

ABSTRACT

Li, Mingyang. M.S.E., Purdue University, May 2013. Selecting Road Improvements in a Regional Safety Planning. Major Professor: Andrew Tarko.

The Purdue University Center for Road Safety (CRS) developed a tool called the Safety Needs Identification Program (SNIP) to help the Indiana Department of Transportation (INDOT) identify roads with safety needs based on an excessive number of crashes in certain categories (single vehicle, rear-end, run-off-road, etc.). This thesis tested and implemented a heuristic method developed by the director of CRS, Dr. Andrew Tarko and CRS Research Scientist Dr. Mario Romero to solve optimization problems. This method selects the best combination of available relevant safety countermeasures that offer the largest safety benefits under certain constraints where safety improvements are identified. To be able to test and implement this heuristic method, after a thorough literature review of safety countermeasures, a catalog of safety countermeasures that are applicable and suitable for use in Indiana was developed. Also, the unit cost and conditions of each safety countermeasure were defined, and Crash Reduction Factors (CRFs) were proposed to predict the safety benefits. After testing the algorithm and implementing the heuristic method in several different case studies, this method was shown to be capable of producing a relatively good solution. This tool can improve INDOT's ability to determine relatively good cost-effective solutions for safety problems while increasing the efficiency of their investments in traffic safety countermeasures. At the same time, this method also can substantially reduce the time and effort of INDOT engineers to calculate the cost-effectiveness of safety countermeasures.