Interstate 10 – Hassayampa Valley Roadway Framework Study

Chapter 3

Evaluation Framework

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3.1 Goals

The evaluation criteria for roadway network alternatives in the I-10/Hassayampa Valley study area are designed to meet the following goals, which were developed by the MAG Study Team in collaboration with the Funding Partners and Study Review Team:

- ***Safety:*** Develop and maintain a safe transportation system for all users.
- ***Mobility:*** Provide for the rapid and efficient movement of people and goods within the study area, as well as between the study area and other portions of the region and the state.
- ***Access:*** Provide access to high-capacity roadways for study area residents, businesses and activity centers, including mixed-use centers.
- ***Planning Consistency:*** Ensure that the recommended roadway network is consistent with established local plans, whether public or private.
- ***Environmental Compatibility:*** Develop a transportation system that avoids undue disturbance of the natural, physical and human environment.
- ***Cost:*** Minimize the overall cost of the roadway network
- ***Ease of Implementation:*** Recommend an alternative or concept plan that can be implemented with minimal opposition from stakeholders and without undue legal or institutional obstacles.
- ***Cost/Benefit:*** Minimize the cost per unit of user benefit (i.e., vehicle miles of travel).

3.2 Evaluation Criteria and Performance Measures

Table 3.1 lists the evaluation criteria and performance measures associated with each goal. The evaluation criteria are designed to measure the expected attainment of various aspects of a particular goal. The number of criteria per goal ranges from one to eight. This variation reflects both the inherent complexity of each goal and the amount of data available for use in making informed judgments. For example, the MAG model generates numerous measures of effectiveness that can be used to evaluate mobility quantitatively. Mobility is also a broadly defined goal that can be approached in many ways.

Each evaluation criterion has an associated performance measure, and each measure involves minimizing or maximizing a particular outcome that reflects fulfillment of the criterion and attainment of the related goal. Many of the performance measures are quantitative—i.e., directly measurable numerically. These are the easiest measures to use because they require the least exercise of professional judgment in comparing alternatives. The entire safety and mobility evaluation uses quantitative model outputs, or measures of effectiveness derived from these outputs, such as vehicle miles and vehicle hours of travel, travel speed, and volume to capacity ratio. (Level of Service is estimated using methods from the current edition of the *Highway Capacity Manual*, published by the Transportation Research Board Committee on Highway Capacity and Quality of Service.) The last three mobility criteria used a series of strategically placed east-west and north-south "cut-lines." These cut-lines are useful in comparing travel demand with roadway capacity, within a broad band comprising several parallel arterials and higher-level facilities.

The access, cost and cost/benefit portions of the evaluation are also based at least partially on quantitative data. Planning consistency, environmental compatibility and ease of implementation, on the other hand, are evaluated in a more subjective manner that relies heavily on the MAG Study Team's professional judgment and knowledge accumulated during this study. Chapter 6 presents the complete evaluation of alternatives and its results.

A performance measure may be used more than once if it can help measure achievement of two or more goals. In Table 3.1, the fourth mobility measure, "Minimize peak period VHT [vehicle hours of travel] in the study area," is also used to measure air quality and fuel conservation, since traffic congestion (reflected in vehicle hours of travel) causes greater tailpipe pollutant emissions and fuel consumption.

3.3 Limitations of the Evaluation

Some evaluation criteria are not listed in Table 3.1 because the data necessary to conduct an evaluation does not currently exist. For example, environmental justice—the degree to which an alternative avoids disproportionate impacts to certain minorities and disadvantaged groups—is an important component of environmental compatibility. However, most of the Hassayampa Valley study area is currently very sparsely settled, and the demographic composition of the future population is unknown. Impacts on cultural resources cannot be assessed, because limited information is available and this study lacks the scope and resources to investigate individual locations. Consideration of these impacts must be left to more detailed future studies.

Table 3.1 Evaluation Criteria and Performance Measures

Goals	Evaluation Criteria	Notes/Remarks
Safety	Intensity of roadway system use	Minimize PM peak period vehicle miles of travel (VMT) per lane mile in study area
	Proportion of travel on the safest facilities	Maximize the percent of study area PM peak period VMT on freeways*
Mobility	Prevalence of freeway congestion	Minimize the percent of freeway lane miles operating at Level of Service E or worse in the PM peak period*
	Efficiency of freeway traffic flow	Maximize average PM peak period travel speed on freeways in the study area
	Efficiency of surface street traffic flow	Maximize average PM peak period travel speed on arterials and parkways in the study area
	Efficiency of vehicular traffic flow	Minimize PM peak period vehicle hours of travel (VHT) in the study area
	Overall congestion	Minimize the percent of congested (Level of Service E or worse) PM peak period VMT
	Adequate directional network capacity	Minimize the number of facilities crossing selected cut-lines at LOS E or worse in the PM peak period
	North-south traffic flow	Minimize the overall PM peak period volume/capacity ratio across east-west cut-lines
	East-west regional connections	Maximize the number of continuous freeway and parkway lanes crossing a north-south cut-line drawn through the White Tank Mountains
Access	Residential access to freeways	Maximize the percent of study area residents within two miles of a (local service) freeway interchange
	Business access to freeways	Maximize the percent of study area employment within two miles of a (local service) freeway interchange
Planning Consistency	Public land use planning	Maximize land use planning consistency
	Public transportation planning	Maximize circulation planning consistency
	Public economic development planning	Maximize consistency with jurisdictional economic development plans
	Private community planning	Maximize consistency with development master plans

Table 3.1 - Continued

Goals	Evaluation Criteria	Notes/Remarks
Environmental Compatibility	Flood control structure impacts	Minimize impacts to existing canals and flood control structures
	Floodplain and drainage impacts	Minimize impacts associated with crossing of floodplains or disturbance of drainage features, including Waters of the U.S. under jurisdiction of the U.S. Army Corps of Engineers
	Impacts to public recreational land	Minimize impacts to resources protected under Section 4(f) or 6(f)
	Impacts to sensitive habitats and species	Minimize impacts to areas containing known or likely habitat for Threatened, Endangered and other sensitive species
	Wildlife movement impacts	Minimize impacts to wildlife corridors
	Air quality and fuel conservation	Minimize PM peak period VHT in the study area (used also for mobility)
Cost	Construction cost	Minimize capital cost
	Cost of maintaining transportation infrastructure	Minimize operating and maintenance cost
	Land acquisition cost	Minimize right-of-way cost
Ease of Implementation	Funding Partners' and SRT support	Obtain strong support from the Study Review Team & Funding Partners
	Stakeholder and community acceptance	Maximize the likelihood of acceptance by outside agencies, stakeholders & the community
	Miscellaneous constraints	Minimize any legal or institutional barriers that may make one alternative harder to implement than others
Cost/Benefit	Generalized ratio of cost to benefit	Minimize "planning-level" capital cost per VMT accommodated

*Weighted by the relative number of freeway lane miles in each alternative (compared with the average for all alternatives)

Source: MAG Study Team, April 2007