NEVADA DEPRTMENT OF TRANSPORTATION

FFY 2015 RESEARCH PROBLEM STATEMENTS

External Submission Form (Not to exceed 3 pages with font size 12)

I. PROBLEM TITLE (Required):

Automated Pedestrian and Bicycle Count System and Analysis Tool

PROBLEM DESCRIPTION (10 Points): Pedestrian and Bicycle count and flow data are necessary for transportation planning, implementing safety countermeasures, and traffic management. This data is very critical when evaluating the pedestrian level of service and pedestrian safety indices. Also, a performance analysis tool with both vehicle and pedestrian data is required to comprehensively analysis the intersection safety.

II. OBJECTIVE (Required):

1. Explore, implement and evaluate technologies for pedestrian-bicycle count at intersections and mid-blocks.
2. Develop and implement a database with both pedestrian-bicycle and vehicle flow data, crash data, and inventory data in GIS database.
3. Develop and implement a pedestrian-bicycle safety analysis tool for automatic recommendation of pedestrian-bicycle safety countermeasures.
4. Develop and implement a pedestrian-bicycle safety analysis tool for before-and-after (BA) safety evaluation of proposed countermeasures.
5. Develop a technology deployment plan for educating and training NDOT personnel on the use of detection and analysis tools.

III. CUREENT PRACTICE and RELATED RESEARCH (Required):

There are very few instance of manual and automated pedestrian and bicycle counting programs deployed in the country. They can be classified as manual and automated counting systems. A preliminary literature search reveals two program for counting pedestrians and bicycles: 1) Biannual manual count program in downtown Seattle since 2006, and 2) Automated count system in Arlington County, Virginia. Automated pedestrian count employs various detection technologies like video cameras (single and stereo-vision) systems, IR sensors, loop detectors, etc.

Traditionally, intersection or roadway segment safety is well defined methodology exists for evaluating intersection safety indices using vehicle crash data, roadway inventory data, and traffic operations. Based on the intersection safety analysis, critical intersections are identified and detailed manual pedestrian safety audits are performed to recommend pedestrian safety countermeasures. One such tool is the FHWA Pedestrian and Bicycle GIS Safety Analysis Tools considered pedestrian crash rate and geographic data that can be used to develop high pedestrian crash zones.

IV. RESEARCH METHODOLOGY (10 Points):

The proposed research methodology involves using the existing FHWA Pedestrian and Bicycle GIS Safety Analysis Tool and populating with state specific crash, roadway, and traffic operation data. Preliminary analysis will be completed to determine high

pedestrian crash intersections. A detailed pedestrian-bicycle count technology survey, deployment feasibility study, cost of deployment and return of investment will be performed for selected high pedestrian crash intersections. Based on the above analysis, a suitable pedestrian-bicycle detection technology will be identified and implemented on selected locations to collect actual pedestrian-bicycle data. The above used GIS safety analysis tool will be expanded to host addition pedestrian-bicycle databases to support specific data on pedestrian-bicycle counts, crashes, level of services, amenities, etc. Analysis tools will be developed to perform the Spot/Intersection, Strip, Cluster, Sliding-Scale, and Corridor analysis to evaluate crashes. An enhanced weighted crash type matrix and countermeasure matrix based interactive safety analysis tool will be developed to support the safety audit decision-making process. Also, tools for evaluation of quantitative and qualitative Crash Modification Factors (CMF) for before-and-after (BA) countermeasure deployment will be developed.

V. IMPLEMENTATION POTENTIAL (10 Points):

The developed system can be used for an array of studies at pedestrian crossings, from simple counting of pedestrians, analysis of pedestrian-bicycle safety factors, and expanded to complex pedestrian-vehicle conflict detection system. The developed analysis tool will help evaluate pedestrian crashes; study of crash modifications factors both due to vehicle and pedestrian safety countermeasures. Stages 1 through 5 of the Caltrans Research and Innovation Stages are accomplished by the proposed research. The system will be developed with the support of NDOT and FAST.

VI. URGENCY AND PAYOFF POTENTIAL (10 Points each, Total 20 Points):

Nevada's Strategic Highway Safety Plan has identified pedestrian safety as a Critical Emphasis Area (CEA) to reduce pedestrian related fatalities. Consequently, pedestrian fatality in Nevada has been on the rise since 2009. One of the greatest challenges facing the bicycle and pedestrian field is the lack of documentation on usage and demand. In the past, there have been very few literature and data collection initiatives to determine actual pedestrian and bicycle counts. Also, there is a need to develop safety analysis tools to study intersections safety with emphasis on pedestrian safety and the inter-relationship between pedestrian and vehicle characteristics at intersections.

The problem statement is addressed to the Expert Task Group (ETG) on "Planning for Zero Fatalities".

VII. ESTIMATED BUDGET (Required):

The estimated budget for proposal is $ 200,000.

VIII. DATE AND SUBMITTED BY (Required):

Date 5/23/2014

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IX. NDOT CHAMPION, COORDINATION AND INVOLVEMENT (Required and Additional 10 points for multiple champions from more than one section):

PD Kiser – NDOT Safety Engineering,
Bill Story - Nevada Bicycle & Pedestrian Coordinator

Adrain Gibby <arg1941@gmail.com> May 23, 2014 8:29 AM
To: Venkatesan Muthukumar <vm@unlv.nevada.edu>
Cc: Emma Regentova <emma.regentova@unlv.edu>, Alex Paz <apaz@unlv.edu>, Don Hayes <donald.hayes@unlv.edu>
Problem Statement

Venki - I suggest that you include Bill Story and P D Kiser as champions and insert their replies below in the problem statement section dealing with champions. And then go ahead and submit your problem statement to Manju with Cc to Ken Chambers, Emma, Alex, Don Hayes and myself.

Thank you very much. - Reed

A. Reed Gibby, PhD, PE(Ret.)
Senior Transportation Research Engineer - UNLV
Adjunct Transportation Professor - UNR
Professor Emeritus - CSU, Chico
775-626-9740 (message center)
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"Have Mode Will Travel"

> I would also provide any support I can from the planning and education side.
>
> Bill Story
> Bicycle, Pedestrian & Safe Routes to School Programs
> NV Dept. Of Transportation
>
> Sent from my iPhone
>
> On May 9, 2014, at 11:28 AM, "Kiser, PD" <PKiser@dot.state.nv.us> wrote:
>
> > Dr. Gibby – I would be interested in working with you on the proposed research statement to look at pedestrian and bicycle crash rates in the Las Vegas area.
> >
> > P.D. Kiser, P.E., PTOE
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