
4.0 Measures of Effectiveness and Evaluation Overview

4.0 Measures of Effectiveness and Evaluation Overview

The evaluation goals and objectives presented in the previous section provided the framework for the study. This section presents the measures of effectiveness evaluated during the HOV study. These evaluation measures, built on the evaluation objectives, were designed to provide for a comprehensive analysis of the evaluation goals. This section also presents an overview of the methodologies that were used for the study.

■ 4.1 Evaluation Measures

For the evaluation objectives identified in Section 3.0, one or more measures of effectiveness were identified to provide an assessment of the objective. Where possible, these evaluation measures were estimated in quantitative terms; however, many of the measures were more appropriately expressed in qualitative terms.

The evaluation measures for each evaluation objective are presented in Table 4.1. The measures of effectiveness focus on the incremental change estimated between the two evaluation scenarios - “with HOV” (current operating strategy) and “without HOV” (opening HOV lanes to all traffic).

By focusing on the changes occurring between the two scenarios, the evaluation team was able to isolate the particular benefit/impact. The measures of effectiveness are not mutually exclusive and, in some cases, the same measure was used to test several objectives. The evaluation measures were also designed to be “neutral” and not pre-suppose any outcome of the HOV study.

Appropriate data were collected related to each of these measures to provide the opportunity for assessment against the evaluation objectives and goals. Section 4.3 presents an overview of the methodology that was employed in evaluating these measures. The remaining sections of this document provide greater detail on the data collection and analysis methodologies.

Table 4.1 Evaluation Measures

Evaluation Objective	Measures of Effectiveness
Estimate traffic flow impacts (positive and negative) of the HOV facilities for both HOV corridors	<ul style="list-style-type: none"> • Estimated changes in travel time • Estimated change in travel speed • Estimated changes in vehicle and person throughput • Estimated changes in travel time reliability
Estimate impacts (positive and negative) of HOV facilities on transit and carpooling for both HOV corridors	<ul style="list-style-type: none"> • Estimated changes in travel time • Estimated and perceived change in mode shift • Estimated change in auto vehicle occupancy • Perceived change in time of day travel • Estimated change in operating costs for the HOV facilities and transit operations • Estimated change in parking costs due to mode shifts • Customer satisfaction with HOV facilities • Qualitative and policy impacts (mobility options, snow/ice removal for HOV facilities, etc.)
Estimate safety impacts (positive and negative) of the HOV facilities for both HOV corridors	<ul style="list-style-type: none"> • Estimated change in the number of crashes • Estimated change in the severity of crashes
Quantify HOV violation rates and enforcement issues associated with the HOV facilities for both corridors	<ul style="list-style-type: none"> • Estimated changes in operating costs associated with HOV lane enforcement • HOV violation rates • Estimated changes in revenue from HOV enforcement
Estimate the air quality and energy consumption impacts (positive and negative) of the HOV facilities	<ul style="list-style-type: none"> • Estimated regional change in emissions by pollutant and by facility type • Estimated regional change in fuel consumption by facility type
Identify the HOV facility impacts/benefits (positive and negative) on the entire region	<ul style="list-style-type: none"> • Estimated regional change in travel time for different facility types • Estimated regional change in travel speed for different facility types • Estimated regional change travel time reliability • Estimated regional change in emissions and fuel consumption
Identify public attitudes towards the HOV facilities	<ul style="list-style-type: none"> • Carpool/vanpool characteristics • Attitudes towards HOV facilities • “What if” questions on future use of HOV facilities
Compare Mn/DOT’s HOV system to other HOV systems across the country	<ul style="list-style-type: none"> • Documentation only
Identify national trends regarding the HOV strategies and use	<ul style="list-style-type: none"> • Documentation only
Identify benefits, impacts, and costs of HOV use documented in studies done across the country	<ul style="list-style-type: none"> • Documentation only

■ 4.2 Evaluation Scenarios and Assumptions

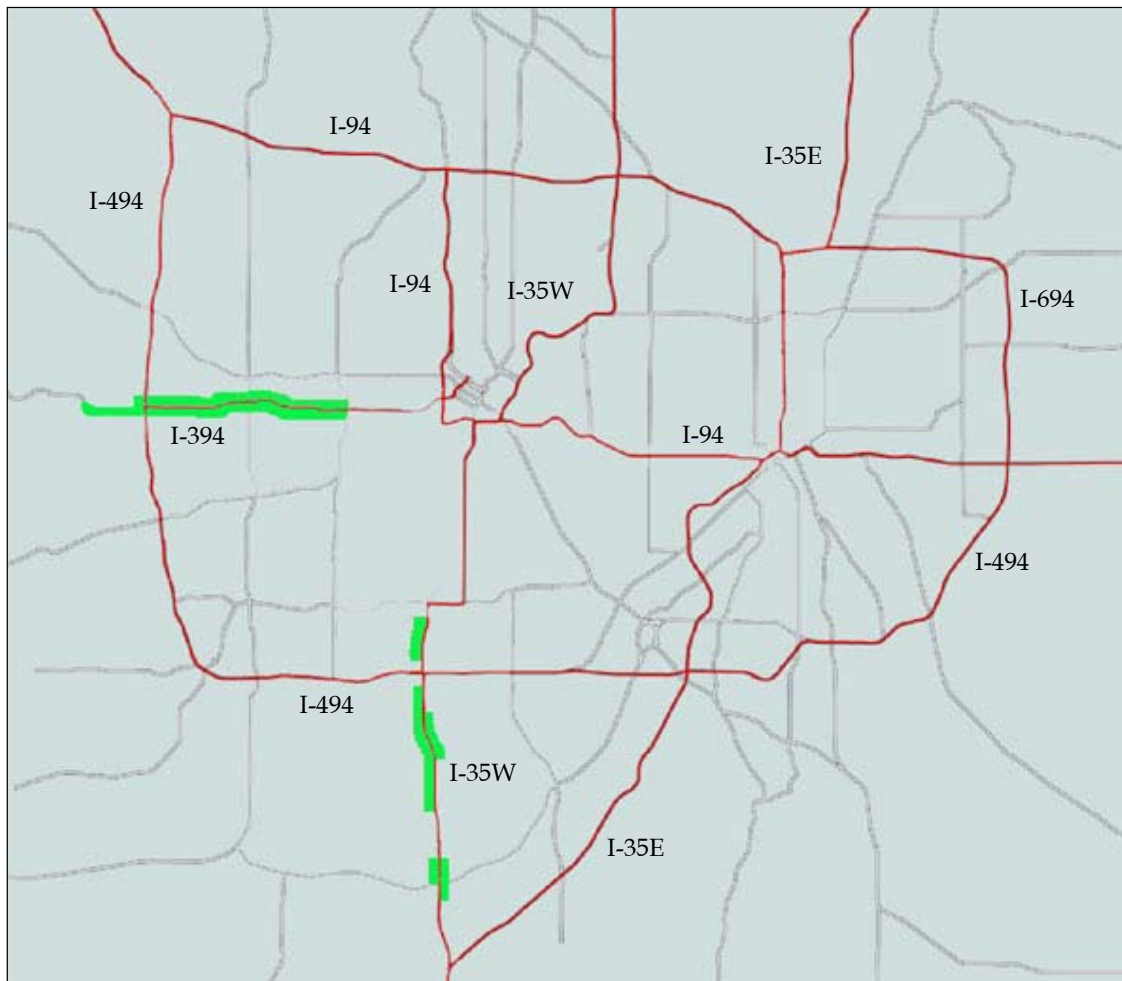
In order to assess whether the benefits of opening the HOV lanes on I-394 and I-35W to mixed flow outweigh the drawbacks and associated costs in both the near- and long-term, four different conditions for both the a.m. and p.m. peak periods were analyzed. These include the following:

1. **Existing “with HOV”** – This scenario assumes current (2001) HOV conditions and operations.
2. **Existing “without HOV”** – The existing I-394 and I-35W freeway HOV lanes are open to all traffic, and bus-only shoulder use was added to those sections of I-394 and I-35W where feasible. No geometric adjustments will be made to the barrier-separated portion of I-394.
3. **Future 2020 “with HOV”** – This scenario assumes existing HOV operations, plus existing and committed improvements, including the extension of the existing I-35W HOV lane to downtown. Year 2020 demand was obtained using the Metropolitan Council’s regional travel demand model.
4. **Future 2020 “without HOV”** – This scenario includes existing and committed improvements with the HOV freeway lanes open to all traffic. Bus-only shoulders would be added to the converted HOV roadway segments where feasible. No geometric adjustments will be made to the barrier-separated portion of I-394. Year 2020 demand was obtained using the travel demand model.

The bus-only shoulders “where feasible” was determined as part of the data collection effort. Discussions with Mn/DOT indicated the following areas as feasible for bus-only shoulders with minimal improvements (as shown in Figure 4.1):

- **I-35W Northbound** – Buses could use the shoulder from Burnsville Parkway to the south end of the Minnesota River Bridge (the bridge is not wide enough to accommodate shoulder bus use in either direction.). The buses could use the truck lane that starts north of the Minnesota River Bridge to just past 106th Street. The buses could start to use the shoulder again just south of 98th Street to 82nd Street. No shoulder use would be available through the I-494/I-35W interchange.
- **I-35W Southbound** – A bus-only shoulder segment exists from 66th Street to 76th Street. Bus-only shoulders are not recommended from 76th Street to 82nd Street due to the weave area of I-494 and I-35W. The buses could then start using the shoulders from 82nd Street to the north end of the Minnesota River Bridge (the bridge does not have wide enough shoulders for bus use in either direction.). Buses could then enter the shoulders at Blackdog and continue to TH 13.

Figure 4.1 Estimated Bus-Only Shoulder Feasibility Areas



- **I-394 Corridor** - Bus-only shoulders exist in the eastbound direction from Xenia to TH 100. Shoulder width should be adequate to accommodate bus-only shoulders for most of I-394, except the section between TH 100 and downtown (where the current barrier-separated HOV lane exist). For the section of I-394 from TH 100 to downtown, bus-only shoulders may be possible only in some limited areas. An analysis of traffic patterns would need to be conducted to determine if it would be faster for buses to use the reversible barrier-separated roadway, the left lane of the general-purpose lanes, or newly constructed bus-only shoulders in limited areas.

■ 4.3 Overview of Evaluation Methodologies

In order to assess whether the benefits of opening the HOV lanes on I-394 and I-35W to all traffic outweigh their drawbacks and associated costs, a combination of data collection,

modeling, and market research was used. The secondary research was used to compare and validate the results obtained from the data collection and modeling tasks. Table 4.2 summarizes the data collection and analysis methods used to assess the measures of effectiveness for this study. The measures of effectiveness and analysis methods are defined in more detail in Section 7.0 of this document.

Table 4.2 Data Collection and Analysis Methods

Measures of Effectiveness	Travel Model	Market Research	IDAS	Secondary Research	Agency Records
Travel time and speed	●	●		●	
Throughput	●			●	●
Travel time reliability		●	●	●	
Mode shift	●	●		●	
Temporal change		●		●	
Average vehicle occupancy	●			●	●
Customer satisfaction		●		●	
Crashes			●	●	
HOV lane violation rates				●	●
Air quality/emissions			●	●	
Fuel consumption			●	●	
Costs				●	●
Benefit/Cost			●	●	●

To support the HOV study, individual test plans were developed to guide the collection and analysis of the different types of data. Each test plan provided detailed instructions for conducting the study. Yet, all of the individual test plans were carefully linked to provide coordination among the different analysis efforts.

The individual test plans developed for this study included the following:

- **Test Plan for Secondary Research** – Identifies the secondary research to be performed to compare and contrast the HOV system in the Twin Cities metropolitan area with other HOV systems across the country (Section 4.0 of the Evaluation Plan in the Appendix document);
- **Test Plan for Market Research** – Defines the survey data collection tasks to be performed and presents the methodology to be used (Section 5.0 of the Evaluation Plan in the Appendix document);

- **Test Plan for Data Collection and Modeling** - Identifies data to be collected and model analysis plan (Section 6.0 of the Evaluation Plan in the Appendix document);
- **Test Plan for Benefit/Cost Analysis** - Identifies how the data collected for the HOV facilities and modeling task will be extrapolated to develop estimates of regionwide impacts and a benefit/cost comparison across scenarios (Section 7.0 of the Evaluation Plan in the Appendix document); and
- **Test Plan for HOT Lane White Paper** - Identifies the review of the use of HOT lanes as a compromise to opening the HOV facilities to all traffic (Section 8.0 of the Evaluation Plan in the Appendix document).