

# Oregon Department of Transportation

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## **Hazard Elimination Program (HEP)**

*A program managed by the Project Safety Management System*

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# **A guide to developing federally funded roadway safety projects**



OREGON DEPARTMENT of TRANSPORTATION  
TECHNICAL SERVICES  
TRAFFIC MANAGEMENT SECTION  
<http://www.odot.state.or.us/traffic>

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## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
<b>2.0</b>	<b>PROGRAM GUIDELINES.....</b>	<b>1</b>
2.1	PROJECTS ELIGIBLE FOR HEP FUNDING .....	2
2.2	PROJECT FUNDING INFORMATION.....	2
2.2.1	<i>Regional Share of HEP Funds</i> .....	3
2.3	PROJECT JUSTIFICATION.....	3
2.3.1	<i>Benefit-Cost Analysis</i> .....	4
2.3.2	<i>Risk Narrative Form</i> .....	4
2.4	GUIDELINES AND STANDARDS .....	4
<b>3.0</b>	<b>HOW TO APPLY FOR HEP FUNDING.....</b>	<b>5</b>
3.1	APPLICATION AND SELECTION PROCESS .....	5
3.2	REVISING PROJECT COST ESTIMATES.....	6
<b>4.0</b>	<b>FEDERAL REPORTING REQUIREMENTS.....</b>	<b>6</b>
<b>5.0</b>	<b>CONTACTS.....</b>	<b>8</b>
5.1	REGION CONTACTS.....	8
5.2	HEP PROGRAM COORDINATOR .....	8
<b>APPENDIX A: TITLE 23 SECTION 152 OF THE U. S. CODE .....</b>		<b>A-1</b>
<b>APPENDIX B: BENEFIT/COST ANALYSIS WORKSHEET .....</b>		<b>A-3</b>
<b>APPENDIX C: RISK NARRATIVE FORM.....</b>		<b>A-5</b>
<b>APPENDIX D: ADDITIONAL SOURCES .....</b>		<b>A-6</b>

Note: This document replaces April 1999 version of the HEP Program Guide

## 1.0 Introduction

The Hazard Elimination Program (HEP) is a federally-funded program and is managed by the Oregon Department of Transportation (ODOT). Approximately 2.8 million dollars are available each year for safety-related projects statewide. The mission of the HEP is to carry out safety improvement projects to reduce the risk, number, and/or severity of accidents at highway locations, sections, and elements on any public road. Both state and local agencies are eligible for this funding.

The purpose of this guidebook is to document program philosophy and the application process for HEP funding. The first section outlines general program guidelines while the second and third sections provide details on the application process. ODOT has placed the responsibilities of program management with the Traffic Management Section and fund management with Financial Services Branch. However, all project solicitation, prioritization, and selection is done by ODOT's Region Traffic staff. Local agencies should work through their Region Traffic office when applying for HEP funds to ensure that their project application meets with the Region's program objectives.

This program manual replaces the April 1999 version of the same title. There have been no major changes to the program, however, some of the minor changes are:

- The \$500,000 cap on project cost has been removed. There is, however, a maximum \$500,000 contribution of HEP funds per project.
- The restriction on using HEP funds for preliminary engineering and right-of-way on state projects has been removed.
- The application process description has been improved.
- "Benefit-Cost Analysis Worksheet" and the "Risk Narrative Form" have been revised. Electronic versions of both forms are available.

## 2.0 Program Guidelines

The federal requirements for the HEP program are described in Title 23 §152 of the United States Code, which is included in the Appendix A of this document. In addition to the federal guidelines required for project eligibility, ODOT has added its own criteria and requirements to tailor the program to match Oregon's needs. In general, for a project to meet both the federal and state requirements for HEP funding, it must:

- Be an eligible project;

- Have committed matching funds of 10% of the project cost and a maximum HEP contribution of \$500,000;
- Have a justification for the project; and
- Meet all applicable guidelines and standards for construction.

These criteria are discussed in the following subsections.

## 2.1 Projects Eligible for HEP Funding

An *eligible* project is defined as any identified safety project on a public road, a public surface transportation facility, a publicly-owned bicycle / pedestrian pathway, or any traffic calming measure. Types of projects include, but are not limited to, the following:

- Signal installation or improvement
- Channelization
- Curve realignment
- Pavement markings
- Guardrail or median barrier
- Slope flattening
- Rockfall correction
- Bicycle lanes
- Road safety audits
- Signal priority preemption
- Grade separation
- Illumination
- Delineation
- Impact attenuators
- Fixed object removal
- Corridor safety improvements
- Pedestrian paths

The following types of projects are not be considered eligible for HEP:

- Enforcement programs;
- Public information campaigns; and
- Other traditional National Highway Traffic Safety Administration Section 402 projects (except as part of a construction project).

## 2.2 Project Funding Information

In the past, ODOT placed a \$500,000 maximum cap on project cost. The intent of this cap was to allow smaller projects to compete for the limited amount of funds each year. The program now allows for a maximum HEP contribution of \$500,000 (not including right-of-way or preliminary engineering) to any one project. Stand-alone safety projects or specific safety improvements as part of a larger safety project are consistent with the

program philosophy and likely to be funded. Applications to pay for safety items (e.g. durable striping, signals, signs) on larger projects whose primary purpose is not safety are discouraged and will likely be rejected.

To be eligible for HEP funds, a 10% match of local or state dollars to the federal share of the project cost is required. For local and state agency projects, HEP funds may pay for preliminary engineering, right-of-way, and construction costs. State HEP projects should be contracted, but state forces may be used if the State Traffic Engineer deems an immediate response is necessary to correct an identified safety problem. HEP projects are required to be in the Statewide Transportation Improvement Program (STIP).

2.2.1 Regional Share of HEP Funds

The total amount of HEP funds available is shared by the five ODOT regions, according to the funding split shown in the current Statewide Transportation Improvement Program (STIP) documents. The funding allocation is based upon a three-year average of the Top 15% Safety Priority Index System (SPIS) sites (high crash locations). Regions may rollover funds from year-to-year, in order to obtain sufficient funds for a project. The approximate funding splits for the 2006-2007 STIP update are shown in the table. Actual funding allocations will vary for each STIP update cycle.

**Table 1 Approximate Regional HEP Allocation (2006-2007 STIP)**

Region	Funding Allocation	HEP Funds per Year
1	54%	1,520,000
2	25%	710,000
3	10%	280,000
4	7%	200,000
5	4%	110,000
Total	100%	2,820,000

**2.3 Project Justification**

There are two ways to justify the use of HEP funds - either by a benefit/cost analysis, or by documenting a potential safety problem with a risk narrative form. Samples of these forms are available in appendices A and B, but applicants should download electronic versions of the forms from the ODOT Traffic Management Section website

(<http://www.odot.state.or.us/traffic>) under the "Safety" section. If applicants do not have Internet access, please contact the current HEP Coordinator to obtain the forms.

### 2.3.1 Benefit-Cost Analysis

In the benefit-cost analysis, the ratio of the economic value of the long-term reductions of target crashes to the estimated cost of the improvement is calculated. If the project's benefit-to-cost ratio (B/C) is greater than 1.0, the project is considered beneficial. The benefits are quantified over a 10- or 20-year period at a 4% interest rate. A sample of the form is available in Appendix A.

ODOT recommends that three to five years of the most recent crash data available should be used for the analysis. Only target crashes - those crashes that can be prevented by the proposed improvement - should be considered. Furthermore, not all target crashes should be considered preventable by the project. Preventable target crashes are determined by applying a crash reduction factor (CRF), which is the expected reduction in crashes because of the improvement. The Traffic Management Section of ODOT maintains a list of CRF for various types of improvements. The economic values for crash types on the "Benefit/Cost Analysis Worksheet" are updated every two years.

### 2.3.2 Risk Narrative Form

The Risk Narrative Form is a way to justify a project based on the safety hazard of a location that does not necessarily have a large number of motor vehicle crash records to support a benefit/cost analysis. Projects on low volume roads, pedestrian, and bicycle safety improvements are often justified by a risk narrative. The risk narrative should demonstrate that the potential for severe or fatal injury crashes is significant without the improvement. In order to compete with more "documented" safety problem areas, additional supporting information such as an engineering-type study should be included. The study may include the use of predictive safety models such as the Interactive Highway Safety Design Model (IHDSM) to demonstrate expected safety problems or the anticipated effectiveness of proposed solutions. The Risk Narrative Form is scored by the Traffic Management Section's HEP Coordinator. A sample of the form is available in Appendix B.

## 2.4 **Guidelines and Standards**

Projects applying for HEP funding should be able to demonstrate that they will meet all of the necessary guidelines and standards for construction. The intent of this

requirement is to ensure that projects approved for HEP funding will be constructable. For example, a project to install a traffic signal will not be eligible for HEP funds if a traffic signal warrant analysis has not been completed.

### 3.0 How to Apply for HEP Funding

At this time, both state and local agencies are eligible for HEP funding. All projects applications must go through the local ODOT Region Traffic office. While the application process is not intended to be cumbersome, well-documented project applications are more likely to receive funding. Each application must contain the following:

- Cover letter addressed to ODOT's Region Traffic Manager (or the HEP Coordinator) describing the problem area and the proposed solution;
- Name of contact person;
- Project justification, either 1) HEP Benefit-Cost Analysis Worksheet **or** 2) HEP Risk Narrative Form, **but not both**;
- Copies of crash records, if used in application;
- Site drawing or sketch; and
- Cost estimate.

In addition, each application should contain:

- Supporting documents or studies that further define the problem area and other pertinent project information (such as traffic signal warrant analyses); and
- Photographs of the typical section.

A list of additional sources that may be helpful in compiling the application are included in Appendix D.

#### 3.1 Application and Selection Process

The HEP application and selection process is shown in Figure 1. The process begins when the applying agency (state or local) identifies a safety problem. Possible safety project locations are identified from a variety of sources including crash records, local citizens, enforcement/emergency response personnel, and road maintenance crews. Next, the agency submits an application to ODOT's Region Traffic office, which reviews then forwards it with the other necessary documents to the Traffic Management

Section's HEP Coordinator. The application is then reviewed and eligibility is determined.

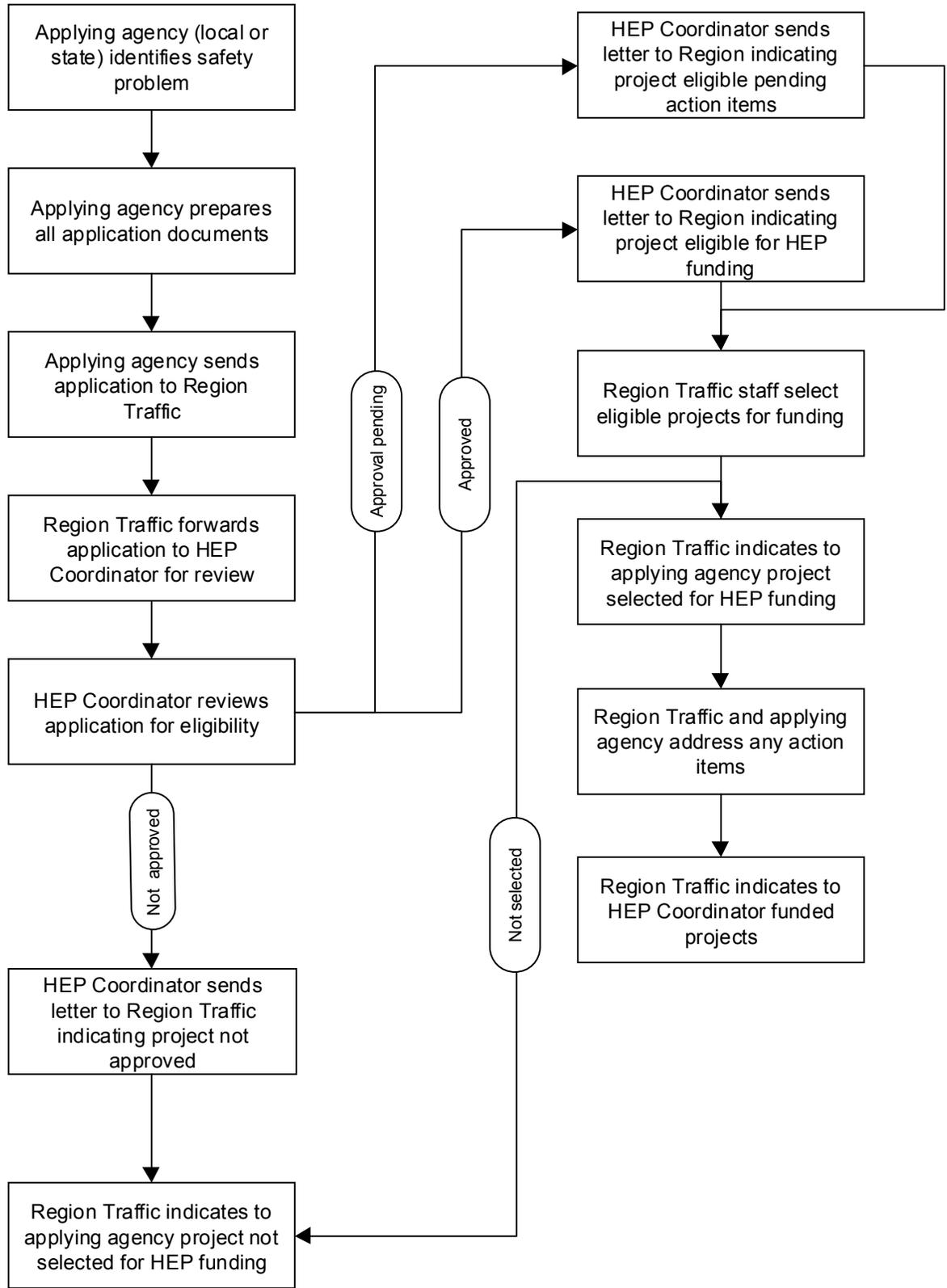
Applications will either be "approved," "approval pending," or "not approved." For the "approval pending" applications, the HEP coordinator will indicate which steps need to be taken before the project receives full approval. Region Traffic staff will then select projects from the pool of "approved" and "approval pending" projects. Competing projects may be ranked by the incremental benefit/cost method. The applying agency will be notified of the project's selection status. For those projects selected, the Region Traffic office will notify the HEP coordinator and a formal project prospectus will be prepared.

### **3.2 Revising Project Cost Estimates**

If the project estimate increases or decreases during the project development phase, the Region Traffic office will send written notice to the HEP Coordinator requesting approval for additional funds. For state projects, increases in HEP projects will be funded from the appropriate Region's budget and decreases will become a savings in that Region's budget. For local projects, project costs will not be allowed to increase more than 10 percent over the original estimate. Funds may or may not be available for funding increases.

## **4.0 Federal Reporting Requirements**

As required by Title 23 §152(f) and (g) of the United States Code, the Oregon DOT has established an evaluation process to analyze and assess results achieved by safety improvement projects funded by the HEP program. Each year, the Oregon DOT files a report with the Federal Highway Administration by December 30. As a part of the use of federal funds, it is expected that the applying agency (either state or local) will contribute to the report as requested by the Oregon DOT.

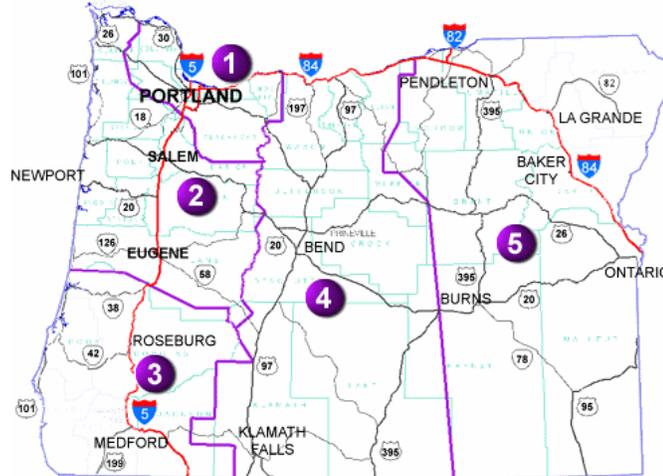


**Figure 1 HEP Application and Selection Process**

## 5.0 Contacts

### 5.1 Region Contacts

The Region Traffic Managers as of October 2002 with their telephone numbers are:



Region	Headquarters	Region Traffic Manager	Telephone
1	Portland	Dennis Mitchell	503-731-8227
2	Salem	Bruce Erickson	503-986-2649
3	Roseburg	Sue D'Agnese	541-957-3688
4	Bend	Joel McCarroll	541-388-6189
5	La Grande	Tom Kuhlman	541-823-0964

### 5.2 HEP Program Coordinator

Questions or comments about the HEP Program can be directed to:

Tim Burks, Highway Safety Engineering Coordinator  
Traffic Management Section  
355 Capitol NE, 5th Floor  
Salem, Oregon 97301

Voice: (503) 986-3572 Fax: (503) 986-4063

[timothy.w.burks@odot.state.or.us](mailto:timothy.w.burks@odot.state.or.us)

## APPENDIX A: TITLE 23 Section 152 of the U. S. Code

(a) IN GENERAL.—

(1) PROGRAM.—Each State shall conduct and systematically maintain an engineering survey of all public roads to identify hazardous locations, sections, and elements, including roadside obstacles and unmarked or poorly marked roads, which may constitute a danger to motorists, bicyclists, and pedestrians, assign priorities for the correction of such locations, sections, and elements, and establish and implement a schedule of projects for their improvement.

(2) HAZARDS.—In carrying out paragraph (1), a State may, at its discretion—

(A) identify, through a survey, hazards to motorists, bicyclists, pedestrians, and users of highway facilities; and

(B) develop and implement projects and programs to address the hazards.

(b) The Secretary may approve as a project under this section any safety improvement project, including a project described in subsection (a).

(c) Funds authorized to carry out this section shall be available for expenditure on—

(1) any public road;

(2) any public surface transportation facility or any publicly owned bicycle or pedestrian pathway or trail; or

(3) any traffic calming measure.

(d) The Federal share payable on account of any project under this section shall be 90 percent of the cost thereof.

(e) Funds authorized to be appropriated to carry out this section shall be available for obligation in the same manner and to the same extent as if such funds were apportioned under section 104(b), except that the Secretary is authorized to waive provisions he deems inconsistent with the purposes of this section.

(f) Each State shall establish an evaluation process approved by the Secretary, to analyze and assess results achieved by safety improvement projects carried out in accordance with procedures and criteria established by this section. Such evaluation process shall develop cost-benefit data for various types of corrections and treatments which shall be used in setting priorities for safety improvement projects.

(g) Each State shall report to the Secretary of Transportation not later than December 30 of each year, on the progress being made to implement safety improvement projects for hazard elimination and the effectiveness of such improvements. Each State report shall contain an assessment of the cost of, and safety benefits derived from, the various means and methods used to mitigate or eliminate hazards and the previous and subsequent accident experience at these locations. The Secretary of Transportation shall submit a report to the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives not later than April 1 of each year on the progress being made by the States in implementing the hazard elimination program (including but not limited to any projects for pavement marking). The report shall include, but not be limited to, the number of projects undertaken, their distribution by cost range, road system, means and methods used, and the previous and subsequent accident experience at improved locations. In addition, the Secretary's report shall analyze and evaluate each State

program, identify any State found not to be in compliance with the schedule of improvements required by subsection (a) and include recommendations for future implementation of the hazard elimination program.

(h) For the purposes of this section the term “State” shall have the meaning given it in section 401 of this title.

# APPENDIX B: Benefit/Cost Analysis Worksheet

Download e-form @ <http://www.odot.state.or.us/traffic/> in the "Safety" section



**OREGON DEPARTMENT OF TRANSPORTATION**  
**HAZARD ELIMINATION PROGRAM**  
**BENEFIT/COST ANALYSIS WORKSHEET**

For Office Use Only

HEP File Code: PRO 08 - \_\_\_\_\_

---

Project Name:

Region:

Date:

---

*Project on Local Agency Facility*

Route Number:

Street Name:

MP Range or Cross Street:

---

*Project on State Highway*

Route Number:

Hwy Name:

MP From:  to

---

Road Character:

Facility Type:

County:

City:

Crash Data From:  to

Project Description:

Prepared By:  Title:

---

Type of Target Crashes	A Number of Target Crashes	B Crash Reduction Factor	C Number of Preventable Crashes A*B	D Economic Value per Crash	Total Economic Value C*D
PDO Crashes	<input type="text"/>	0%	0.0	\$13,000	\$ -
Countermeasure 1	<input type="text"/>	<input type="text"/>			
Countermeasure 2	<input type="text"/>	<input type="text"/>			
Countermeasure 3	<input type="text"/>	<input type="text"/>			
Moderate (Injury B) and Minor (Injury C) Injury Crashes	<input type="text"/>	0%	0.0	\$41,000	\$ -
Countermeasure 1	<input type="text"/>	<input type="text"/>			
Countermeasure 2	<input type="text"/>	<input type="text"/>			
Countermeasure 3	<input type="text"/>	<input type="text"/>			
Fatal and Severe (Injury A) Injury Crashes	<input type="text"/>	0%	0.0	\$689,000	\$ -
Countermeasure 1	<input type="text"/>	<input type="text"/>			
Countermeasure 2	<input type="text"/>	<input type="text"/>			
Countermeasure 3	<input type="text"/>	<input type="text"/>			
<b>Total Crash Value for</b>				0 Months	\$ -
<b>Annual Benefits =</b>				Total Crash Value	=
				Total Months / 12	=
<b>Estimated Project Cost</b>					=
<b>B/C Ratio =</b>				Annual Benefits X Present Worth Factor (10 or 20 years)	
				Estimated Project Cost	
<b>B/C Ratio =</b>				<input type="text"/> x <input type="text"/>	=
				\$	

Comprehensive Economic Value per Crash		
Highway/Street Type	Urban	Rural
PDO <sup>3</sup>		
All facilities	\$13,000	\$13,000
Moderate (Injury B) and Minor (Injury C) Injury <sup>4</sup>		
Interstate or Freeway	\$39,000	\$51,000
Other State Highway	\$41,000	\$55,000
Fatal and Severe (Injury A) Injury <sup>4</sup>		
Interstate or Freeway	\$694,000	\$1,352,000
Other Highway	\$689,000	\$1,359,000

Uniform Series Present Worth Factor (4%)	
10 years	20 years
8.11	13.59

**Notes**

- 1 Composite crash reduction factor calculated if more than one countermeasure is applied
- 2 Select a PWF for the life of countermeasure. See instructions
- 3 PDO value is \$6,500 per crash adjusted with an under reporting factor of 2.0. National Safety Council, 2000 estimates of value per crash.
- 4 Economic costs per crash are calculated using 1998-2000 Oregon crash data and FHWA's Technical Advisory "Motor Vehicle Accident Costs, T 7570.2, October 31, 1994 updated to 2001 dollars with GDP implicit price deflator.

## Instructions

1. Complete project header information. Urban road character is classified as being within urban transportation boundaries if existing, otherwise within city limits. The date range for the crash data is required to calculate the annual benefit and must be entered in date form.
2. From the crash data, enter the number of target crashes for each crash severity in the yellow-shaded cells in the column labeled "A - Number of Target Crashes." Target crashes are those types of crashes that the proposed project will mitigate. For example, the target crashes for installing a red-light running camera are crashes where the driver disregarded the traffic control device.
3. Type a brief description of the proposed countermeasure (this will usually be the same for all three crash severities) and enter the crash reduction factor (CRF) for the countermeasure in the column labeled "B - Crash Reduction Factor" expressed as a decimal. The CRF is the estimated percent reduction in target crashes. For example, installing a left turn refuge might reduce target crashes by 65 % (CRF= 65%). To apply multiple countermeasures on a project, enter the additional countermeasures in the additional cells. A composite CRF is calculated automatically using the formula:

$$. CRF_{C_n} = CRF_1 + (1 - CRF_1) CRF_2 + \dots + (1 - CRF_1) \dots (1 - CRF_{j-1}) CRF_j \text{ where:}$$

$CRF_{C_n}$  = composite crash reduction factor for crash type  $n$

$CRF_j$  = crash reduction factor for countermeasure  $j$

$j$  = number of countermeasures

4. Enter the economic value of a reduced crash based on road character and facility type in the project header (this is automated on e-form) from the "Comprehensive Economic Value per Crash" in the pink shaded table in the column labeled "D Economic Value - per Crash."
5. Enter the estimated project cost. Include preliminary engineering **but not** right-of-way costs and round to nearest \$1,000.
6. Select a present worth factor for the life of countermeasure. Long-term treatments such as left-turn refuges and geometric improvements should use a 20-year analysis. Short-term improvements such as signs and pavement markings should use a 10-year analysis.

# APPENDIX C: Risk Narrative Form

Download e-form @ <http://www.odot.state.or.us/traffic/> in the "Safety" section

		<small>For Office Use Only</small>	
		HEP File Code: PRO 08 - ___ - ___	
<p>Oregon Department of Transportation Traffic Management Section Traffic Engineering Services Unit</p>			
<b>Hazard Elimination Program - Risk Narrative Form</b>			
Project Name: _____		Region: ___ Date: _____	
City: _____	County: _____	Preparer: _____	
<u>Project on State Highway</u>			
Route No: _____ Highway name: _____		MP From: _____ To: _____	
<u>Project on Local Agency Facility</u>			
Route No: _____ Street name: _____		MP Range or cross street: _____	
<hr/>			
1. Describe the problem. (10 points)			
2. Describe the proposed solution. (10 points)			
3. What is the estimated project cost? (5 points)			
4. Has an engineering-type study of the problem area been conducted? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, please attach a copy. (25 points)			
5. What are the frequency, type, and severity of crashes (or conflicts) that will be mitigated by the proposed project? Include dates. (25 points)			
6. What is the average daily motor vehicle, pedestrian, or bicycle volume exposed to the hazard for the same time period as above? (10 points)			
7. Is the site on an appropriate state or local priority list? <input type="checkbox"/> Yes <input type="checkbox"/> No. If yes, identify the priority list and the rank. (10 points)			
8. Please describe the local agency and citizen support for the proposed project. (5 points)			

## APPENDIX D: Additional Sources

### **CRASH DATA:**

Sylvia Vogel  
Oregon DOT, Transportation Development Division  
555 13th Street NE  
Salem OR 97301-4178  
(503) 986-4240  
Sylvia.M.VOGEL@odot.state.or.us

### **STATEWIDE CRASH RATE TABLES:**

[http://www.odot.state.or.us/tdb/accident\\_data/](http://www.odot.state.or.us/tdb/accident_data/)

### **CITY AND COUNTY MAPS:**

<http://www.odot.state.or.us/tdmappingpublic/index.htm>

### **OREGON DOT HIGHWAY INVENTORY:**

[http://www.odot.state.or.us/transview/highwayreports/aml\\_summary\\_parms.cfm](http://www.odot.state.or.us/transview/highwayreports/aml_summary_parms.cfm)

### **OREGON DOT HIGHWAY VOLUMES**

[http://www.odot.state.or.us/tdb/traffic\\_monitoring/tvtable.htm](http://www.odot.state.or.us/tdb/traffic_monitoring/tvtable.htm)

### **SAFETY PRIORITY INDEX SYSTEM (SPIS) INFORMATION:**

Tim Burks, Highway Safety Engineering Coordinator  
Oregon DOT, Traffic Management Section  
355 Capitol NE, 5th Floor  
Salem, Oregon 97301  
Voice: (503) 986-3572 Fax: (503) 986-4063  
Timothy.w.burks@odot.state.or.us

### **COUNTERMEASURE LIST WITH CRASH REDUCTION FACTORS:**

Tim Burks, Oregon DOT (listed above)