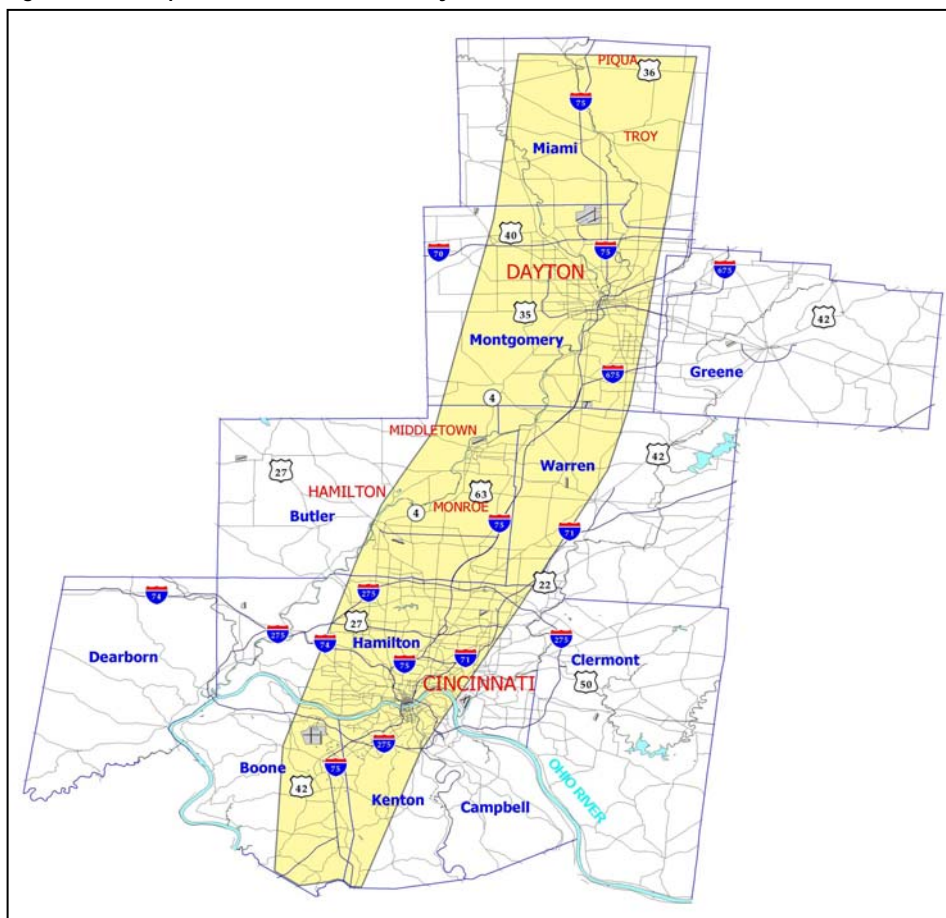


CHAPTER 11 • BENEFIT – COST ANALYSIS

A benefit-cost analysis was conducted to measure and to compare the economic benefits, costs and net benefits (benefits minus costs) of five strategies to address mounting traffic congestion in the region's principal north-south travel corridor (Figure 11-1) over the coming 30-years. The benefits, costs and net benefits of each strategy are compared against a common baseline called the "base case." The base case constitutes a series of modest improvements that seek to make the most productive use of existing infrastructure capacity through moderate up-grades and innovative traffic management initiatives.

Figure 11-1: Map of the I-75 Corridor Study Area



The five strategic alternatives to the base case are as follows:

Alternative 1 -- Four-Lane Continuity This option would fill in gaps along the Interstate system so as to provide four continuous general purpose traffic lanes in each direction along I-75 through Hamilton County.

Alternative 2 -- Four-Lane Continuity plus HOV A modification of Alternative 1, this strategy would reserve one traffic lane in each direction for high occupancy vehicles (a minimum of two passengers) only.

Alternative 3 -- Light Rail Transit (LRT) This strategy represents the construction of a light rail line along an alignment covering sections of both the I-75 and I-71 corridors.

Alternative 4 -- Peak Period Truck Restriction Under this option, trucks – a major source of congestion in the North-South Corridor, would not be permitted to use I-75 during morning and evening peak travel times.

Alternative 5 -- Combined Four-Lane Continuity and Light Rail Transit (LRT) This strategy would combine the roadway capacity expansion of Alternative 1 with the light rail development plan of Alternative 3.

As shown in Table 11A, construction of a light rail transit system (Alternative 3) emerges as the highest ranking strategy in terms of net contribution to the economic welfare of the region. With economic benefits that exceed the costs of constructing and operating the system (over 30 years) by more \$911 million, the light rail strategy creates an estimated \$1.84 of economic value for each dollar of incurred cost. By comparison, the completion of four lanes in each direction along I-75 through Hamilton County – the highway strategy (Alternative 1), is forecast to create only just enough economic value to cover its construction and maintenance costs. Against total, 30-year life-cycle costs of \$616.7 million, the highway capacity strategy yields 30-year economic benefits of \$699.9 million, or \$1.13 of

11.1 Principal Findings

11.2 Risk Analysis

economic value for each \$1.00 of capital and labor resources consumed in the construction and roadway maintenance process.

The second highway strategy, which contemplates reserving one travel lane in direction for car pools and van pools, fails to generate sufficient economic value to cover the life-cycle costs of its construction and maintenance (only \$0.73 of benefit is foreseen to arise for each \$1.00 expended). This is because the number of people projected to form car pools is small relative to the number who would use the three remaining general-purpose lanes, leaving the overall level of congestion higher under Alternative 2 and than under Alternative 1. As a result, Alternative 2 emerges as the least favorable of the five strategies under examination.

The assessment of uncertainty in the forecasts presented above lends further weight to the light rail strategy (Alternative 3) as the highest ranking strategy from an economic perspective. Based on the assignment of probabilities to all of the various technical assumptions entailed in the forecasting process, Table 11B indicates which of the five alternatives exhibit at least a 90 percent likelihood of generating economic benefits that exceed their economic costs (including the opportunity cost of capital employed). As the Table shows, only the light rail option and Alternative 4 (truck restrictions during peak periods) survive this test. None of the other alternatives offer the public a 90 percent assurance of generating more benefits than costs.

The Timing and Sustainability of Economic Congestion Management Benefits

Congestion management benefits under the light rail transit strategy are found to be sustainable: This is not the case under the highway alternative. Whereas, the highway capacity strategy (Alternative 1) promises significant short-term improvements in traffic speeds and average journey times, the gains are concentrated in the first seven years. The propensity of new highway capacity to draw vehicles from other routes would lead travel times to return to pre-widening levels by the end of seven years, and to continue to erode thereafter. In contrast, a light rail system is expected to draw increasing volumes of traffic off the highway system as traffic congestion mounts, leading to stable and increasing congestion management benefits over the longer term.

The Nature of Economic Benefits Under Alternative Strategies

Although the lion's share economic value created under each of the five strategic alternatives arises in the form of time savings, the transit option also generates a disproportionate range of benefits of other kinds. One is additional mobility for low income people without access to an automobile. In the absence of public transportation, such individuals use taxis, endure higher unemployment, and rely more heavily on social services than they do when offered access to a greater range of transportation choices. In providing a lower cost alternative to the taxi and in helping alleviate unemployment and pressure on social service agency budgets, the light rail alternative is projected to generate corresponding economic benefits of just under \$200 million over a 30-year project life-cycle, or about 10 percent of the total benefits reported in Table 11A.

Table 11A
Estimated Costs, Benefits, Net Benefits and
Ranking of Alternative Strategies

	TOTAL ECONOMIC COST In Millions	TOTAL ECONOMIC BENEFITS In Millions	NET ECONOMIC BENEFITS Benefits minus costs, In Millions	RANK Rank order of contribution to regional economic welfare
Alternative 1 – <i>Four-Lane Continuity</i>	\$616.7	\$699.9	\$83.2	4
Alternative 2 – <i>Four-Lane Continuity plus HOV</i>	\$605.6	\$439.2	(\$167.3)	5
Alternative 3 – <i>Light Rail Transit (LRT)</i>	\$1,087.9	\$1,999.4	\$911.4	1
Alternative 4 – <i>Peak Period Truck Restriction</i>	\$65.0	\$385.5	\$320.5	3
Alternative 5 – <i>Combined Four-Lane Continuity and Light Rail Transit (LRT)</i>	\$1,704.6	\$2,428.3	\$723.6	2

Note: Time Period = 2003-2032; dollars represented are of present-day value

Table 11B
Economic Risk Analysis of Alternative Strategies

	Net Benefit Forecast with at least 50% Probability of Being Exceeded In Millions	Net Benefit Forecast with at least 90% Probability of Being Exceeded In Millions
Alternative 1 – <i>Four-Lane Continuity</i>	\$83.2	(\$211.2)
Alternative 2 – <i>Four-Lane Continuity plus HOV</i>	(\$167.3)	(\$212.7)
Alternative 3 – <i>Light Rail Transit (LRT)</i>	\$911.4	\$196.7
Alternative 4 – <i>Peak Period Truck Restriction</i>	\$320.5	\$170.6
Alternative 5 – <i>Combined Four-Lane Continuity and Light Rail Transit (LRT)</i>	\$723.6	(\$184.3)

Note: Time Period = 2003-2032, dollars represented are of present day value