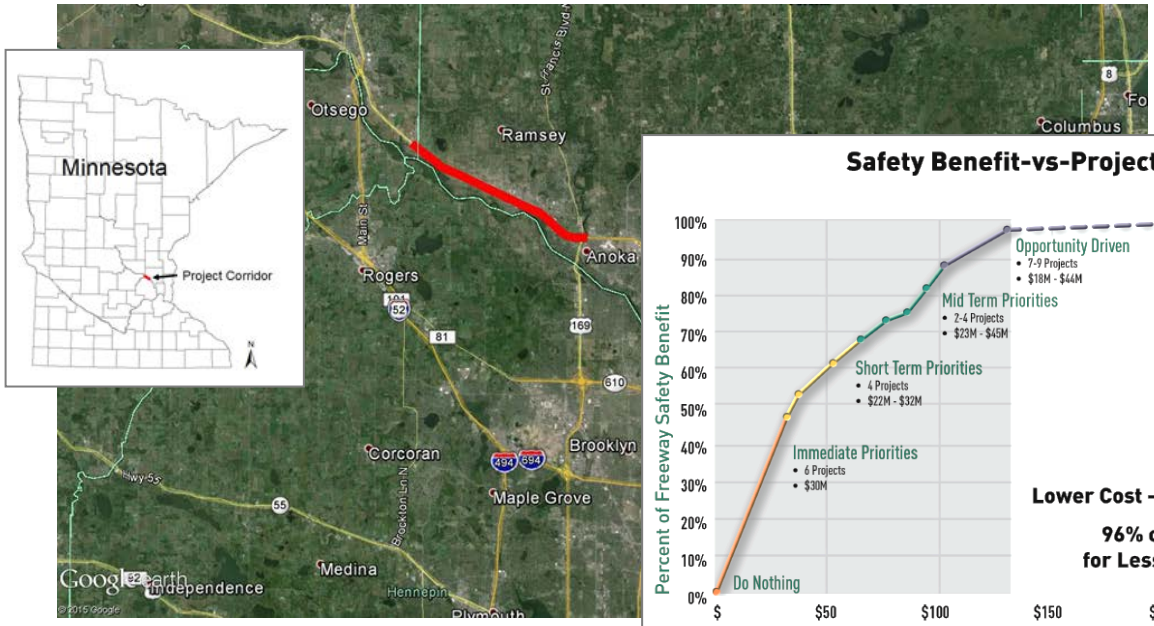
PERFORMANCE-BASED PRACTICAL DESIGN – Minnesota Highway 10



Map Data: Google Earth, Image Landsat 2016

Overview

The Minnesota DOT (MnDOT) goal of converting Highway 10 between Minneapolis/St. Paul and suburban areas in Minnesota from a four-lane divided highway into a freeway has not been feasible due to budget constraints and impacts to adjacent land uses. The MnDOT decided to improve safety and capacity on 7-mile portion of Highway 10, between the Anoka/Sherburne County Line and the Rum River. In order to do so within a limited budget and to minimize impacts to adjacent land uses, MnDOT utilized components of a Performance-Based Practical Design (PBPD) approach to develop less-expensive alternatives to achieve project goals.

Project Improvements

The MnDOT developed potential improvement projects using the following three approaches: 1) access management, 2) westbound Highway 10 free flow and 3) eastbound Highway 10 free flow. Each approach was intended to incrementally build off the other approaches. The development team thoroughly reviewed potential improvement projects and selected 20 proposed projects to be quantitatively evaluated for implementation along Highway 10.

Safety and Traffic Operations Analysis

Proposed projects were analyzed using the Highway Safety Manual (HSM) to quantify the predicted safety impacts. Crash modification factors (CMFs) used in this analysis were developed based on information from the CMF Clearinghouse, local experience and data, and the HSM. The CMFs were applied to observed crash data to determine the predicted crash reduction.

The traffic operations analysis was performed for the no-build alternative, the full freeway alternative, and the implementation of the 20 project alternatives to determine afternoon rush hour delay. The projected 2030 rush hour delay was used to evaluate the traffic operational benefits of the alternatives.

Results

The implementation of the 20 projects can provide the vast majority of the safety and mobility benefits of the freeway conversion at a fraction of the cost. Using components of a PBPD the approach, the project team was able to quantify that the 20 proposed projects would provide 96% of the safety benefit and 90% of the operational benefits of the freeway alternative at less than 50% of the cost of the freeway.

View the full report at:
http://www.fhwa.dot.gov/design/pbpd/documents/fhwahif16018.pdf

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