

CEE 123 Transport Systems 3: Planning & Forecasting

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The Miasma Beach Transportation Model

Task 6. DEMAND FORECASTING: FUTURE NETWORK ALTERNATIVES

The first five tasks developed, applied, and validated a Four Step travel forecasting model for Miasma Beach. This model will now be utilized to examine future demand and performance in Miasma Beach using projected growth estimates for 2030. Task 6 will focus on applying the **Transportation Planning Process** to (1) identify problems, (2) generate potential solution alternatives, (3) analyze each of these alternatives, (4) evaluate the relative effectiveness of each alternative, and (5) recommend a single future alternative to the City.

6.1 Forecast Activity System for Year 2030

Projected growth in Miasma Beach can be characterized as rapid and focused. Primary residential growth is expected in zone 5; primary employment growth is expected in zone 4 (for agricultural employment) and in CBD zone 2 (for other employment). New residential suburbs are being developed east and west of the City limits; a significant increase in trips from these areas (via External Stations) is expected. External traffic is increasing rapidly. **Table 9** summarizes the results of a comprehensive land use forecasting process completed by the City Planning Department using a variety of demographic and economic forecasting techniques based on current and planned growth in the region. All activity estimates within the city limits are consistent with the adopted master plan for the city. **Table 10** provides growth estimates of external and through trips which were produced by the County Department of Transportation.

Table 9. Forecast Year 2030 Miasma Beach Demographic Data

ZONE	POP	LABF	CARS	HINC	DU	EIND	ERET	EOTH	ETOT	AREA
1	3000	1200	800	33000	700	400	200	1100	1700	1.56
2	2000	1700	900	52500	1000	500	350	1650	2500	2.53
3	3500	1300	2700	81000	1000	0	350	250	600	3.10
4	0	0	0	0	0	2300	300	800	3400	2.83
5	5000	2400	2800	55500	1750	0	250	250	500	1.27
6	5700	2000	2500	61500	1750	0	550	550	1100	3.09
TOT	19200	8600	9700	58300*	6200	3200	2000	4600	9800	14.38

* Income figure is weighted mean, all others are totals

Table 10. Year 2030 External Station PM-Peak O/D Matrix *

ORG\DST	1	2	3	4	5	6	7	8
1	20	40	40	40	0	0	100	200
2	40	20	20	20	0	0	100	150
3	40	20	30	40	0	0	100	100
4	40	20	40	20	0	0	300	400
5	0	0	0	0	0	0	100	100
6	0	0	0	0	0	0	150	150
7	50	50	100	0	100	150	0	1200
8	200	150	100	0	50	50	1300	0

* For 1-hour PM peak (5-6 pm) period (combined purposes)

6.2 Forecast Travel Demand for Year 2030 "No Build" Alternative

To provide a frame of reference in the forecast period (2020-2030), a "No Build" alternative is defined. This alternative is also referred to as the "Do Nothing" or "No Project" alternative. Transportation projects that are planned, funded, and scheduled to be implemented during the forecast period should be reflected in this "No Build" network, however, there are no such projects scheduled for Miasma Beach. The assignment of future demand, based on forecasted activity system, to the "No Build" network provides an assessment of potential transportation problems arising over the forecast period.

6.2.1 Future Trip Generation

Use the validated models from Task 3 to **forecast** internal trip productions and attractions for the year 2030.

Provide a summary table **comparing** these estimates with those for 2020.

HELP: Trip Generation Forecasting

For assistance in forecasting future trip generation, Click [HERE](#).

6.2.2 Future Trip Distribution

Use the validated models from Task 4 to **forecast** internal trip distribution for the year 2030. Use the 2020 *base network skims* with Year 2030 trip generation results. **Compare** these forecasts with the 2010 estimates.

Report.

HELP: Trip Distribution Forecasting

For assistance in forecasting future trip distribution, Click [HERE](#).

6.2.3 Assign Future Demand to the Base Network

Repeat the analysis of Task 5 by assigning *future demand* to the *base year network*; be sure to reflect *future external trips* identified in **Table 10**. This is Alternate **A0**, the "No Build" Alternative. **Review and compare** the base and future User Equilibrium (UE) assignments, each on the 2020 base network. **Identify** all operational problems by focusing on volumes and capacity restrictions for: (1) selected validation screenlines, (2) selected critical links, and (3) selected critical intersections (3 is optional).

HELP: Trip Assignment Forecasting

For assistance in forecasting future trip assignments, Click [HERE](#).

6.3 Develop Future Network Alternatives

Apply the Transportation Planning Process. Based on the results of Task 6.2, clearly **define** the *key transportation problems* in Miasma Beach, relative to the Values, Goals, and Objectives, defined prior to Task 1. The City is interested in *Solution Alternatives* which expand the supply of transportation as well as those which seek to constrain the growth in demand. As such, infrastructure improvements and other supply-oriented strategies can be integrated with demand management strategies. **Identify** those future deficiencies that appear to be most critical, **justify** these choices, and proceed to **develop** alternate potential solutions to address these key identified problem(s). **Document** this process.

Develop alternative transportation networks, one for each team member (labeled **A1**, **A2**, etc.), that address the problem(s) identified. The analyses completed in Tasks 6.2.1 through 6.2.3 represent the "No Build" Alternative **A0**; clearly define the extent of each of your alternatives **relative** to this future baseline alternative. These changes should be tabulated **and** depicted graphically (clearly identify existing versus planned infrastructure). All result tabulations should reflect the baseline and future alternatives.

Note: Each project team member must assume sole responsibility and will receive sole credit for only one alternative.

HELP: Designing Future Network Alternatives

For assistance in developing future network alternatives, Click [HERE](#).

6.3.1 Traffic Estimation

Apply the **full system of models** to each future network alternative. Any network changes that will alter network skim trees will necessitate regenerating the shortest paths and repeating the demand analysis. Although changes in overall demand (as represented in the O/D matrix) may be minor, the assignments to the alternative networks must attempt to address the congestion problems identified.

HELP: Traffic Estimation for Design Alternatives

For assistance in estimating design alternative traffic, [Click HERE](#).

6.3.2 Summary Performance Measures

Develop **two or more** performance measures that summarize each future alternative for Miasma Beach. These performance measures provide decision-makers with a set of key indicators upon which recommendations may be made. Performance measures might include network-wide indicators such as total vehicle miles traveled (VMT), average commuting travel time (or average speed), or indicators that can be compared across zones, corridors, or facility types. Tabulate these results.

6.3.3 Cost Estimation

Develop cost estimates for each of your defined alternatives. [Table 11](#) provides a summary of infrastructure improvement costs which must be utilized in your cost estimates. The figures provided are Present Value estimates for capital, operating, and maintenance costs through 2030. All infrastructure has a cost:

1. Links that remain unchanged for 10 or more years require maintenance costs
2. Links that remain unchanged for 20 or more years require rehabilitation costs
3. New links and links that are being upgraded do not incur rehabilitation or maintenance costs

You may **NOT** add centroid connectors to redistribute excessive volumes to alternative routes unless you also add a new roadway between the new connector and the existing network (there is no cost associated with centroid connectors added in this manner). Every link improvement requires a corresponding intersection improvement at the downstream end of the link. If you improve a facility, be sure to add the intersection costs to the section costs (review the Help file below).

HELP: Cost Estimation for Design Alternatives

For assistance in estimating design alternative costs, [Click HERE](#).

6.3.4 Summarize Each Alternative

Create a summary table for each future alternative, including the AO "No Build" alternative. These tables should minimally include:

1. Alternative: number and name (e.g., A1. Basic Transit Alternative)
2. Description: include (a) a summary description and (b) a list of specific proposed changes
3. Map: clearly indicating the location and type of all proposed changes
4. Performance results: minimally, include:
 - a. total trips: interzonal and intrazonal, by mode (if relevant)
 - b. VMT and VHT estimates
 - c. travel time, speed, or other measures of level of service
5. Project Cost: cost each major component separately
6. Comparison to A0: relative change in performance, benefit-cost ratios, etc.

6.3.5 Modified Activity System Alternative [CEE223 Only]

In light of evolving state policy to address sustainability and climate change, the City of Miasma Beach has developed an alternative plan for the 2030 Activity System. This plan shifts planned residential growth from TAZ 5 to TAZ 4, and also shifts employment growth associated with the agricultural industry from TAZ 4 to TAZ 5. The intent was to increase residential density near the Old Town and beach community zones (TAZ 1, 2, and 3) to better accommodate non-vehicle traffic and shorten trip lengths. These changes will also have minor impacts on the overall distribution of employment and population as well as impacts on external traffic.

The proposed alternative, labeled **B0**, is summarized in Tables 11 and 12.

Table 11. B0: Year 2030 Miasma Beach Demographic Data

ZONE	POP	LABF	CARS	HINC	DU	EIND	ERET	EOTH	ETOT	AREA
1	3000	1200	800	33000	700	400	200	1100	1700	1.56
2	2000	1700	900	52500	1000	500	350	1650	2500	2.53
3	3500	1300	2700	81000	1000	0	350	250	600	3.10
4	2550	1000	800	57000	800	400	400	900	1700	2.83
5	2450	1400	2000	55500	950	1900	150	150	2200	1.27
6	5700	2000	2500	61500	1750	0	550	550	1100	3.09
TOT	19200	8600	9700	58300*	6200	3200	2000	4600	9800	14.38

* Income figure is weighted mean, all others are totals

Table 12. B0: Year 2030 External Station PM-Peak O/D Matrix *

ORG\ST	1	2	3	4	5	6	7	8
1	20	40	40	10	30	0	100	200
2	40	20	20	10	10	0	100	150
3	40	20	30	10	30	0	100	100
4	10	10	10	10	0	0	100	100
5	30	10	30	0	10	0	300	400
6	0	0	0	0	0	0	150	150
7	50	50	100	50	50	150	0	1200
8	200	150	100	30	20	50	1300	0

* For 1-hour PM peak (5-6 pm) period (combined purposes)

1. Using your full model system, **estimate** the corresponding impacts of Alternative **B0** and compare with the base No Build Alternative **A0**. Describe the impact of this proposed Sustainable Community Strategy alternative.
2. Using your full model system, **design** and **analyze** an alternative **B1** similar to your alternative **A1** (but fitting the problems that you identified under the **B0** activity system. Compare **B1** with **A1**.

6.4 Recommendations

Based on your assessment of the traffic modeling and estimates of **costs and benefits** for each transportation alternative, **prepare and justify** your recommendation to the Miasma Beach City Council using standard project evaluation techniques. Refer to the summary tables for key data. **Provide** all supporting evidence in concise displays (graphs, tables, etc.).

Task 7. PREPARE FINAL REPORT AND PRESENTATION

7.1 Final Report

Develop and **submit** a comprehensive Project Final Report. Incorporate material from the (corrected) interim reports as part of this final document. All standards for report presentation must be met (see [Project Report Style Guidelines](#)). Append a project **Glossary** containing at least four key terms from the Task 6 analysis (extending the Glossary from Task 5).

Document the tasks in a way that shows your understanding of the tasks and justifies your choices of the particular models and the recommended alternative. The report should include a clear description of the inputs and outputs of each task (table, matrices, and maps). Utilize maps and other graphics to better present your results and preferred alternative. Clearly describe each proposed alternative. Include a *transmittal letter* from the project team and an *executive summary*. This is for the money!

7.2 Final Presentation

Develop and **present** a Powerpoint summary of your future alternatives. The slides should be equivalent to a 5 minutes oral presentation and include the following:

1. Project, Client, Team, Date, etc.
2. A0 No Build Alternative
 - a. Base network with horizon year assignments (network maps and tables)
 - b. A0 Performance Assessment (graphics, aggregate measures)
3. Transportation Planning Process based on A0
 - a. Problem Definition
 - b. Solution Generation
4. Solution Analysis: Present **one** future system alternative *in detail*
 - a. Define each future alternative and the problems that it addresses
 - b. Future network with horizon year assignments (network maps and tables)
 - c. Future Performance Assessment (graphics, aggregate measures)
 - d. Cost Estimation
5. Solution Evaluation:
 - a. Compare you future alternative relative to A0
 - b. Describe the other future alternatives analyzed
 - c. Tabulate Performance and Cost Assessment for each alternative
 - d. Economic Analysis (Benefit Cost Analysis)
6. Recommendation to City Council

Miasma Beach Project -- Tasks 6-7

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