



XL-OPTIMTM
BECAUSE ANYONE CAN MODEL

Basic TransCad 5.0

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1 File types and file handling

TranCad has three native data file types (that concern to the CEE123 project): *.bin, *.dbd & *.cdf (All types can only be read by Caliper Softwares (TransCad, Maptitude & TransModeller)

*.bin – Binary file to hold databases. Small sized and extremely fast to be handled in TransCad.

*.cdf – COMPACT file that contains geographic features. This file cannot be edited, but it is often used to deliver information in the end of a project (the data associated to it remains editable).

*.dbd – Standard geographic file. It has more accessory files (up to 17 total for a single geographic layer) but it can be edited. It is the standard file to be used during project development.

ALL operations performed with the above types of files (dbd & bin) are **PERMANENT**, and there is **NO UNDO**. So before moving, adding or deleting a geographic feature or editing, adding or deleting a data field, BE SURE that the change you are performing is correct. BACKUP your files with a rather high frequency.

BOTH *.cdf and *.dbd files contain an associated database linked to the geographical features existent on the layers.

Other file types also exist and are extremely useful. Particularly the *.map files will hold ALL the formatting and displaying information. During manipulation of these files there is undo and no information is permanent (labels, loose graphical elements, charts, etc), meaning none of those other features are part of a database.

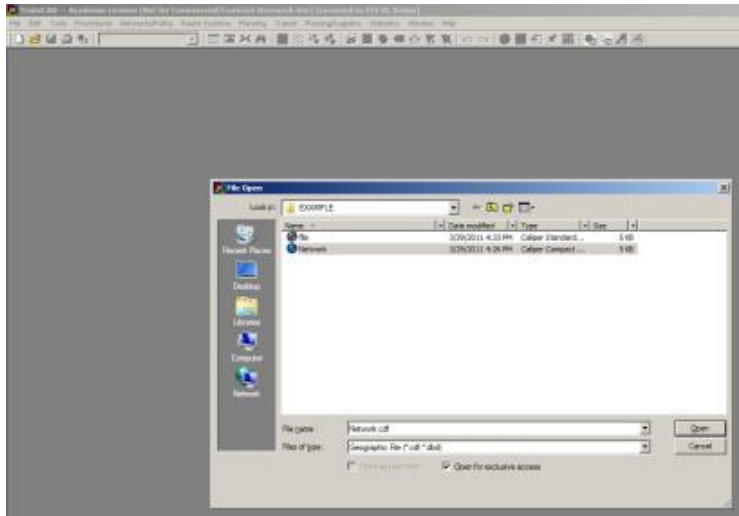
1.1 Sidenotes

The standard file type for geographical files interchange is the ESRI Shape file (*.shp). It is important to know that there is a humongous amount of free geographical databases in the *.shp for free download ([Tiger](#) – for US databases, [Geocomm](#) – for worldwide data, and census entities of most countries), but shape files don't often import to TransCad formats perfectly, specially area layers and highly complex line layers.

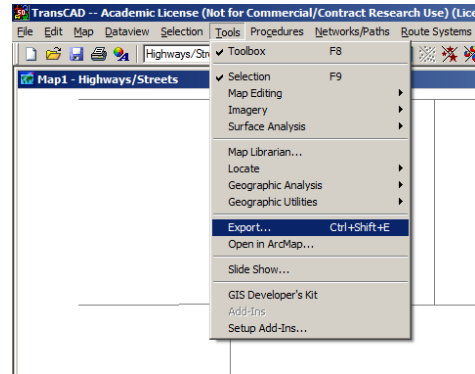
TransCad can also import models from other platforms, such Cube, Vissum, Emme/3, but it is not relevant to this course.

1.2 Transforming a file from *.cdf to the *.dbd format:

Open the *.cdf file

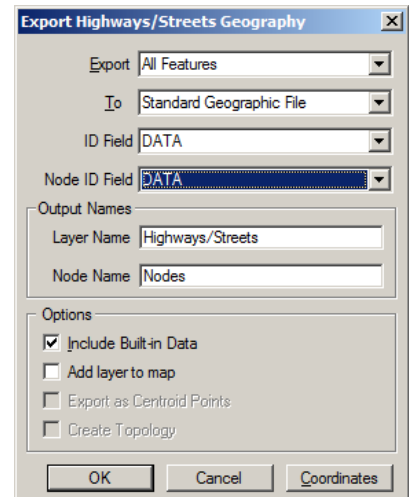


Access the menu Tools/Export:



There are a few parameters that you have to choose during the export procedure:

- Type of file that you are exporting to
- Which portion (selection) of the layer you are exporting`
- Which are the fields where link IDs and node IDs are
- Layers' names
- If the data has to be exported along or not



2 Creating a map - Basic map tools


One of the tasks that can be performed in TransCad is the creation of maps, which is the sole purpose of Maptitude (also from Caliper), a much cheaper software that doesn't have the transportation related resources.

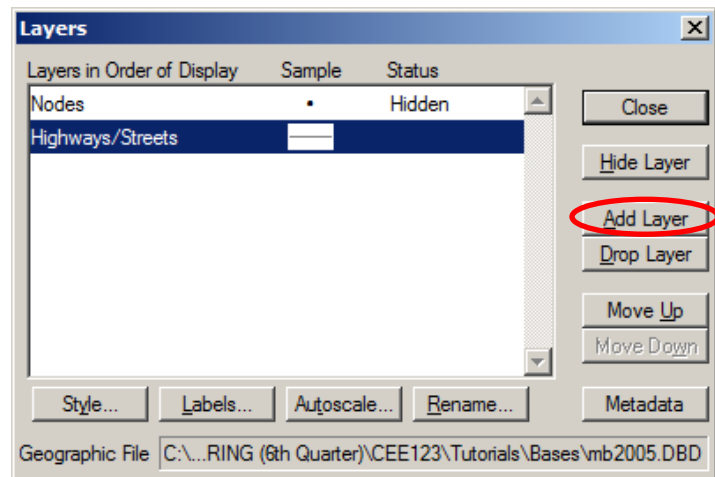
Creating a map in TransCad is a lot like creating a map in any other GIS software, and can be made through the following set of steps:

2.1 Add the layers you want to use in your map


The first step is always to open the layers you want to work with.

The first layer should be open through the traditional File-Open, but the other layers have to be added to the map where the first layer was opened to (when you open a layer, it automatically creates a map environment).

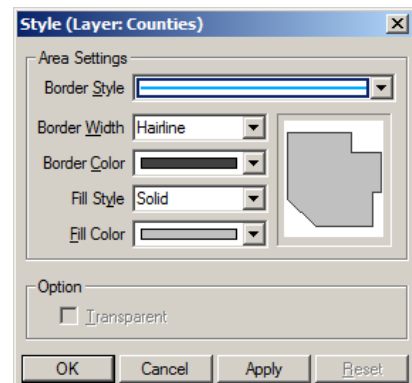
To add layers to a map you have basically three options: Click on the icon  in the main menu bar, right-click the map and select "Layers" or go to the menu Map-Layers. All three options will open a screen with several options. In this case you will need to press the "Add layer" button, that will open the regular Windows's file opening screen, in which is possible to navigate until the file you are looking for. This process has to be repeated for as many layers as one wants to add to the map.



2.2 Formatting lines and fillings

It is possible to format layers' appearance (lines, points and filling of areas) by accessing the Layer style icon  in the main menu bar of TransCad. Once the formatting form is open, all the formatting alternatives will be available to the user (forms for lines, points and areas are slightly different, but self-explanatory).

After choosing the colors of a certain layer it is also possible to make these changes permanent for the next times you access




that given layer, and this can be achieved by accessing the menu Tools-Geographic Utilities-Geographic Files and press the button “Save settings”, which might save some time if several maps are going to be made from scratch with that layer.

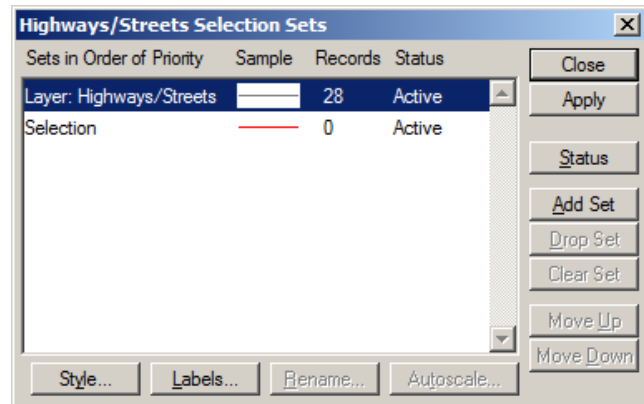
2.3 Adding labels

Labels can be added in three basic ways:

- I. Labeling all elements of a layer or set of features of a given layer (selection will be covered in the next section);
- II. Labeling one element at a time using information in the database; &
- III. Adding free-hand text to the map.

The third method is neither the most common or efficient way of adding labels to a map, so it won't be discussed, while the methods I and II are both very common and useful. Given the similarities of both methods, the second one will be explained as a particular case of the first one.

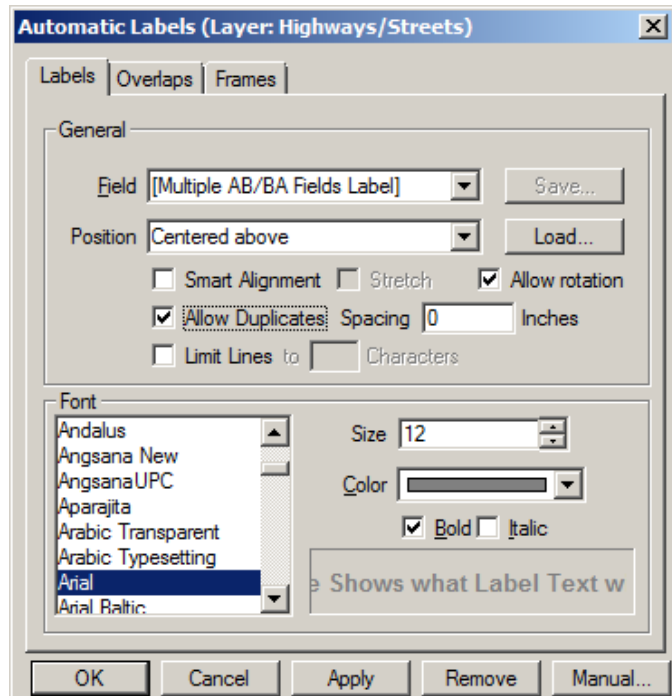
There are several ways to add labels to a set of features of a given layer present in a map. The most straightforward one is to just click on the menu  in the main menu bar of TransCad, but a preferred method is to go to the menu Selection-Settings (Ctrl+E) and find the box that allows you to deal with selections and press the button “Labels” with the layer or selection to which you want to add labels. (The usefulness of always working with selections will become clear as you do enough map formatting work).



Regardless the method used to access the label menu, you will be presented with a very straightforward menu for labeling your map features.

The first thing to choose is the data field that is going to be used as a label. Multiple fields and formulas involving several fields can also be used, and are listed in the bottom of the list of fields that is presented in the first drop-down box of the label form.

The second decision to make is where to locate these labels in relation to the




features (right, left, above, etc), which can be done through the second dropdown box.



The rest of the options in the first tab are not all important, but the existence of duplicates (different links of the same street would be labeled, for example) and the rotation of labels (aligned to the features they label) make a big difference in the final look of the map and should be used carefully. Font and color can be used as the user wants, and almost every company has its own standard for it.

In the “Overlaps” tab you can decide how to deal with overlapping labels, if you want to allow them (generally creating a not very pretty map) or if you want to set a certain priority rule to automatically remove the labels that are overlapping.



The “Frames” tab allows you to put frames and fill them with colors, what usually give the map a much better aspect. Both overlapping and frames are further discussed in the video posted online.

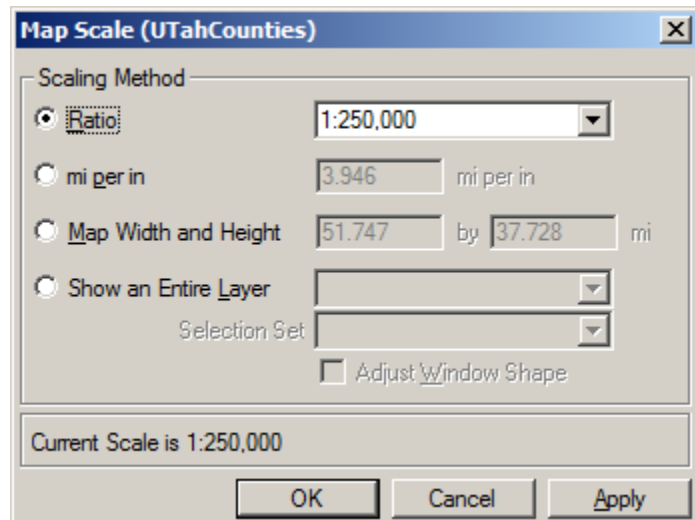
To add manual labels the user should press the icon  on the main toolbox and proceed the same way as if it were the case of automatic labels. The basic difference here is that the labels will be added as freehand text, so overlapping does not apply to this case. For further reference, please refer to the video posted online.

2.4 Working with zoom and scale

Zooming in TransCad works like many other softwares, with two main tools to zoom in  and one to zoom out , both in the main toolbox (F8). With these tools it is possible to just click in a point to zoom in or out (after selecting the appropriate tool) or to select the area that you want to zoom to.


Besides these basic tools, there are three other tools in TransCad that might come in handy in some situations. The first one regards setting a pre-defined scale to the map, which would be pretty difficult to achieve by using the traditional zoom in/out tools. To access this tool it is enough to go to the menu Map-Scale and then set the appropriate scale.

The second pretty handy resource available is the option to go back to the previous zoom (or view) used, which can be done by pressing , while the third tool,  takes the map back to its original zoom (the last time the map was saved or the original zoom of the first layer opened to create the map in case it was still not saved)



For a better reference and a trick to allow you to zoom to the exact are you want, please refer to the video posted online.

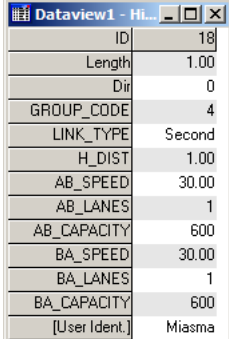
2.5 Adding and editing the map legend

To add the map legend it is just to click on the icon  in the main menu bar and the legend will automatically appear in the right lower corner of the map, and with a double-click on it is possible to format it (more advanced legend formatting will be used when charts and theme maps are discussed). It is worth noting that with a right click on the legend it is possible to attach it to the map and make the legend to look like a part of the map itself and not something that is floating on top of it.


For a better reference on the topic, please watch the video on map editing (9:22 time mark on the video).

2.6 Info

Asking for the “Info” associated to a geographical feature (point, line or area) it is actually seeing the data associated to it. In TransCad there is a possibility of seeing the information of multiple features in multiple layers at the same time, but we are going to focus on asking for the data of a single feature of the active layer.




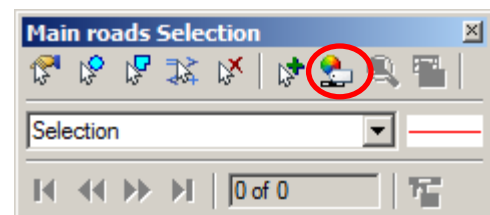
ID	18
Length	1.00
Dir	0
GROUP_CODE	4
LINK_TYPE	Second
H_DIST	1.00
AB_SPEED	30.00
AB_LANES	1
AB_CAPACITY	600
BA_SPEED	30.00
BA_LANES	1
BA_CAPACITY	600
[User Ident.]	Miasma

To do this it is enough to select the icon  located in the main toolbox and clicking on the feature for which you want to check the associated data. After clicking a box will appear with the fields associated to that geographic feature, and if the layer was opened with exclusive access, it will be possible to edit this data, as it is going to be seen further on this document.

2.7 Selection

Selection is one of the most useful resources for creating a map, as it allows to control formatting of sets of geographical layers pertaining to the same layer.

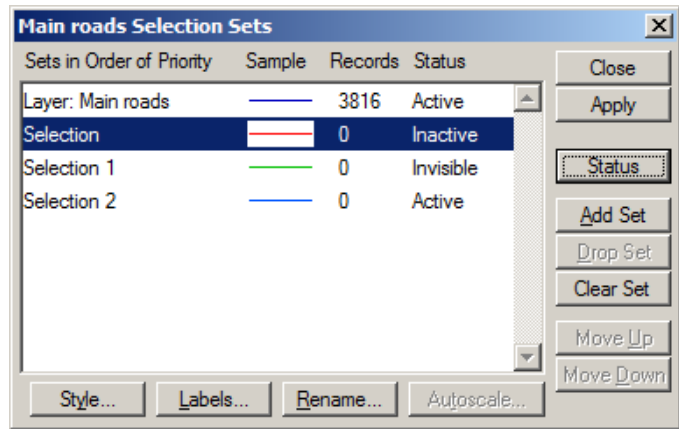
The simplest way of building a selection is by doing it by hand, accessing the selection toolbox  in the main menu bar and then choosing how to select features. It is possible to add features by touching them, by creating a circle and selecting everything that is within that circle and defining an arbitrary polygon (more advanced selection procedures will be discussed ahead on this text).



By clicking on the “Selection settings” button, the user has access to the screen that allows him/her to format each one of the selection sets.

In this box the user can define the format and even add labels to all the elements in each one of the selection sets, besides being able to make the elements of a certain selection set totally invisible.

On this screen it is also possible to add and drop selection sets, and it is a resource that has to be mastered in order to create good maps with more complex layers.




3 Geographic files data – Dataviews, Selection & Joining tables

There are two different types of data that can be view/edited in TransCad: Independent databases and those associated to a geographical layer.

In the first case, working with the database is pretty much like working in any other database handling software and less restrictive than handling those associated with geographical databases, so we will focus on the latter.


3.1 Dataviews


Dataviews are the equivalent for databases of the maps for geographical files (layers).

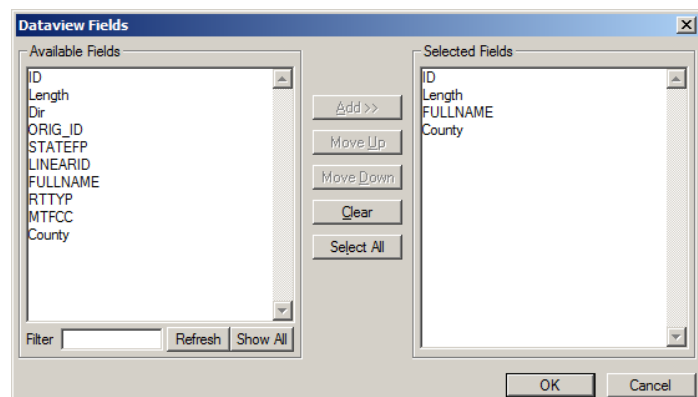
To open the database associated to the geographical file currently active, it is enough to access the icon  in the main menu bar (by the layer selection dropdown box). After clicking on this icon the user will be prompted with a traditional database view. All the operations that you are going to see in this chapter will require having the dataview open.

It is possible to open the database associated with a geographic file without opening it (the geographic file). However, **an imprecise alteration of this file could corrupt the geographic file altogether.**


3.2 Selecting columns to show

To select the columns you want to keep in a dataview you can press the icon  in the main menu bar, and select the fields that are of interest.

To make a field always visible, regardless of panning the dataview to see fields that are not “fitting” in the screen, the user should just click on the field header and press the lock icon  in the main menu bar.




3.3 Searching data

To search for a certain value in a dataview it is enough to press the find icon  on the main menu bar and choose the field you want to look at and the value that you are looking for.


3.4 Sorting

There are three ways of sorting a dataview. The first one is to access the menu Dataview-Sort and choose the fields you want to sort the database by. This process is very similar to sorting databases in Excel, and should not be specially difficult to grasp.

The second and third ways of sorting a dataview are really similar, and involve two steps, being the first common to both. The user must select all the fields that he/she wants the database sorted by (in order of importance, just like for the first method). With the columns selected (will be highlighted), the user can right-click any one of the selected columns and select the sorting method (increasing or decreasing). Alternatively, the user can also use the icons  located on the main menu bar.

3.5 Changing order and locking columns

An useful resource when analyzing, exporting and printing tables is the possibility of reordering them or to locking one on the left (pretty much like freezing panes in Excel). These two resources are extremely easy to use.

To move columns from one position to the other in the dataview simply select it by clicking on its header and press the left and right arrows on your keyboard. To lock a column on the left side of the dataview just select the column you want locked and press  on the main menu bar.

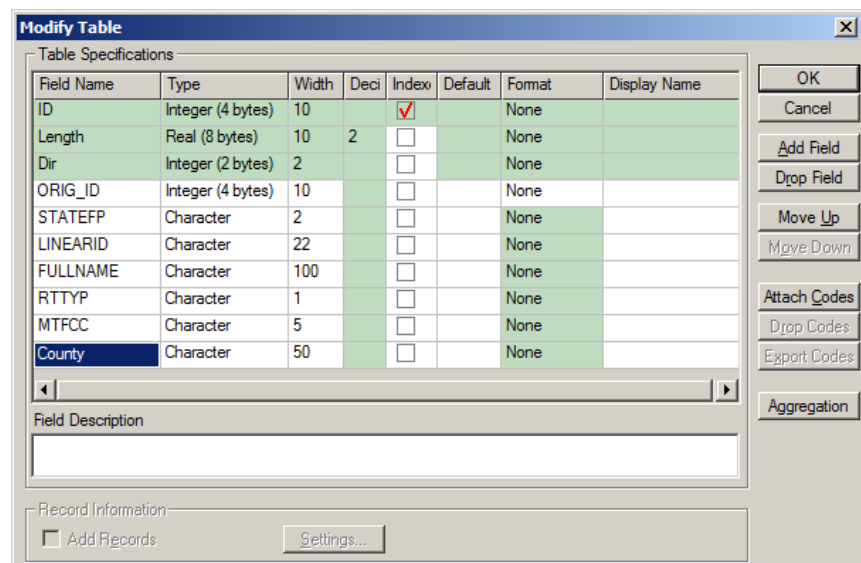
3.6 Data editing

Data editing in TransCad is very similar to data editing in other database manipulation softwares, with the difference that it is possible to use geographic based operations to edit data fields.

a. Data structure

The first topic to cover when discussing data editing is the data structure that each and every database has on TransCad. To view the database structure the user can simply access the menu Dataview-Data Structure.

To modify the data structure the user can access the menu Dataview-Modify Table, that will open a windows that allows the user to add and drop fields, besides changing their order permanently on the database and changing the type of data of each field. ALL THE CHANGES MADE ON THIS SCREEN ARE PERMANENT.



b. Inputting data on a cell

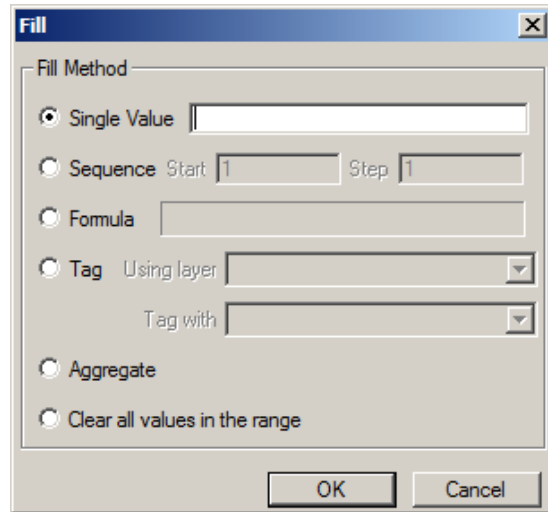
To input data on a cell the user can simply select the cell and use the keyboard. There is undo for this operation on TransCad 5.0, but older versions still in use don't have that resource, so be aware when doing it.

c. By using "FILL"

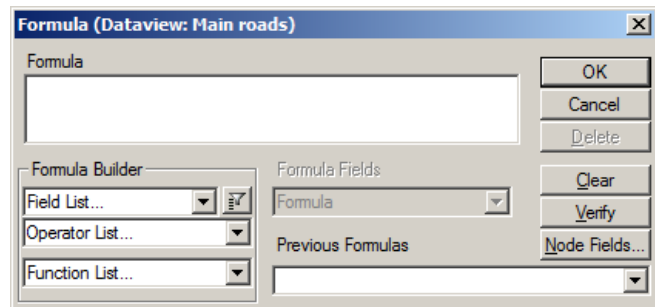
The most common way of filling a set of cells with values (and a set is usually a field), is through the use of a tool called "Fill", which combines several tools on it.

To open the tool the user has to select the set of cells he/she wants to fill (by clicking on a field header you select the whole field) and go to the menu Edit-Fill or right click on the selected cells and press "Fill".

After opening the "Fill" box the user will be given several options. The first two, Single value and sequence, are pretty straightforward so they won't be discussed here.



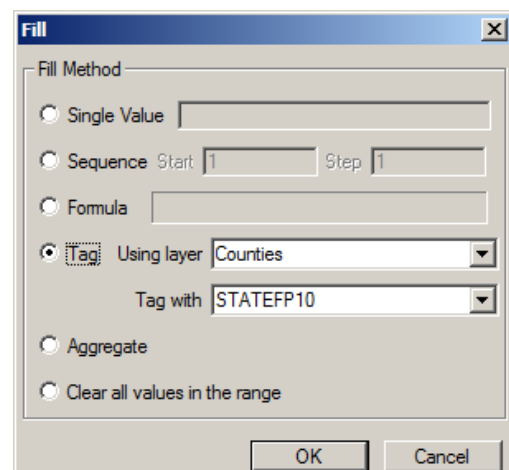
The following two are the most important of all, and both are going to be useful for our project. When selecting the option of formulas, the user will be prompted with another formula in which the user will be able to write the appropriate formula.




It is important to notice that the data format is extremely important, so often the use of functions to transform strings in numbers and vice-versa will be necessary.

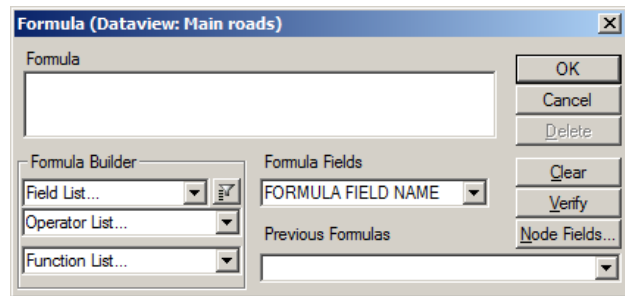
The 4th option is the use of Tagging, which is a geographical operation, in which the user information of a different layer that is on the same place on the map (overlapping). If this is the case, the user will have to choose the layer and the field where the information will be retrieved from to fill the set of cells in question.

For a better understanding of these resources it is recommended that you watch the tutorial video available on the website.



3.7 Formula fields

Formula fields can be understood as temporary database fields, and are built by accessing the icon  in the main menu bar and typing your formula. It is important to highlight that if there is no map using the data field or no saved dataview that contains the formula field, it will be lost when the dataview is closed.



3.8 Selection

Selection plays a central role in data-base editing and in map formatting, as it allows to operations and formatting procedures to be applied to an user-defined set of geographical features.

There are several ways of selecting elements on a map/dataview, but three of them are particularly useful.

The first one is selecting by condition, which is the traditional way of selecting elements in databases, but it is important to notice that it can be done while having the map active in the proper layer or the dataview active.

To start the selection the user should access “Selection-Select by condition”, and select the features using the same screen used to create formula fields and formulas to fill a set of cells.

The second important type of selection is the selection by location, that uses the same physical approach used to fill fields by tagging another layer. The idea here is to select the features of a layer that share a certain relation (inside, touching, not inside, not touching, etc) with a set of features of a second layer. This can be the case of, for example, selecting all the nodes that are endpoints of rail links in a multimodal network, for example, or selecting all census tracts that have railroads or freeways passing through it.

3.9 Importing and exporting data from TransCad

TransCad imports and exports data to many different formats (*.csv, *.txt, *.xlsx, *.dbf, etc). It is important to notice that even though it is possible to work with databases in other formats different than *.bin (*.dbf being the best example), this practice is not recommended due to the possibility of corruption of databases or that fields will be truncated.

To export a dataview to a different format, just go to “File-Save as” and select the file type you want, and to import from another format just go to “File-Open” and choose the format you want.

4 Layer types & layer editing

In GIS there are three possible geographic entities: Points, lines & areas, each one with some peculiarities that are relevant for the CEE123 project.

Area layers are not those which are more intensively used in transportation models, since the attributes of each area could be assigned to points representative of the polygons (individual areas). The greatest use of area layers, however, lays in the possibility of using Geographical analysis tools, specially TAGGING and OVERLAYS, which will be discussed later.

There are two concerns that users must have before they start an analysis with area layers:

1st – Is each and every area compact or do you have a single geographical entity (polygon) that is a sum of two different and disjoint polygons?

2nd – When importing area layers you have to check if all the polygons area there or if one of them were lost during the import procedure (specially from *.shp to *.cdf/*.dbf)

There are two main concerns when editing line layers: The first and most important one is connectivity. You **MUST** assure that the links that should be connected are in fact connected. The second big concern is with Topology, which is the “natural orientation” of lines (links in transportation networks). This characteristic will be what decides, for a given link, which direction is AB and which direction is BA.

4.1 Best practices in layers editing

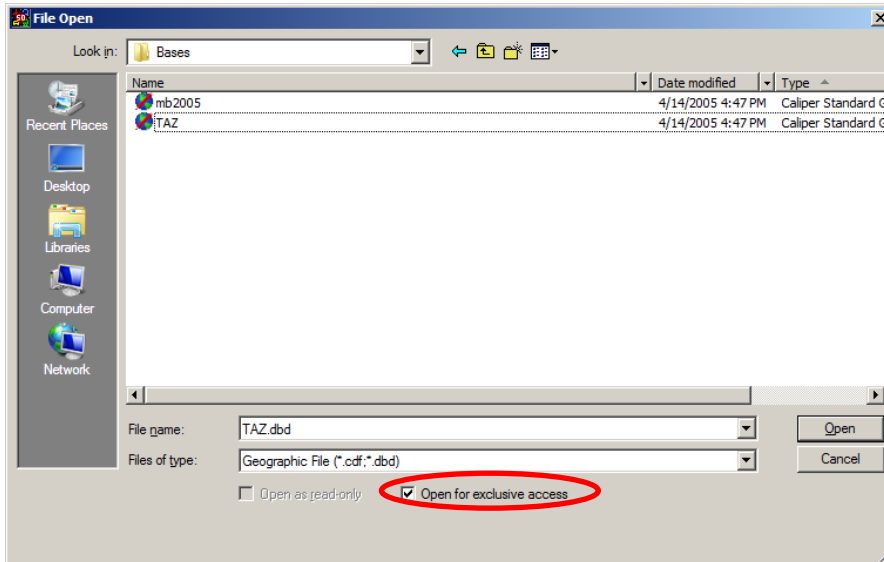
Although there is no general rule about editing or maintaining geographical layers, some advices are good to be taken into consideration when setting a strategy to edit a layer. They are:

1. Have a standard for everything you do with the layers: Numbering, adding, moving, etc;
 - a. When adding links, always add with the same orientation (from the centroids to the network, from North to South, from East to West, etc);
 - b. Be careful when moving a node on top of the other. Make sure that the node that is going on the **BOTTOM** is the one you want to keep. The data associated with the other node will be deleted;
2. Have difference ID ranges for different types of links (1**** for freeways, 2**** for arterials, 3**** for local, etc.);
3. Name the data fields with clear names and KEEP a data dictionary;
4. When you have more than one field with the same information (Code and name of a link hierarchy, for example), edit only one and fill the other with formulas based on the first field;
5. Favor moving over deleting and adding;
6. EDIT ALL THE GEOGRAPHY THAT YOU HAVE TO BEFORE YOU EDIT THE DATABASE;

7. In a network that contains transit routes, DO NEVER EDIT THE NETWORK WITHOUT HAVING THE TRANSIT ROUTES OPEN;
8. **BACK-UP YOUR WORK FREQUENTLY (Every time you stop working) or even every one or two hours for big and complex projects.**

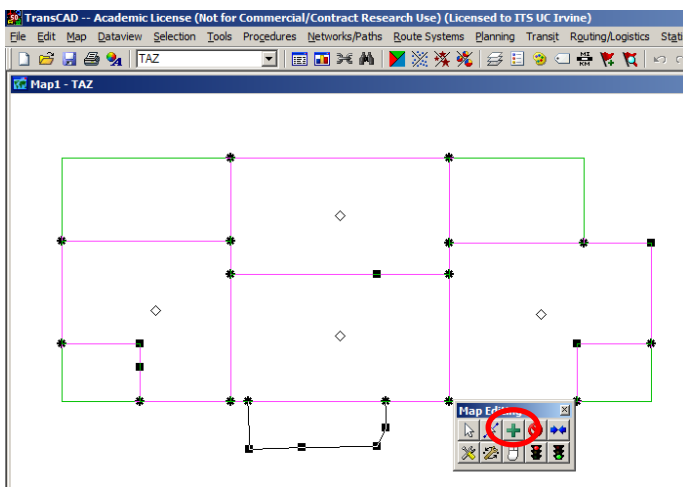
4.2 Area-layer editing

The first step is to open the layer in the *.dbd format with the “open with exclusive access” option checked.



Open the editing tool-box in Tools/Map Editing/Toolbox

To add an area you simply click in green plus icon in the editing toolbox the starting point and keep clicking to “draw” the new polygon you are adding (it is not recommended to add an area inside an existing one).

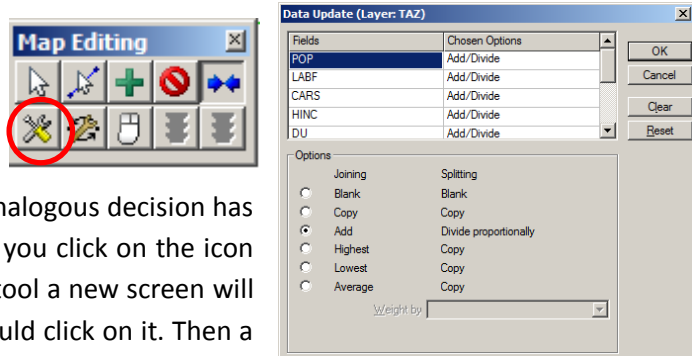


After drawing the area, if the drawing is correct you can press the green light, otherwise press the red light and start again.

To divide a polygon in two do the same operation of adding a new polygon but tracing in such a way you divide an existing area.

To combine two areas you can click on the two blue arrows pointing to each other, click on the areas you want to marge (always pressing the green light to confirm the operation and the red light to cancel it).

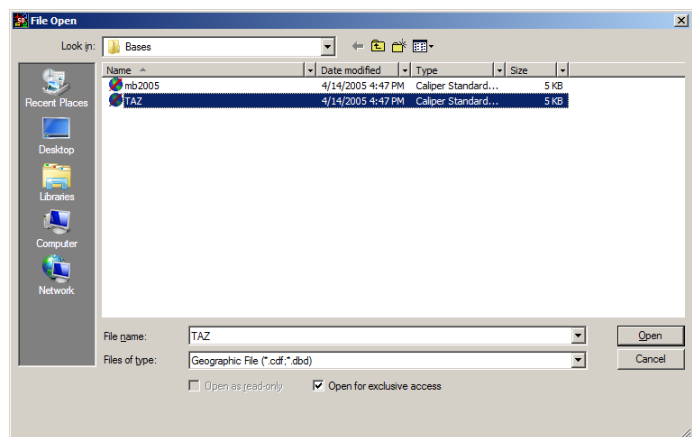
When joining and dividing areas, it is important to decided what to do with the database associated with these polygons. When joining, do you want to add, keep the lowest, the highest, an average or delete each one of the fields on the database? The analogous decision has to be made when you are dividing an area. If you click on the icon on the left bottom corner of the map editing tool a new screen will show up with a button “update”, and you should click on it. Then a new screen with the options to be used for each data field will be shown and you can set it accordingly.




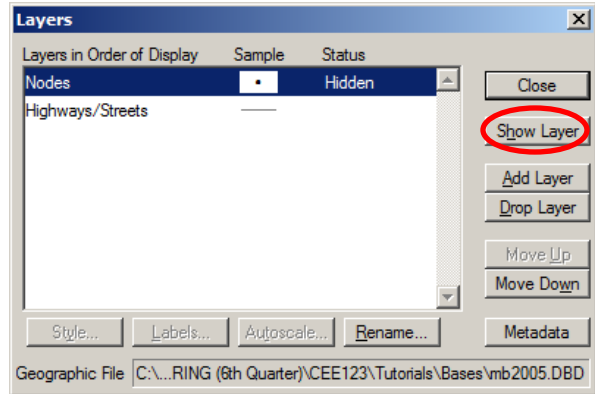
All these operations are shown in the video available on the webpage, and might be a good reference for your work.

4.3 Line layer editing

The first step is to open the layer in the *.dbd format with the “open with exclusive access” option checked.



In order to make things a little bit easier, you can make the node layer associated with the link layer (endpoints) visible, by accessing the menu Map-Layers (Ctrl+L) or the icon , selecting the node layer (that will be shown as Hidden), and pressing the button Show Layer (Alt+h).



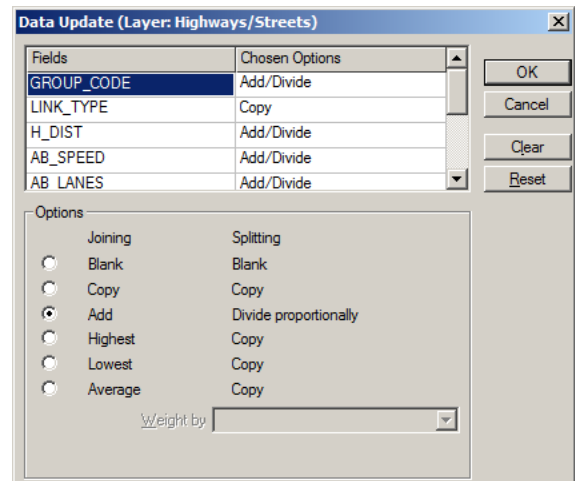
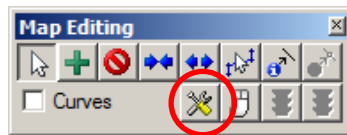
Although this operation is not 100% necessary, it makes the layer editing a lot easier (don't forget to set the link layer as the active layer once you go back to the map).

There are 5 operations that are worth looking at for this course (and for most professional projects):

- Adding links;
- Deleting links;
- Splitting links;
- Joining links; &
- Checking for connectivity.


The first step, as usual is to open the editing toolbox: Open the editing tool-box in Tools/Map Editing/Toolbox



As done before editing the area layer, you should make sure that the database will be altered accordingly to what you want it to be before you add, join or split links. To do that you can simply press the icon with the wrench and the screwdriver in the map editing toolbox and press the button "Update" in the screen that will appear next.









In the "Data Update" screen you can decide how each one of the fields existing in the database associated with the line layer will behave when you join two links or split a link in two parts. There are several options available and it is up to the person editing the layer to decide which option is best.




After setting the standards for field behavior, the next step is to start editing the link layer.



To add a link, you can press the  icon and, with a single click, choose where the new link will start (it can be in a node that already exists, in the middle of nowhere or in the middle of an existing link,

in which case it is going to be automatically split). By using single clicks you can draw the link and by using a double click you define the ending point of the link (for which you have the same options as for choosing the link initial node). To confirm the link addition, press , and to cancel .

To delete a link simply press , and then click on the links you want to delete (it can be more than one at a time). To confirm the link(s) deletion, press , and to cancel .

To split a link simply press , and then click on the link you want to split and on the exact point you want to split the link at. To confirm the link split, press , and to cancel .

To join two links (that HAVE TO BE ADJACENT), simply press , and then click on the node that divides the links you want to join (if this node has more than two links connected to it you won't be able to select the node). To confirm the link join, press , and to cancel .

To check for network connectivity, select  on the Map editing toolbox, and then click and hold on the node you want to check connectivity. By dragging this node and verifying that not all the links that were apparently connected to that node move when the node is moved, you verify which link is not connected. To cancel the geographical displacement you imposed to the network, just press .

Since link editing is a little bit more complex, it is strongly recommended that you watch the video about this topic that was posted on the website.

5 Themes & charts


Themes & charts are extremely useful resources both for analyzing and presenting data/results. Three of the four types of charts and themes are going to be useful for your project, so we are going to focus on them:

- ✓ Color themes;
- ✓ Scaled symbol theme; &
- ✓ Chart theme.

Even though each one of these tools can have a wide variety of uses, this tutorial will focus on the most likely uses for your report.

5.1 Color themes

Color themes are used to show different groups of physical elements (defined by a certain field in their associated database). Two very good examples of this use are for showing links of different hierarchies with different colors and to area maps so the “client” can more easily distinguish the different areas without relying on the areas.

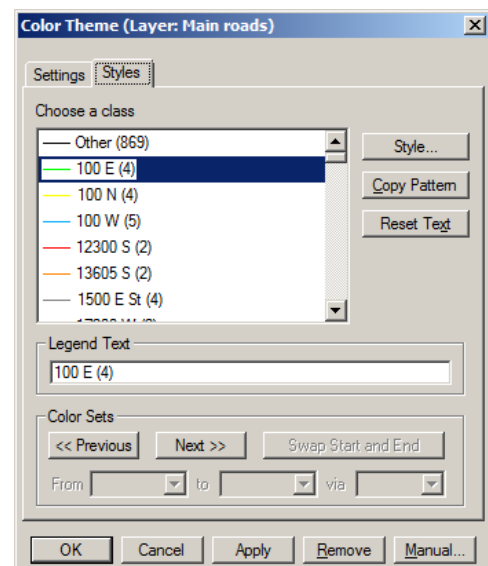
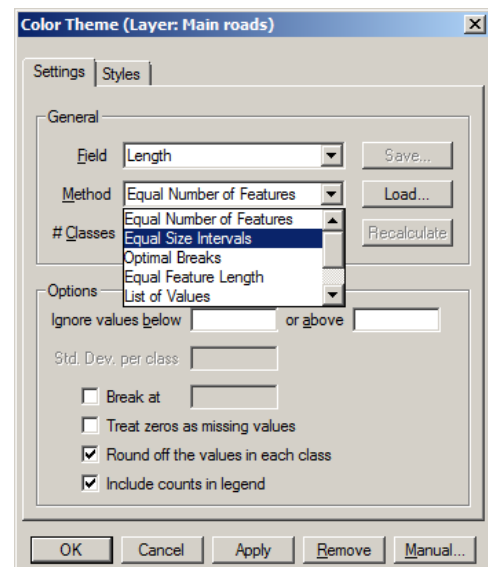
For both of these uses you can simply choose the field you are using to distinguish the objects by (Hierarch, ID, etc) and create the theme based on it, which you can start by pressing  on the main menu bar.

In both of these cases, your best bet is to build the theme using “list of values”, which will result in a map with a different color for each different attribute value.

On the tab “Styles” it is possible to format each one of the groups of features with the desired theme by hand, or just browse the pre-set themes using the “previous” and “next” buttons.


Other uses for this type of theme is for displaying V/C of each link after traffic assignment, activities and population density in each TAZ, etc.

For a better description on how to construct these maps, please refer to the video posted on the website.



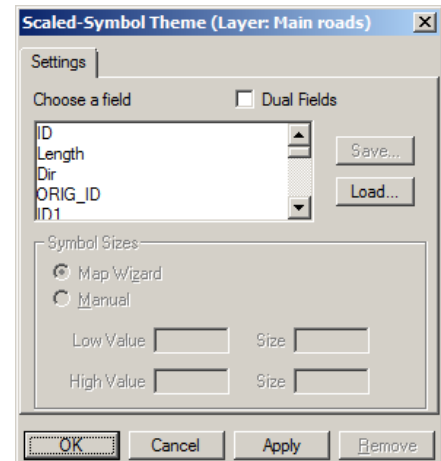
5.2 Scaled symbol theme

Scaled symbol themes are the most common form of displaying traffic assignment, since it allows for displaying each link with a different thickness according to some link attribute (traffic volume, for example).

To build this theme the user has to access the icon  on the main menu bar and choose the field that will define the “thickness” of the links. It is important to notice that since TransCad works also with bi-directional links, it can display results of both directions of the same link at the same time.


To do this, just click on the “Dual Fields” box and all pairs of fields that correspond to the same quantity but for different directions will show grouped on the list of possible fields.

For a better reference on this tool, please refer to the video posted online.

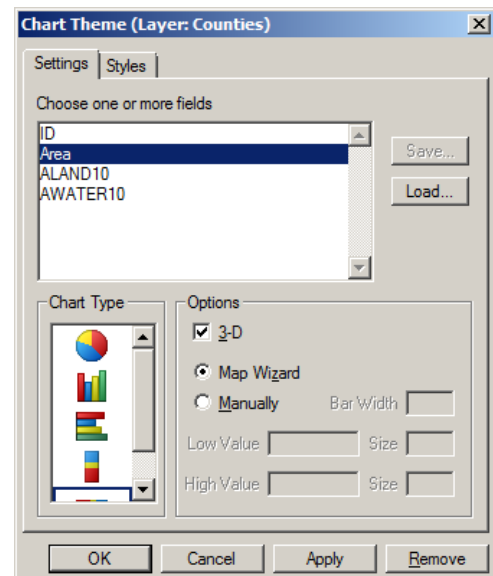


5.3 Chart theme

Chart themes are not the most frequently used in TransCad maps due to the fact that it often makes the map too crowded. However, for maps with less geographical features it might be interesting to be used.

To build charts the user has to access the icon  on the main menu bar and choose the fields that will be part of the chart and the type of chart that will be used (pie, bars, columns, piled bar or piled column) and format it.

As it is extremely straightforward, more detailed instructions will be left only on the video posted online.





6 Matrices

It should be clear to anyone that matrices play a fundamental role in transportation planning, since they are an easy way to display trips, travel times, costs (and more) between TAZs. Due to this fact, TransCad has a matrix data structure specific for holding matrices. Just as a sidenote, it is important to know that matrix files can hold multiple matrices as their “layers”.


There many ways of creating a matrix in TransCad, but the one that is used the least is “File-New-Matrix”. Instead, many of the procedures used in TransCad create matrices as their output (multiple path, matrix distribution, etc). If the user decides to create a new matrix, first he/she will have to create a set (selection) of features (geographical elements) to use as the indexes of the matrix.

After creating the matrix, the user can perform several different operation with it.

 - To show the marginals (total, max, min, etc);

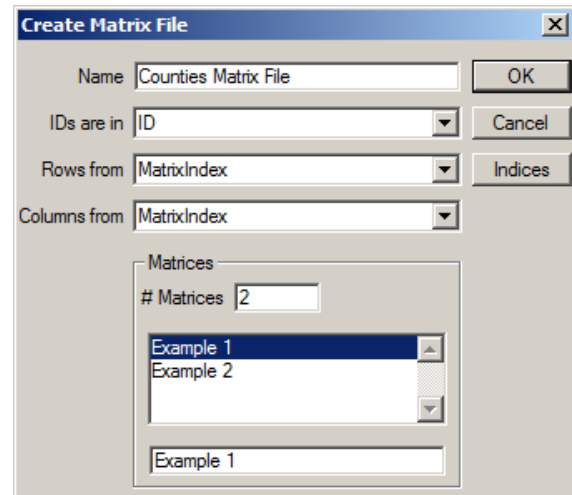
 - To rename, add and drop matrix layers;

 -To fill the matrix with formulas, fixed values of matrix multiplication results;

 - To fill the matrix with values from a different file (indices have to match).

As the matrix format does not exist in other platforms, it is possible to export matrices (Menu Matrix-Export) to other data formats (*.dbf, *.csv, etc) and then open it with a different platform. To import matrices from other platforms the procedure is the same, and the user has to provide a file with a column for the index I (origim) a oclumn for index j (destination) and a column for each one of the layers of the matrices he/she wants to create.

A better reference of this topic is available on the video posted on-line.



7 Networks and Shortest paths

Before using TransCad to compute shortest paths and other transportation analysis, it is important to know that the network that is displayed on a map is NOT the file that is going to be used on transportation analysis.

In order to be able to not all link of a network in a certain analysis (a link that represents a road that was not built yet, for example), and to create a more efficient data structure for the data (Nodes organized on a min-heap and link in a foreword-star), the network (.dbd) has to be converted into a graph (.net). **Therefore, every time that a change is made on the network, the graph has to be updated in order to the change to be used for the subsequent steps.**

To create a graph (.net), the user can go to the menu Network/Paths>Create and fill the form that will be prompted to him/her.

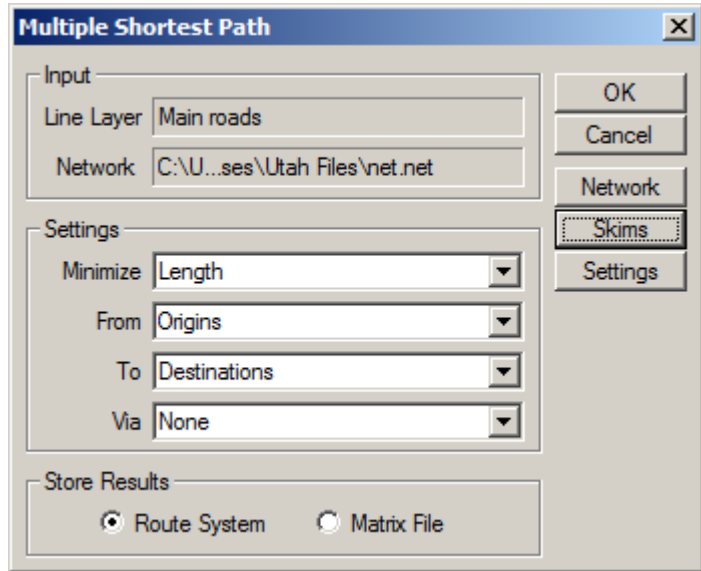
There are several options that can be used in order to make the subsequent steps faster, but would have no effect on this project.

Since this is the case, it is recommended to add to the graph all the fields of both link and node layers, but it is important to pay attention to the choices of length field and type field at the top of the form.

With the network created the user can start creating shortest path between points. The first step is to compute some arbitrary shortest paths in order to find some eventual error on the network. TO do this the user can go to the menu Network/Paths-Shortest Path and open the shortest path toolbox. The first icon on the toolbox is used to set origin and destination of the paths (nodes on the network, always).and the 4th icon computes the shortest path, while the 5th icon removes the points for origin and destination already added so the user can re-start the process.

If the user wants to compute multiple shortest path from menu Network/Paths-Multiple Paths, but before doing that he/she has to remember to create a selection with the origin and other with the destinations of the shortest that will be created.

The output of this procedure can be presented in a matrix with the distance between each origin and each destination, or can be presented as a route system with a route linking each one of the origins to each one of the destinations.



For a more clear explanation on topic, please access the video available online.