Project/Analysis Type
Corridor Study

Facility Type(s)
Select HCM procedures used:

Freeway Facility	Freeway Reliability Analysis	Freeway and Multilane Highway Segment

Mode(s)
☐Bicycle ☐Pedestrian ☐Transit ☒Vehicle ☐Other:

Location and Facility Description (describe the facility in a few sentences):

US-23 Freeway in Washtenaw County, north of Ann Arbor, Michigan

Purpose of the Analysis
To determine the Level of Service (LOS) of the US-23 freeway corridor with the addition of a hard shoulder lane the HCM methodology was used. The existing two general purpose lanes with 12 foot standard lane widths would remain open at all times. The project proposed the addition on a new left-side 11 foot hard shoulder lane, which would be opened to traffic during peak periods and special events. To determine if the hard shoulder lane would be enough to relieve congestion and improve Level of Service, the Highway Capacity Manual was used for part of the analysis.

Inputs for the Analysis

Input	Default Used	Non-Default Value Used
Free Flow Speed: SL+5=75mph	☒	
# Mainline Lanes = 2	☒	
Area Type: Rural	☒	
Entry Mainline Traffic Volume	☐	Traffic Volumes Measured in Field
Lane Widths	☒	11 foot lane width used for Hard Shoulder Lane
Heavy Vehicle %	☐	% Measured in Field
Manage Lane Demand Volume	☐	Heavy vehicles excluded for Hard Shoulder Lane
Projected future growth rate	☐	Predicted values from MPO

Procedures Used from the Highway Capacity Manual

Several procedures from Chapter 10 of the Highway Capacity Manual were used for the analysis. In particular, Equations 10-1, 10-4, 10-5, and 10-6 were used. Exhibits 10-6, 10-7, and 10-8 were also used. Also, the methodologies described in Chapter 10 were applied in evaluating the operation of the proposed hard shoulder lane.

As there are relatively few other hard shoulder lanes in North America, there was not a large sample size available from which characteristics of hard shoulder lanes could be drawn from. As such, the analysis used HCM methodologies for a traditional general purpose lane, but with a slower desired free flow speed used in the narrower Hard Shoulder Lane. The slower speed was attributed to driver behavior in a lane with narrower lane widths, as well as the lack of an emergency left side shoulder when the hard shoulder lane is in operation.

Results of the Analysis

Interpretation of the results:

The analysis concluded that with the addition of a hard shoulder lane, the freeway would be able to operate with an acceptable Level-Of-Service during peak traffic periods. This finding helped convince the Michigan Department of Transportation to move forward with the project.

How did this analysis fit into the project?

The analysis was used to provide justification both to the general public, as well as internally to the Department of Transportation, that the addition of a hard shoulder lane would produce the intended traffic benefits.