

Appendix F1:  
Amador and Alpine  
Counties State Route  
SSAR Project

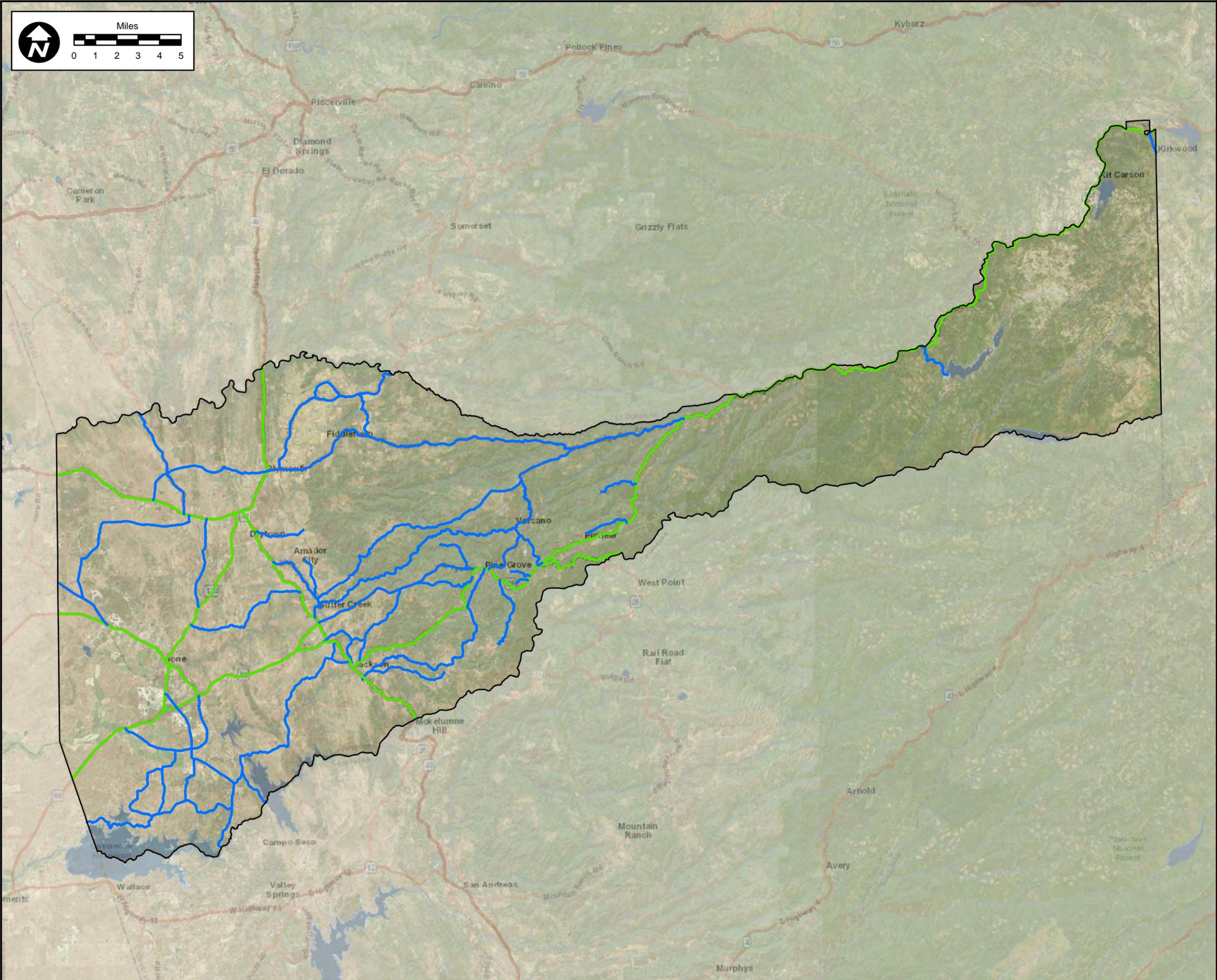


# RSSA Project Overview Amador County

## Map Features

### RSSA Segments

-  County Road (+/- 210 mi)
-  State Route (+/- 126 mi)



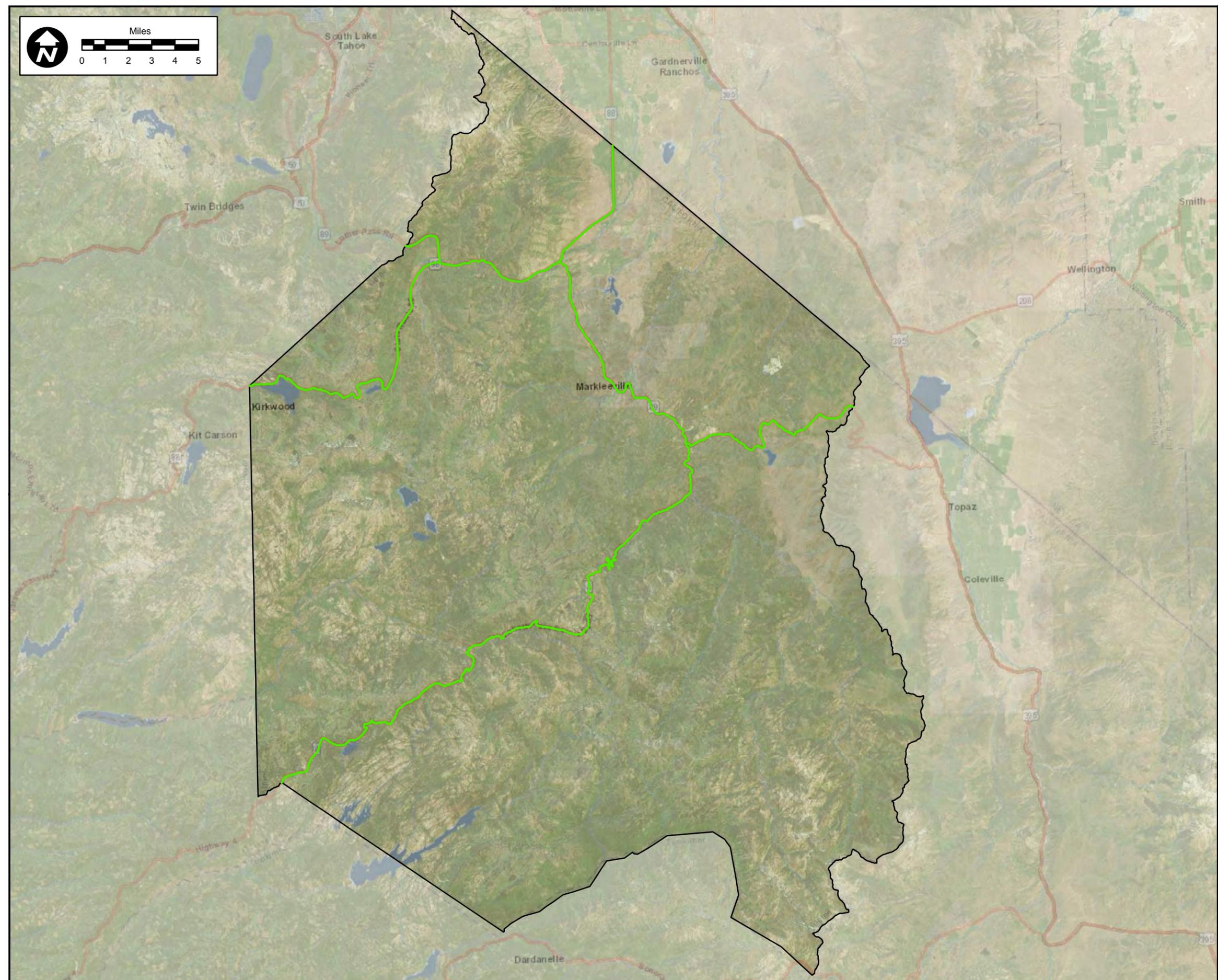


# RSSA Project Overview Alpine County

## Map Features

### RSSA Segments

 State Route (+/- 81 mi)



Print Form

# HSIP ANALYZER

## Cost Estimate, Crash Data and Benefit Cost Ratio (BCR) Calculation for Highway Safety Improvement Program (HSIP) Application

**Important:** Review and follow the step-by-step instructions in "[Manual for HSIP Analyzer](#)". Completing the HSIP Analyzer without referencing to the manual may result in an application with fatal flaws that will be disqualified from the ranking and selection process.

All yellow highlighted fields must be filled in. The gray fields are calculated and read-only. This is a dynamic form (later steps vary depending on the data entered in earlier steps). If any error messages in red appear, fix the errors prior to proceeding to the next steps.

### 1. Application ID, Project Location and Project Description (copy from the HSIP Application Form):

Application ID:

10-Amador Alpine-01

Save this file using the Application ID plus "Calc" as the file name (e.g. "07-Los Angeles-01Calc.pdf").

Project Location:

(limited to 250 characters)

Various state routes within Amador and Alpine Counties

Project Description:

(limited to 250 characters)

Conduct a roadway signing and safety audit (RSSA) and remove/install/relocate roadway signs based off of RSSA recommendations.

### 2. Application Category (Check one):

#### Application Categories that require a Benefit Cost Ratio (BCR):

Common BCR Application       Set-aside for High Friction Surface Treatment

#### Application Categories that do NOT require a Benefit Cost Ratio (BCR):

Set-aside for Guardrail Upgrades       Set-aside for Horizontal Curve Signing  
 Set-aside for Pedestrian Crossing Enhancements       Set-aside for Tribes

#### Dual consideration?

If an Application Category that does not require a BCR is selected above, check this box to indicate your desire that this application will be considered as a Common BCR Application as well in case it does not get selected for funding under the set-aside category. If this box is checked, a benefit cost analysis is required so the project will have a BCR.

A safety benefit cost analysis is required for this application. This tool will guide through cost estimate, safety benefit evaluation and Benefit Cost Ratio (BCR) calculation.

## Section I. Construction Cost Estimate and Cost Breakdown

The purpose of this section is to:

- Provide detailed engineer's estimate (for construction items only). The costs for other phases (PE, ROW, and CE) will be included in Section II.
- Test if countermeasures (CMs) (up to 3) are eligible for being used in the project benefit calculation. For a CM to be used in the project benefit calculation, the construction cost of the CM must be at least 15% of the project's total construction cost, unless an exception is requested. And
- Determine the project's maximum Federal Reimbursement Ratio (FRR).

### I.1 Select up to 3 countermeasures (CMs) to be tested in the Engineer's Estimate:

Number of CMs to be used in this project:

CM No. 1:	R26: Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)
CM No. 2:	R27: Install chevron signs on horizontal curves
CM No. 3:	R28: Install curve advance warning signs

### I.2 Detailed Engineer's Estimate for Construction Items:

**Cost breakdown by CMs.** For each item, enter a cost percentage for each of the CMs and "Other Safety-Related" (OS) components. (e.g. enter 10 for 10%). The cost % for "Non-Safety-Related" (NS) components is calculated.

	No.	Item Description	Unit	Quantity	Unit Cost	Total	% for CM#1 (R26)	% for CM#2 (R27)	% for CM#3 (R28)	% for OS*	% for NS**
+ -	1	Mobilization	LS	1	\$77400.00	77,400	33%	33%	33%	0%	1
+ -	2	Traffic Control	LS	1	\$61900.00	61,900	33%	33%	33%	0%	1
+ -	3	Conduct RSSA	MI	207	\$1400.00	289,800	33%	33%	33%	0%	1
+ -	4	Sign Construction	MI	207	\$2200.00	455,400	33%	33%	33%	0%	1
		Weighted Average (%)					33%	33%	33%		1%
		Total (\$)				\$884,500					

\* % for OS: Cost % for Other Safety-Related components;

\*\* % for NS: Cost % for Non Safety-Related components.

Contingencies, as % of the above "Total" of the construction items:

(e.g. enter 10 for 10%)

Total Construction Cost (Con Items & Contingencies):

(Rounded up to the nearest hundreds)

### I.3 Summary

3 CM(s) are eligible to be used in the project benefit calculation.

Countermeasure ID	Federal Funding Eligibility (FFE)	Cost %	Eligible to be used in benefit calculation?	Request exception to the 15% rule*
R26	100%	33.00%	Yes (>=15% cost)	<input type="checkbox"/>
R27	100%	33.00%	Yes (>=15% cost)	<input type="checkbox"/>
R28	100%	33.00%	Yes (>=15% cost)	<input type="checkbox"/>

\*By requesting an exception to the 15% rule, the CM with less than 15% of the construction cost will then be eligible to be used in the benefit calculation. if an exception is requested for any CM(s) above, please provide the reason (low cost treatment with significant safety benefits, etc.):

Project's Maximum Federal Reimbursement Ratio = 100.0%

The project's Maximum Federal Reimbursement Ratio is calculated as the least of the FFEs of the above countermeasures, minus the percentage of the non-safety related costs in excess of 10%. This is the maximum value allowed to be entered in "HSIP/Total (%)" column in Section II (Project Cost Estimate).

## Section II. Project Cost Estimate

All project costs, for all phases and by all funding sources, must be accounted for on this form.

- i. "**Total Cost**": Round all costs up to the nearest hundred dollars.
- ii. "**HSIP/Total (%)**": The maximum allowed is the project's Federal Reimbursement Ratio (FRR) as determined in Section I. Click the button to assign the maximum to all, OR enter if not the maximum.
- iii. "**HSIP Funds**" and "**Local/Other Funds**" are calculated.

Pay attention to the interactive warning/error messages below the table. The messages, if any, must be fixed, or exceptions should be justified in Question No. 5 in Section II of the HSIP Application Form.

Project's maximum Federal Reimbursement Ratio (FRR)  
(from Section I, rounded up to integer)

To set all "HSIP/Total (%)" in the below table  
to the above maximum FRR, click "Set":

Description	Total Cost	HSIP/Total (%)	HSIP Funds	Local/Other Funds
<b>Preliminary Engineering (PE) Phase</b>				
Environmental	\$97,300	100 %	\$97,300	\$0
PS&E	\$145,900	100 %	\$145,900	\$0
<b>Subtotal - PE</b>	<b>\$243,200</b>	<b>100 %</b>	<b>\$243,200</b>	<b>\$0</b>
<b>Right of Way (ROW) Phase</b>				
Right of Way Engineering	\$0	100 %	\$0	\$0
Appraisals, Acquisitions & Utilities	\$0	100 %	\$0	\$0
<b>Subtotal - Right of Way (ROW)</b>	<b>\$0</b>	<b>%</b>	<b>\$0</b>	<b>\$0</b>
<b>Construction (CON) Phase</b>				
Construction Engineering (CE)	\$145,900	100 %	\$145,900	\$0
Construction Items	\$973,000 (Read only - from Section I)	100 %	\$973,000	\$0
<b>Subtotal - Construction</b>	<b>\$1,118,900</b>	<b>100 %</b>	<b>\$1,118,900</b>	<b>\$0</b>
<b>PROJECT TOTAL</b>	<b>\$1,362,100</b>	<b>100 %</b>	<b>\$1,362,100</b>	<b>\$0</b>

Agency does NOT request HSIP funds for PE Phase (automatically checked if PE - HSIP funds is \$0).

### Interactive Warning/Error Messages:

If there are any messages in the below box, please fix OR explain justification for exceptions in Question No 5, Section II in the HSIP Application.

## Section III. Project Location Groups, Countermeasures and Crash Data

The benefit of an HSIP safety project is achieved by reducing potential future crashes due to the application of the safety countermeasures (CMs). In this section, you will need to provide information regarding the project's safety CMs and historical crash data at the project sites. The data will be used to estimate the project benefit in Section IV.

### 1. Divide the project locations into groups.

It is quite often that an HSIP project has multiple locations. Theoretically the benefit for every single location may be calculated separately and then sum them up. However, that may be time consuming or almost impossible when there are a lot of locations. It is more efficient that the project locations with exactly the same safety countermeasures are combined into a group. The benefits of the locations in the same group can then be calculated at once.

#### When only one group is needed:

If your project consists of only one location or multiple locations that have similar features, address similar safety issues and utilize the same countermeasure(s). The crash data of all the locations can be combined and only one group is needed.

#### When multiple groups are needed:

If your project include multiple locations that have various safety issues and the proposed safety improvements (countermeasures) are not exactly the same for all the locations. The locations must be divided into different groups. The project benefits are then calculated multiple times, once for each location group. The project total benefit is the sum of the benefits from the different groups.

It should be noted that within a group, all locations should be of the same type: Signalized Intersection (S), Non-Signalized Intersection (NS), or Roadway (R).

If necessary, you may explain the location grouping for your project in details in Question No. 3 (Crash Data Evaluation), Section II in the HSIP Application Form.

### 2. After the number of location groups is entered, one subform will be populated for each location group. For each location group:

1) First, select the applicable CMs. *Note: If a Roundabout CM (S18 or NS4A or NS4B) is selected, additional information is required.*

For each group, only the CMs of the same type as the group location type can be used. For example, if a group consists of 5 signalized intersections, only "Signalized Intersection" CMs may be used for this group.

2) Based on the selected CMs, crash data tables of the required types are displayed for data entry.

Different CMs will reduce crashes of different types during the life of the safety improvements. Depending on the selected CMs for the group, you will be required to fill in one or more crash data tables, for any combination of the five crash types (datasets): "All" , "Night" , Ped & Bike", "Emergency Vehicle", and "Animal" (Each of the later four datasets is a sub-dataset of the "All" dataset.)

For more information regarding grouping project locations and examples, please refer to the Manual for HSIP Analyzer.

### III.1 List of Project Locations and Location Groups

List all locations/sites included in this project by groups. The locations entered in Table III.1 below will be automatically populated in the crash data tables in III.2.

Based on the criteria described on the last page, the locations/sites need to be divided into **1** groups.

**Table III.1 List of Project Locations by Groups**

Highlighted fields must be filled in. For each group:

- 1) Must select a Location Type;
- 2) Initially each group has one location line. Click "+"/"-" to add a new line/delete an existing line;
- 3) Enter location description for each line. The same descriptions will be auto-populated in III.2.

\*Note: If your project has a large number of locations, please aggregate some locations into one description, e.g. 10 stop controlled intersections, 5 horizontal curves, etc., as long as they have similar features and the safety improvements to be implemented are the same.

	No.	No. in Group	Location Description (Intersection Name or Road Limit or General Description)	
	<b>GROUP 1</b>		Select Location Type:	R (Roadways)
+ -	1	G1-1	Various State Routes within Amador and Alpine Counties	

### III.2: Countermeasures and Crash Data

(Repeats for each location group)

#### Countermeasures and Crash Data -Location Group No. 1 of 1

[Hide Group Details](#)

#### Step 1: Select countermeasure(s) to be applied to this location group

This group's location type: R (Roadways)

Please check the CMs for this location group. All the CMs that have passed the test in Section I AND match the location type of this group are listed below.

	No.	Countermeasure (CM) Name	CM Type*	Crash Reduction Factor (CRF)	Expected Life (Years)	Crash Type	Federal Funding Eligibility
<input type="checkbox"/>	1	R26: Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)	R	0.15	10	All	100%
<input type="checkbox"/>	2	R27: Install chevron signs on horizontal curves	R	0.4	10	All	100%
<input type="checkbox"/>	3	R28: Install curve advance warning signs	R	0.25	10	All	100%
*CM Type: S-Signalized Intersection; NS-Non-Signalized Intersection; R-Roadway.							

#### Step 2: Provide crash data.

2.1 Crash Data Period: must be between 3 and 5 years.

from (MM/DD/YYYY):  To (MM/DD/YYYY):  Crash Data Period (years) = 5

2.2 Fill out the crash data table(s) for the crash type(s) as required by the selected countermeasure(s) in Step 1.

Based on the countermeasures selected in Step 1, the crash data types to be provided are:

(Unknown - No countermeasures selected)

## Section IV. Calculation and Results

Click the "Calculate" button to calculate. The script will first check if there are any errors or inconsistencies in the countermeasure selections and crash data. If errors are detected and displayed below, the errors must be fixed first before you click the "Calculate" button again. If no errors are displayed, the calculation results are provided in this section. Please refer to the Manual for HSIP Analyzer for details regarding possible errors.

Calculate

### Project Summary Information:

Project Total Cost: 1362100

3 countermeasures are eligible in benefit calculation. ( R26 R27 R28)

Project location(s) are divided into 1 group(s) for calculating the benefits.

### IV.1 Benefit Summary by location groups

Group No.	Group Info/Data*	Benefit from CM #1	Benefit from CM #2	Benefit from CM #3	Total Benefit of the group
1	Location type: R (Roadways) Number of location(s): 1 Number of selected countermeasure(s): 3 ( R26 R27 R28) Crash Data Information: Crash data period (years): 5 Number of crashes(F/SI/OVI/I-CP/PDO)*: All: 34,60,215,240,718	\$55,789,404	\$148,771,744	\$92,982,340	\$297,543,488
<b>Sum</b>		<b>\$55,789,404</b>	<b>\$148,771,744</b>	<b>\$92,982,340</b>	<b>\$297,543,488</b>

\*Number of crashes: five crash numbers are for Fatal (F), Severe Injury (SI), Other Visible Injury (OVI), Injury - Complaint of Pain (I-CP), and Property Damage Only (PDO), respectively.

### IV.2. Project Benefit and BCR Summary

No.	Countermeasure Name	Benefit	Cost	Resulting B/C
1	R26	55,789,404	\$454,033	122.9
2	R27	148,771,744	\$454,033	327.7
3	R28	92,982,340	\$454,033	204.8
	<b>Entire Project</b>	<b>297,543,488</b>	<b>\$1,362,100</b>	<b>218.4</b>

### \*\*\*Data to be transferred to the HSIP Application Form\*\*\*

This section is generated automatically once the data entry and calculation have been completed. Transfer the data on this page to Section III of the HSIP Application Form.

#### Safety Countermeasure Information

Number of countermeasures: 3

R26: Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)

R27: Install chevron signs on horizontal curves

R28: Install curve advance warning signs

#### Cost, FRR, Benefit and BCR:

Total Project Cost:	\$1,362,100
HSIP Funds Requested:	\$1,362,100
Max. Federal Reimbursement Ratio (FRR):	100%
Total Expected Benefit:	297,543,488
Benefit Cost Ratio:	218.44