CEE 123 Transport Systems 3: Planning & Forecasting
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The Miasma Beach Transportation Model

Task 2. DEVELOP 2020 BASE YEAR TransCAD NETWORK and SKIMS

The objective of this task is to create a TransCAD network file that will convert the GIS information representing the Transportation System **T** into a form suitable for subsequent transportation analysis. TransCAD will use this network file to find minimum path trees for all Miasma Beach centroids (internal zones and external stations).

2.1 Create TransCAD Network File

Set the Highway/Streets layer as the Working Layer. Select **Networks/Paths** (if not on the menu bar, go to **Procedures** and select it). Select **Networks/Paths / Create...**. Create links from: **Entire line layer**. Read length from **H_DIST**. Under Network Fields/Link Fields, click **Choose Link Fields**, choose **Select All** in the prompt window. Save file as **mb2020.net**.

VIDEO: For a **video** on creating a Network file, click HERE.

> **NOTE: TransCAD Network File**
> The network file (***.net**) created in TransCAD should not be mistaken for the geographic file for the highway network that displays the network on the map. A ***.net** file is a special data structure that stores attributes (time) of each network link. This data structure is needed for network analyses such as shortest paths and traffic assignment. When the highway geographic file is editted (e.g., adding or deleting links) or when link attributes are updated (e.g., changing speeds or capacities), the network file is **not** updated automatically: the ***.net** file must be re-created. The network file specified remains the active one until it is changed (the active network name is displayed on the status bar at the bottom of the TransCAD window).

2.2 Develop 2020 Base Year SKIM Trees with TransCAD

There are two objectives of this sub-task. First, compute the travel time matrix for use in travel demand forecasting. Second, to use the resulting skim trees to error check the network for coding mistakes.

Three steps are required to generate the travel time matrix. First, zone to zone (interzonal) minimum paths are computed. Intrazonal travel times cannot be computed directly from the network, thus, a second step involves approximating these times from interzonal times to neighboring zones. Finally, terminal times may be appended to selected zone pairs.

2.2.1 <u>Create Interzonal Skim Trees</u>
Perhaps the most efficient way to generate skim trees is to create a TransCAD *Selection Set* comprising network centroids and then skim the network to create the travel time matrix.

Select Centroids
To perform node selection you can **see this video** about selection and perform it using anyone of the techniques mentioned. You can also follow the next set of instructions, which describe a less efficient method.

Set Nodes as the Working Layer. Go to **Tools / Selection**. To add a selection set, click the "+" button and then the "Selection Settings" button. Click on the set created, then click on **Rename...**; enter **Centroids** as the new

name and close this dialog box. Next, click the "Select by Pointing" button on the main tool box. Select multiple centroids by holding the shift key and clicking on each of 8 centroids (selected nodes will be highlighted).

Find Skim Tree
For assistance in calculating the skim matrix, you may **see this video** about shortest paths and skim matrices. You can also follow the instructions below, which describe an alternative method.

With **Nodes** as the Working Layer and **mb2020.net** as the active network, go to **Networks/Paths / Multiple Paths**; minimize: **AB_Travel_Time/BA_Travel_Time**; from: **Centroids**; to: **Centroids**. Select Matrix File as the output option. Click **OK** and save the file as **time.mtx**. The interzonal skim tree matrix using link travel times will appear in a *matrix view*.

Save this file and include this **matrix** in your interim report.

VIDEO: For a **video** on editting skim tables, click HERE.

2.2.2 <u>Append Intrazonal Impedances</u>
Use **one half the travel time to the nearest TAZ**, in terms of skim times from the zone in question, as the intrazonal travel time (diagonal elements). You may manually compute and enter these numbers into the diagonal cells of the matrix created in **2.2.1** or use the TransCAD procedure below.

Save this file and include this **matrix** in your interim report.

> **HELP: Estimating Intrazonal Travel Times**
> **If** assistance is needed in estimating intrazonal travel times, **then** Click HERE.

2.2.3 <u>Update Skim Trees with Terminal Times</u>
Once you finish step 2.2.2, you have a minimum path matrix for both interzonal and intrazonal travel times. Miasma Beach also utilizes terminal times for selected trips to reflect the extra time it takes to access the network (such as walking to your car).

Add **1 minute terminal time to intrazonal cells only** of the travel time matrix. This may be accomplished manually or by utilizing TransCAD utilities.

**Save** this file and include this **matrix** in your interim report.

> **HELP: Updating Travel Times with Terminal Times:**
> **If** assistance is needed in updating a travel time matrix, **then** Click HERE.
>
> **VIDEO:** For a **video** on shortest paths and skim tables, click HERE.

2.3 Report Skim Trees

Report each stage of the centroid-to-centroid free flow travel time table. Plot the skim trees for each centroid to error check your network data (if any errors are found, correct the network and repeat earlier tasks as necessary). Figure 3 is a sample network tree.
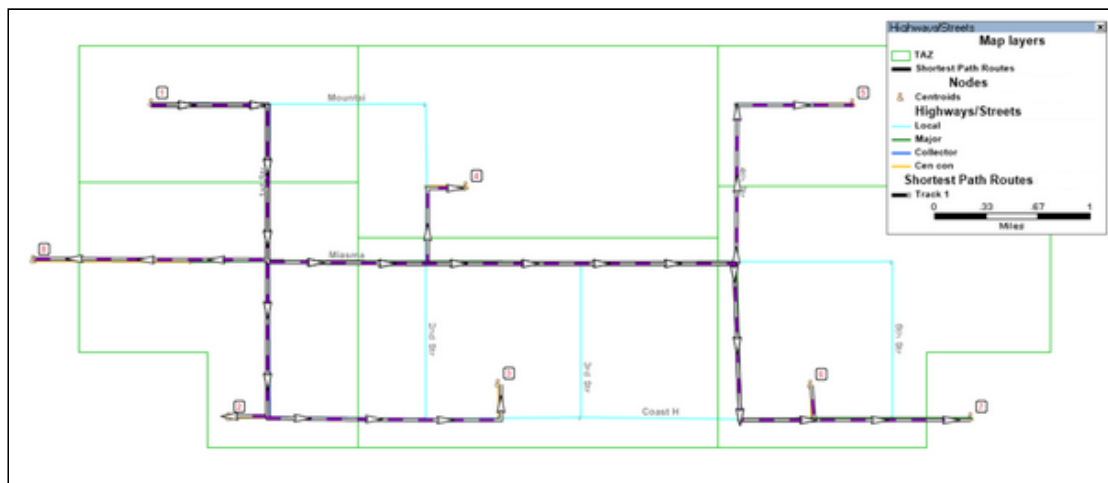
HELP: Plotting Skim Trees
If assistance is needed in Plotting Skim Trees, **then** Click HERE.

2.4 Prepare Task 2 Documentation

Prepare Task 2 documentation, including all TransCAD maps and dataviews. Follow all Format Guidelines in the preparation of this material, which will be submitted as part of the first **Interim Report** (see Task 2.5). Append to your project **Glossary** at least four key terms from the Task 2 analysis.

The report should minimally include:

1. A fully labeled network graph with street names (one or two labels per street and not on every single link) and node numbers.
2. Annotate network graphs displaying link characteristics such as speed, distance, and travel time (combine annotation with colored links).
3. Include a table of links, sorted by link type.
4. Minimum path trees for each of 8 origin nodes, as well as three skim tables (interzonal, inter+intrazonal, and inter+intra+terminal)

2.5 Submit Project Interim Report for Tasks 1 and 2

Please label the first section of your report **Introduction** and subsequent sections **Chapter 1** through **Chapter 6**, corresponding to defined project work tasks. The last section should be labeled **Summary and Recommendations**. You must include all prior chapters, revised as necessary, in each report.

Submit a **Project Interim Report** incorporating Interim Reports for Tasks 1 and 2. Append a project Glossary containing key terms from the Task 1 and Task 2 analyses. Include a cover letter describing you submission. Follow all Format Guidelines in preparing this interim report.

This and subsequent Project Reports will incorporate prior Project Interim Reports, possibly reflecting additions and corrections based on prior review and grading. Each submission must include a cover letter and an updated Table of Contents. You will be graded for only the new material unless you indicate in the cover letter that you are requesting to re-submit earlier reports.

Video File Summary:

- Creating a Network File
- Selecting Nodes
- Shortest Paths and Skim Trees
- Intrazonal and Terminal Times

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