

Assessing Pedestrian Risk Locations: A case study of WSDOT efforts

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The Washington State DOT (WSDOT) has developed a process for WSDOT regional planners, traffic engineers and program managers to identify, in a systematic way, locations that have inadequate facilities (crossings or walkway environment) for pedestrian safety. This is the first phase in the development of a comprehensive methodology which will allow the pedestrian planner and designer the ability to identify and address locations that have high pedestrian accident potential. The second step is the development of computer models which will eventually predict collision frequency and probabilities.

In previous years, the WSDOT created a method to identify pedestrian collision (accident) locations - called PALs. This process was approved by the agency executives and PALs were allowed to compete within the Safety Program (I2) for safety dollars. That process mirrored the agency's critical rate method for identifying and ranking vehicle high accident locations (HALs). WSDOT addresses pedestrian issues in both its safety and mobility program. Under current revenue and policy direction few dollars are made available by the Department to correct mobility deficient areas - particularly sidewalks and other pedestrian type projects. With this limitation, the Bicycle and Pedestrian program sought alternative means to the typical historic based collision reduction methods. Through the development of a proactive method, high probability collision locations could be addressed before a series of collisions occurred that warranted fixes through the critical rate method. This type of programmatic thinking would allow Regional planners and traffic engineers to address areas which were not experiencing collisions, but had a significant number of "close calls." At the same time the safety fix could also address the mobility need.

The Bike and Ped staff assembled a team of regional traffic engineers, planners, and program managers. Initially, the concept was to develop a computer model which would predict future pedestrian collision locations. The team also recognized the need to make the methodology flexible. Pedestrian collision identification consists of two parts. The first step is to identify locations of high frequency or probability, second the severity of collision, should it occur, must also be addressed. By mixing these two factors locations with high frequency and low severity and those with high severity and low frequency could be improved. Most modeling systems focus only on the high frequency locations.

The agency is developing these computer models to “run” the entire DOT roadway system enabling planners to identify future collision locations (risks sites).

In technical terms, count models, zero-altered probability models and nested logit structures are being analyzed along with findings from their applications. Using the count data regression structures, the models can be used to predict accident frequency. Using the generalized extreme value structures, the team will identify variables that influence accident severity. The research staff are also exploring the plausibility of mixing count distributions and generalized extreme-value structures in modeling pedestrian accidents. The mixing of the model effort examines how accident frequency and severity are intertwined. For more information on the computer model development, contact John Milton, Ph.C., P.E. at the WSDOT Design Office 360.705.7299.

Understandably, this complex analytical methodology’s drawback is lag time in development and implementation. To account for this delay an interim Pedestrian Risk Project Identification method was designed (see Figure 1).

Much of the discussion surrounding the interim methodology dealt with whether the project identification criteria should put more weight on collisions (less than 4 collisions or it would qualify as a PAL), or should the methodology be weighted with other factors that influence safety. Figure 1 is a compromise between the two. Several members of the team were also involved with the vehicle risk program and brought that expertise to the discussion.

The ranking criteria assesses sections of roadway on the basis of: (1) indicators that estimate the presence of pedestrians, (2) indicators that relate to the absence of sufficient accommodations, and (3) indicators of the degree of hazard that this absence creates. It allows non-pedestrian staff to identify and submit projects to compete for DOT safety dollars.

The agency has committed funding for the 1999-2001 biennium, and for the following two biennium’s to address these pedestrian risk locations. The money is allocated to each of the agency’s six regions, based on the percentage of the total vehicle risk dollars they receive. This allows the regions to prioritize, benefit/cost and scope these projects within their regions; without competing with each other for the funds. As an example, half of the regions are sparsely populated without the urban density of the metropolitan regions. This process allows those regions to still get funding for pedestrian risk areas that may be associated with school locations, a senior center or a transit stop.

The WSDOT feeling is that by focusing pedestrian safety efforts on a comprehensive and rigorous methodology and thought process it can maximize the Departments safety investment and flexibility. WSDOT also believes that

only through forward thinking and the willingness to approach pedestrian safety from many angles will it improve its pedestrian safety investment and record. Additional research and evaluation will be critical to this success. This effort is looked to by WSDOT as a starting point, not an ending point.

Figure 1.

PEDESTRIAN RISK PROJECT IDENTIFICATION
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PROJECT TITLE _____
REGION _____ S.R. _____ S.R. MP _____ TO S.R. MP _____
LENGTH _____
LOCAL JURISDICTIONS _____
PROJECT DESCRIPTION _____
REGIONAL CONTACT _____ Phone _____

1. PEDESTRIANS PRESENCE INDICATORS

Current Land Use

- Low density residential - **1 pt.** _____
- High density residential - **2 pts.**
- High use recreational - **3 pts.**
- Apartments - **4 pts.**
- Suburban (commercial and residential) - **5 pts.**
- Dense urban or Downtown area - **6 pts.**

- The presence of isolated pedestrian generators and attractors should also be considered, such as businesses, schools, community centers, and recreational ball fields, swimming pools, parks, etc. Allow up to **6 points**.

(If proposed land use changes are known and will occur within the "design life" use proposed land use.)

At Risk Groups: Children, Elderly, Handicapped

- Heavy Concentration - **6 pts.** _____
- Moderate Concentration - **3 pts.**
- Normal Concentration - **0 pts.**

(Heavy concentrations are determined by the presence of grade schools, parks, large retirement complexes, and other facilities where high-risk pedestrians are likely to be found within one-half mile of the proposed project.)

2. INDICATORS OF INSUFFICIENT FACILITIES

Does this project provide a missing link in a current walkway system?

- Provide a crossing to transit, school, or other pedestrian trip oriented destination, such as recreational park? -**10 pts.** _____
- Complete a missing link in an existing walkway system link? - **5 pts.**
- Connect to an existing walkway? - **3 pts.**
- Replace a deficient section of a walkway? **1 pt.**

(Can accumulate up to 19 points for this question)

Average shoulder width

- 0-4 feet - **6 pts.** _____
- 4-8 feet - **3 pts.**
- >8 or sidewalk - **0 pts.**

PEDESTRIAN RISK PROJECT IDENTIFICATION *(continued)*

Signalized Intersection Spacing or Distance to Alternate Crossing Facility

>1,320 ft. - **3 pts.**; 1,319 - 660 ft. - **2 pts.**; <660 feet - **0 pts.**

(Use greatest distance if multiple signals)

3. DEGREE OF HAZARD INDICATORS

Pedestrian exposure to vehicles, Current ADT

<8,000 ADT - **1 pt.**; 8,001-25,000 ADT -**2 pts.**; >25,000 - **3 pts.**

Posted Travel Speed

<25 mph -**0 pts.**, 25-35 mph - **2 pts.**, 35-45 mph - **4 pts.**, >45 mph - **6 pts.**

Prior vehicle-pedestrian crashes at location within past three years:

3 or more - **5 pts.**

1-2 crashes - **2 pts.**

Width of Roadway

2 or 3 lanes - **1 pt.**; 4 lanes - **2 pts.**; 4 or more lanes with a two way left turn lane - **4 pts.**

(standard 11 or 12 foot lane width)

Horizontal and/or Vertical Stopping Sight Distance

Meets desirable to minimum stopping distance requirements - **1.5 pts.**

Doesn't meet minimum stopping distance requirements - **2 pts.**

TOTAL POINTS
