Task 6. TRAVEL FORECASTING: ANALYSIS OF ALTERNATIVES

The first five tasks developed, applied, and validated a Four Step Model for Miasma Beach. This model is to be utilized to examine future demand and performance using projected growth estimates for 2040. Task 6 will apply the **Transportation Planning Process** to (1) identify future 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 2040

Growth in Miasma Beach is both rapid and focused. Primary residential growth is occurring in zone 5; primary employment growth is occurring in zone 4 (for agricultural employment) and in zone 2 (for other employment). New residential suburbs are being developed east and west of the City; 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 standard 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 9. Forecast Year 2040 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 provides growth estimates of external and through person trips which were produced by the County Department of Transportation.

Table 10. Year 2040 External Station AM-Peak (7-8 am) O/D Matrix

ORG\DST	1	2	3	4	5	6	7	8
1	20	30	30	30	0	0	100	200
2	30	20	10	10	0	0	50	200
3	30	10	20	30	0	0	100	100
4	30	10	30	10	0	0	50	50
5	0	0	0	0	0	0	120	100
6	0	0	0	0	0	0	300	150
7	100	100	100	300	100	150	0	1200
8	200	250	100	400	100	150	1100	0

6.2 Forecast Travel Demand for Year 2040 "No Build" Alternative

To provide a frame of reference in the forecast period (2020-2040), 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 are 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 2040. **Provide** a summary table **comparing** these estimates with those for 2020.

HELP: Trip Generation Forecasting
For assistance in forecasting future trip generation, Click:

http://www.its.uci.edu/~mmcnally/cee/cee123/project/mbt6-hnt1.html

6.2.2 Future Trip Distribution

Use the validated models from Task 4 to **forecast** internal trip distribution for the year 2040. Use the *2020 base network skims* with Year 2040 trip generation results. **Compare** these forecasts with the 2020 estimates. **Report**.

HELP: Trip Distribution Forecasting
For assistance in forecasting future trip distribution, Click:

http://www.its.uci.edu/~mmcnally/cee/cee123/project/mbt6-hnt2.html

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 screen lines, (2) selected critical links, and (3) selected critical intersections (3 is optional).

HELP: Trip Assignment Forecasting
For assistance in forecasting future trip assignment, Click:

http://www.its.uci.edu/~mmcnally/cee/cee123/project/mbt6-hnt3.html

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 individual future design alternatives ***relative*** to this future team baseline alternative. These changes must be tabulated **and** depicted graphically (clearly identify existing versus planned infrastructure). All result tabulations should reflect the baseline and future alternatives.

HELP: Designing Future Network Alternatives
For assistance in designing future network alternatives, Click:

http://www.its.uci.edu/~mmcnally/cee/cee123/project/mbt6-hnt4.html

Future Alternatives:

Each project team member must assume sole responsibility and will receive sole credit for only one alternative (A1, A2, etc.). Each future alternative must have unique aspects but can incorporate elements of other alternatives. For example, A1 and A2 might have different infrastructure changes but A3 could be both sets combined. Or A2 could be based on A1 with an additional major change to assess incremental impact while A3 could be a second, distinct variation of A1. The individual analysis and documentation for each future design alternative must include application of the Transportation Planning Process, incorporating future problems, a design to address these problems, full model application, and a full cost analysis. The team should agree to use the same set of performance measures for each design alternative.

6.3.1 Traffic Estimation

Apply the full system of models to each future network alternative. Any change to the network 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 address the congestion problems identified.

HELP: Travel Estimation for Design Alternatives
For assistance in estimating design alternative flows, Click:

http://www.its.uci.edu/~mmcnally/cee/cee123/project/mbt6-hnt5.html

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 2040. All infrastructure has a cost:

1. For links that remain unchanged since 2000, estimate rehabilitation costs
2. For links added between 2000 and 2020 but which are not being upgraded for 2040, estimate maintenance 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). When you improve a facility, be sure to always **add** intersection costs to the section costs (please review the following Help file).

HELP: Cost Estimation for Design Alternatives
For assistance in designing future network alternatives, Click:

http://www.its.uci.edu/~mmcnally/cee/cee123/project/mbt6-cost.html

6.3.4 Economic Evaluation

The travel forecasting model is applied for only one time period thus your assessment of benefits is also limited to this period. The proposed infrastructure and service changes, and thus total system cost, apply to all time periods, thus a direct comparison of benefits to costs is not possible. It is recommended that a Cost Effectiveness approach be used where measures of effectiveness for the AM-peak hour are compared to the total cost to achieve those outcomes, and that the relative cost effectiveness ratios be used in ranking alternatives.

6.3.5 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 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 for each major component separately
6. Comparison to A0: relative change in performance, cost effectiveness, etc.

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. FINAL REPORT

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).

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!

Team and Individual Reporting:
Each team will submit a single Final Report. This report will incorporate the two preceding Interim Reports, appropriately corrected. The Task 6 results will include team section corresponding to Tasks 6.1 and 6,2, as well as individual sections from each team member, corresponding to Task 6.3. Finally, Task 6.4 will be completed by the team and include the team's recommendations to the City of Miasma Beach.

7.2 Final Presentation

A final presentation of consulting work will not be required.