TransportationModeler User Guide

TransportationModeler Overview

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TransportationModeler (TransMod) is a standalone 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.

TransMod includes powerful, last-mile routing capabilities that other modeling solutions lack to provide detailed insight into 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 trucks.

TransMod delivers multi-modal, what-if scenarios perfect for use:

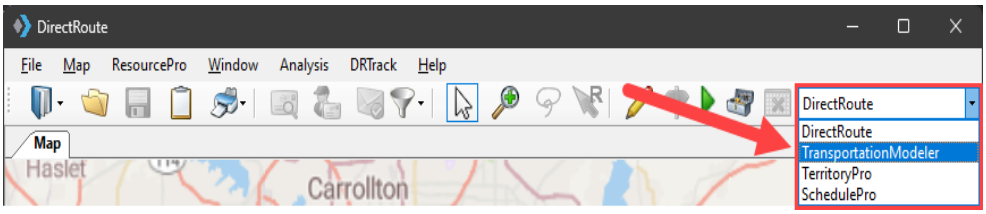
- Analyzing and preparing for freight network changes.
- Responding to shipper RFP/RFQ with accurate bids.
- Comparing multiple transportation plans.
- Evaluating cost benefits with outside carriers and company fleets.
- Exploring transportation mode shifts (LTL to TL) for cost savings.
- Exploring business 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.

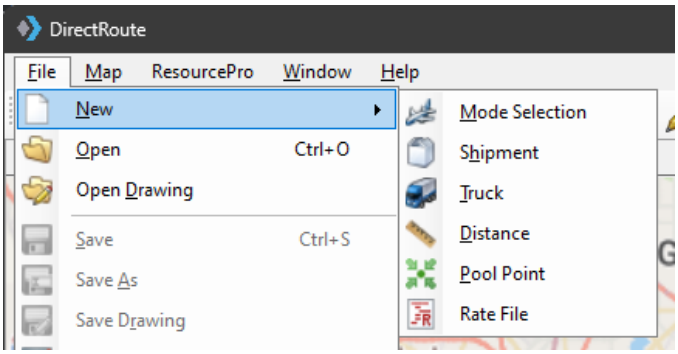
TransportationModeler Tools

The TransMod module is incorporated within the DirectRoute software and works similarly 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 TransMod module is incorporated within DirectRoute. To use, click **TransportationModeler** from the ***Module*** dropdown menu:



All the basic DirectRoute menu and toolbar options remain available for use while working in TransMod, 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.



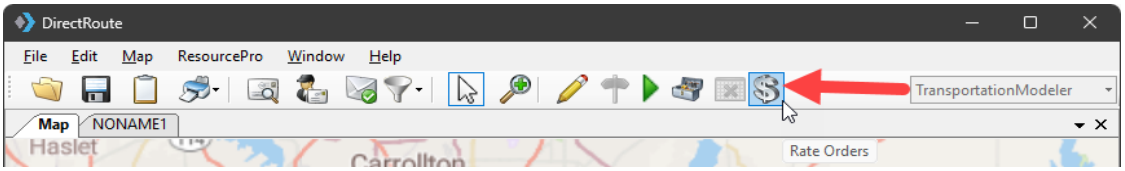
Selecting the menu item **File > New**, or **File > Open** displays the types of files used in TransMod:

- **Mode Selection:** Click **New** to create a new Shipment Solution, or **Open** to view an existing Solution File.
- **Shipment:** Click New to create a new Shipment File, or Open to view an existing Shipment File.

- **Truck:** Click New to create a new Truck File, or Open to view an existing Truck File.
- **Distance:** Click New to create a new manual Distance File, or Open to view an existing Distance File.
- **Pool Point:** Click New to create a new Pool Point file, or Open to view an existing Pool Point file.
- **Rate File:** Click New to create a new Rate File, or Open to view an existing Rate File.

Rate Orders Tool

The Rate Orders Tool is located at the end of the toolbar 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.



When to Use TransportationModeler

Use the TransportationModeler vs. DirectRoute table to determine whether TransMod or DirectRoute would be the proper tool to use.

TransportationModeler vs. DirectRoute

DIRECTROUTE	TRANSPORTATIONMODELER	
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 the same routing parameters as DirectRoute, in addition to the 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	

Create a New TransMod Project

A completed TransMod 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 new TransMod projects are similar to creating a new routing project using DirectRoute.

Each new project consists of four primary steps:

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.
2. **Create/Update TransportationModeler Files**: The three primary files used are a Shipment File, a Truck File, and a Rate File. These files will contain all the information needed by the software to calculate a shipment solution.
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.
4. **Build a Shipment Solution**: Generates a multi-shipment routing solution.

Update and Set Mode Selection

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, which are accessible from the menu

before 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, click **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.

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 customer's 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 customer's 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

Create and Update TransMod Files

The TransMod 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.
- **TransportationModeler 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.
- **TransportationModeler Distance File:** The Distance File contains distances as well as 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.

The Shipment File

The Shipment File identifies the specific shipments that need to be scheduled, where the shipments will originate (Origin Point), delivery 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

1. From the menu, click **File > Open > Shipment**, or **File > New > Shipment**.
2. Enter the required data onto the spreadsheet, or double-click on the first cell to open the Shipment Dialog box, allowing entry of all necessary data per shipment in one window.
3. 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).

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 use 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)

The TransportationModeler 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 that will automatically populate the necessary header columns and allow manual input of all data. Use the TransportationModeler Truck File Fields Table to assist in completing the required columns. Create/Update a Truck File:

1. Click **File > New > Truck** from the menu.
2. A new spreadsheet will display with the required column headings.
3. Enter the vehicle data directly into the spreadsheet, or double-click on the first cell to open the Truck Dialog box, allowing entry of all necessary data per vehicle.
4. 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.

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.

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 Common Carrier vehicles.

TransportationModeler 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 the 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 the 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

TransportationModeler 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.

1. From the menu, click **File > Preferences > PreProcess > Generate Distance File**.

2. Use the Distance File Settings Table to assist in updating each item, as necessary.
3. Click **OK** when all selections are completed.

For more information or instructions on generating a Distance File, see Generate a Distance File.

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.

Click **File > New > Rate File** from the menu.

To edit/update an existing Rate File, select **File > Open** and 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).

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

NOTE: SMC3 Rateware XL is required to rate LTL shipments in TransportationModeler.

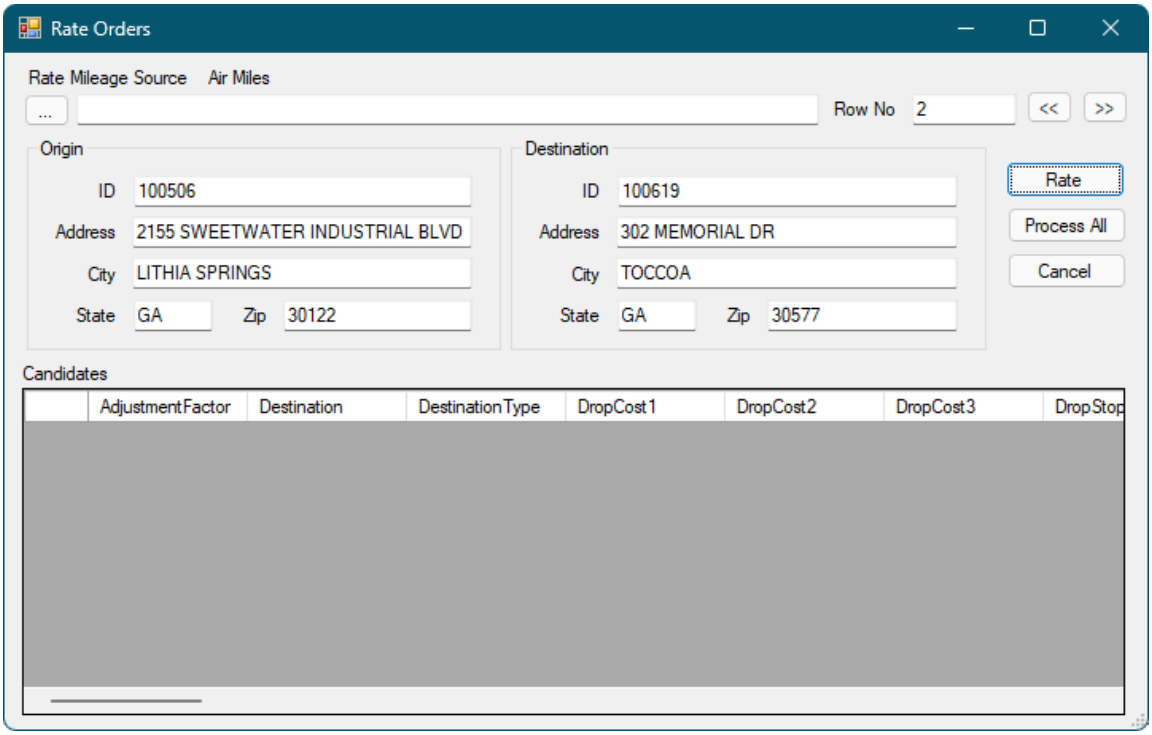
Rate Shipments

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

1. From the toolbar, click the Rate Orders Tool  .
2. The first shipment listed in the Shipment File will be the first shipment to appear in the ***Rate Orders*** Info box.

3. To rate just the one shipment shown, click **Rate**.
4. To rate ALL shipments listed in the file, click **Process All**.



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 the Destination point.

After reviewing the Shipment File with the updated Rate Fields, save the file again.

Build a Shipment Solution

Building a shipment solution is the final stage of 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 and prepare the best possible shipment solution.

To start the building process, click **File > New > Mode Selection** from the menu.

1. Select the files that will be used in the project:

a. **Shipment:** Select the name and location of the Shipment File.

b. **Truck:** Select the file name and location of the Truck File.

c. **Distance:** Select the name and location of the Distance File (Private Fleet).

d. **Boundaries:** Select the name and location of the Drawing File (Private Fleet).

2. Select the Load Options to use in the build:

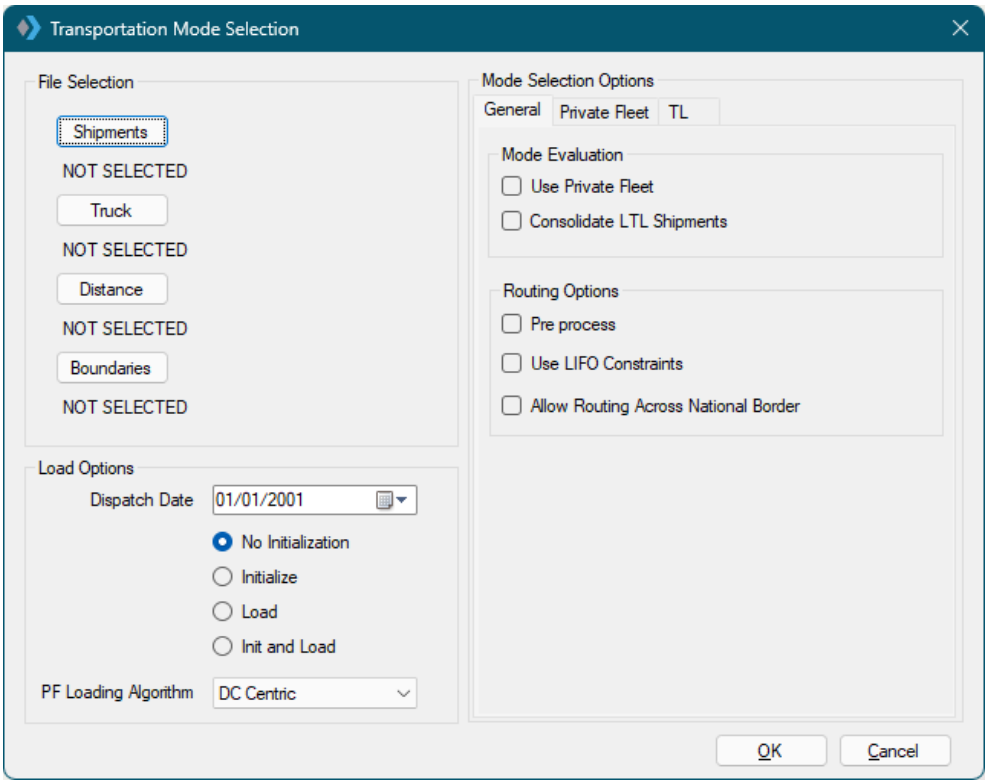
a. **Dispatch Date:** Enter the dispatch date, or select the Calendar icon to select the date.

b. **No Initialization:** If manual loading of each shipment is preferred.

c. **Initialize:** Use previously loaded Rt/Seq settings (Rt/Seq have already been identified in the Shipment File).

d. **Load:** Allows the software to build routes utilizing all parameters that have been chosen/input.

e. **Init and Load:** Use a Shipment File with some fixed Rts/Seqs, as well as new shipments not previously loaded.



TIP: Generally, Initialize Route for baseline/fixed routes or Load Routes to have TM utilize all input parameters.

3. Select the Loading Algorithm to use in the build:

a. The remote Shipment Algorithm does not use the DirectRoute algorithm; uses the parameters set within the Routing Preferences to calculate the solution.

b. DC Centric Algorithm uses the same routing parameters as the DirectRoute routing algorithm, in addition to the ability to handle separate origin and destination stops.

4. Select any General Options (General Options tab) that should be applied to the build and/or Shipment Files.
    a. **Use Private Fleet:** Select if using Private Fleet (see Private Fleet Options Tab).
    b. **Consolidate LTL Shipments:** Check to consolidate LTL shipments (Common Carriers).
    c. **Preprocess:** Applies the Preprocess parameters set in Routing Preferences.
    d. **Use LIFO Constraints:** Generates a solution respecting 'last in, first out' constraints.
    e. **Allow Routing Across National Borders:** Applies parameters set Routing Preferences (**File > PC*MILER Direct > Route Across Borders**) for routing across US borders.
5. Select any Private Fleet Options that may need to be applied (Private Fleet Options tab).
    a. **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 the service radius.
    b. **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.
    c. **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.
    d. **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 loads 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.

6. Select any Truck Load (TL) Options that may need to be applied (TL Options tab).
    a. **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 loads 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.

7. **Prevent Loading Pickup After Delivery On TL Routes:** Used to prevent pickup of new stops after the last delivery
8. **Min Distance for Teams:** Input the minimum distance (in miles) to limit selection.
9. **Max Stops on TL Routes:** Input the maximum number of unique stops to limit the selection of Truckload scheduling.
10. **Min dollar savings to consolidate LTL:** Input the minimum dollar savings that should be realized to consolidate LTL shipments.

   a. Max Distance Between Origin on TL Routes: Enter the max distance, in miles.

11. **Max Empty Miles:** If either the Private Fleet Max Empty Miles or Empty Miles Percent parameters are violated or would be violated by a specific routing action.
12. **Prevent Loading Pickup After Delivery on TL Routes:** For TL assets, a second shipment was placed on a route that was intended to be a one-way route.

After all options have been reviewed/selected, click **OK** to begin the build process.

Shipment Solution Results

When the build is complete, the software will return a Shipment Solution in the Route Book.

The Route Book is created when a Shipment Solution is created and provides a detailed picture of each route with summarized data for the entire 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 name 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 about 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/or edited using any of the tools available in the Route Book. For additional information on edit options, see Route Modifications.

Common Violation Types

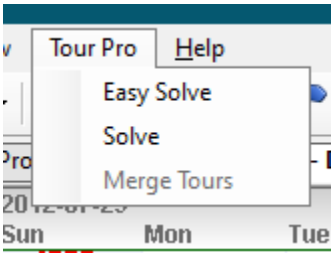
VIOLATION	LOCATION - WHERE TO FIND OR FIX	POSSIBLE FIELD(S) BEING VIOLATED
Time Window	Stop File	Open1, Close1, Pattern1, EarliestDate, LatestDate
Capacity	Stop File: a volume is too big in error, Truck File	Volume for stop and Capacity of the Truck could be exceeded

EqCode	Stop File (EqCode) or the Truck File (SpEq)	No SpEq in the truck file matches the necessary EqCode in the Stop File
Work Time	Truck File	MaxWorkTm value has been exceeded. Occurs sometimes after Get Directions has updated the transit speed
Return Time	Truck File	Volume for stop and Capacity of the Truck could be exceeded
Max Drive Time	Truck File	MaxDriveTm value has been exceeded. Occurs sometimes after Get Directions has updated the transit speed
Max Distance	Preferences	Violation is controllable by the user. Go to **File > Preferences > Routing > Algorithm** and adjust *Max Distance Between Stops*
Max Empty Miles	Mode Selection PF Parameter	**File > New > Mode Selection** (PF tab)
Prevent Loading Pickup After Delivery on TL Routes	Mode Selection TL Parameter	**File > New > Mode Selection** (TL tab)

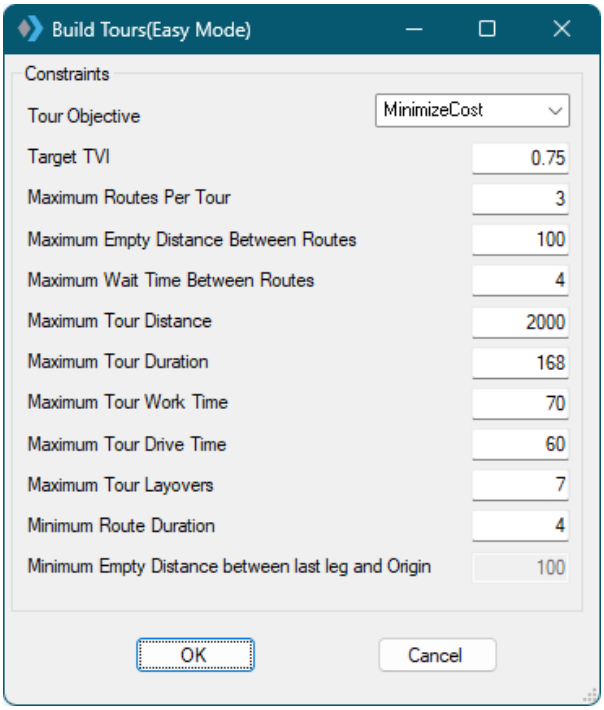
TourPro

TourPro is a tool within TransMod 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.

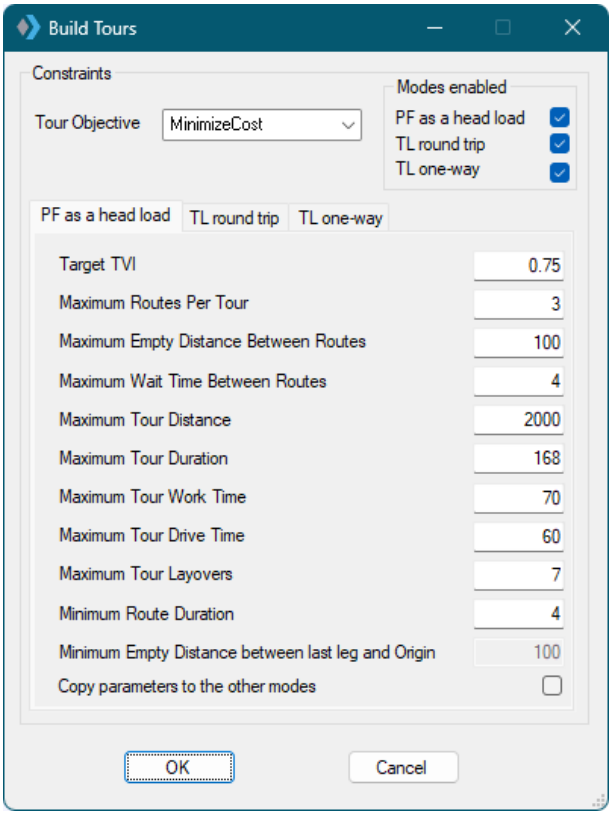
TourPro is used on a solution that has already been created through TransMod, or upon the initialization of a group of shipments. The TourPro menu is launched after a TransMod solution has been generated.
With the solution files open, click **TourPro** from the main menu.



Easy Solve: Choose if only solving for Private Fleet assets (PF).



Solve: Option to define mode type (PF or TL) and trip type (roundtrip or one-way).



Tour Objectives

You 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:** Sets the system up to combine routes that provide a 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:** 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:** 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 Minimize Empty Miles.
- **Mode Selection (PF as head load, TL round trip, TL one-way):** Allows you to select which mode of transportation they want TourPro to consider. You will get to define different parameters for different modes of transportation. If there is no problem with multiple modes of transportation, you can use the Easy Solve TourPro menu instead of the regular TourPro menu.

TourPro Parameters

These parameters act as disqualifiers during the tour creation process. If a group of shipments does not meet the criteria set by users, the shipments won't 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 you 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, the default is 4.
- **Maximum Empty Distance Between Routes:** Sets the maximum distance between the destination of a shipment and the origin of the next shipment 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 set up in the truck file (set in # of Layovers, default = 7).

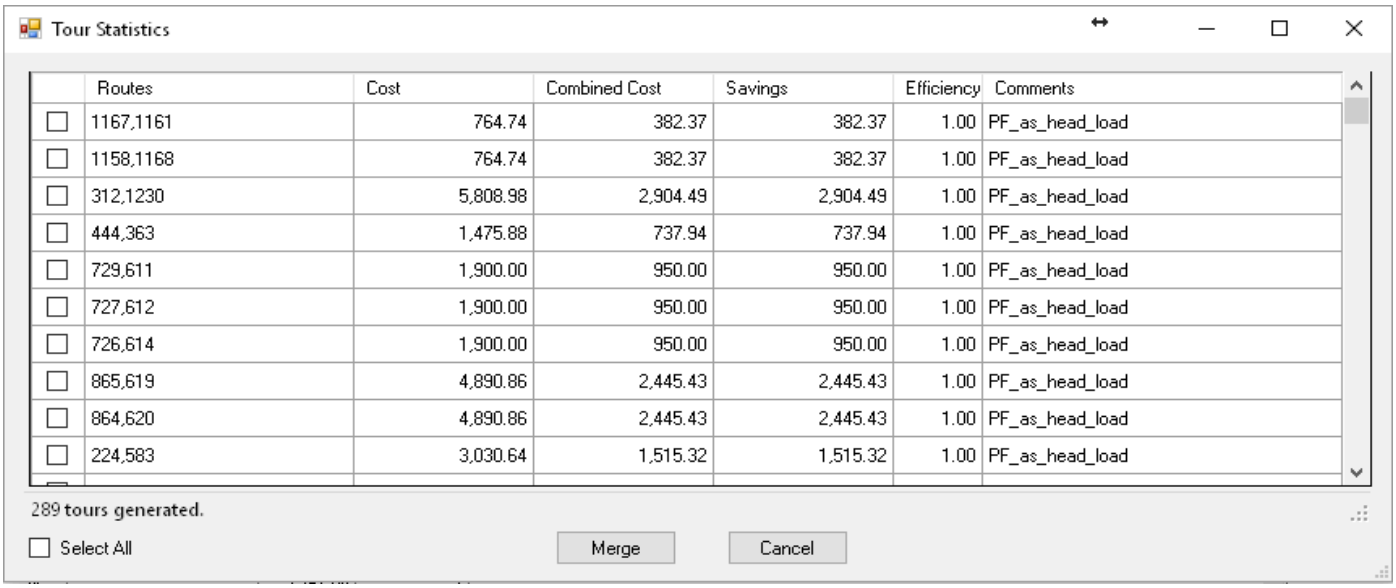
- **Minimum Route Duration:** This parameter sets up the shortest (in hours) shipment that can be considered for the tour creation process. This parameter is used to exclude short, local runs from the tour creation process (set in Hours, default = 4).
- **Minimum Empty Distance between last leg and Origin:** 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).

Merging TourPro Results

Once TourPro has run, you are presented with a results tab. The results are sortable by selecting the column header. Each column provides you with information regarding the tours that have been created.

- **Routes:** Route numbers of shipments being combined in the presented tour.
- **Cost:** Total cost of each separately-run shipment.
- **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).

You 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.



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.