. In the Stop File, opens the selected stop record dialog box for editing.
Left click x 2	On the map, zooms into the area where the mouse cursor is positioned; degree of zoom is set via Map Settings (*Map→Zoom→Settings*).
Left click	In the Truck or Stop File, selects the cell for editing. In the Route Book, selects the record to view.

Figure 273 – Mouse Enabled Shortcuts Table

Appendix D – Printing From DirectRoute

DirectRoute enables the printing of several files used in the routing process, in addition to reports, directions, and map pages. The following files can be printed while working in DirectRoute.

- Route File
- Route Book Summary Page
- Route Book Route Pages
- Driving Directions
- Truck File
- Stop File
- Maps

Printing Route Book Pages (Route Files)

To print a Route File, or portions of a Route File (Summary and/or Route pages):

- Open the Route File.
- From the DirectRoute menu, select *File→Print→Route Book*, or
- Select the Print icon from the menu.
- When the 'Print Route Book' info box opens, make the appropriate selections in both the Options and Layout tabs then select the OK button to print.

Print Options and Layout Tabs

- **Print To** – Select Paper, File (Text, Excel, or HTML), or Crystal Reports (if installed).
- **Print Range** – All routes and stops, or selected routes and/or stops.
- **Show Summary** – Summary Page of the Route Book (composite list of routes).
- **Show Stats** – The detailed report appears in gray above the detailed stops (Route Book).
- **Show Detail** – Detailed list of each route and its stops (if directions were generated, select this option to print them).
- **Show Unloaded** – Will print unloaded stops/routes.
- **Show Input Files** – Print files used to generate the route in the report.
- **Skip Empty Routes** – Will skip unloaded routes.
- **Print Route Maps** – Only available if printing to paper.
- **Print Displayed Routes Only** – Print only the routes displayed on the screen.
- **Display Route Number** – If not selected, the Route/Leg number on the Route Page will print.
- **Number of Copies** – Enter the number desired.
- **Print Landscape** – Check if desired.

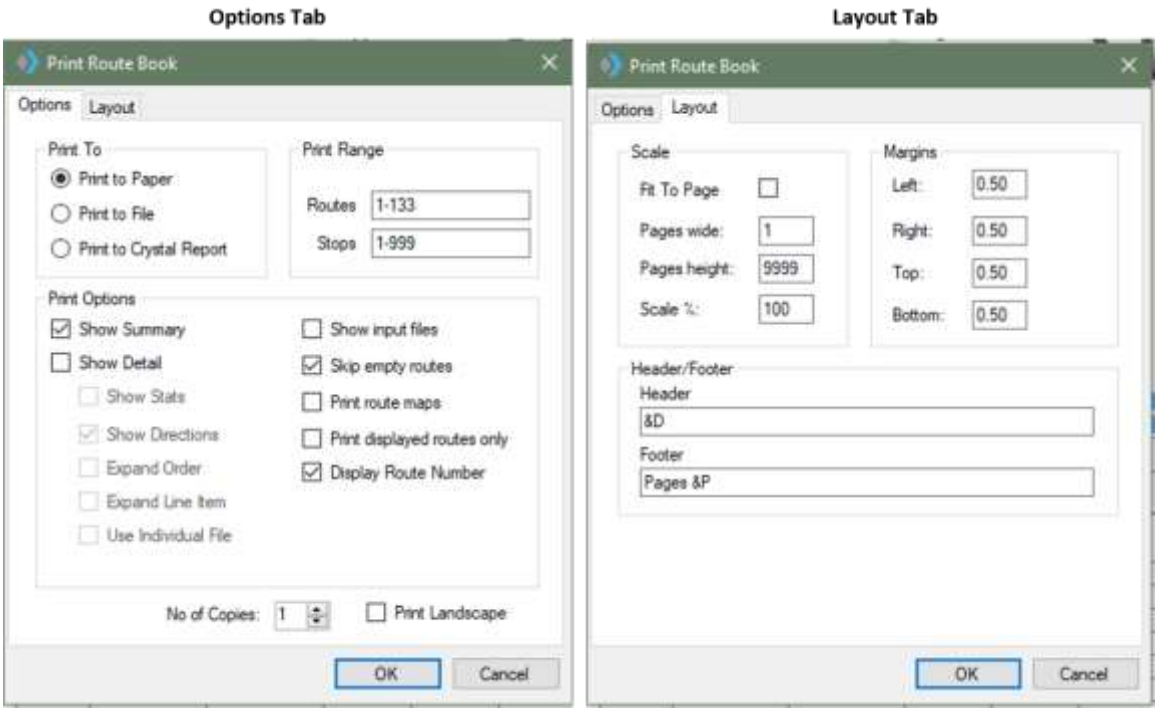


Figure 274 – Print Route Book

- **Scale** – Select Scale settings or leave at default settings (100%).
- **Margin** – Select Margin settings or leave at default settings.
- **Header/Footer** – Edit to customize the header/footer (Route pages and spreadsheets) or leave at default settings.
- &D (prints date)
- &T (prints time)
- &L (left align)
- &C (center alignment)
- &R (right align)
- &P (prints page number)
- &N (prints total number of pages in document)
- &B (prints text in bold font)
- &I (prints text in italics)
- &U (underlines the text)
- &S (strike out the text)
- &"font name" (allows you to select font)
- &NN (allows you to select font size, must be two digits)

Printing Maps

To print a map, with or without any Route Book Files opened, the map window must be the active window. The map that is displayed in the window will be the map that is printed.

If the Route Book is open and an active route is displayed on the map, this will be the view that prints.

- Select *File→Print→Map* from the menu or select the Print icon from the menu.

- Type desired text in Line 1/Line 2 to add a header to the map (actual text, not header commands).
- Check Landscape or uncheck to print Portrait format.
- To change current printer settings, select the Set Up button.
- Select OK to print.

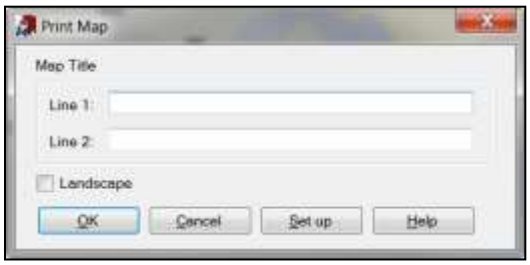


Figure 275 – Printing Captions on Maps

Printing Spreadsheet Records

To print records from one of the spreadsheets (Stop File, Truck File, etc.), the spreadsheet file must be open.

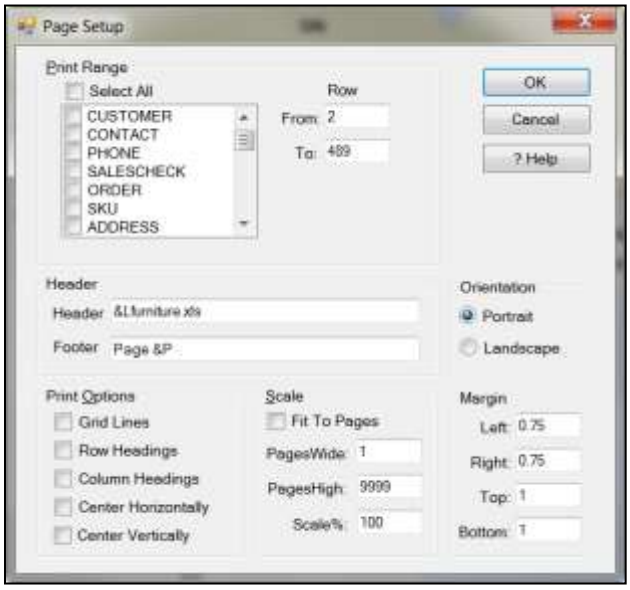


Figure 276 – Print Page Setup

- Select *File→Print→Stop File* (or Truck File) from the menu or select the Print icon from the menu
- Select the print range; select specific columns or Select All to print all columns
- Designate specific rows to print; default will list From/To all rows
- Change the Header/Footer command if desired or leave at default settings
- Choose Printing Format; default is Portrait or select Landscape
- Select Print Options (Grid Lines, Headings, Horizontal/Vertical centering)
- Select Scale Options or leave at default settings
- Select Margin Options or leave at default settings.
- Select OK to print.

Appendix E – **What's New!**

Release Highlights are now available online via the **Trimble MAPS/Support** webpage. Click the links below to view the highlights for each release update.

DirectRoute 2021.1 (Feb 2021)
DirectRoute 2020.3, (Oct 2020)
DirectRoute 2020.2 (Jul 2020)
DirectRoute 2020.1 (Apr 2020)
DirectRoute 2019.4 (Nov 2019)
DirectRoute 2019.3 (Aug 2019)

Important Note: Effective with the DirectRoute 2019.3 release, DirectRoute map data relies on an internet connection to retrieve current Trimble map data provided by PC*MILER Web Services. Customers should ensure they have external internet access to the following sites:

- **http://license.appianlogistics.com:7070/DRLicense.svc**
- *.license.appianlogistics.com
- *.appianlogistics.com
- *.alk.com
- **https://pcmiler.alk.com/**
- **https://raster-tiles.alk.com/**

Additional information is available in the Readme.txt file, included in the DirectRoute release download. The file is copied to your DirectRoute folder when updated with any new release (typically C:\Program Files (x86)\TMW Systems\Appian\Direct Route).

If you missed an update or need a Release download file, please contact Trimble MAPS Support, **support@trimblemaps.com**, Phone: (800) 663-0626, Option 6 then Option 7.

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