THE UNIVERSITY OF TEXAS AT AUSTIN
CENTER FOR TRANSPORTATION RESEARCH

TECHNICAL REPORT 0-6820-P5
TxDOT PROJECT NUMBER 0-6820

Stage 2 Tool User's Manual

Research Supervisor:
Dr. Michael Walton

August 2016; Published August 2017

http://library.ctr.utexas.edu/ctr-publications/0-6820-P5.pdf

THE UNIVERSITY OF TEXAS AT AUSTIN
CENTER FOR TRANSPORTATION RESEARCH

0-6820-P5

Stage 2 Tool User's Manual

Research Supervisor:
Dr. Michael Walton

TxDOT Project 0-6820: A Process for Designating and Managing Overweight Truck Routes in Coastal Port Regions

AUGUST 2016; PUBLISHED AUGUST 2017

Performing Organization: Center for Transportation Research The University of Texas at Austin 1616 Guadalupe, Suite 4.202 Austin, Texas 78701	**Sponsoring Organization:** Texas Department of Transportation Research and Technology Implementation Office P.O. Box 5080 Austin, Texas 78763-5080
Performed in cooperation with the Texas Department of Transportation and the Federal Highway Administration.	

Table of Contents

List of Figures

List of Tables

INTRODUCTION

The purpose of the Permitted Overweight Truck Corridor Analysis Tool (referred to in this document as the *Stage 2 Tool*) is to evaluate existing or to create new proposed overweight (OW) truck corridors to estimate the permitted OW truck, pavement, bridge consumption, and safety project costs of OW truck operations. These designated or proposed corridors serve coastal ports or border ports of entry in Texas. The analysis tool is intended to compute the consumption costs for OW trucks that have purchased a permit from the corridor-operating authority. The tool currently does not compute the consumption costs of *all* truck traffic operating on the corridor (such as legally loaded trucks, unpermitted OW trucks, and permitted OW trucks that have received a permit from the Texas Department of Motor Vehicles—Permits Section through TxPROS)—only the consumption costs for trucks that received a permit from the corridor-operating authority.

The Stage 2 Tool is structured in three levels (Figure 1): 1) Corridor network level, 2) Route level, and 3) Segment level. The corridor level is the higher level, and is composed of the routes that are part of the corridor network. Routes in the corridor are composed of segments. The segmentation of the routes is necessary in order to accurately estimate the corridor costs.

The Stage 2 Tool is designed to help the user complete the required inputs. The process is divided into six steps:

- Step 1—Create a New Project, Open an Existing Project
- Step 2—Select Routes
- Step 3—Select Segment Attributes
- Step 4—Describe the Freight Movement
- Step 5—Select Safety Projects
- Step 6—Obtain Corridor Cost Analysis and Report Results

The first section of the User's Manual presents the system requirements that are necessary for the proper tool functionality. Section 2 presents step-by-step directions to create/edit or continue a corridor analysis. Section 3 presents the information that supports the Stage 2 Tool, which is contained in the tool's Excel file worksheets and libraries. Section 4 presents the information related to the management of the libraries. Finally, Section 5 presents a glossary for use with the Stage 2 Tool.

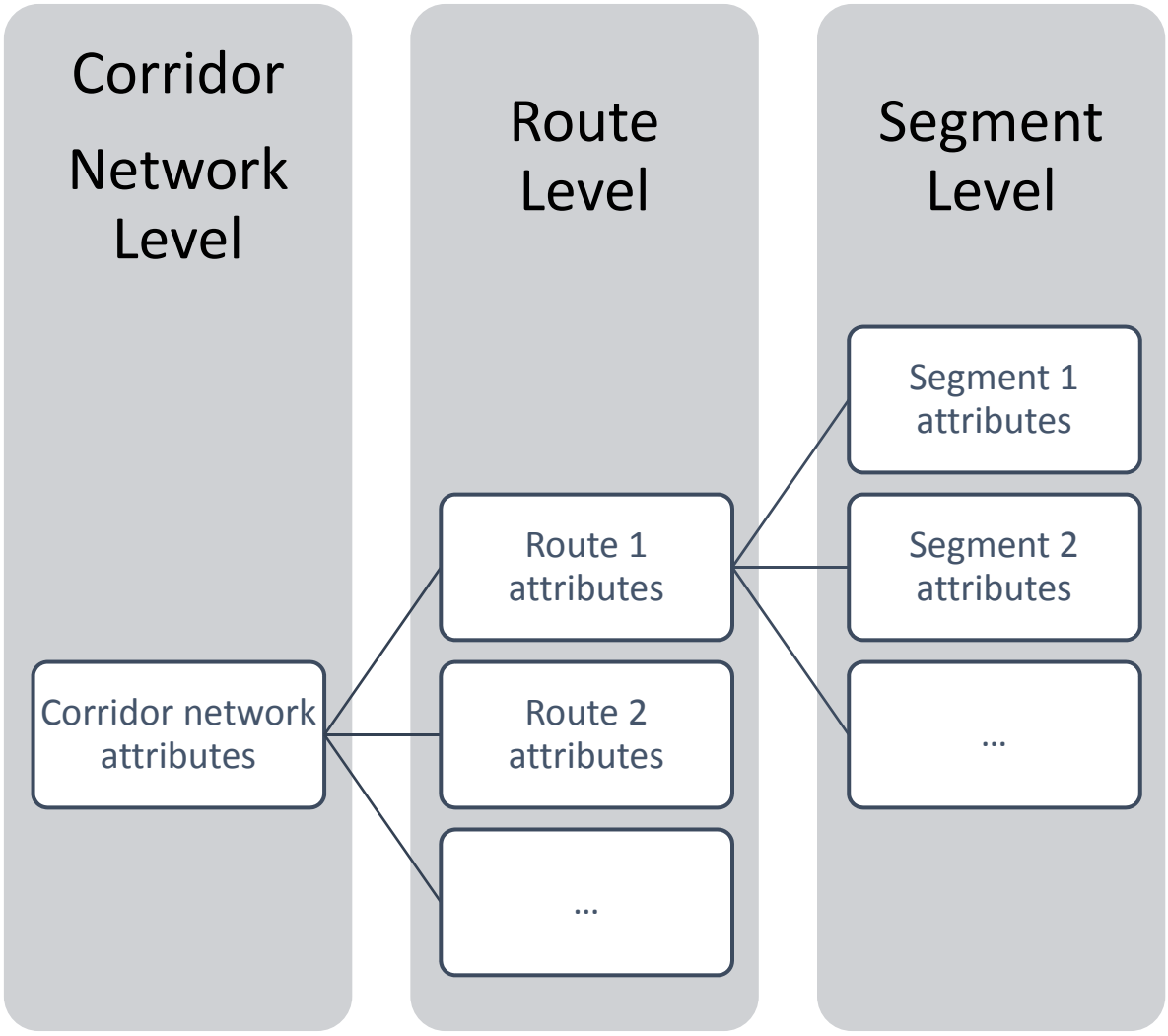


Figure 1. Structure of the Stage 2 Tool

SECTION 1. SYSTEM REQUIREMENTS

The Stage 2 Tool was developed using Microsoft® Excel® 2013 (15.0.4849.1003) MSO (15.0.4849.1000) 32 bits. The following are the requirements for the proper functionality of the tool:

1. Same or updated versions of Microsoft® Excel® that read the format ".xmsl" can be used to open the Stage 2 Tool.
2. The Excel® file is a macro-enabled file type. The user must enable the use of macros on the computer where the Stage 2 Tool is used.
3. The computer must be configured with the following format for numbers:
    a. Thousands are separated by ","
    b. Decimals are separated by "."

To begin, download the Stage 2 Tool here:
http://library.ctr.utexas.edu/ctr-publications/0-6820-P3.zip

NOTE: This tool uses an Excel spreadsheet (Stage II.xlsm) as its base; this spreadsheet extracts and stores information from a series of files contained within three accompanying folders. Thus, in order for the tool to work, the Excel file must be stored in the same folder with its subfolders.

SECTION 2. STEP-BY-STEP DESCRIPTION OF THE STAGE 2 TOOL

Before Start

Open the Stage 2 Tool Excel File (Stage II.xlsm). To start using the Stage 2 Tool, click the Worksheet "Start." The user should see the following interface with four buttons:

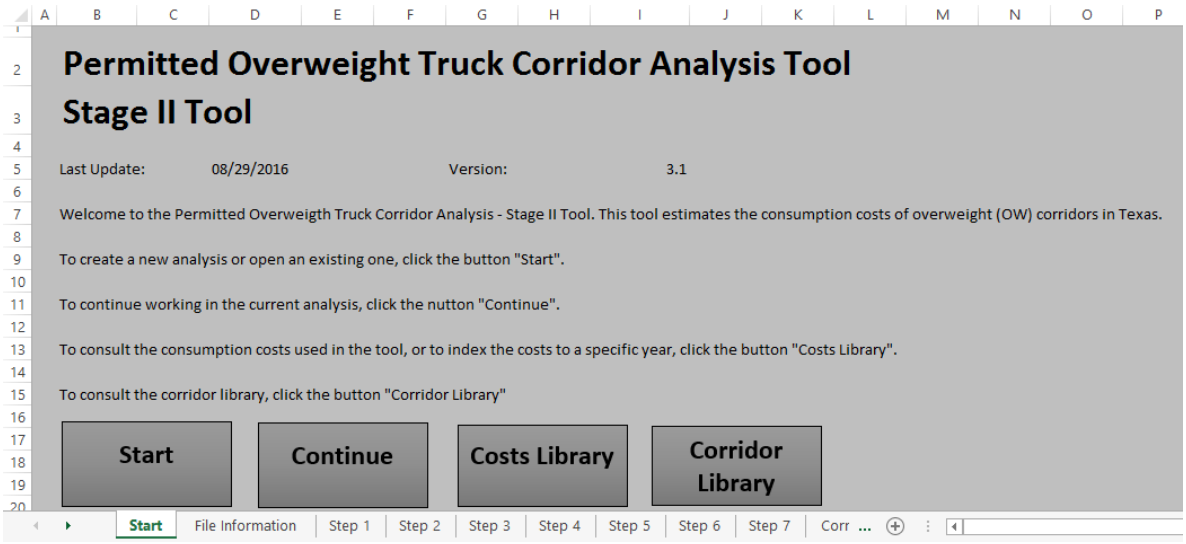


Figure 2. "Start" worksheet interface

Table 1 summarizes the actions for each of the buttons.

Table 1. Description of the Buttons in the "Start" Worksheet

Button	Description
Button "Start"	Launches the Stage 2 Tool from the beginning. If there is a project that has not been saved, it would be deleted.
Button "Continue"	Launches the Stage 2 Tool from Step 2. It can be used only if there is a project that the user was working previously and was not saved.
Button "Costs Library"	Opens the worksheet "Cost Library." This worksheet has the costs used for Stage 2 Tool.
Button "Corridor Library"	Opens the worksheet "Corridor Library." This worksheet has the corridors saved in the Stage 2 Tool.

Click the "Start" button to launch the Stage 2 Tool.

Start

Once the Stage 2 Tool is launched, the user will see the following interface:

Figure 3. Stage 2 Tool interface

Table 2 summarizes the buttons in this window.

Table 2. Description of the Buttons in the Initial Interface of the Stage 2 Tool

Field or Button	Description
Button “Quit”	Closes the Stage 2 Tool.
Button “Start”	Proceeds to Step 1 of the Stage 2 Tool.

Click the “Start” button to continue. A new window will open, as shown in Figure 4.

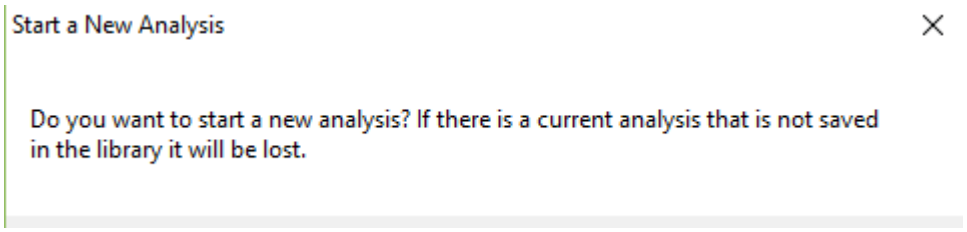


Figure 4. “Start a New Analysis” window

If the user clicks “Yes,” the program will proceed to Step 1. In this case, if a current analysis is in progress but not saved in the library, it will be lost.

If the user wants to continue the current analysis, the user should click “No,” then “Quit.” Once the user is in the “Start” worksheet (Figure 2), they should click the “Continue” button.

Step 1—Create a New Project or Open an Existing Project

In Step 1 the user has options to create a new, proposed, or hypothetical project, to load an existing project, or to modify an existing project and save it as a new project. The user will see the interface as shown in Figure 5:

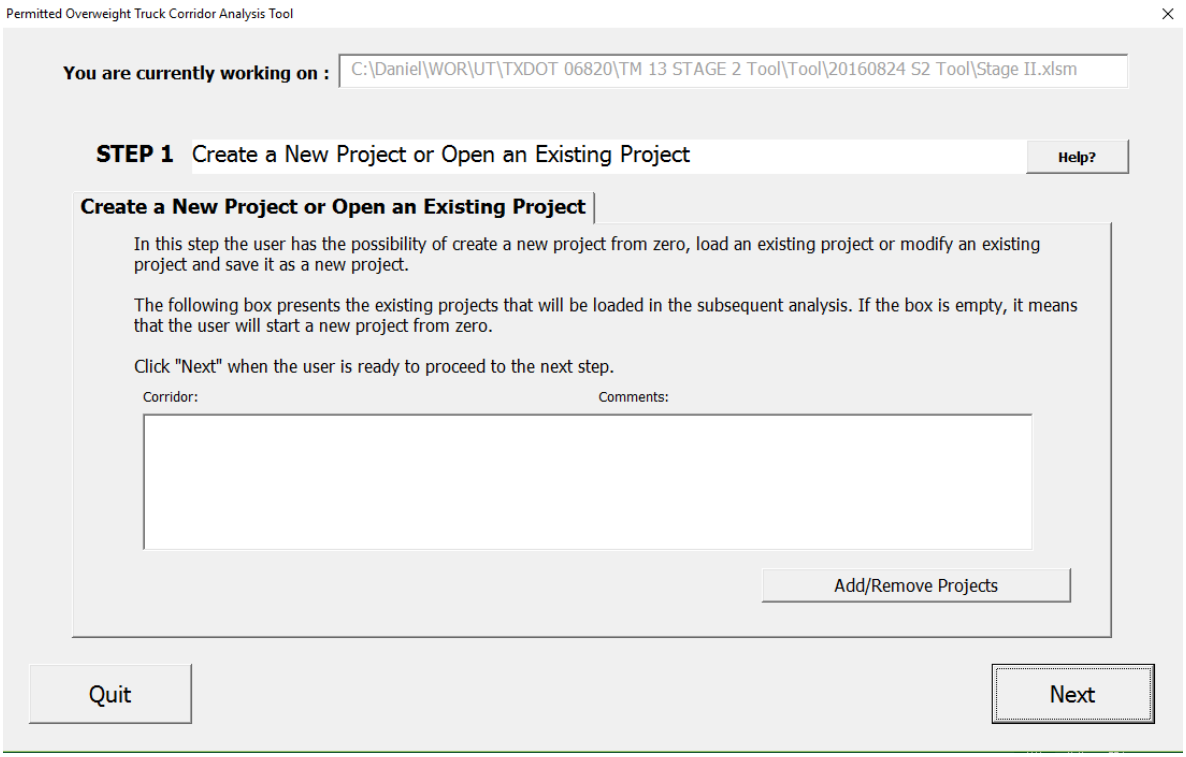


Figure 5. Step 1 interface

Table 3 summarizes the fields and buttons of Step 1.

Table 3. Description of the Fields and Buttons in the Step 1 Interface

Field or Button	Description
Field "Corridor and Comments"	Lists corridors that will be loaded in the Stage 2 Tool. If the box is empty, no corridor will be loaded in the Stage 2 Tool, and the user will create a new corridor from zero. If the box has one corridor in the list, the Stage 2 Tool will load the information of that specific corridor. The user can edit or review the information of the corridor. However, the original corridor cannot be changed. If modifications are made to an existing corridor it must be saved with a different file name. This is done to ensure that all of the original corridors and their associated data are retained as a permanent record in the database. The user can choose to include a modified corridor in these "archived" corridors to document a planned new addition to a corridor, changes to OW truck traffic patterns at some future date, or to create another scenario that the user wants to retain as an unchangeable record in the database. If the box has two or more corridors in the list, the Stage 2 Tool will combine all the corridors as one corridor. This function can be useful if the user wants to analyze or edit the combination of two or more corridors.
Button "Help"	Opens a new window where the components of the current step are explained, step by step.
Button "Add/Remove Projects"	Opens a new window that allows the user to add or remove previous projects from the "Corridor and Comments" field. However, the original set of corridors that are included in the tool are "archived" and cannot be changed or deleted. A copy of an archived corridor can be made and modified, but the original version is always kept intact in the tool.
Button "Quit"	Closes the Stage 2 Tool.
Button "Next"	Opens a new window where the user is prompted to name the project. After a name is assigned, the tool proceeds to Step 2.

Add/Remove Projects

When the user clicks the “Add/Remove Projects” button, the tool opens a new window as illustrated in Figure 6:

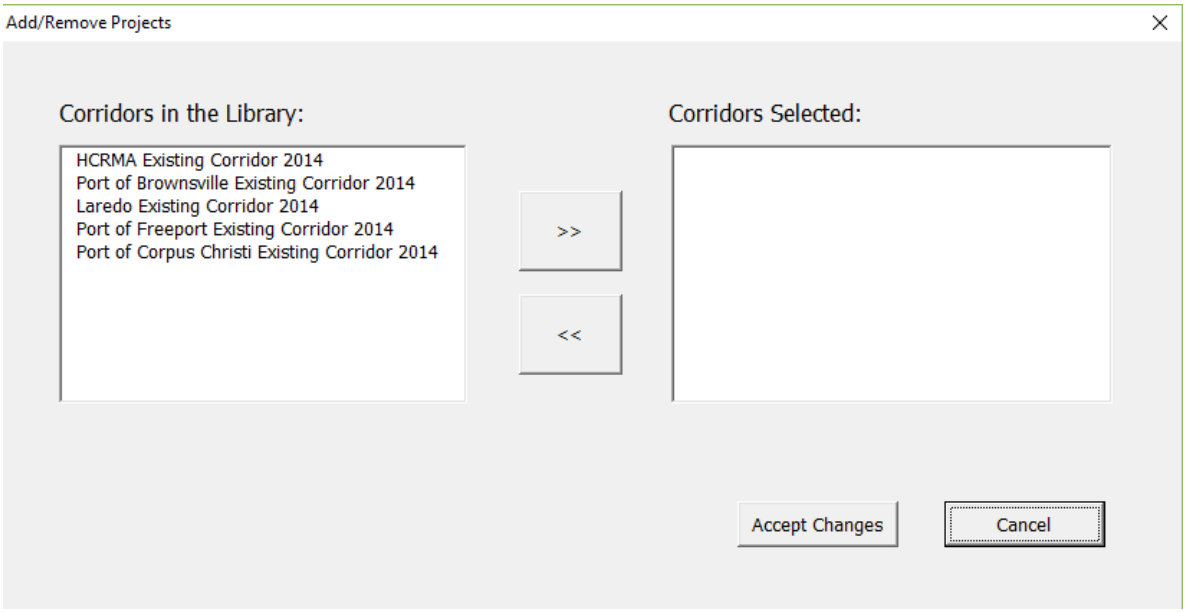


Figure 6. “Add/Remove Projects” Window

Table 4 summarizes the fields and buttons in the “Add/Remove Projects” window.

Table 4. Description of the Fields and Buttons in the "Add/Remove Projects" Window

Field or Button	Description
Field "Corridors in the Library"	Lists of all the corridors that are available in the library. By default, it contains five existing archived corridors from 2014 (Hidalgo County RMA; Port of Brownsville, Laredo, Port of Freeport, and Port of Corpus Christi). It also includes other projects that are saved by the user.
Field "Corridors Selected"	Lists all the corridors that are going to be included in the analysis. Subsequently, these corridors will be loaded in the following steps of the tool.
Button ">>"	Adds a corridor from the field "Corridors in the Library" to the field "Corridors Selected." This means that the corridor selected will be included in the subsequent analysis of the tool. Adding a corridor from the analysis adds or removes all routes, segments, and library data associated with the corridor from the proposed analysis,.
Button "<<"	Removes a corridor from the field "Corridors Selected." This means that the removed corridor will not be included in the subsequent analysis of the tool, including all routes, segments, and library data associated with the corridor.
Button "Accept Changes"	Accepts the changes applied to the corridors selected. This updates the field "Corridor and Comments" of Step 1 interface with the corridors selected.
Button "Cancel"	Cancels the changes made to the corridors selected.

Name of New Corridor

Once the changes are accepted, click the button "Next" in the Step 1 interface to proceed. A new window will be opened, and the user will be asked to name the current analysis. Naming the current analysis will temporarily save the project, but it will not save the project in the library (this is done at the end of Step 6). The user can change the name given to the project in a later step. Figure 7 illustrates the "Name of New Corridor" window.

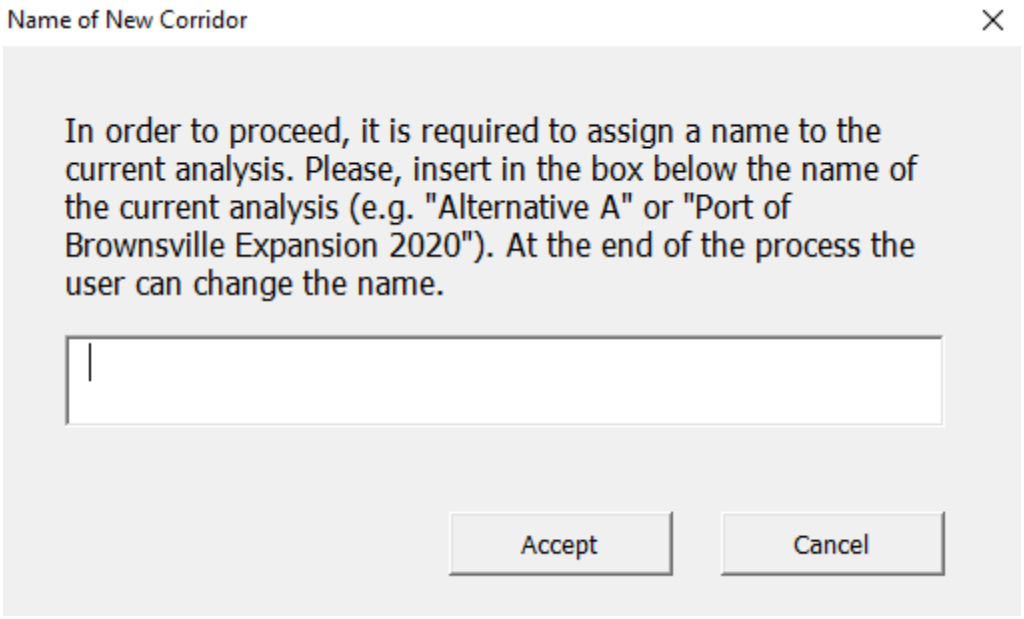


Figure 7. "Name of New Corridor" window

Table 5 summarizes the fields and buttons in the "Name of New Corridor" window.

Table 5. Description of the Fields and Buttons in the "Name of New Corridor" Window

Field or Button	Description
Field "Name of New Corridor"	Enter the name assigned by the user for the new analysis. **NOTE:** This is a temporary name. If the user wants to save the current analysis in the library, the user cannot use the name of a previous analysis. If no name is added the program will not proceed.
Button "Accept"	Proceeds to Step 2.
Button "Cancel"	Returns to Step 1.

Click the button "Accept" to proceed to Step 2.

Step 2—Select Routes

In this step, the user must add the routes that are part of the new corridor network. Each route must be added individually (i.e., each route is added one-by-one), using the posted highway abbreviation and route number (e.g., FM 1500). NOTE: At least one route is required to proceed with the analysis.

Figure 8 illustrates the Step 2 interface.

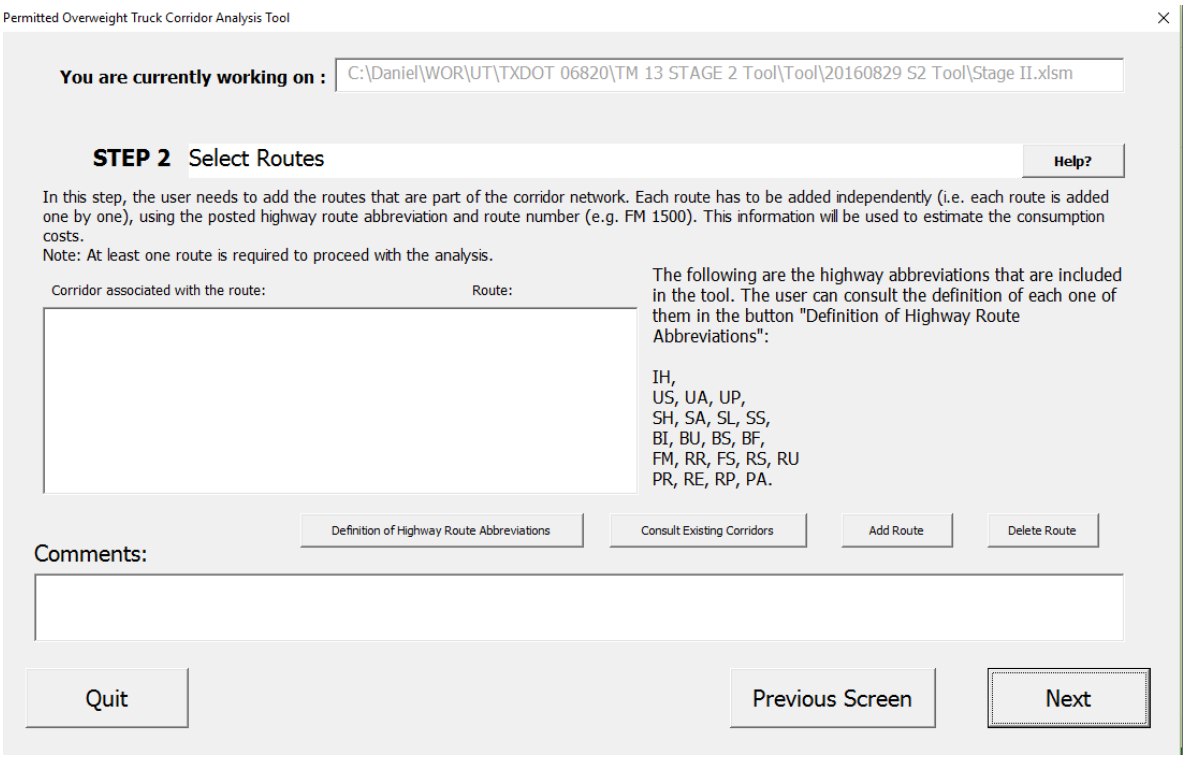


Figure 8. Step 2 interface

If necessary, the user can return to Step 2 to modify the routes that belong to the corridor.

Table 6 summarizes the fields and buttons in the Step 2 interface.

Table 6. Description of the Fields or Buttons in the Step 2 Interface

Field or Button	Description
Field "Corridor Associated with the Route"	Lists the corridors that are associated with the routes of the analysis. When the tool opens a corridor saved from the library, this list shows the original corridor where the route belongs. When the tool creates a new corridor without previous information, the list is empty.
Field "Route"	Lists the routes that are currently part of the analysis. At least one route is required to proceed to Step 3.
Field "Comments"	Allows for comments about the corridor that the user would like to save for future reference.
Button "Help"	Opens a new window where the components of the current step are explained, step by step.
Button "Definition of Highway Route Abbreviations"	Opens a new window where the Highway Route Abbreviations included in the tool are explained.
Button "Consult Existing Corridors"	Opens a new window where the maps of some corridors saved in the library are presented.
Button "Add Route"	Opens a new window where the user can add the required information for a new road.
Button "Delete Route"	Deletes the information of a selected route from the field "Route." At least one route should be selected. **NOTE:** This action cannot be undone.
Button "Quit"	Closes the Stage 2 Tool. The current analysis can be continued in the future if the user clicks the button "Continue" at the "Start" worksheet.
Button "Previous Screen"	Returns to Step 1. **NOTE:** All the information stored that has not been saved in the library would be lost. In order to save the corridor in the library, the user must input the required information for at least one route and save the corridor in Step 7. The tool cannot save partial corridors in the library because that may cause errors.
Button "Next"	Proceeds to Step 3. There must be at least one route in the field "Route" in order to proceed to Step 3.

Definition of Highway Route Abbreviations

When the user clicks the "Definition of Highway Route Abbreviations" button, a new window will open. This new window will present the definitions of the Highway Route Abbreviations supported by the tool, as shown in Figure 9.

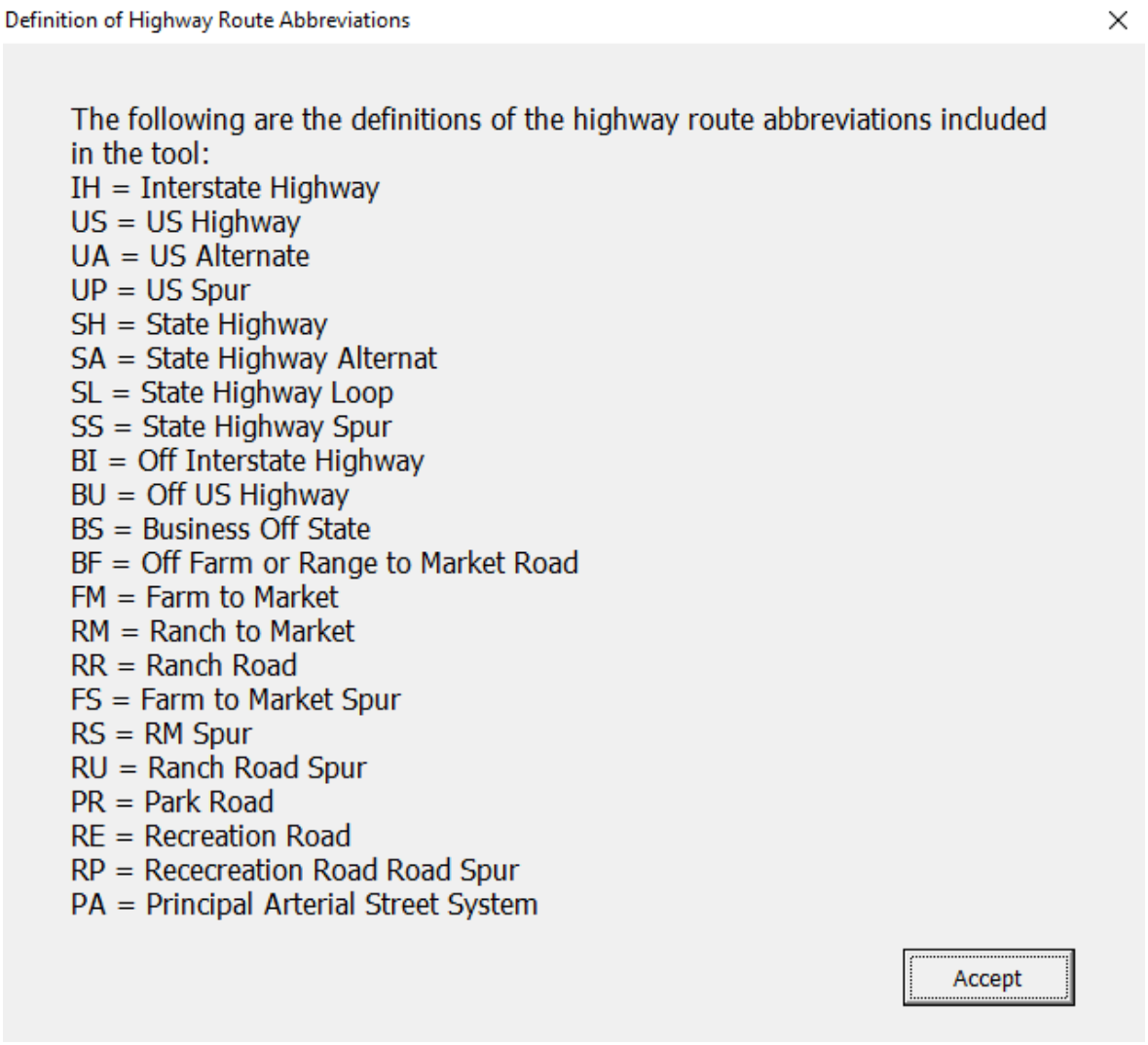


Figure 9. "Definition of Highway Route Abbreviation" interface

Consult Existing Corridors

When the user clicks the "Consult Existing Corridors" button, a new window will open, presenting the maps that are available in the Stage 2 Tool. Figure 10 illustrates this window.

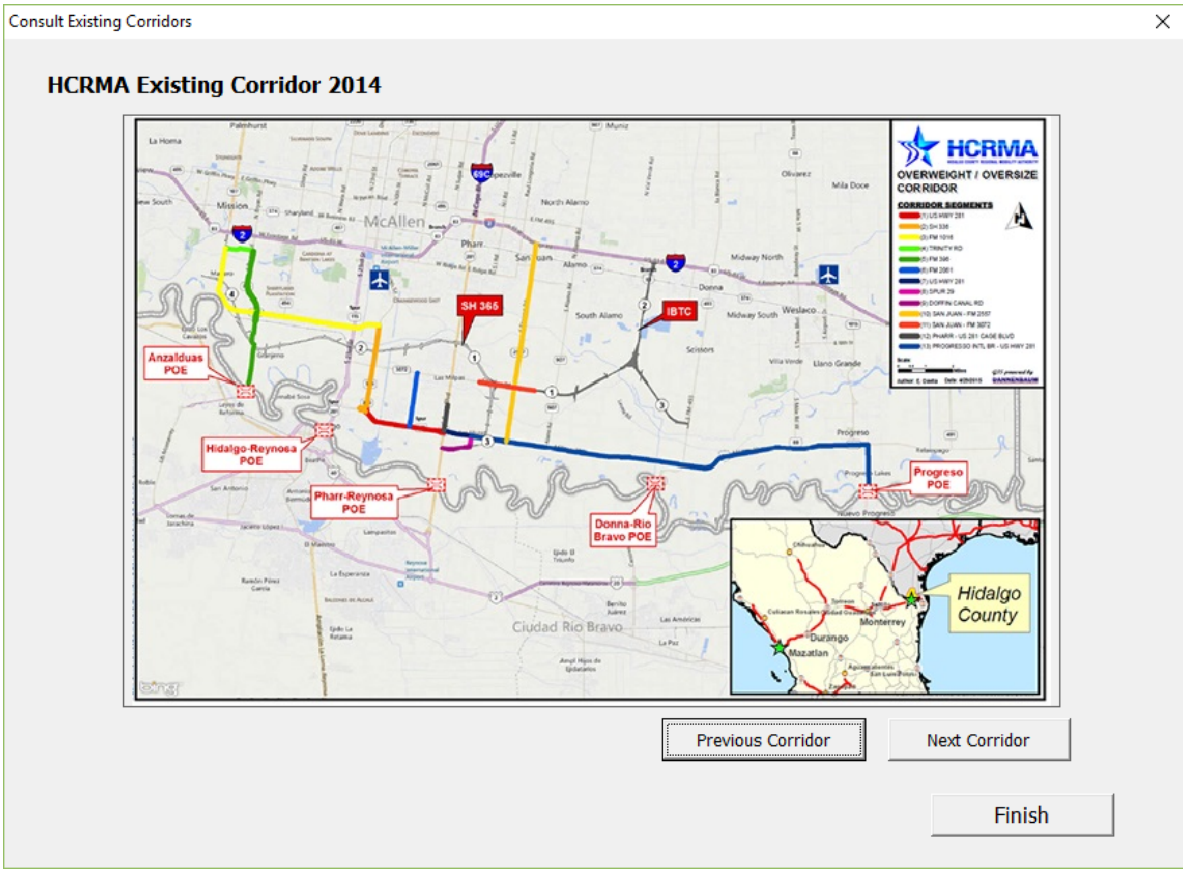


Figure 10. "Consult Existing Corridors" interface

Add a Route

When the user clicks the "Add a Route" button, a new window will open with two required fields: 1) the highway abbreviation of the route to add (e.g., "IH"), and 2) the number of the route (e.g., "35").

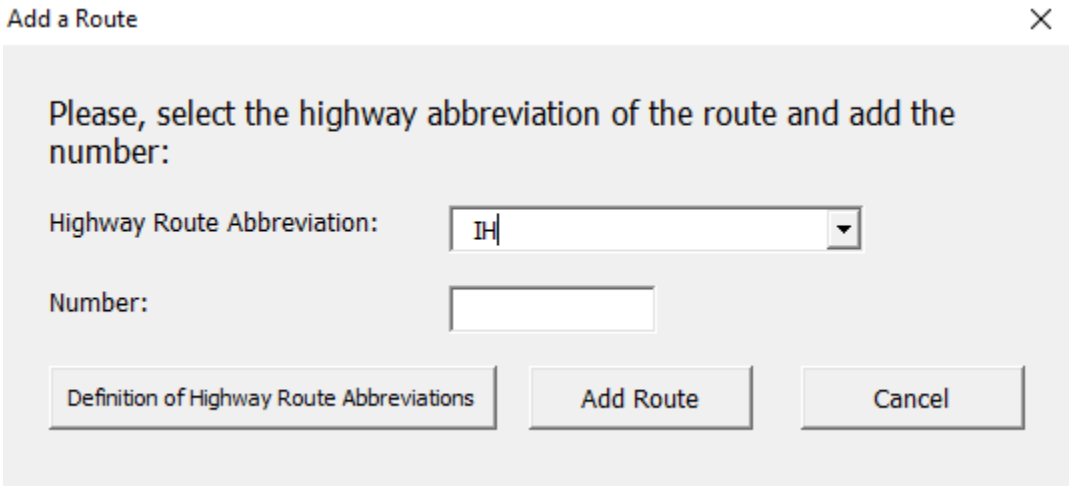


Figure 11. "Add a Route" window

Table 7 summarizes the fields and buttons of the "Add a Route" window.

Table 7. Description of the Items in the "Add a Route" Window

Field or Button	Description
Field "Highway Abbreviation"	Highway abbreviation of the route to add (e.g., "IH," "US," "UP," "RR," etc.)
Field "Number"	Route number to be added (e.g., "36," "10," "2," "0181," etc.)
Button "Definition of Highway Route Abbreviations"	Opens a new window where the Highway Route Abbreviations included in the tool are explained.
Button "Add Route"	Adds the route to the analysis. **CONDITIONS:** 1) Highway abbreviation must be selected from the drop-down list of Highway Route Abbreviations supported by the tool, and 2) The route must have a number.
Button "Cancel"	Returns to Step 2.

In this example, a route named "IH 1" will be added in Step 2.

When finished entering the route name information, click the "Next" button.

Step 3—Select Segment Attributes

In this step, the user must segment the routes in order to increase the accuracy of the consumption estimation.

When is it necessary to create segments?

Each route can be segmented according to the user's preferences, but the following criteria should be considered:

1. The same route could have different pavement types at different points, which will affect the attributes of the route (Figure 12).

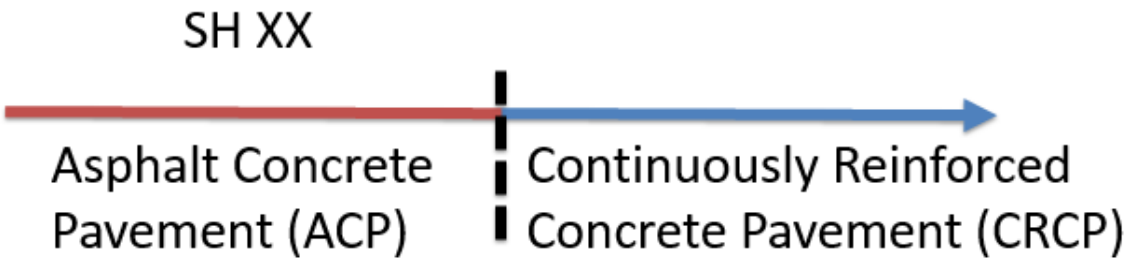


Figure 12. Example of a route with two different pavement types, and the required segmentation

2. The same route may have one segment in a rural area and another in an urban area (Figure 13), which will affect the bridge consumption estimation because bridge densities may be higher in urban areas than in rural areas within a given region of the state. One way to determine if the segment is in a rural or urban location is by consulting the Rhino database. The Rhino database can be downloaded at the following website: http://www.txdot.gov/inside-txdot/division/transportation-planning/roadway-inventory.html

   Rural/urban designations in the Rhino database are based on four codes:

   a. 1: Rural (Population < 5,000)
   b. 2: Small Urban (Population 5,000—49,999)
   c. 3: Urbanized (Population 50,000—199,999)
   d. 4: Large Urbanized (Population 200,000 +)

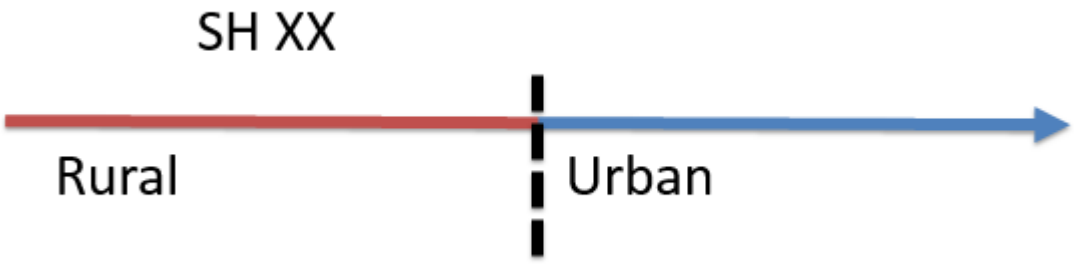


Figure 13. A route with a segment in a rural area and a segment in an urban area, with ~~and~~ the required segmentation

3. If the same route has different OW truck traffic at different points (Figure 14), the pavement and bridge consumption is based on the number of trucks using the infrastructure. If the same route has a portion with higher OW trucks, and another with less OW trucks, it is necessary to split the route into two sections.

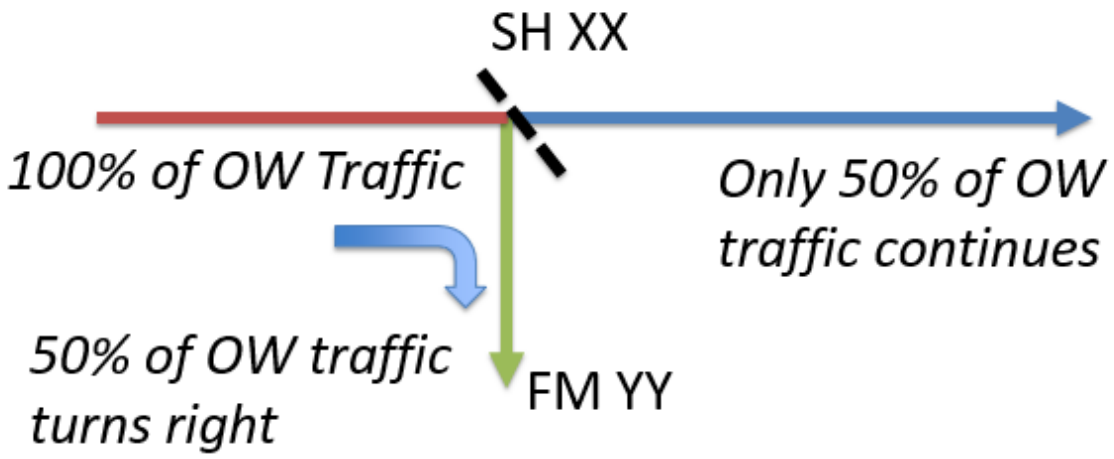


Figure 14. Example of a route with different ow traffic at different points, and the required segmentation

4. If the same route crosses a county (Figure 15) bridge consumption estimation will be affected because the consumption cost is based on the county where the segment is located.

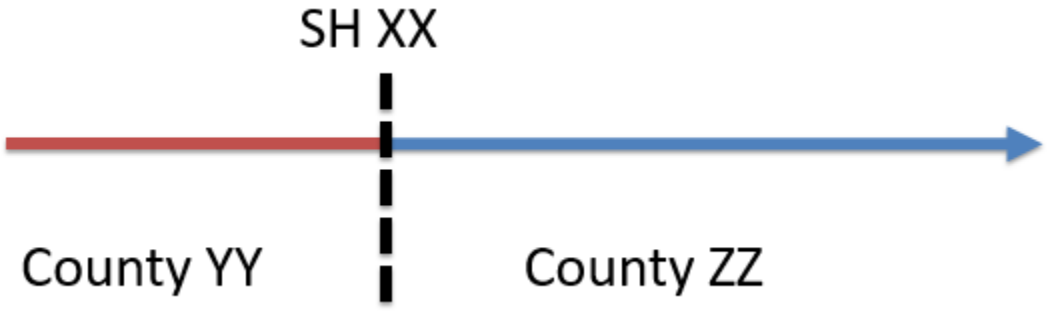


Figure 15. Example of a route crossing a county and the required segmentation

5. If the same route has a change in the number of lanes in the roadbed (Figure 16) total pavement maintenance will be affected because the cost per lane is multiplied by the number of lanes in the roadbed. If the number of lanes in the roadbed increases, the total pavement consumption will also increase.

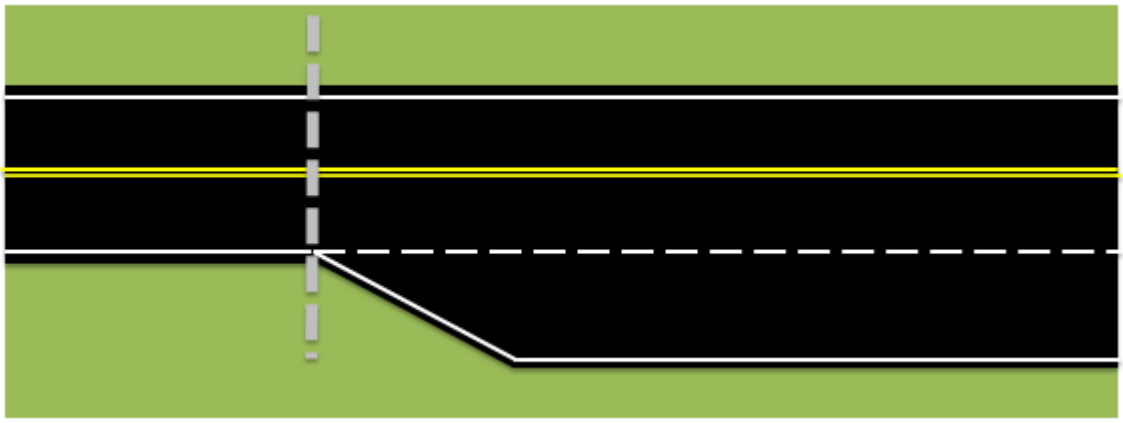


Figure 16. Example of a route with a change in the number of lanes in the roadbed, and the required segmentation

6. When the roadbed is divided and the OW traffic goes in both directions (Figure 17), each roadbed must be analyzed as two different segments because different roadbeds can have different attributes such as number of lanes**,** pavement type, or percent of OW trucks traveling in one or the other direction.

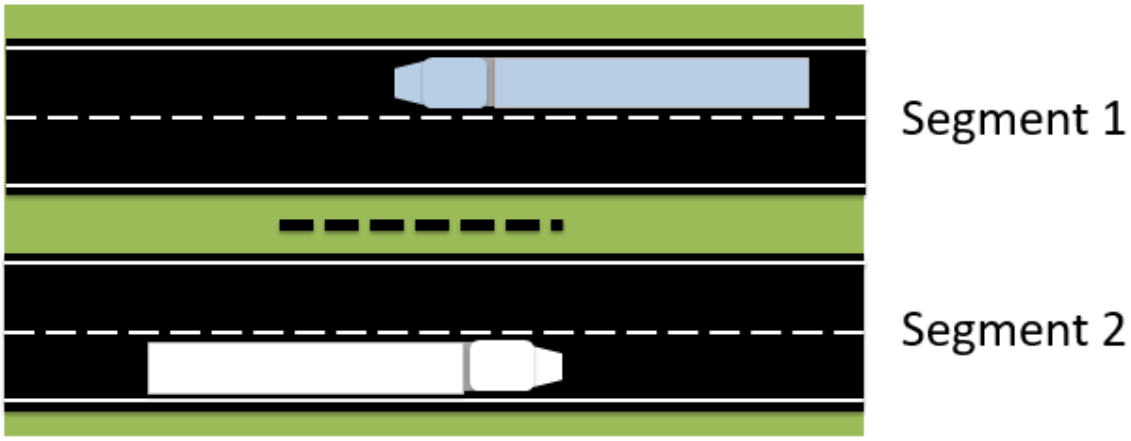


Figure 17. Example of a route that has divided roadbed and OW traffic traveling in both directions

NOTE: The tool supports the creation of as many segments as the user prefers, but in order to continue, each route needs at least one segment.

Step 3 Interface

Figure 18 presents the Step 3 interface, which features a panel for the different attributes of the segment.

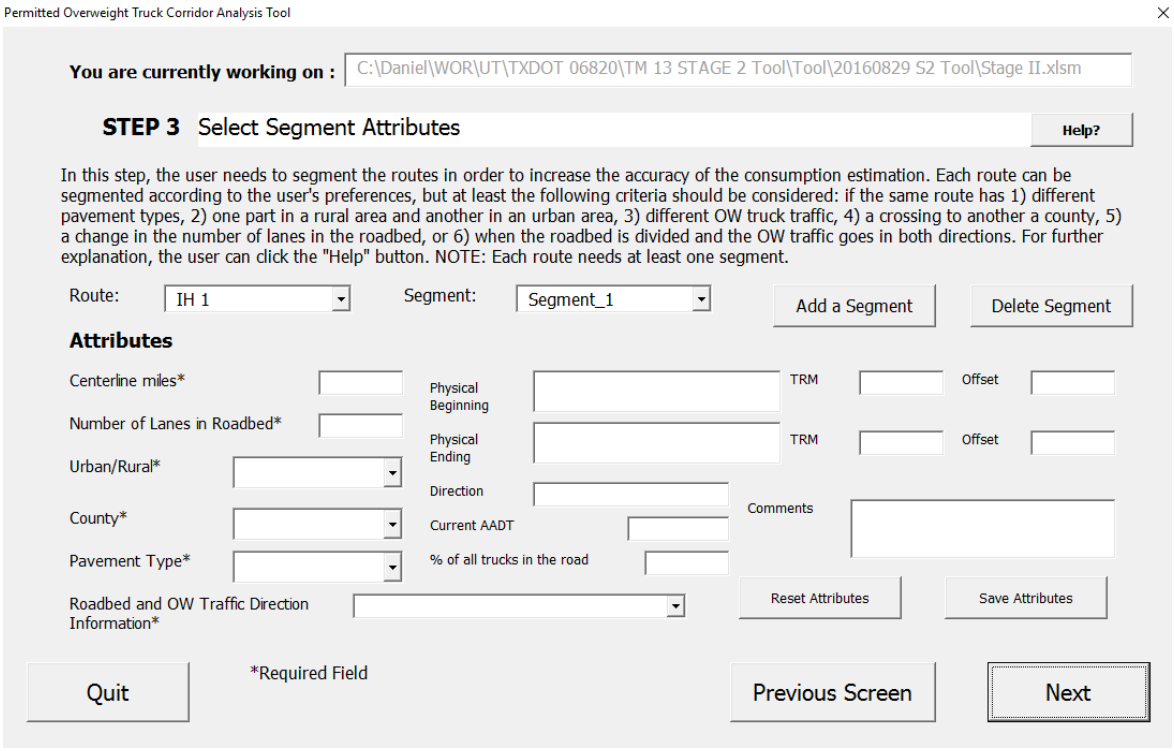


Figure 18. Step 3 interface

Table 8 summarizes the fields and buttons of the Step 3 interface. It is important to clarify that some attributes are required, while there are others are optional:

Table 8. Description of the Fields and Buttons in the Step 3 Interface

Field or Button	Description
Field "Route"	Lists of the routes that are part of the current analysis.
Field "Segment"	Lists of the segments that are part of the route. Each route has at least one segment.
Field "Centerline Miles"	Length of the segment, in miles and decimals. **NOTE:** This is a required field.
Field "Number of Lanes in Roadbed"	Number of through lanes in the roadbed. **NOTES:** 1) This is a required field. 2) The number of through lanes should not include localized turn lanes (e.g., turn lanes localized only at intersections).
Field "Urban/Rural"	Designates whether a segment is in a "RURAL" or "URBAN" location, which affects the bridge consumption. Refer to the TxDOT Rhino database for Rural or Urban route designations (http://www.txdot.gov/inside-txdot/division/transportation-planning/roadway-inventory.html) **NOTE:** This is a required field.
Field "County"	Select the county where the segment is located, which affects the bridge consumption. **NOTE:** This is a required field.
Field "Pavement Type"	Select the pavement type of the segment. The PMIS database, managed by TxDOT, can be the best source of information for the pavement surface type. **NOTE:** This is a required field.
Field "Roadbed and OW Traffic Direction Information"	Select the information about the roadbed of the route and the OW traffic direction. The roadbed can be divided or undivided. The OW traffic can be in one direction or two directions. If the segment is divided and the OW traffic moves in both directions, each roadbed must be included in the analysis as two separate segments. **NOTE:** This is a required field.
Field "Physical Beginning"	Enter the reference for the user about the beginning of the segment (e.g., "Intersection with SH 40"). **NOTE:** This is an optional field.

Field or Button	Description
Field “TRM” (up)	Enter the reference marker, using TxDOT’s PMIS database, to locate the beginning of the segment. **NOTE:** This is an optional field.
Field “Offset” (up)	Enter the offset, from the reference marker, to locate the beginning using TxDOT’s PMIS database. **NOTE:** This is an optional field.
Field “Physical Ending”	Enter the reference for the user about the end point of the segment (e.g., “Intersection with SH 40”). **NOTE:** This is an optional field.
Field “TRM” (down)	Enter the reference marker, using TxDOT’s PMIS database, to locate the end point of the segment. **NOTE:** This is an optional field.
Field “Offset” (down)	Enter the displacement from the reference marker to locate the end point, using TxDOT’s PMIS database. **NOTE:** This is an optional field.
Field “Direction”	Enter the reference of the user where the direction of the OW traffic can be recorded (e.g., “Northbound”). **NOTE:** This is an optional field.
Field “Current AADT”	Enter the current AADT (Average Annual Daily Traffic) on the segment as a numeral. This is for the user’s reference, and it does not impact the consumption estimation. **NOTE:** This is an optional field.
Field “% of all trucks in the road”	Enter the percentage of trucks compared to the overall traffic. This is for the user’s reference, and it does not impact the consumption estimation. **FORMAT:** The percentage must be written as a number (e.g., “4.5%” should be entered as “4.5”). **NOTE:** This is an optional field.
Field “Comments”	Records comments that the user may want to save about the segment. For example: “This segment was added in the last legislation.” **NOTE:** This is an optional field.
Button “Help”	Opens a new window where the components of the current step are explained, step by step.

Field or Button	Description
Button “Reset Attributes”	Restores the initial attributes of the segment before any change was saved.
Button “Save Attributes”	Saves the current attributes of the segment. **NOTE:** If changes have been made in the attributes but the saved button was not clicked, the changes will be lost.
Button “Quit”	Closes the Stage 2 Tool. The current analysis can be accessed in the future if the user clicks the button “Continue” in the “Start” worksheet.
Button “Previous Screen”	Returns to Step 2.
Button “Next”	Proceeds to Step 4. **CONDITION:** All the segments must have the required attributes: 1) Centerline miles 2) Number of lanes in the roadbed 3) Urban/rural 4) County 5) Pavement Type 6) Roadbed and OW traffic direction information

Once the required fields are completed, click “Next” to proceed to Step 4.

Step 4—Describe Freight Movement

In Step 4, the user must add the information required to describe the OW traffic in two parts. The first part includes the information related to the total number of OW trucks in the corridor, and the proportion of OW truck configurations for the OW traffic. The second part includes the information related to the number of OW trucks in specific segments and routes in the corridor (i.e., how many OW trucks will use each segment of the network). Figure 19 presents the Step 4 interface.

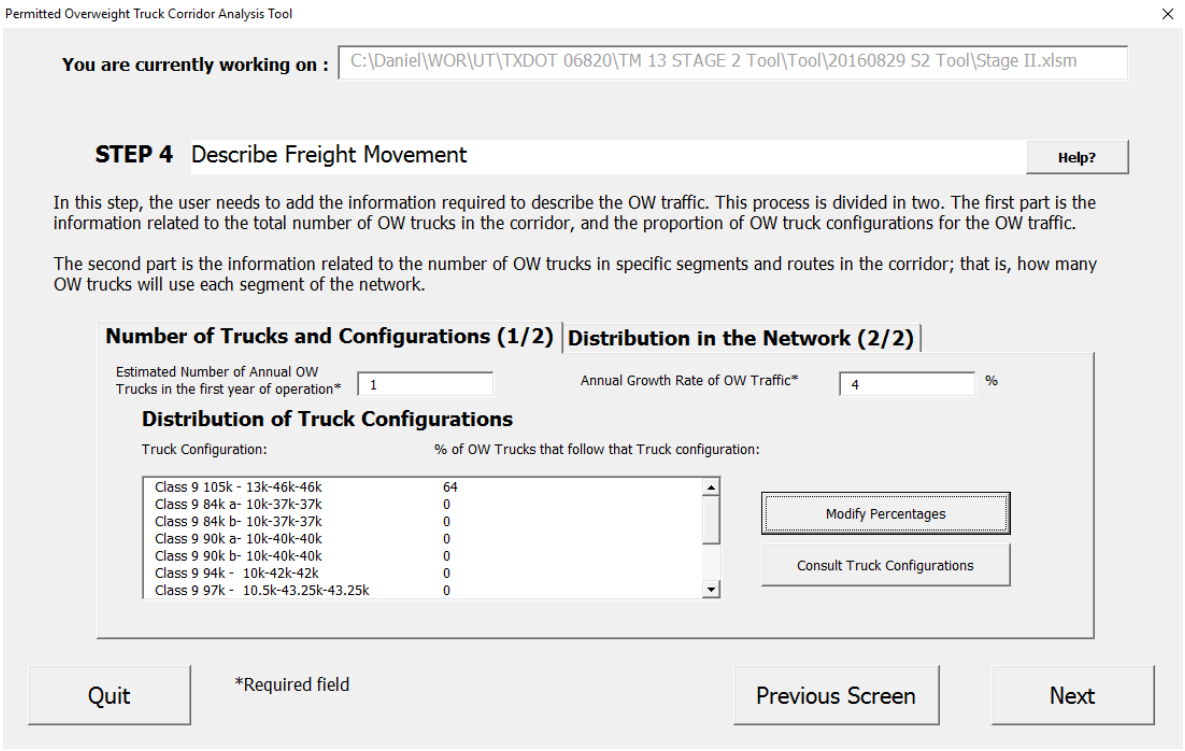


Figure 19. Step 4 interface—"Number of Trucks and Configurations Panel"

The Step 4 interface has two different panels:

1. Number of trucks and configurations
2. Distribution in the network

Number of Trucks and Configurations Panel

Table 9 summarizes the fields and buttons of the "Number of Trucks and Configurations" panel.

Table 9. Description of the Fields and Buttons in Step 4—Number of Trucks and Configurations Panel

Field or Button	Description
Field "Estimated Number of Annual OW Trucks in the First Year of Operation"	Number of OW trucks that are expected during the first year of operation. The number of OW trucks per year will be estimated using the initial number of OW trucks and the "Annual Growth Rate of OW Traffic" added by the user. **FORMAT:** Number. **NOTE:** This is a required field.
Field "Annual Growth Rate of OW Traffic"	Percentage of annual growth of the number of OW trucks. This value is used to estimate the number of trucks every year during the study period (i.e., twenty years). **FORMAT:** The percentage must be written as a number (e.g., "4.5%" should be entered as "4.5"). **NOTE:** This is a required field.
Field "Distribution of Truck Configurations"	Lists all the truck configurations supported by the tool, and the percentage of each configuration in the network. Different corridors may have different truck configurations. For this reason, the user can select the combination of truck configurations that is most like the distribution observed or expected in the corridor. In order to modify these percentages, click the button "Modify Percentages." Figure 22 through Figure 33 present the different Truck Configurations supported by the Stage 2 Tool.
Button "Help"	Opens a new window where the components of the current step are explained.
Button "Modify Percentages"	Opens a new window where the user can modify the percentages of the field "Distribution of Truck Configurations."
Button "Consult Truck Configurations"	Opens a new window where the truck configurations supported by the Stage 2 Tool are presented.
Button "Quit"	Closes the Stage 2 Tool. The current analysis can be accessed in the future if the user clicks the button "Continue" in the "Start" worksheet.
Button "Previous Screen"	Returns to Step 3.

Field or Button	Description
Button “Next”	Proceeds to Step 4. **CONDITION:** The percentages of the “Distribution of Truck Configurations” must equal 100%.

Modify Percentages of Truck Configurations

When the user clicks the “Modify Percentages” button, a new window will be opened with two fields: 1) the truck configuration that the user wants to modify the percentage (e.g., “Class 9 105k—13k-46k-46k”), and 2) the percentage of that configuration (e.g., “10”). Figure 20 presents the “Modify Percentages of Truck Configurations” interface.

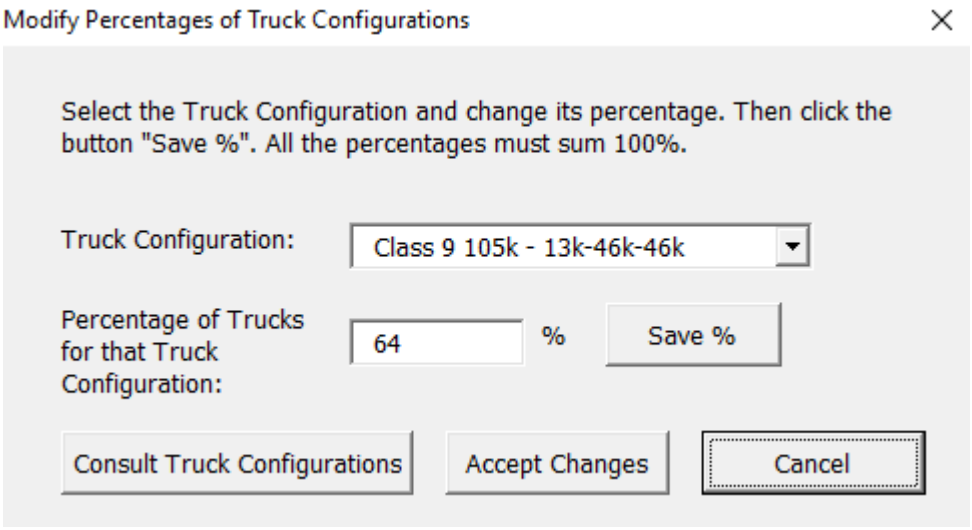


Figure 20. “Modify Percentages of Truck Configurations” window

Table 10 summarizes the fields and buttons of the “Number of Trucks and Configurations” panel.

Table 10. Description of the Fields and Buttons in the "Modify Percentages of Truck Configurations" Window

Field or Button	Description
Field "Truck Configuration"	Lists the twelve truck configurations supported by the Stage 2 Tool. The user must select the truck configuration that he/she wants in order to change the percentage.
Field "Percentage of Trucks for that Truck Configuration"	Percentage of OW trucks in the network that follow the truck configuration selected in the field "Truck Configuration." **FORMAT:** The percentage must be written as a number (e.g., "4.5%" should be entered as "4.5").
Button "Save %"	Saves the changes produced by the user. Percentages must be saved in order to modify them.
Button "Consult Truck Configurations"	Opens a new window where truck configurations supported by the Stage 2 Tool are presented.
Button "Accept Changes"	Accepts the changes introduced by the user. **CONDITION:** The sum of the percentages for the different truck configurations must be 100%.
Button "Cancel"	Cancels all the changes introduced by the user, and returns to Step 4.

Consult Truck Configurations

When the user clicks the "Consult Truck Configurations" button, a new window opens and presents the different truck configurations supported by the Stage 2 Tool. Figure 21 presents the interface.

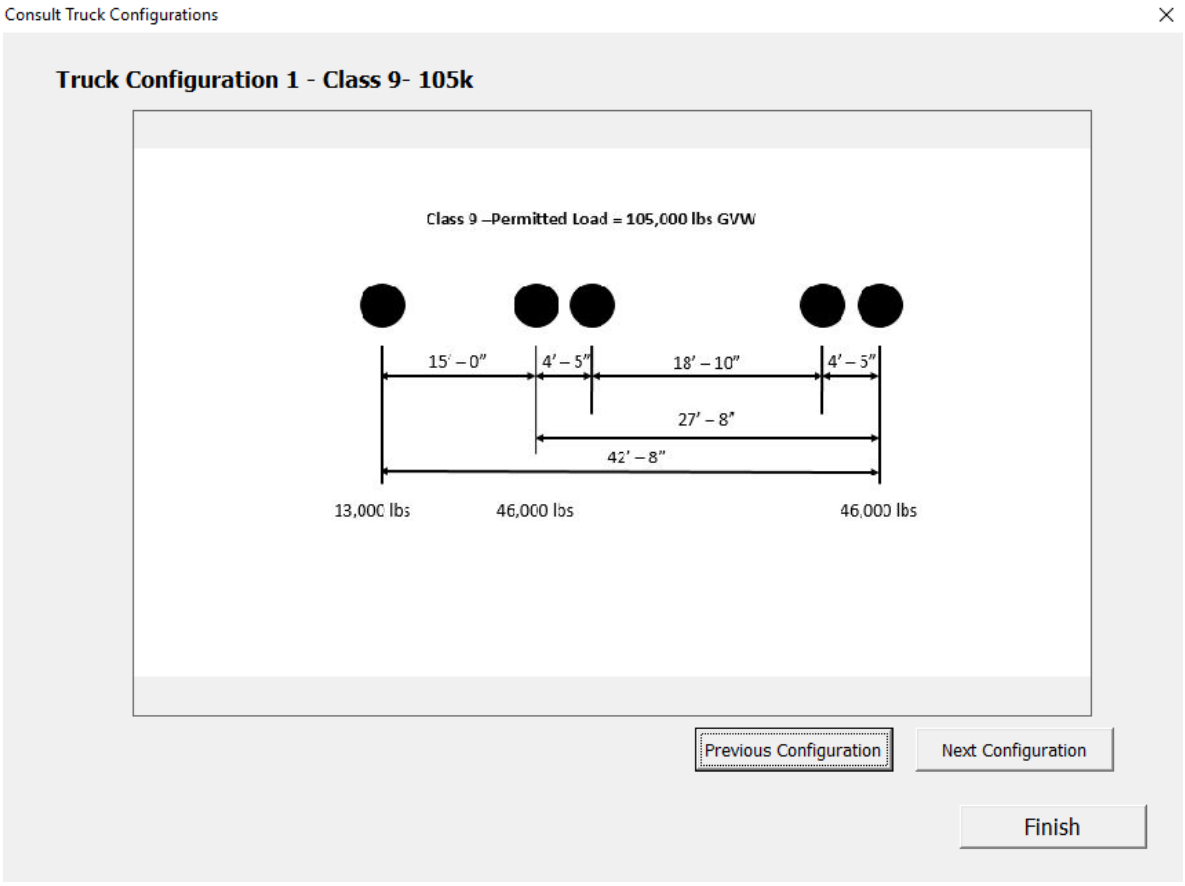


Figure 21. "Consult Truck Configurations" interface

Truck Configurations Included in the Stage 2 Tool

A total of twelve configurations are included in the Stage 2 Tool. Figure 22 through Figure 33 present the different truck configurations included.

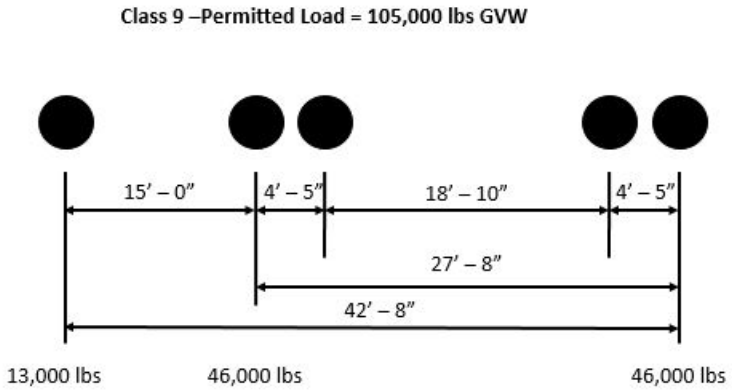


Figure 22. Truck Configuration 1—Class 9 105k—13k-46k-46k

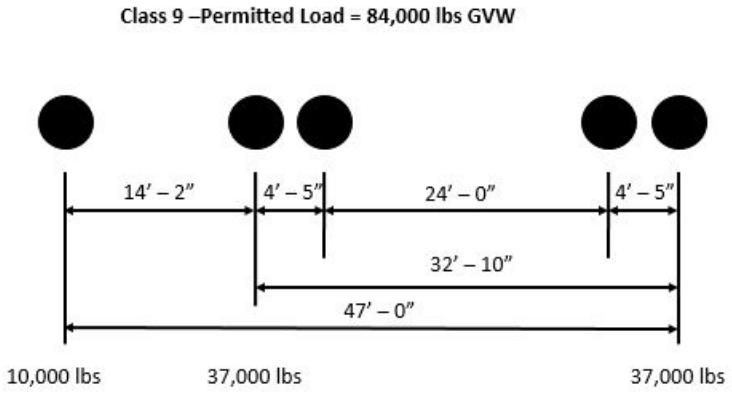


Figure 23. Truck Configuration 2—Class 9 84k a—10k-37k-37k

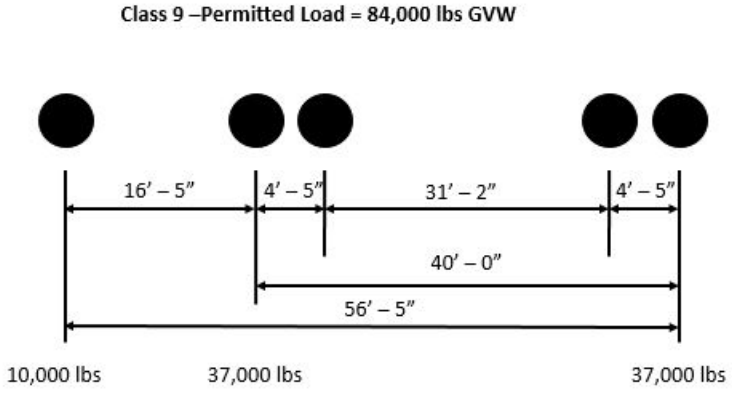


Figure 24. Truck Configuration 3—Class 9 84k b- 10k-37k-37k

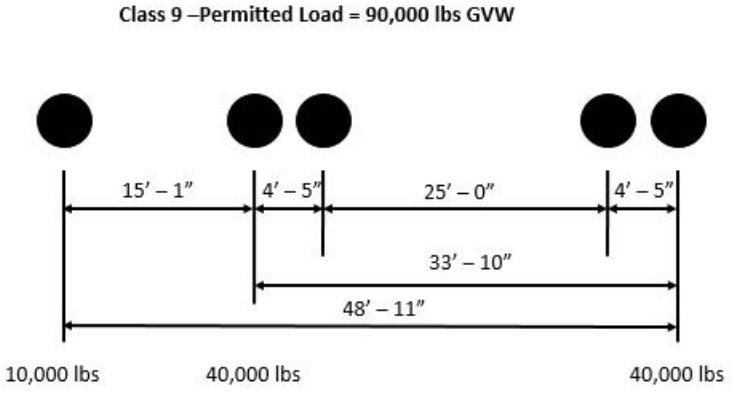


Figure 25. Truck Configuration 4—Class 9 90k a—10k-40k-40k

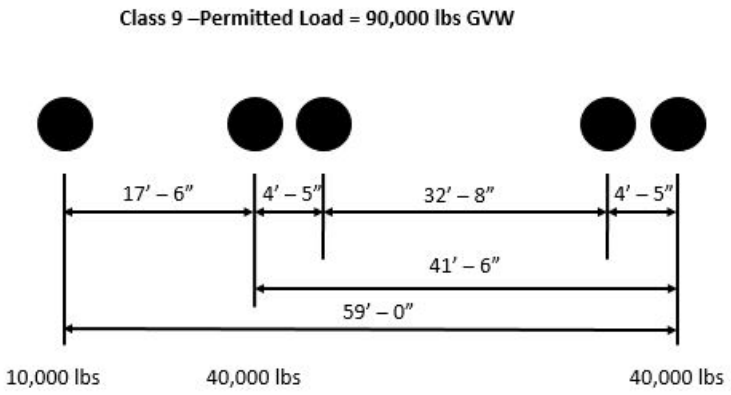


Figure 26. Truck Configuration 5—Class 9 90k b—10k-40k-40k

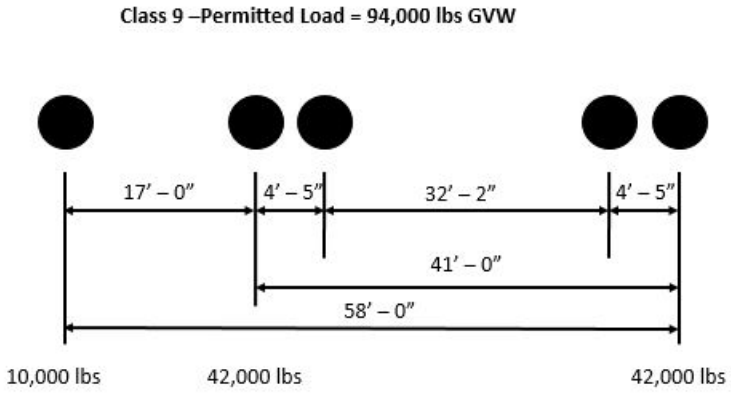


Figure 27. Truck Configuration 6—Class 9 94k—10k-42k-42k

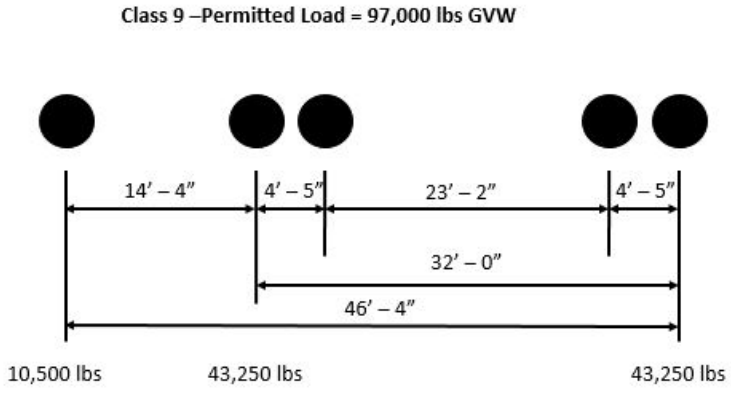


Figure 28. Truck Configuration 7—Class 9 97k—10.5k-43.25k-43.25k

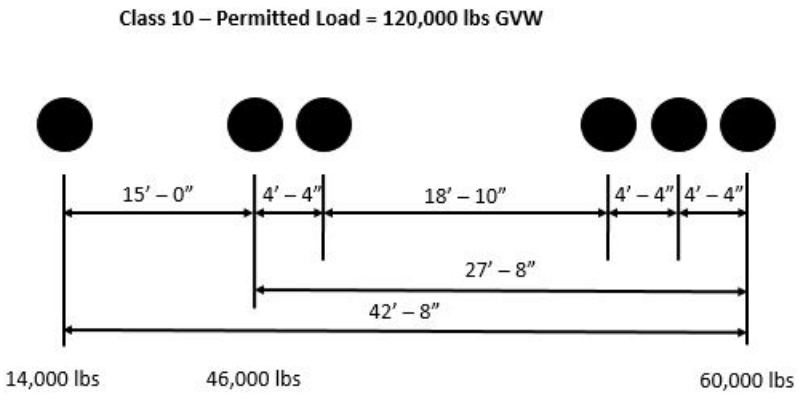


Figure 29. Truck Configuration 8—Class 10 120k—14k-46k-60k

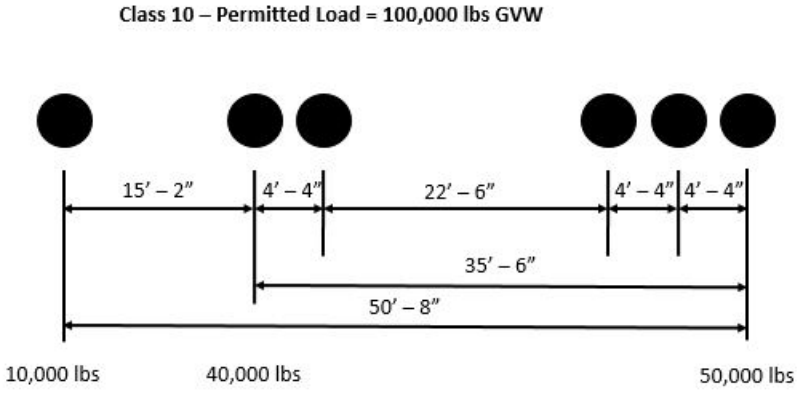


Figure 30. Truck Configuration 9—Class 10 100k—10k-40k-50k

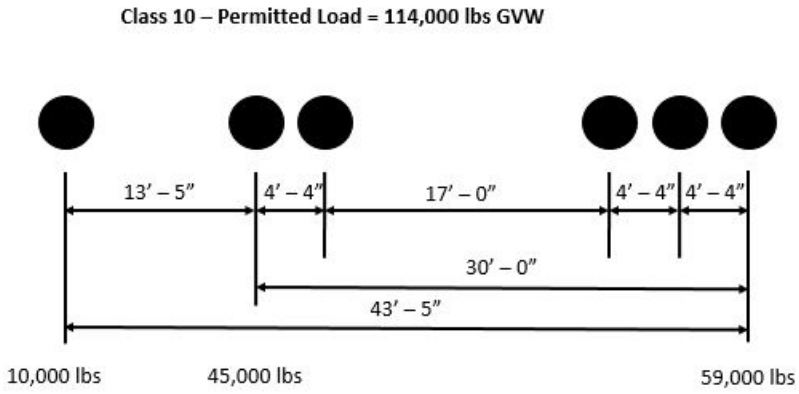


Figure 31. Truck Configuration 10—Class 10 114k—10k-45k-59k

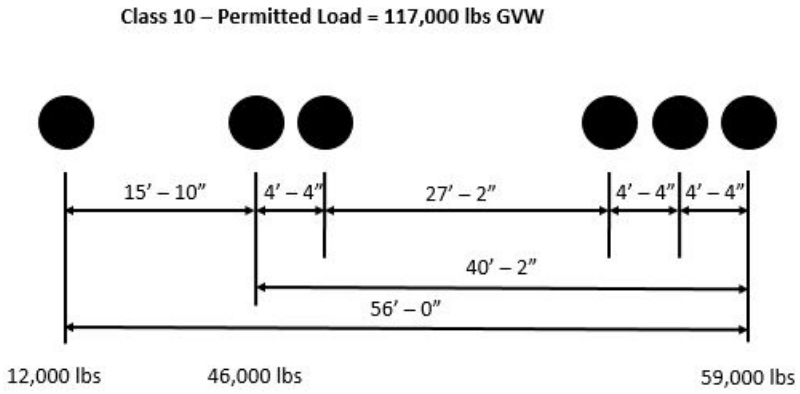


Figure 32. Truck Configuration 11—Class 10 117k—12k-46k-59k

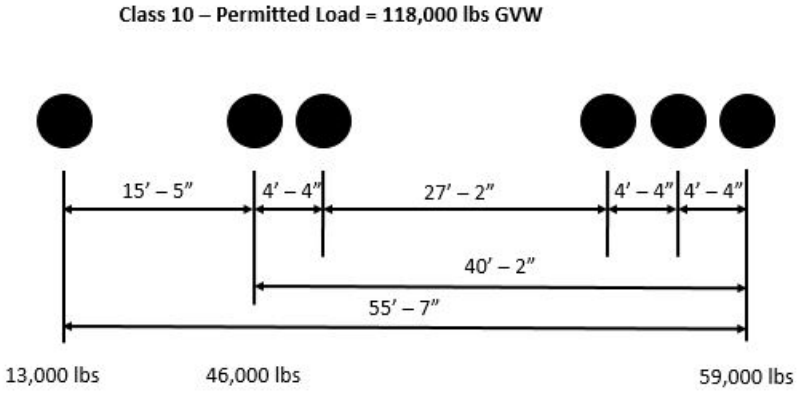


Figure 33. Truck Configuration 12—Class 10 118k—13k-46k-59k

Distribution in the Network Panel

The second part of Step 4 is the distribution (assignment) of OW traffic in the network. The purpose of this interface is to input the number of OW trucks in each of the previously defined segments.

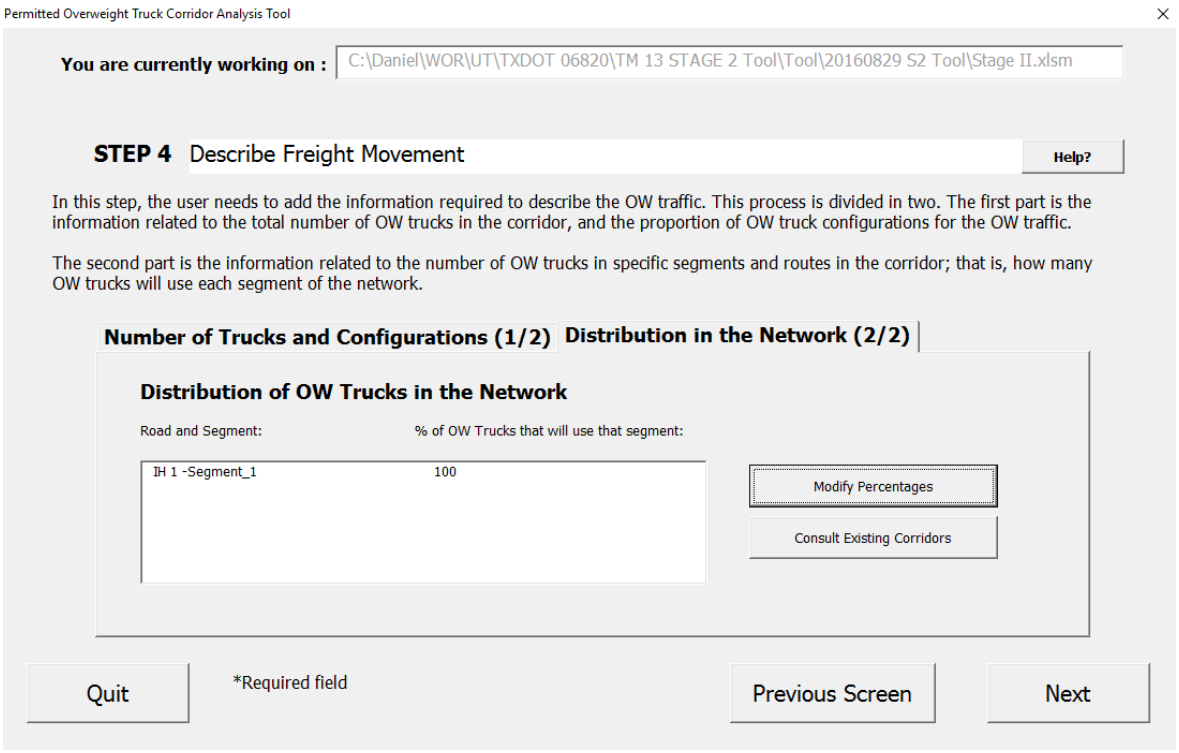


Figure 34. Step 4 interface—"Distribution in the Network Panel"

The number of trucks in each segment is estimated based on the total number of trucks per year in the corridor and the percentage of OW trucks that will use a specific segment. Basically, there are three sources of information for these information:

1. **Use Studies or Data Available:** If there is a study of the paths used by OW trucks in the corridor—or if there is data about their path—this information could be used here to accurately estimate the consumption cost.
2. **Use an Approximation Based On Overall Truck Traffic:** If there is no information about the paths used by the OW traffic, an approximation can be made assuming that the OW traffic follows the same pattern as the overall truck traffic. One way to do this is to use the percentages of trucks in the road and the AADT to estimate the different percentages.

   The TxDOT Transportation Planning and Programing (TP&P) online tool provides the percentage of trucks and AADT of most of the on-state system (Figure 35). The following example illustrates how this information can be used:

   Example: There is a port with two routes open to OW traffic, but it is not known how the OW traffic will split between the two roads.

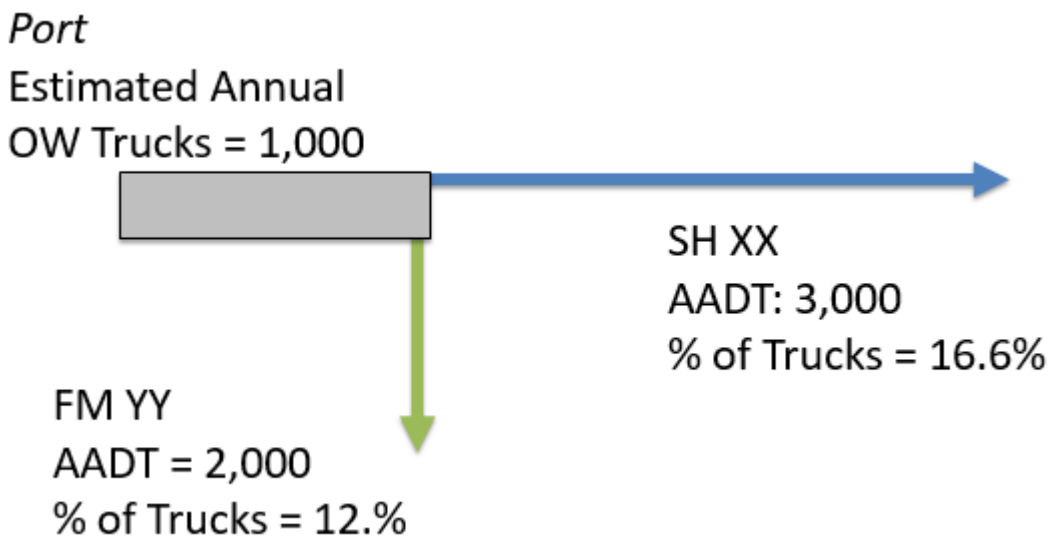


Figure 35. Distribution of the OW traffic in the network using overall truck traffic information

In Figure 35, the number of trucks in each route can be estimated by multiplying the AADT by the percentage of trucks in the road. FM has 250 trucks per year, while SH XX has 500 trucks per year. Thus, following the same proportion, the OW traffic percentage of FM YY is 33.3% and in SH XX is 66.7%.

In the case of existing corridors, the percentage of all trucks may or may not reflect OW traffic. For that reason, it is recommended that the user uses the best information possible and minimize the assumptions done.

3. **Use Default Values:** If there is no information, a conservative value is 100% for all the segments. This means that all the OW trucks will use all the segments of the corridor. This is the default value.

Modify Percentages of Trucks in the Network

When the user clicks the "Modify Percentages" button, a new window will open. The new window presents the different segments defined by the user and the percentage of OW traffic in each.

Figure 36 illustrates the interface.

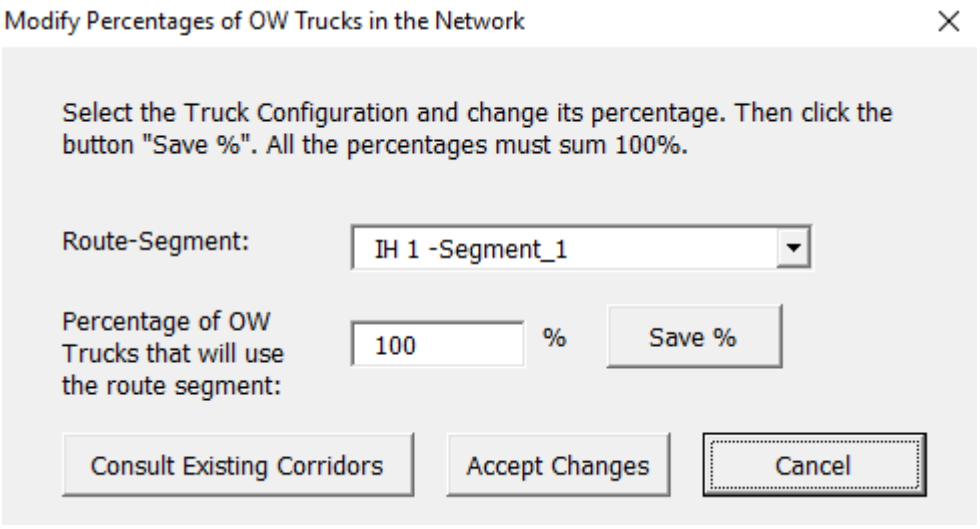


Figure 36. "Modify Percentages of OW Trucks in the Network" window

Table 11 summarizes the fields and buttons of the "Modify Percentages of OW Trucks in the Network" window.

Table 11. Description of the Fields and Buttons in the "Modify Percentages of OW Truck Configurations" Window

Field or Button	Description
Field "Route Segment"	Lists the routes and segments that the user defined in Step 3.
Field "Percentage of OW Trucks that will use the route segment"	Percentage of OW Trucks that will use the route-segment. **FORMAT:** The percentage must be written as a number (e.g., "4.5%" should be entered as "4.5").
Button "Save %"	Saves the changes produced by the user. Percentages must be saved to modify them.
Button "Consult Existing Corridors"	Opens a new window where the maps of some corridors saved in the library are presented.
Button "Accept Changes"	Accepts the changes introduced by the user.
Button "Cancel"	Cancels all the changes introduced by the user, and returns to Step 4.

When the user clicks the "Consult Existing Corridors" button, a new window will open, as shown in Figure 10.

Once all the modifications of Step 4 are complete, click the "Next" button in the Step 4 interface.

Step 5—Select Safety Projects

In Step 5, the user can add the safety treatments considered necessary for the operation of the corridor; this information is not mandatory. By default, there is no safety measure applied to the corridor. Figure 37 presents the Step 5 interface.

NOTE: The values provide in this step are a portion of the safety costs that are charged to the OW traffic, and not the total cost.

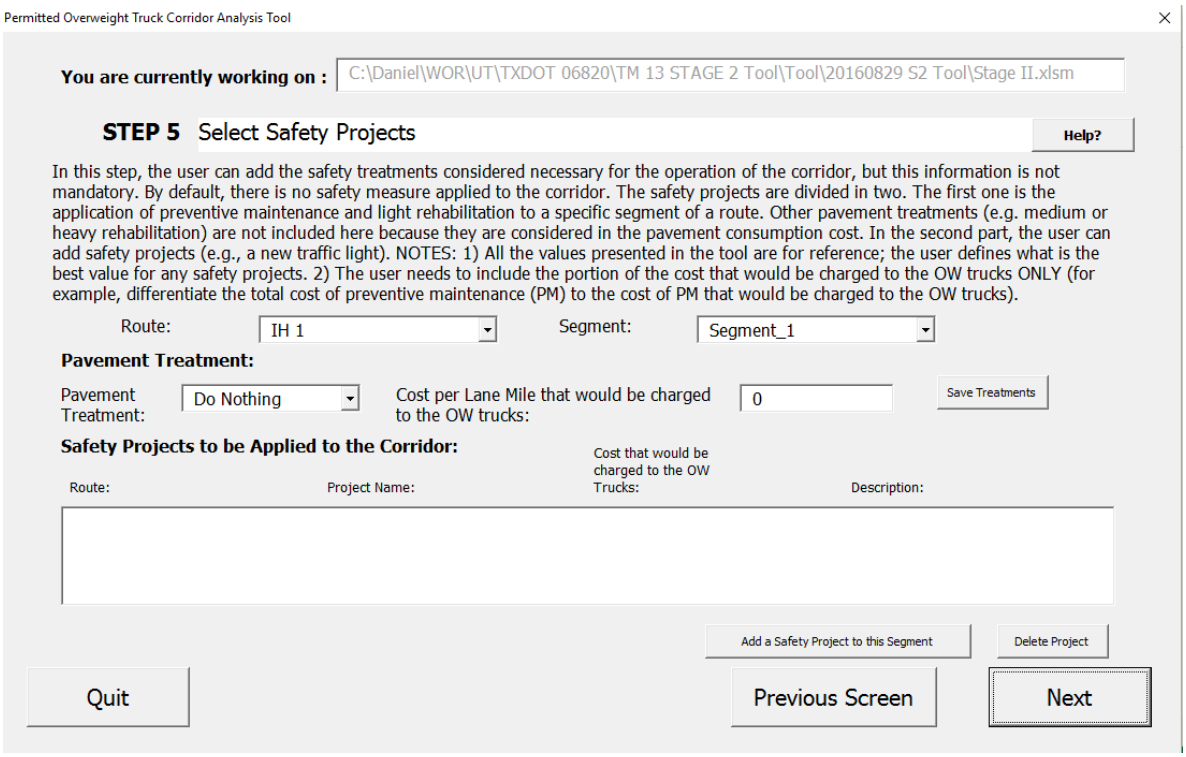


Figure 37. Step 5 interface

The safety projects are divided in two parts: 1) the application of a treatment to the pavement, and 2) the addition of safety projects to the corridor cost. The two groups are explained in the “Pavement Treatment“ and “Add Safety Projects“ subsections.

Table 12 summarizes the fields and buttons of the Step 5 interface.

Table 12. Description of the Fields and Buttons in the Step 5 Interface

Item	Description
Field "Route"	Lists the Routes that are currently in the analysis, and these that were defined by the user in Step 2. The safety projects will be stored in the route and segment that is shown to the user.
Field "Segment"	Lists the segments that belong to the route selected in the field "route," and that were defined by the user in Step 3. The safety projects will be stored in the route and segment that is shown to the user.
Field "Pavement Treatment"	Lists pavement treatments that can be added to a segment. There are three options: "Do Nothing" (no cost is added), "Prev Maintenance" (Preventive Maintenance), and "Light Rehab" (Light Rehabilitation). Other pavement treatments (e.g., medium or heavy rehabilitation) are not included here because they are considered in the pavement consumption cost. **NOTE:** To save any modification, click the "Save Treatments" button.
Field "Cost per Lane Mile that would be charged to the OW trucks"	Shows estimated total cost per lane per mile of the treatment selected in "Pavement Treatment" that is charged to OW trucks. Each time the user modifies the "Pavement Treatment" field, the "Cost per Lane Mile that would be charged to the OW trucks" field is updated with the total average cost per lane mile for this treatment. The user can use this value as a reference, but must use his/her judgement to add only the portion of the treatment cost that is charged to OW Trucks. **FORMAT:** Number. **NOTES:** 1) The user must add the most appropriate value that will be charged to the OW trucks according to his/her judgement. 2) This value can be modified by the user. 3) To save any modification, click the "Save Treatments" button.
Field "Safety Projects to be Applied to the Corridor"	Lists the safety projects that are included in the current analysis. Each project has a route and segment where the treatment is located, project name, and cost that would be charged to the OW trucks. Each project may or may not have a project description. If the user wants to add a safety project, click the "Add a Safety Project to the Segment" button. If the user wants to delete a safety project from the list, select the safety project and click the "Delete Project" button.

Item	Description
Button “Help”	Opens a new window explaining the components of the current step.
Button “Save Treatments”	Saves the modifications made by the user to the “Pavement Treatment” and “Cost per Lane Mile that would be charged to the OW Trucks” fields.
Button “Add a Safety Project to the Segment”	Opens a new window where the user can add a safety project.
Button “Delete Project”	Deletes the safety project selected from the “Safety Projects Applied to the Corridor” field.
Button “Quit”	Closes the Stage 2 Tool. The current analysis can be accessed in the future if the user clicks the button “Continue” in the “Start” worksheet.
Button “Previous Screen”	Returns to Step 4.
Button “Next”	Proceeds to Step 6.

Pavement Treatment

The application of a pavement treatment is identified as “Do Nothing,” “Preventive Maintenance,” or “Light Rehabilitation.” Other pavement treatments (e.g., medium or heavy rehabilitation) are not included here because they are considered in the pavement consumption cost.

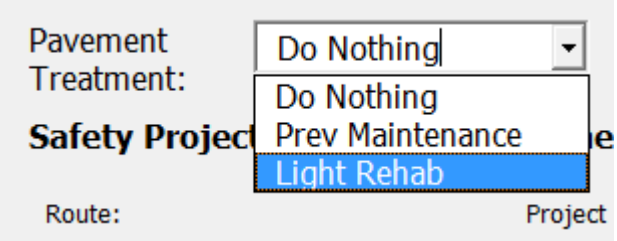


Figure 38. Pavement treatment list

Each time the user modifies the “Pavement Treatment” field, the “Cost per Lane Mile that would be charged to the OW trucks” field is updated with the total average cost per lane mile for this treatment. The user can use this value as a reference, but the user must use his/her judgement to add only the portion of the treatment cost that is charged to OW trucks.

Add Safety Projects

The user can add safety projects (e.g., a new traffic light) to each segment.

NOTES:

1) All the values presented in the tool are for reference; the user defines what is the best value for any safety project.

2) The user must include the portion of the cost that is charged to OW trucks (that means, differentiate between a total safety project cost and the portion that is charged to OW trucks). When the user clicks the "Add a Safety Project to the Segment" button, a new window opens, as shown in Figure 39.

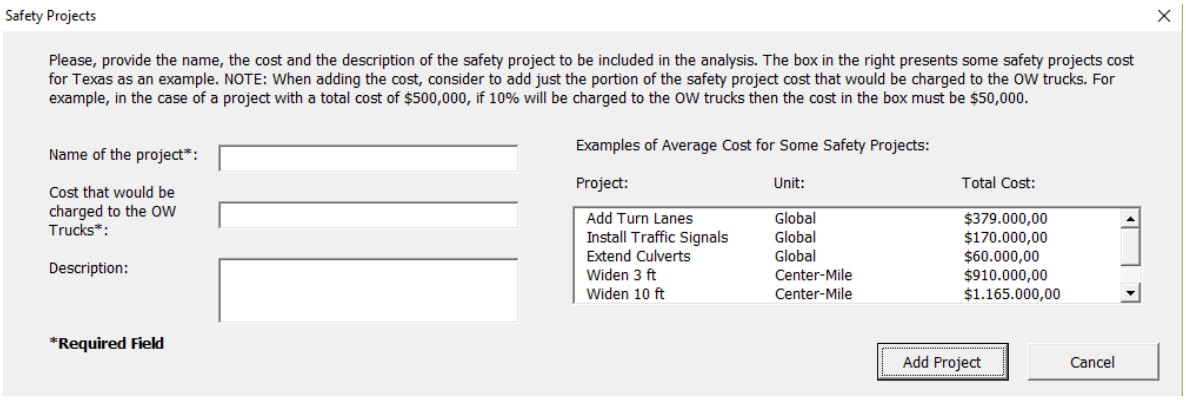


Figure 39. "Safety Projects" interface

Table 13 summarizes the fields and buttons of the Step 5 interface.

Table 13. Description of the Fields and Buttons in the "Safety Projects" Interface

Field or Button	Description
Field "Name of the Project"	Name of the safety project that will be included in the analysis. For example, "Add one turn lane". **INPUT:** Name of the project. **FORMAT:** Text. **NOTE:** This is a required field.
Field "Cost that would be charged to OW Trucks	Portion of the cost that is charged to the OW trucks (that means, differentiate between a total safety project cost and the portion that is charged to OW Trucks). For example, in the case of a project with a total cost of $500,000, if 10% will be charged to the OW trucks then the cost in the box must be $50,000. **FORMAT:** Number. **NOTE:** This is a required field.
Field "Description"	Description or comments about the safety project. For example "The turn lane is needed at the intersection with SH XX".
Field "Examples of Average Cost for Some Safety Projects"	List of safety project costs that are presented as examples and reference. This costs are total costs. No action is required.
Button "Add Project"	Return to Step 5 saving the project information added by the user. **CONDITION:** The required fields "Name of the Project" and "Cost that would be charged to the OW Truck" must be filled.
Button "Cancel"	Return to Step 5 without saving any changes.

When the user finishes the addition of pavement treatments and safety projects, click the "Next" button to proceed to the next and final step.

Step 6—Obtain Corridor Cost Analysis and Report Results

Step 6 is the final step of the Stage 2 Tool. In this step the user reports the charge required to cover the pavement consumption, bridge consumption, and the safety project costs of the OW trucks.

Figure 40 illustrates the Step 6 interface.

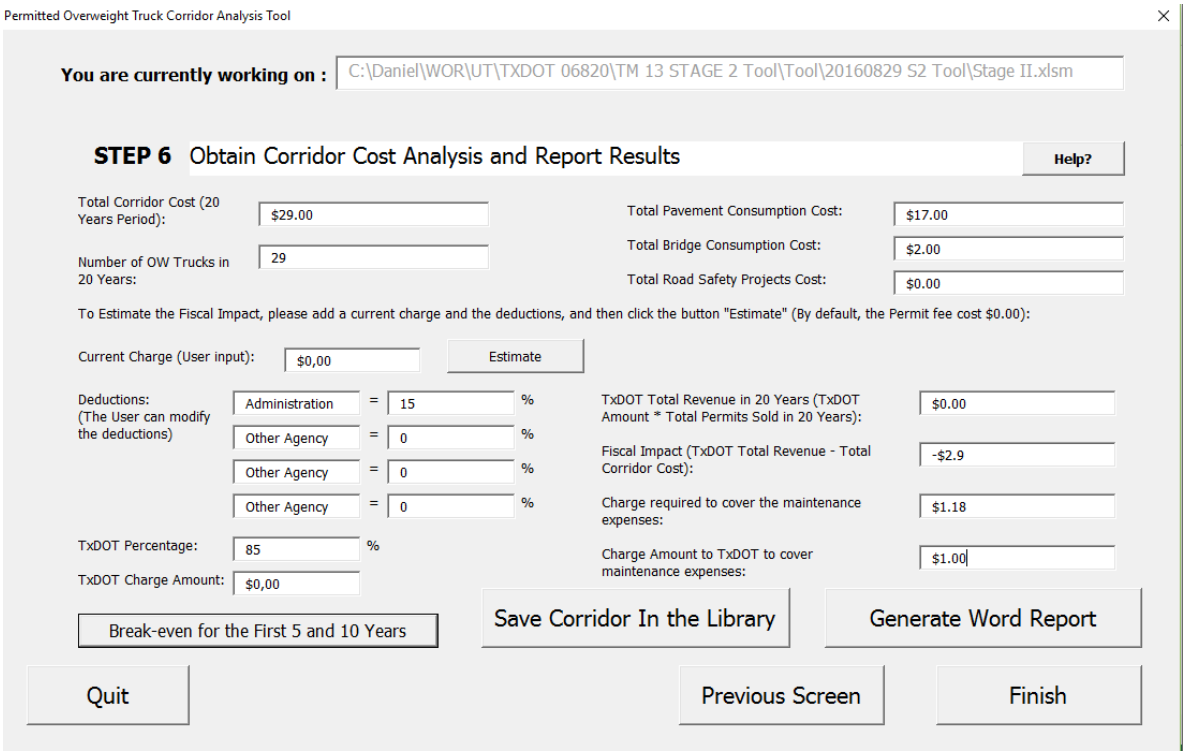


Figure 40. Step 6 interface

Most of the fields in the Step 6 interface present the results of the analysis, but there are some inputs and options for the user.

Table 14 summarizes the inputs and options of the Step 6 interface.

Table 14. Description of the Fields and Buttons in the Step 6 Interface

Field or Button	Description
Field "Current Charge"	Enter the current charge or expected charge of the corridor. This value is used to estimate the fiscal impact for existing corridors, or the potential fiscal impact for new corridors. **FORMAT:** Number. **NOTE:** By default this value is zero.
Fields "Deductions"	Enter the current or expected deductions of the OW charge that will not be allocated to the TxDOT Highway Fund. The additional fields for deductions account for the portions of the charge to OW trucks that are allocated to the administration of the corridor permitting process by the operating authority (for example, port, RMA, etc.). Even though a percentage of the charge might be allocated to a city, county, RMA, or port and used for maintenance of off-system routes, this version of the tool is not intended to analyze consumption of off-system routes such as city streets or county roads. Costs are computed only for on-state system routes. This is because the consumption rates were determined for on-system pavements and bridges—off-system pavements and bridges might have much different consumption rates and resulting fees. **FORMAT:** Text and number. **NOTE:** By default there is only one agency ("Administration") that would receive 15% of the charge.
Button "Help"	Opens a new window where the components of the current step are explained.
Button "Estimate"	Estimates, using the current charge and deductions, TxDOT percentage of the charge, TxDOT charge amount, TxDOT total revenue in nominal dollars for the study period, fiscal impact, charge required to cover maintenance expenses, and the charge amount to TxDOT to cover maintenance expenses.

Field or Button	Description
Button “Break-even for the First 5 and 10 Years”	Opens a new window where the break-even is estimated for the first 5 and 10 years, using an inflation rate for the pavement and bridge consumption, and keeping a flat charge over that period.
Button “Save Corridor In the Library”	Saves the corridor in the library, allowing the user to open it in the future.
Button “Generate Word Report”	Creates a Microsoft® Word® document containing all the information of the corridor. The Word document is organized in four parts: 1) Summary of the analysis 2) Corridor level information 3) Route level information 4) Segment level information
Button “Quit”	Closes the Stage 2 Tool. The current analysis can be accessed in the future if the user clicks the button “Continue” in the “Start” worksheet. If the corridor is not saved in the library and a new analysis is created, the information in the current analysis will be lost.
Button “Previous Screen”	Returns to Step 5.
Button “Finish”	Closes the Stage 2 Tool. The current analysis can be accessed in the future if the user clicks the button “Continue” in the “Start” worksheet. If the corridor is not saved in the library and a new analysis is created, the information in the current analysis will be lost.

Table 15 summarizes the fields that report the results of the analysis of the Stage 2 Tool. There is no action required by the user in these fields.

Table 15. Description of the Fields in the Step 6 Interface

Item	Description
Field "Total Corridor Cost (20 Years Period)"	Displays the total cost of the corridor for the 20-year period. It is the sum of the 1) pavement consumption cost, 2) bridge consumption cost, and 3) pavement treatments and safety projects.
Field "Number of OW Trucks in 20 Years"	Displays the number of annual OW trucks that will permitted in the 20-year period.
Field "Total Pavement Consumption Cost"	Displays the total pavement consumption cost for the corridor in the study period (20 years).
Field "Total Bridge Consumption Cost"	Displays the total bridge consumption cost for the corridor in the study period (20 years).
Field "Total Road Safety Projects Cost"	Displays the total cost of safety projects for the corridor in the study period (20 years).
Field "TxDOT Percentage"	Displays the percentage remaining for TxDOT after the deductions from different agencies.
Field "TxDOT Charge Amount"	Displays the portion of the charge that is for TxDOT.
Field "TxDOT Total Revenue in 20 Years"	Displays the total revenue that will be collected by TxDOT in the 20-year period.
Field "Fiscal Impact"	Displays the fiscal Impact for TxDOT due to the difference between the TxDOT total revenue and the corridor cost.
Field "Charge required to cover the maintenance expenses"	Displays the charge that is required to cover all the corridor costs, including deductions for other agencies.
Field "Charge amount to TxDOT to cover maintenance expenses"	Displays the charge that is required for TxDOT to cover all the corridor costs, but does not include deductions to other agencies.

NOTE: The additional fields for deductions account for portions of the charge to OW trucks that are allocated to the administration of the corridor permitting process by the operating authority (for example, port, RMA, etc.). Even though a percentage of the charge might be allocated to a city, county, RMA or port, and used for maintenance of off-system routes, this version of the tool is not intended to analyze consumption of off-system routes such as city streets or county roads. Costs are computed only for on-state system routes. This is because the consumption rates were determined for on-system pavements and bridges—off-system pavements and bridges might have much different consumption rates and resulting fees.

Break-even for the First 5 and 10 Years

When the user clicks the "Break-even for the First 5 and 10 years" button, a new window opens. This window estimates the break-even by inflating the annual consumption cost (both

of pavements and bridges) at an annual rate given by the user, and dividing the consumption cost by the number of OW trucks.

Figure 41 illustrates the interface.

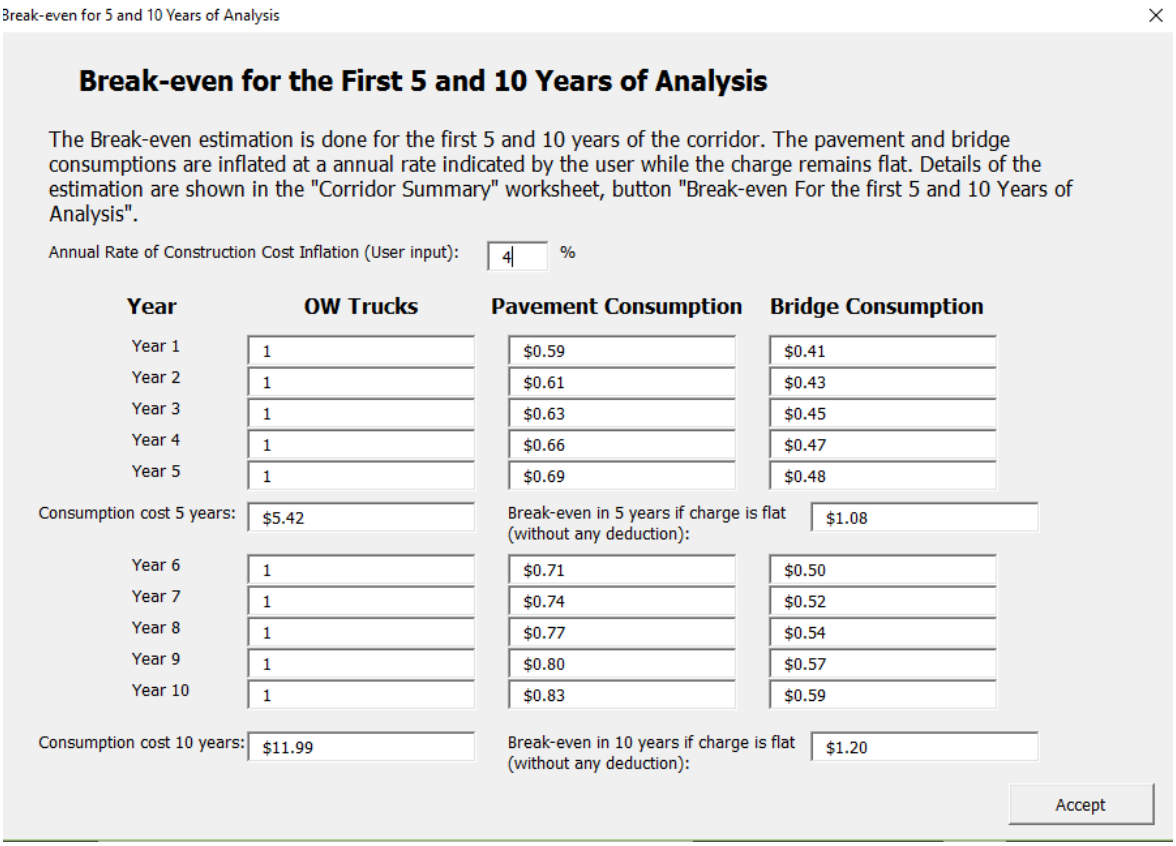


Figure 41. "Break-even for 5 and 10 Years of Analysis" interface

The only input for the user in this interface is the field "Annual Rate of Construction Cost Inflation," which is the percentage of annual inflation for the pavement and bridge consumption.

Save Corridor in the Library

When the user clicks the "Save the Corridor in the Library" button, the Stage 2 Tool will confirm this action. If the user confirms this action, the program will ask for a confirmation of the name of the corridor. There are two options:

- **Save the Corridor with the Same Name:** The Corridor will be saved in the library with the name defined after Step 1.
- **Save the Corridor with a Different Name:** A new window will open, prompting the user to rename the current analysis.

Figure 42 illustrates the interface.

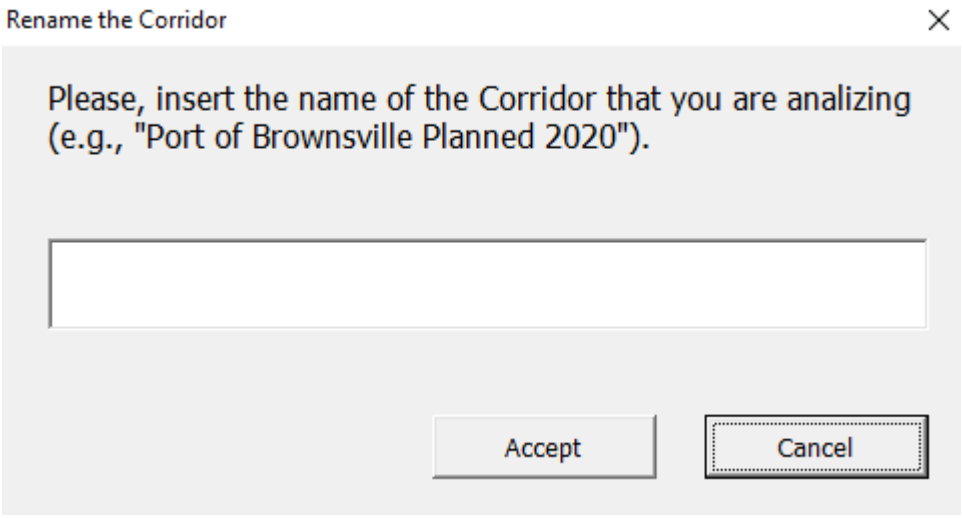


Figure 42. "Rename the Corridor" window

NOTE: The user cannot overwrite any of the existing projects stored in the library. If the corridor name is the same as the one previously used, the corridor will not be saved.

For more information about the management of the libraries, please refer to Section 4.

When the corridor is saved in the library, a message will appear indicating that the corridor was successfully added to the Stage 2 Tool Library (Figure 43).

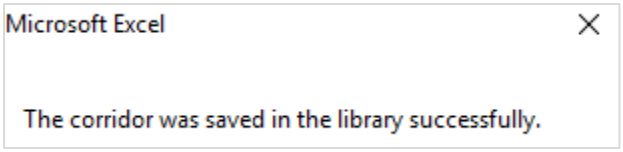


Figure 43. Message indicating that the corridor was saved in the library

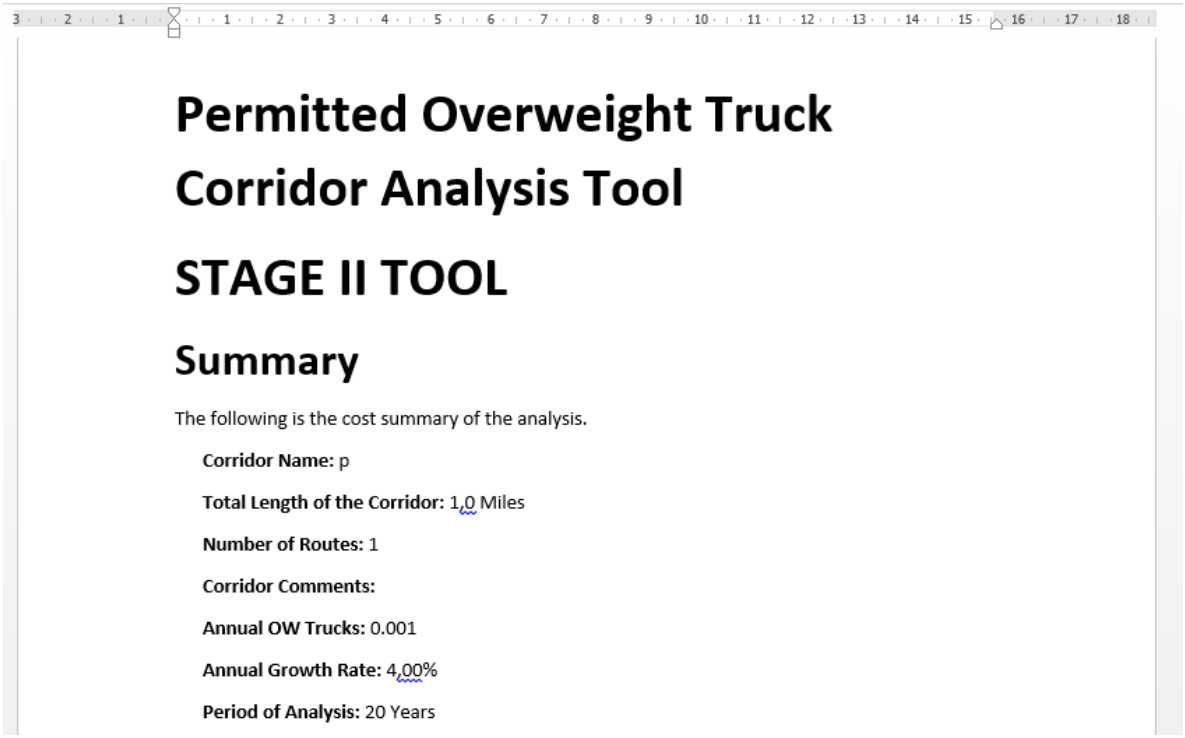
Generate Word® Report

When the user clicks the button "Generate Word Report," the Stage 2 Tool will create a Microsoft® Word® document where all the results are presented.

The Word document is organized in four parts:

1) Summary of the analysis
2) Corridor level information
3) Route level information
4) Segment level information

Figure 44 illustrates the report produced by the Stage 2 Tool.



Permitted Overweight Truck Corridor Analysis Tool

STAGE II TOOL

Summary

The following is the cost summary of the analysis.

Corridor Name: p

Total Length of the Corridor: 1,0 Miles

Number of Routes: 1

Corridor Comments:

Annual OW Trucks: 0.001

Annual Growth Rate: 4,00%

Period of Analysis: 20 Years

Figure 44. Example of the Microsoft® Word® report prepared by the Stage 2 Tool

SECTION 3. EXCEL FILE AND SUPPORT WORKSHEETS

The Stage 2 Tool contains 200 procedures, and 15 worksheets, and more than 7,000 lines of code where the information is stored. The user can open these worksheets and read the descriptions in each one of them. However, no modifications should be made to the data because any modification can negatively impact the proper functionality of the tool. This section explains the structure of the tool and the supporting worksheets.

Support Worksheets

The Support Worksheets store the temporary information added by the user through the Stage 2 Tool.

The worksheets can be summarized as:

- **"Start" Worksheet:** Initial worksheet where the user can open and access the Stage 2 Tool or open the libraries.
- **"File Information" Worksheet:** Worksheet that contains important reference information for the Stage 2 Tool (e.g., the name of the file or the location of the folders with the images).
- **"Step #" Worksheets:** Worksheets where temporary information that the user can add through each one of the steps is stored. It also contains the information for the "Help" button for each step.

Summary Worksheets

The summary worksheets summarize the information that the user added through the whole analysis and the intermediate estimations made before the final results are reported. The information there is the current analysis being performed.

There are three summary worksheets:

- **"Corridor Summary" Worksheet:** Worksheet summarizing the information at the corridor level (e.g., name of the corridor, total length of the corridor, etc.).
- **"Route Summary" Worksheet:** Worksheet summarizing the information at the route level (e.g., name of the routes, number of segments of each route, etc.).
- **"Segment Summary" Worksheet:** Worksheet summarizing the information at the segment level (e.g., number of through lanes, pavement type of the segment, etc.).

Library Worksheets

Library worksheets store the information of consumption costs and previous analysis results. It is important to note that the corridors saved in the library are complete analyses; the tool cannot save in partial corridors (for example, corridors with missing required information for the segments).

For information regarding importing or deleting corridors from the library, please refer to the next section.

SECTION 4. MANAGEMENT OF LIBRARIES

Library Types

Cost Library

Worksheets where costs are stored. The following tables are contained in this worksheet:

- Pavement types supported by this tool
- Roadbed and direction types supported by the tool
- Pavement treatments cost
- Bridge consumption rates
- Classification of the county in East/West, depending on the location
- Default bridge consumption rates
- Pavement consumption cost
- Estimated percentage above operating rating
- Cost of safety projects

To index consumption costs to a specific year, please refer to the "Index Consumption Costs to a Present Year" subsection (later in this section).

Corridor Library

Worksheet where the information at the corridor level is stored for all the corridors saved in the library (e.g., name of the corridor, total length of the corridor, etc.).

Route Library

Worksheet where the information at the route level is stored for all the corridors saved in the library (e.g., name of the routes, number of segments of each route, etc.).

Segment Library

Worksheet where the information at the segment level is stored for all the corridors saved in the library (e.g., number of through lanes, pavement type of the segment, etc.).

Code Organization

User Forms

The Stage 2 Tool has 25 "User Forms" that were developed using Microsoft® Excel® Visual Basic®. These forms can be accessed through the Visual Basic option in Excel.

There are three types of "User Forms" in the Stage 2 Tool (see Figure 45):

1. **Step-by-Step Interface:** These are the most important user forms in the tool, and are the backbone of the program. They can be identified by the letter and step indicated in their file name. For example:
    a. b_step1
    b. d_step3
2. **Auxiliary Windows:** The user may need to add information from auxiliary windows while using the tool. These forms are named similarly to the Step-by-Step interface, with the addition of a letter and an identifier. For example:
    a. e_step4c_MdyPerNetwork
    b. f_step5a_SafetyPro
3. **Help Window:** Similar to the auxiliary windows, help window forms are clearly labeled as help files. For Example:
    a. e_step4_Help
    b. h_step7_Help

NOTE: What the user sees as Step 6 in the code is really Step 7. There is no Step 6 in the code.

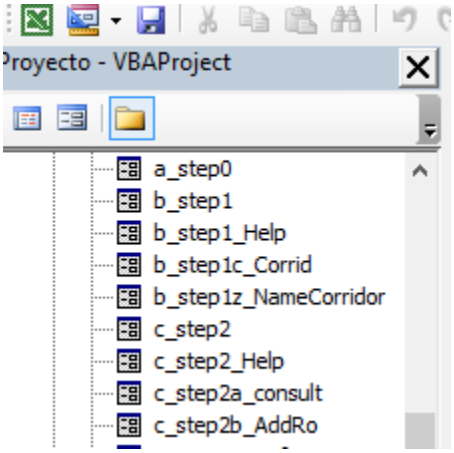


Figure 45. Example of the names of the user forms

Code within User Forms

At the top of each procedure or function is a description, in the form of a comment, as shown in this example:

```
**COMMENT**
"This procedure helps to add information"

**PROCEDURE**
AddInformation()
```

The code in each of the forms is divided into three sections:

1. **Initialize:** Algorithm to initialize the user form. It is required for all user forms in order to open.
2. **Buttons:** Part of the code where the actions of all the buttons are stored.
3. **Support:** Part of the code with the algorithms that are invisible to the user, but that support the functioning of the tool.

Each section has its algorithms organized from A to Z (e.g., the procedure "loadTempTruckConfigurationPer()" is before "updatePerTruckConfig()"). The sections are separated as shown in Figure 46.

```
Option Explicit


'The algorithms are organized in three groups:
'    -INITIALIZE: the algorithm to initialize the form
'    -BUTTONS: the algorithms associated with the actions when a button is clicked
'    -SUPPORT: Algorithms to support the previous algorithms
'All are ordered following an alphabetical order

'-----------------------------------------------------------------------------------------------
'INITIALIZE
'-----------------------------------------------------------------------------------------------
'Initialize the window 'Modify Percentages of Truck Configurations'
Private Sub UserForm_Initialize()
    Worksheets("Corridor Summary").Activate

    Me.loadTempTruckConfigurationPer

    Me.updatePerTruckConfig

    Worksheets("Corridor Summary").Activate
End Sub

'-----------------------------------------------------------------------------------------------
'BUTTONS
'-----------------------------------------------------------------------------------------------
'Update the information presented when the user selects different truck configurations
Private Sub ComboBox_TruckConfig_Change()
    Me.updatePerTruckConfig
End Sub

'Accept the changes and return to Step 4
Private Sub cmd_AcceptChanges_Click()

    Worksheets("Corridor Summary").Activate

    Dim per1 As Double
```

Figure 46. Example of the visualization of the code for one of the user forms

NOTE: What the user sees as Step 6 in the code is really Step 7. There is no Step 6 in the code.

Add a Corridor from Another File

The following directions help the user to add a corridor from another file.

NOTE: For the purpose of this example, we will show how to copy the contents of “File A” containing “Corridor A” to “File B”.

1. Open “File A” and “File B”.
2. Check that the name of the corridor that the user wants to add in “File B” does not exist in the library of “File B”.
    a. If the corridor name that the user wants to copy from “File A” already exists in “File B”, change the name of the corridor in “File A” by opening the “Corridor Library” of “File A”, the “Corridor Name” column. The user could change manually the name in this cell.
    b. Likewise, open the “Route Library” worksheet of “File A”, and change the name of the corridor in the column “Corridor Name”. NOTE: The name must be changed for all the routes in that corridor.
    c. Finally, open the “Segment Library” worksheet of “File A”, and change the name of the corridor in the column “Corridor Name”. NOTE: The name must be changed for all the segments in that corridor.
    d. Continue to the next step.
3. Open the “Corridor Library” worksheet of “File A”, and copy the row of “Corridor A”.
4. Open the “Corridor Library” worksheet of “File B”, and paste the row in the first available space.
5. Open the “Route Library” worksheet of “File A”, and copy all the rows of “Corridor A” that contain the information of the routes.
6. Open the “Route Library” worksheet of “File B”, and paste the rows in the first available space.
7. Open the “Segment Library” worksheet of “File A”, and copy all the rows of “Corridor A” that contain the information of the routes.
8. Open the “Segment Library” worksheet of “File B”, and paste the rows in the first available space.
9. Close “File A”.
10. Open the “Corridor Library” worksheet of “File B”.
11. Click the button “Update Corridor ID”.

If the update is successful, the user will see the following message (Figure 47):

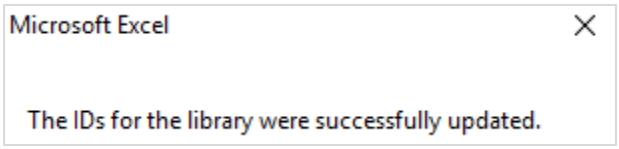


Figure 47. Message if the update of the corridor is successful

Add a New Map to the Library

The following directions help the user to add a new map to the Library:

1. Create an image with the map of the corridor that the user wants to add in "JPEG" format (with the extension ".jpg").
2. Copy the file, and paste it in the next folder within the Stage 2 Tool:
    a. /Stage 2 Tool/Images/Corridors
3. Open the Stage 2 Tool Excel File.
4. Open the "Corridor Library" worksheet.
5. Go to the table "List of Maps of Existing Corridors".
6. Locate the next empty field, and add the following text:
    a. In the row "Name of Corridors Available", write the name of the corridor. For example, "Example".
    b. In the row "Name of the Map", write the name of the file with the image of the map, including the ".jpg" extension suffix.

An example is shown in Figure 48:

List of Maps of Existing Corridors
Description: This list provides the name of the existing corridors and the names of the maps, to be loaded in the tool

	List of Maps of Existing Corridors								
Description	**Name In VBA Code**	**Existing Corridors**							
Name of Corridors Available	**z_ExistingCorridorsName**	HCRMA Existing Corridor 2014	Laredo Existing Corridor 2014	Port of Brownsville Existing Corridor 2014	Port of Corpus Christi Existing Corridor 2014	Port of Freeport Corridor Existing Corridor 2014	Example		
Name of the map	**z_ExistingCorridorsNameMap**	HCRMA Existing Corridor 2014.jpg	Laredo Existing Corridor 2014.jpg	Port of Brownsville Existing Corridor 2014.jpg	Port of Corpus Christi Existing Corridor 2014.jpg	Port of Freeport Corridor Existing Corridor 2014.jpg	Example.jpg		
Number of map being showed	**z_MapShowed**	0							

Figure 48. Example of adding a new map to the library

Delete a Corridor

The following directions help the user to delete a corridor from the Library.

NOTES: 1) This action cannot be undone. Any corridor deleted cannot be recovered. 2) The corridors "HCRMA Existing Corridor 2014", "Port of Brownsville Existing Corridor

2014", "Laredo Existing Corridor 2014", "Port of Freeport Existing Corridor 2014" and "Port of Corpus Christi Existing Corridor 2014" (IDs 1 to 5) cannot be deleted because they are integral components of the Stage 2 Tool.

1. Open the Stage 2 Tool Excel file.
2. Open the "Corridor Library" worksheet.
3. Click the button "Delete a Corridor".

A new window will open, as shown in Figure 49:

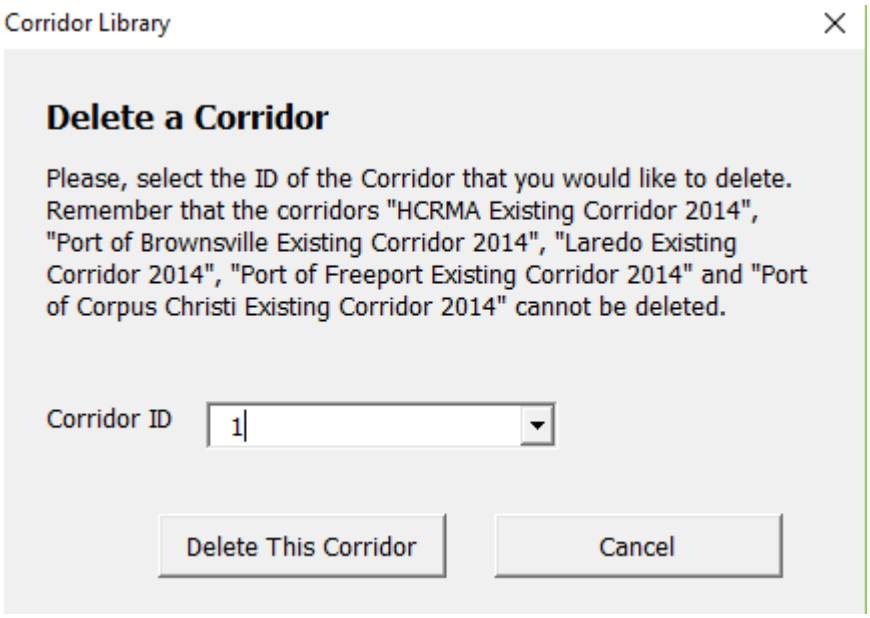


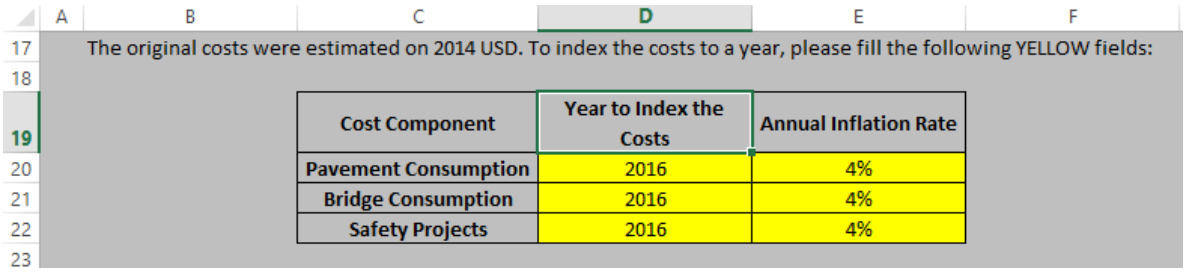
Figure 49. "Delete a Corridor" interface

4. Select the ID of the corridor that the user wants to delete.
5. Click the Button "Delete This Corridor". There would be two "Warning Messages" asking a confirmation for that action.
6. If the user confirms to delete the corridor twice, the corridor will be deleted. A message window will be open confirming that the corridor was deleted.

Index Consumption Costs to a Present Year

Objective: The objective of this function is to index the consumption costs from 2014 USD to a specific year. The year input and inflation rates are provided by the user.

Directions: Open the Excel file of the Stage 2 Tool. Open the "Cost Library" Worksheet. Go to cell C19. The user should see something similar to what is shown in Figure 50.



The original costs were estimated on 2014 USD. To index the costs to a year, please fill the following YELLOW fields:

Cost Component	Year to Index the Costs	Annual Inflation Rate
Pavement Consumption	2016	4%
Bridge Consumption	2016	4%
Safety Projects	2016	4%

Figure 50. "Cost Library" worksheet to index the consumption costs

Enter the year to which the costs will be indexed in cells D20, D21, and D22. Then, enter the annual inflation rate for pavement consumption, bridge consumption, and safety projects in cells E20, E21, and E22, respectively. The costs will calculate automatically.

To find the annual inflation rate in construction, consult the Highway Construction Cost Index.

SECTION 5. GLOSSARY

Concept	Definition
Axle Weight	The OW permits sold by the city, port, or regional mobility authority have maximum axle weight limits as established in the Texas Administrative Code Title 43, Part 1, Chapter 28, Subchapter H, § 28.105, which states that the axle weight limits are: Single axle: 25,000 lbs Two-axle group: 46,000 lbs Three-axle group: 60,000 lbs Four-axle group: 70,000 lbs Five-axle group: 81,400 lbs Trunnion-axles: 60,000 lbs
Bridge Consumption	Marginal cost of an OW truck for using Texas bridges. **PARAMETERS:** It is a function of the truck configuration, the county where the bridge is located, the highway abbreviation of the road where the bridge is located, and the location of the road in a rural or urban area. **UNIT:** Cost-per-mile per-truck per-specific configuration.
Class 9 Truck	The FHWA designation for a tractor-trailer with 5 axles. A typical 18-wheeler is a Class 9 truck.
Class 10 Truck	The FHWA designation for a tractor-trailer with 6 axles. The tractor usually has 3-axles and the trailer 3-axles.
Configuration	Truck configuration indicates to whether the truck is a tractor-semi-trailer unit or a single-unit truck (such as a ready-mix truck, dump truck, or garbage roll-off unit not towing a trailer). The configuration also indicates the number and arrangement of axles including single-, two-axle groups, three-axle groups, etc.
Corridor Network	Unit of analysis to which the consumption costs and safety costs are estimated. It is composed of “routes,” and is the higher hierarchy within the analysis of the Stage 2 Tool.
Gross Vehicle Weight (**GVW)**	The total weight of the tuck including the tare (or unloaded) weight of the truck, plus the cargo and other items such as fuel, etc. The GVW limit at most of the OW corridors in Texas is 125,000 pounds. Axle weight limits restrict the practical GVW limits to Class 9, 5-axle 105,000 pounds GVW and Class 10, 6-axle 120,000 pounds GVW.

Concept	Definition
k	The letter "k" as used in the truck designations is an abbreviation of "kip," which is an abbreviation of kilo pounds (or 1,000 pounds). Thus, a 105k Class 9 truck is a 5-axle truck with a GVW of 105,000 pounds.
Library	The repository of the Stage 2 Tool where is located the consumption costs and the corridors are saved by the user. There are four libraries: 1) Cost Library—location of consumption costs 2) Corridor Library—location of the information at the corridor level 3) Route Library—location of the information at the route level 4) Segment Library—location of the information at the segment level
Over Weight (**OW)**	An OW truck is above the legal load limit for the truck configuration (tractor, trailer, or single-unit truck, such as a ready mix truck), number of axles, and axle groups. The legal GVW limit in Texas is 80,000 pounds GVW for a 5-axle Class 9 truck, the maximum axle load limits are: Single axle—20,000 pounds Two-axle group—34,000 pounds Three-axle group—42,000 pounds Four-axle group—50,000 pounds
Overweight (OW) Truck	An OW truck is required to have a permit to operate on one of the OW corridors that have been established at a port, by an RMA, or in a city. However, illegal OW trucks may also be operating on the corridor, and OW trucks may have a permit issued by the Texas Department of Motor Vehicles—Permit Section through the TxPROS online system. The analysis tool is intended to consider OW trucks that are permitted (and therefore pay a permit fee to the local authority that operates the OW corridor).
Pavement Consumption	Marginal cost of an OW truck for using a Texas road. **PARAMETERS:** It is a function of the truck configuration. **UNIT:** Cost-per-lane-mile per-truck per-specific configuration.
Project or Analysis Project	The Permitted Overweight Truck Corridor Analysis Tool allows the user to create an analysis of an existing corridor, to modify an existing corridor that is then renamed, or to create a completely new corridor. Each analysis project, or simply "project" can be stored for later reference, updating, or modification. The project can also be added to the analysis tool library.

Concept	Definition
Route	Roads that composed the corridor network. Routes are segmented in "segments" according to differences in the following attributes: 1) Pavement type 2) Urban/rural location 3) Change in the OW traffic 4) County 5) Number of lanes in the roadbed 6) Roadbed and OW traffic direction information
Safety Cost	Amortized cost of safety projects that is charged to the OW trucks. **UNIT:** Total project cost using default values provided in the tool or a value provided by the user based on more detailed information.
Safety Project	A project such as adding a turn lane, installing traffic signals, intersection lighting, vehicle impact attenuators, signs, and striping. The intent is that a safety project included in the analysis is required due to the operation of OW trucks on the corridor and is needed to improve the safety and reduce crash risk and/or severity due to OW trucks.
Segment	Smaller unit of analysis in the Stage 2 Tool. Segments are parts of the routes that are segmented in order to increase the precision in the consumption costs.
Summary	Summary of the analysis for an on-going corridor that is created or edited using the Stage 2 Tool. If the corridor is not saved in the library, the information will be lost in the next analysis. There are three summaries: 1) Corridor Summary—location of the information at the corridor level 2) Route Summary—location of the information at the route level 3) Segment Summary—location of the information at the segment level