

I. PROBLEM TITLE:

Development of a Comprehensive Crash Database for Nevada that can be used with AASHTOWare Safety Analyst

II. PROBLEM DESCRIPTION

The University of Nevada, Las Vegas (UNLV) has developed a safety database and visualization system for Clark County, Nevada. The database system has been designed to provide data to multiple transportation applications. However, the main objective is providing data and visualization capabilities for Safety Analyst, the state-of-the-art AASHTO software for traffic safety analysis. A recent nationwide survey reveals major deterrents for using Safety Analyst (1). Some of these deterrents include non-availability of comprehensive data sources and tedious data importing and processing. Hence, the developed database system significantly contributes to the adoption of Safety Analyst. The developed database integrates various data sets collected by the Nevada Department of Transportation (NDOT) and The Regional Transportation Commission of Southern Nevada (RTC-SN). UNLV collected missing interception and ramp data using Google Maps and Google Earth.

The existing database does not include data for all facilities in Clark County. It only includes information for those facilities for which data was collected by NDOT or RTC-SN. In addition, the database is limited to Clark County. The next logical steps are to (i) create a similar database using available data for the entire state, (ii) collect data for all facilities in Clark County so as to enhance the existing database for Safety Analyst, and (iii) integrate existing data and collect missing information for the entire state of Nevada. Although these steps can be worked in parallel, this proposal focuses on step (i), create a safety database, similar to the one developed for Clark County, using all the available data for the entire state of Nevada.

III. OBJECTIVE

The objective of this study is to develop a comprehensive safety database for Nevada that can be used with Safety Analyst. The database could also provide data to other traffic applications such as micro simulation traffic flow models.

IV. CUREENT PRACTICE and RELATED RESEARCH

The UNLV team has provided to NDOT and University of Nevada, Reno, (UNR) a demonstration of the capabilities of the Clark County database and the associated visualization tool for Safety Analyst. Currently NDOT Traffic Safety Engineers and UNR are reviewing the database and its use with Safety Analyst. It is expected that with the provided database and visualization tool, NDOT Engineers will adopt Safety Analyst as a regular tool to conduct traffic safety studies and make sound safety decisions.

During the development of the database and visualization tool, UNLV gained tremendous knowledge and developed efficient techniques and tools to integrate various data sets. This knowledge and tools can be used to expand the database including the remaining urban and rural areas in Nevada.

V. RESEARCH METHODOLOGY

The proposed approach is to take advantage of all the knowledge and tools that were obtained during the development of the database for Clark County to add data for missing areas in Nevada in an efficient and effective manner. Safety Analyst results will be

evaluated and validated according to quality assurance / quality control (QA/QC) parameters set by the Traffic Safety Engineering Division. That is, the results provided by Safety Analyst need to be reasonable and valid. Calibration efforts may be required to achieve satisfactory results.

Tasks and schedule:

Task 1.Data Collection and Generation

Most of the data required by Safety Analyst is already available at UNLV. However, considering the multiple data needs and sources of data, additional work is required to obtain, review, and process existing data. Based on the results from the inventory of existing data, a comprehensive plan will be developed for data gathering.

Deliverables for Task 1

At the end of this task, UNLV and NDOT will have access to multiple databases and files including all the information required by Safety Analyst.

Task 2. Data Processing and Formatting

The various datasets that are obtained, collected and generated will be filtered and formatted to ensure consistency with Safety Analyst. The data required by Safety Analyst may be available in existing data sets or generated using modeling tools. However, these data maybe combined with data that is not required by Safety Analyst or in a format that is not consistent with the mandatory format.

Deliverables for Task 2

All data required by Safety Analyst in the mandatory format.

Task 3. Design, Development, and Implementation of the Proposed Database System

This task includes the design, development, and implementation of the proposed database system. The exiting design and implementation for Clark County will be reviewed to ensure that is the best alternative for a Nevada wide database. After NDOT approves the recommended design for Nevada, it will be developed and implemented.

Deliverables for Task 3

This task will deliver a single database containing all the information required by Safety Analyst in the mandatory format and with the capability to interact in a consistent manner with Safety Analyst.

Task 4.Testing and Analysis of the Database with Safety Analyst

Once the database has been developed, implemented, and populated with all the required data, each of the Safety Analyst modules will be tested. Problems or issues associated with the performance of Safety Analyst using the developed database will be addressed as part of this project. Basic research to support the success of this project will be conducted in conjunction with UNR, Department of Civil & Environmental Engineering, – who will be developing the Safety Performance Functions - used by SA, as well as other UNLV research projects.

Deliverables for Task 4

A document will be generated describing various experiments used to test the performance of the developed database and its interaction with Safety Analyst. This document will provide details and the experiments conducted to test each module in Safety Analyst. The document will include all the information required to repeat the experiments as well as the corresponding results.

Task 5.Report

A draft report documenting findings, providing guidelines, and making recommendations will be submitted to NDOT. All the developed tools, software, and data will be provided to NDOT. Comments from NDOT will be addressed in the final report. In addition, peer review journal papers and at least one research thesis will be written.

Deliverables for Task 5

A report including the documents generated and work performed in Tasks 1 - 4.

VI. IMPLEMENTATION POTENTIAL

NDOT Safety Engineering is currently testing Safety Analyst using the database that was developed by UNLV. Hence, there is significant interest on using Safety Analyst as part of the efforts to implement the Highway Safety Manual (HSM). Having the database for the entire state will facilitate the use of Safety Analyst and the HSM.

VII. URGENCY AND PAYOFF POTENTIAL

The implementation of the HSM and the use of Safety Analyst are expected to help in the selection of better projects to address traffic safety problems. The result would be better use of resources and less traffic crashes. In addition, traffic safety engineers would be able to do their job in a more efficient manner using state-of-the-art tools that have been designed to facilitate their tasks.

VIII. ESTIMATED BUDGET

The estimated budget for this project is \$ 239,000.

IX. DATE AND SUBMITTED BY

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