

# All Roads Transportation Safety (ARTS) Program Hot Spot

ODOT Region 1 Kick-Off Meeting  
March 18, 2015

# Agenda

- Introductions
- Purpose of the Meeting
- Project Background
- Hot Spot Analysis Process
- Next Steps
- Region 1 Hot Spot Leads





# Project Background



All Roads Transportation Safety

# ARTS Background

- ODOT met with representatives from League of Oregon Cities (LOC) and Association of Oregon Counties (AOC)
  - ✓ Need for developing a safety program for all public roads
  - ✓ Memorandum of understanding between ODOT, AOC, and LOC
- Agreed to All Roads Transportation Safety (ARTS) program

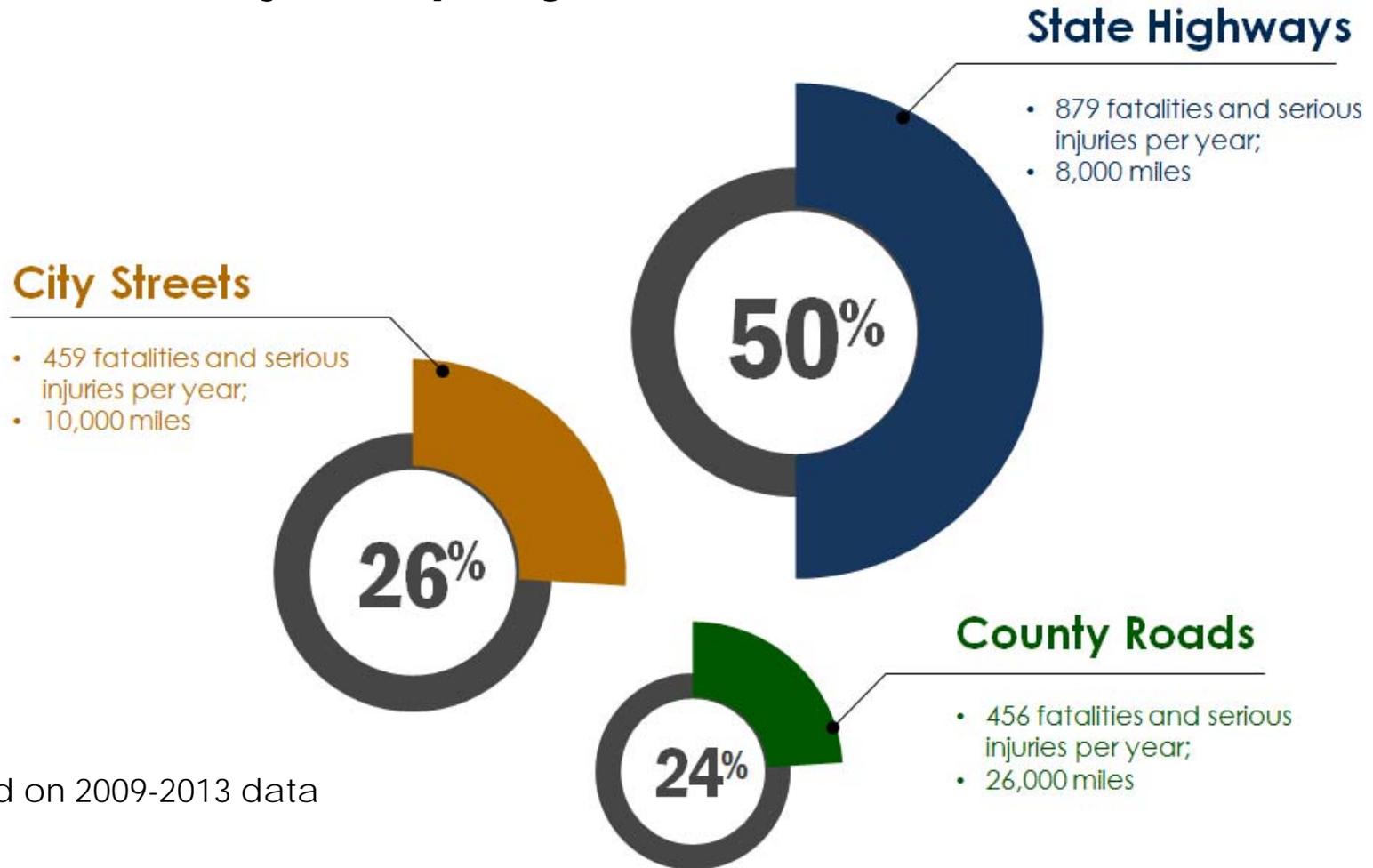


**All Roads Transportation Safety**



**HSIP funding was traditionally only spent on State Highways, but 50% of our Fatal and Serious Injury crashes occur on local agency roads**

# Oregon averages 1,800 fatalities and serious injuries per year



Based on 2009-2013 data

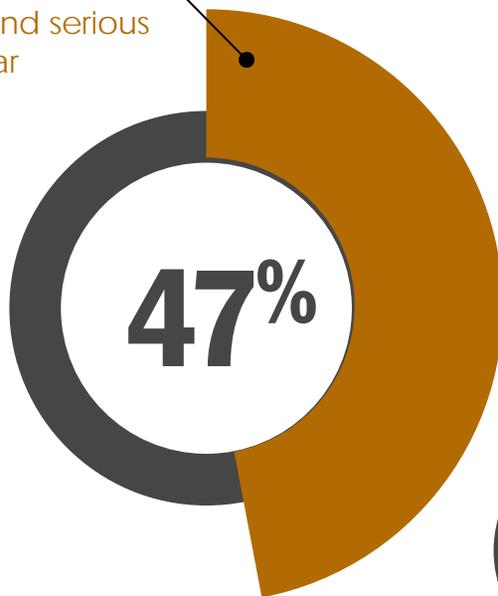


## All Roads Transportation Safety

# Region 1 averages 580 fatalities and serious injuries per year (1,800 Statewide)

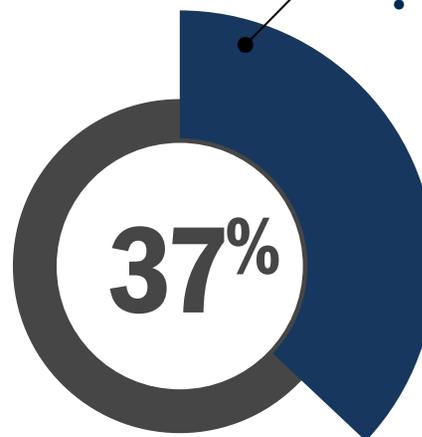
## City Streets

- 273 fatalities and serious injuries per year



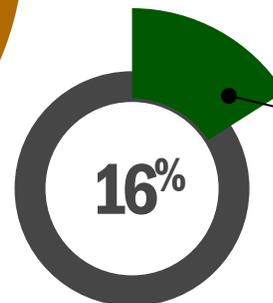
## State Highways

- 214 fatalities and serious injuries per year;



## County Roads

- 97 fatalities and serious injuries per year;



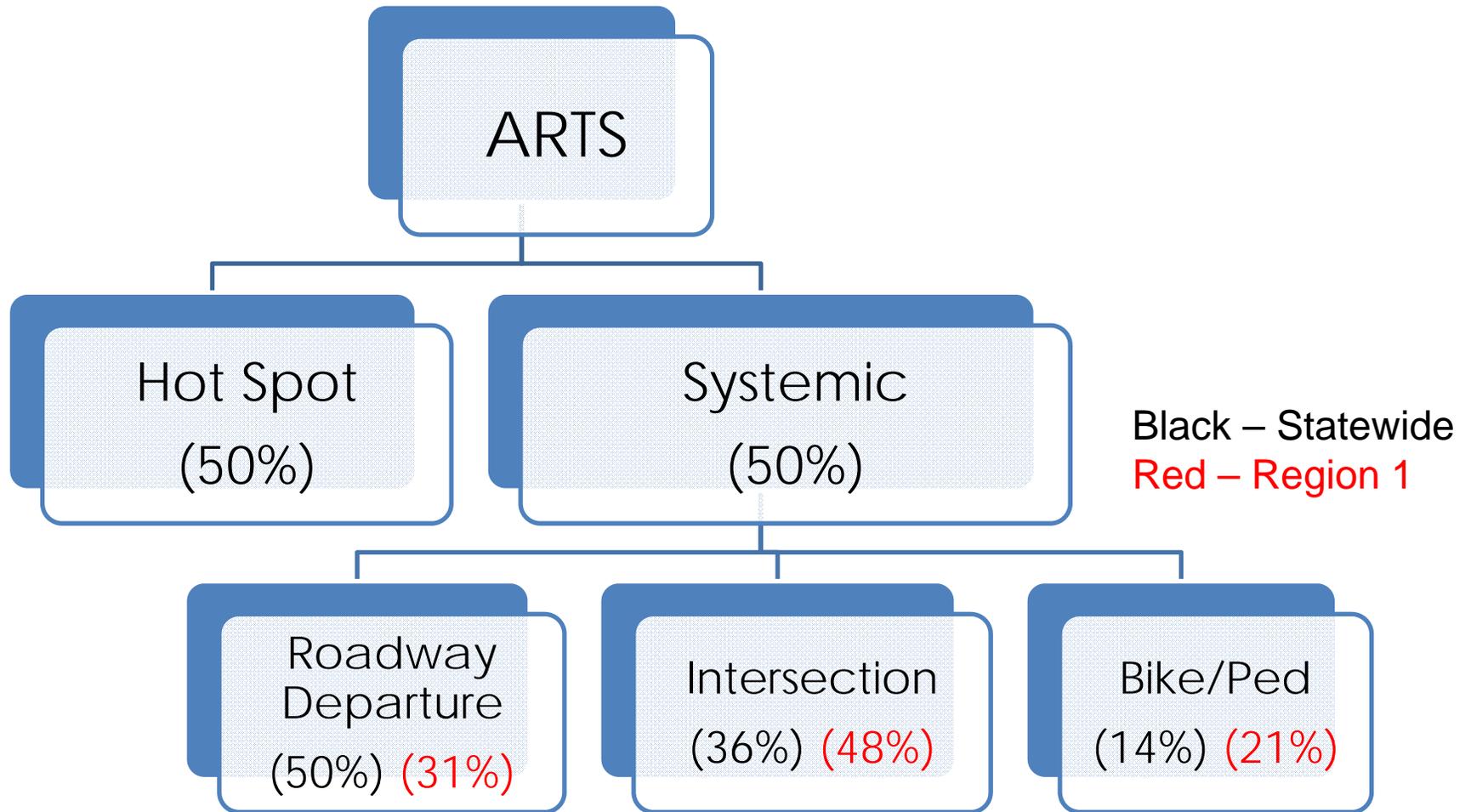
# ARTS Program Goals

- Select the best projects to reduce fatalities and serious injuries
- Address safety on all roads
- Data-driven and blind to jurisdiction



All Roads Transportation Safety

# ARTS Program



Numbers in ( ) represent approximate funding split



All Roads Transportation Safety

# ARTS Hot Spot Funding (2017-2021)

- Funding will be allocated to ODOT Regions based on Fatal & Serious Injury crashes
- Required 7.78% Local Agency match

Region	2017	2018	2019	2020	2021	5-Yr Total
1	\$6,064,985	\$6,064,985	\$5,084,683	\$5,084,683	\$5,084,683	\$27,384,019
2	\$6,323,450	\$6,323,450	\$5,197,753	\$5,197,753	\$5,197,753	\$28,240,159
3	\$2,746,225	\$2,746,225	\$2,461,453	\$2,461,453	\$2,461,453	\$12,876,808
4	\$2,130,150	\$2,130,150	\$1,605,598	\$1,605,598	\$1,605,598	\$9,077,093
5	\$1,196,690	\$1,196,690	\$1,073,298	\$1,073,298	\$1,073,298	\$5,613,273
<b>Total</b>	<b>\$18,461,500</b>	<b>\$18,461,500</b>	<b>\$15,422,784</b>	<b>\$15,422,784</b>	<b>\$15,422,784</b>	<b>\$83,191,352</b>



All Roads Transportation Safety

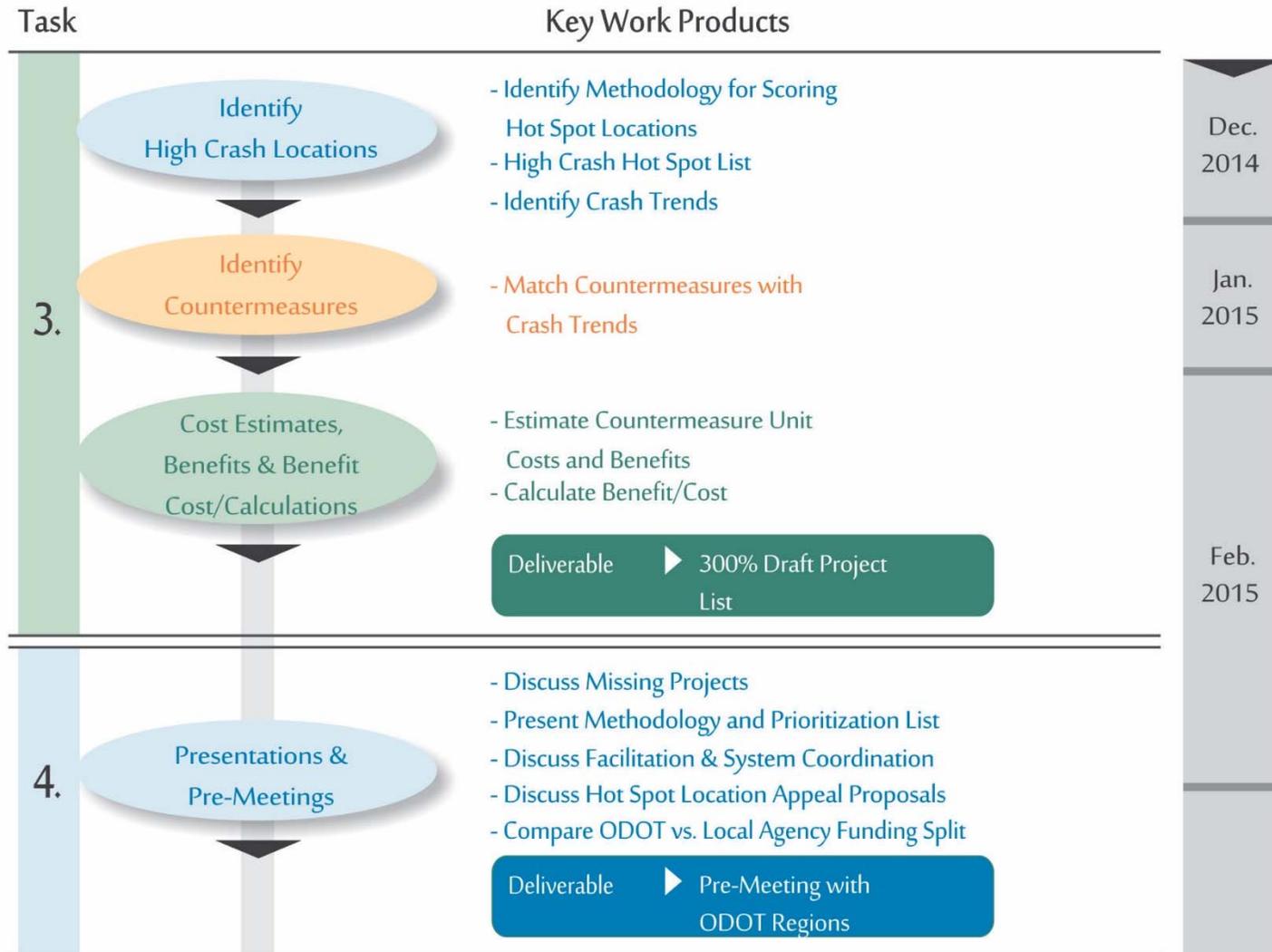


# Hot Spot Analysis Process



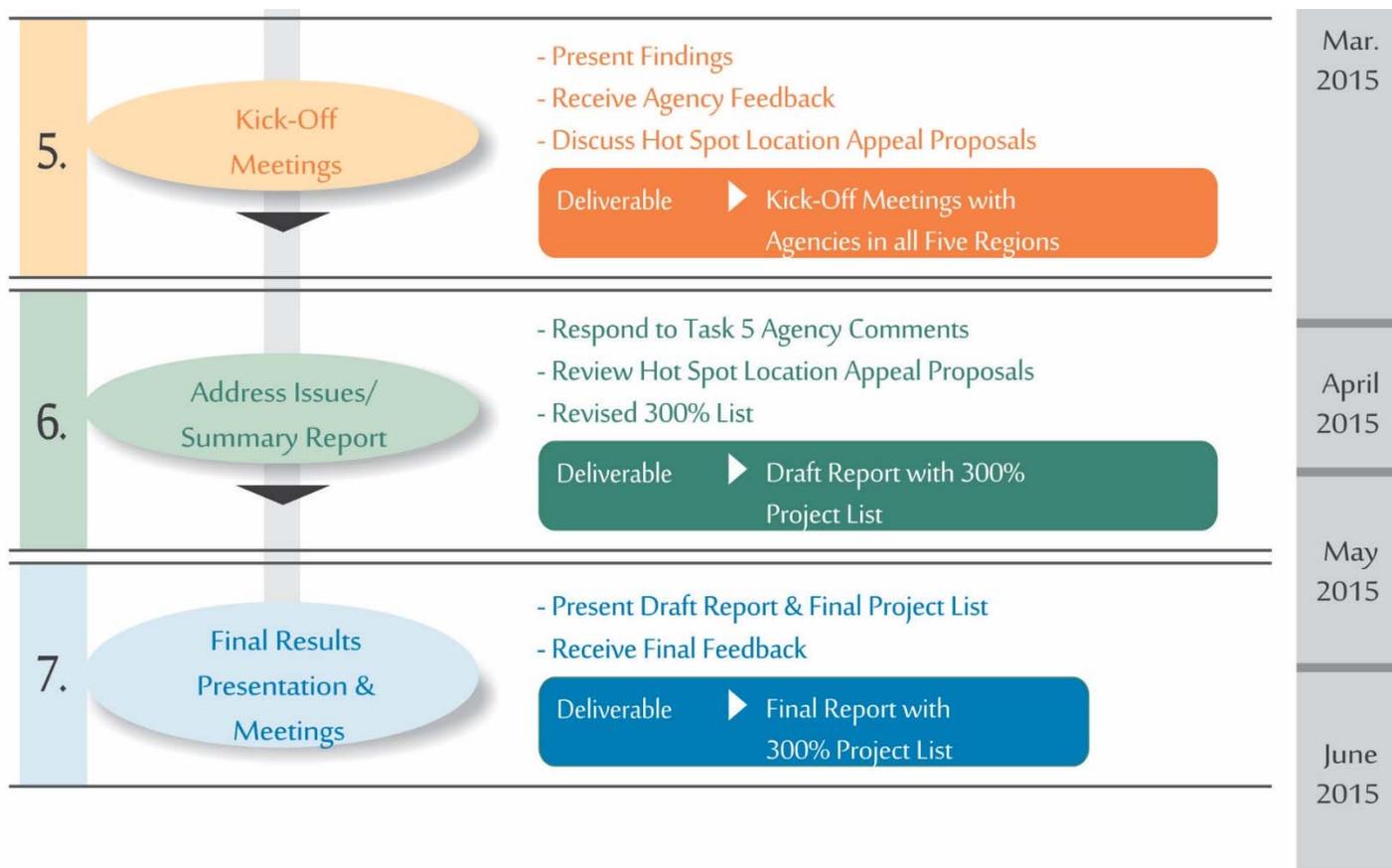
All Roads Transportation Safety

# ARTS Process and Timeline

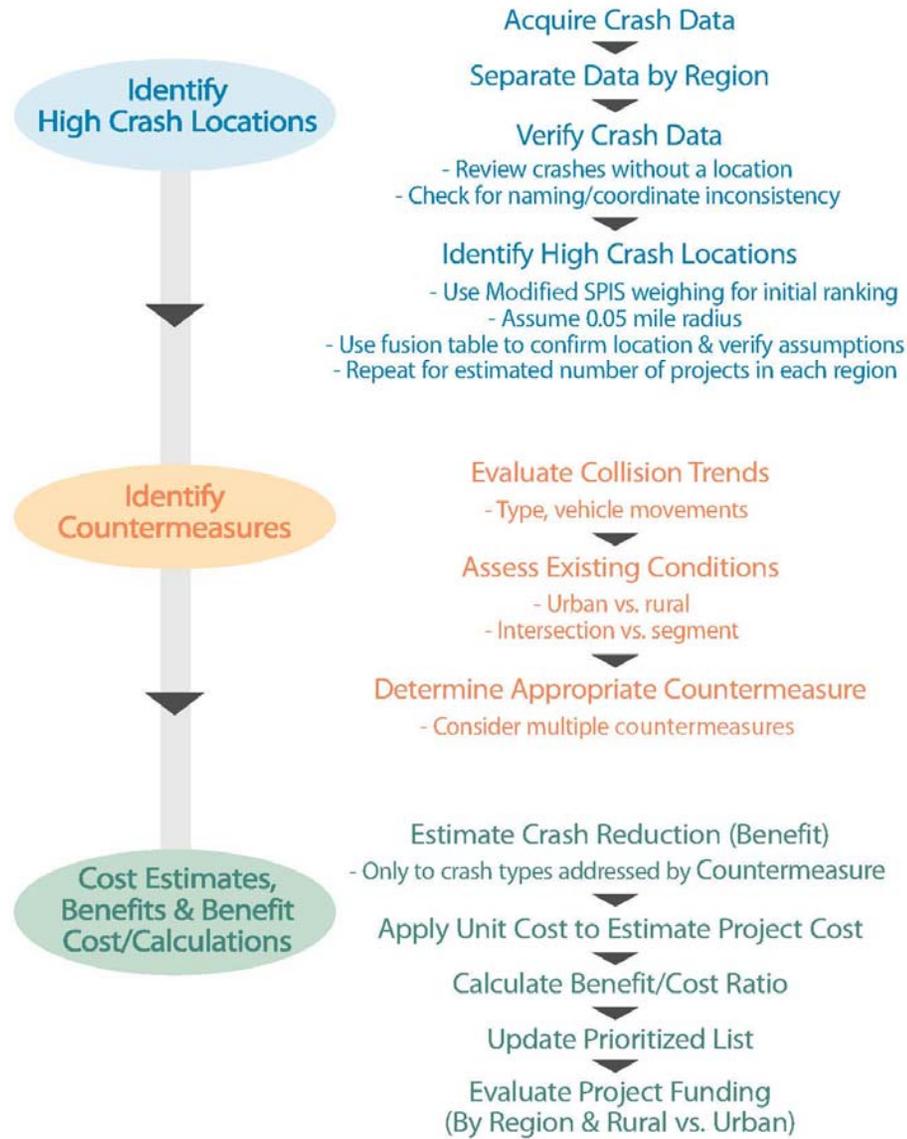


All Roads Transportation Safety

# ARTS Process and Timeline



# ARTS Process



All Roads Transportation Safety

# ODOT Crash Data

- ARTS Hot Spot analysis based on ODOT Collision Records
- 5 Years of crash Data (2009 – 2013)
- ODOT data unbiased and consistent
- No additional collision data considered for hot spot analysis

Crash ID	Crash Year	Street Number	Nearest Intersecting Street Number	Collision Type	Crash Severity	Weather Condition	Road Surface Condition	Light Condition
1355116	2009	810	5209	3	5	2	2	1
1399940	2010	810	5209	9	5	1	4	2
1374464	2010	810	933	1	4	1	1	1
1403260	2011	810	5185	3	4	1	1	2
1421960	2011	810	5185	3	5	1	1	1
1309863	2008	810	5209	6	5	6	3	1
1231845	2007	810	933	3	5	1	1	1
1233602	2007	810	933	3	5	1	1	1



All Roads Transportation Safety

# Hot Spot Identification

- Only considered locations with at least one Fatal or Injury A crash
- Used 250' radius in urban setting and 500' radius in Rural setting
- Created initial ranking based on ODOT SPIS severity calculation

## Severity Scoring Assumptions

- 100 points for Fatal or Injury A
- 10 points for Injury B or Injury C
- 1 point for Property Damage Only



# Countermeasures

- Used ODOT's Approved Crash Reduction Factor List
- Countermeasures split into 4 categories:
  - Hot Spot
  - Intersection Systemic
  - Bike/Pedestrian Systemic
  - Roadway Departure Systemic



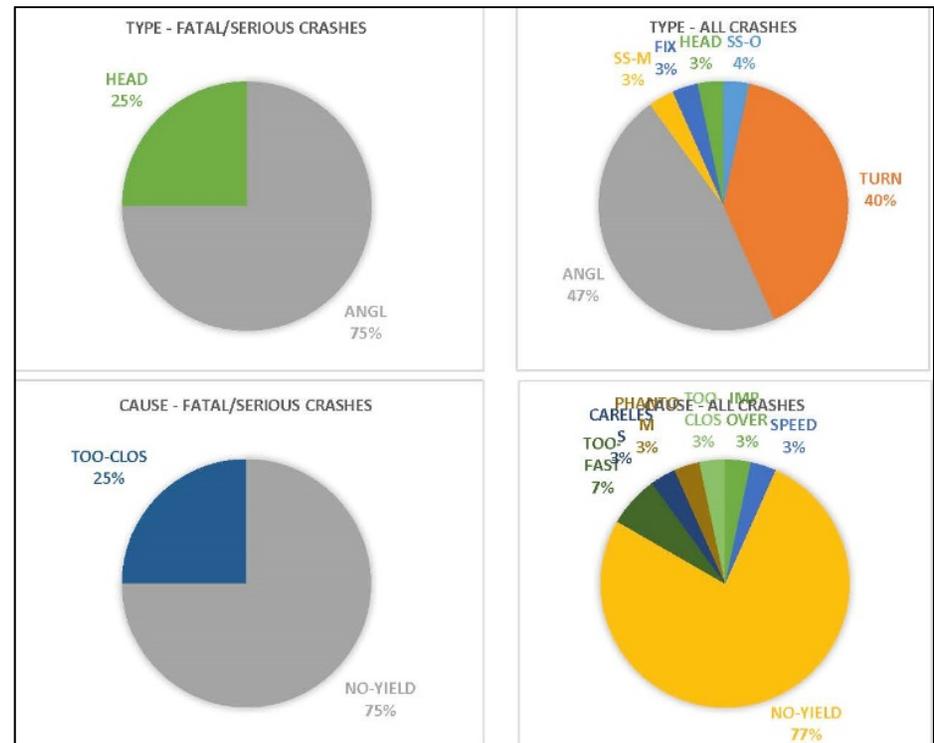
Systemic or Hotspot	Consider for Hotspot	Countermeasure Number	Countermeasure	Crash Type	Injury, PDO or All	Service Life (Yea)	Existing Intersection Traffic Control	Urban or Rural	CRF %
Hotspot	NA	H1	Median U-Turn Intersection Treatment	All	All Injury	20	Signal or Non Signal	Either	30
Hotspot	NA	H4	Right Turn Lane on Single Major Road Approaches: Signalized Intersection (3- or 4-leg)	All	All	20	Signal	Either	4
	NA	H5	Right Turn Lane on Both Major Road Approaches: Signalized Intersection (3- or 4-leg)	All	All	20	Signal	Either	8
Hotspot	NA	H6	Channelized Right Turn Lane with Raised Median	All	All	20	Signal or Non Signal	Either	35
Hotspot	NA	H11	Left Turn Lane on Single Major Road Approach: Urban, Signalized Intersection (3-leg)	All	All	20	Signal	Urban	7
	NA	H12	Left Turn Lane on Both Major Road Approaches: Urban, Signalized Intersection (4-leg)	All	All	20	Signal	Urban	19



All Roads Transportation Safety

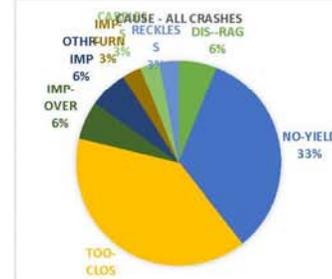
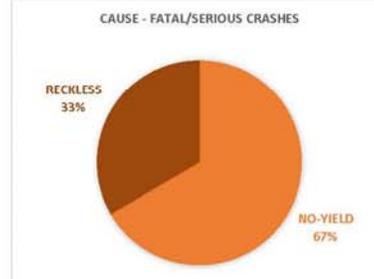
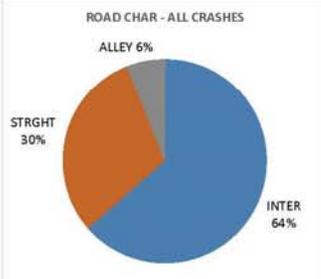
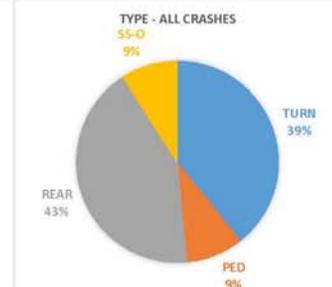
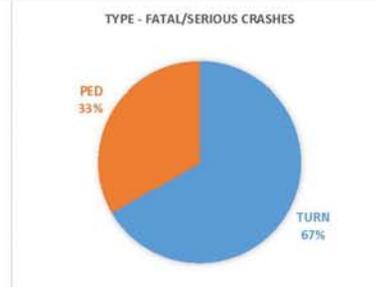
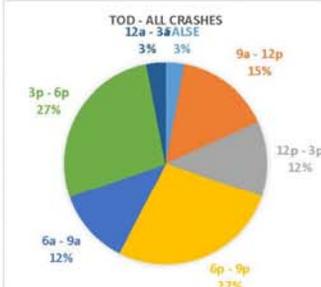
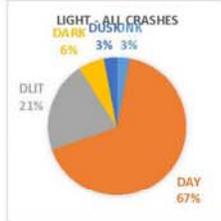
# Countermeasure Identification

- Evaluated crash trends at each location to determine appropriate countermeasures





**Location ID** 179  
**Road Control** PORTLAND CITY STREET  
**County** Multnomah  
**City** Portland SE  
**Urban Area** PORTLAND UA  
**Route Name** 0  
**Route M.P.** 0  
**Street Name** SE HOLGATE BLVD  
**Intersecting Street** SE 112TH AVE  
**Number of Crashes** 33 (3 F&A)



**Severe Crash Characteristics**

Crash	Severity	Type - Event	Pave	Weather	Light	Cause	V1 Mvnt	V1 From	V1 To	V2 Mvnt	V2 From	V2 To	Ped Inv?	Bike Inv?	SPD/ALC/DRG	Date	ToD	Road Char
1343018	Inj A	PED	WET	RAIN	DAY	NO-YIELD	TURN-L	N	E					1	0 / 0 / 0	11/20/2009	9a - 12p	INTER
1420046	Inj A	TURN	DRY	CLR	DAY	NO-YIELD	STRGHT	E	W	TURN-L	W	N		0	0 / 0 / 0	6/16/2011	6a - 9a	INTER
1481001	Inj A	TURN	DRY	CLR	DAY	RECKLESS	TURN-L	W	N	STRGHT	E	W		0	0 / 1 / 0	8/22/2012	6p - 9p	INTER

**Countermeasures**

ID	Description	Notes	Project Group #	Estimated Benefit	Estimated Cost	Estimated B/C Ratio	Other Notes
I2	Improve Signal Hardware: Lenses, ReflectORIZED Back plates, Size, and Number	Supplemental heads	1	\$ 2,517,000.00	\$ 30,000.00	83.9	
I5	Replace Urban Permissive Left Turns to Protected/Permissive	EB and WB lefts currently permissive. Street view shows lack of storage in left turn pocket for EB traffic.	1	\$ 1,214,000.00	\$ 28,000.00	43.4	
BP3	Install Urban Leading Pedestrian or Bicycle Interval at Signalized Intersection	Three ped crashes	1	\$ 580,000.00	\$ 1,000.00	580.0	



# All Roads Transportation Safety

# Cost Estimates

- Develop standard cost for each countermeasure, including:
  - 100% Markup for Design, Contingency and Temporary Traffic Control
  - Additional markup for HAZMAT mitigation depending on countermeasure
- Adjusted cost based on specific location characteristics that are not included in standards cost estimate

ID	Name	Unit	Traffic Cost	Civil Cost	Markup	R/W	HAZMAT	Total
H1	Median U-Turn Intersection Treatment	EA		\$ 275,000	\$ 181,500	\$ 20,000	\$ 82,500	\$ 559,000.00
H2	Right turn lane for single major road approach, unsignalized	EA	\$ 2,000	\$ 87,000	\$ 58,740	\$ 17,186	\$ 26,100	\$ 192,000.00
H3	Right turn lane for both major road approach, unsignalized	INT (2 approaches)	\$ 4,000	\$ 174,000	\$ 117,480	\$ 34,373	\$ 52,200	\$ 383,000.00
H4	Right turn lane on single major road approach, signalized	EA	\$ 84,000	\$ 81,000	\$ 108,900	\$ 23,008	\$ 24,300	\$ 322,000.00
H5	Right turn lane on both major road approach, signalized	INT (2 approaches)	\$ 168,000	\$ 162,000	\$ 217,800	\$ 46,015	\$ 48,600	\$ 643,000.00
H6	Channelized right turn lane w/raised median	EA	\$ 104,000	\$ 436,000	\$ 356,400	\$ 53,325	\$ 130,800	\$ 1,081,000.00
H7	Left turn lane on single major road approach, urban, unsignalized	EA	\$ 2,000	\$ 321,000	\$ 213,180	\$ 117,740	\$ 96,300	\$ 751,000.00
H8	Left turn lane on both major road approach, urban, unsignalized	INT (2 approaches)	\$ 4,000	\$ 642,000	\$ 426,360	\$ 235,480	\$ 192,600	\$ 1,501,000.00
H9	Left turn lane on single major road approach, rural, unsignalized	EA	\$ 2,000	\$ 410,000	\$ 271,920	\$ 89,816	\$ 123,000	\$ 897,000.00
H10	Left turn lane on both major road approach, rural, unsignalized	INT (2 approaches)	\$ 4,000	\$ 667,000	\$ 442,860	\$ 179,632	\$ 200,100	\$ 1,494,000.00
H11	Left turn lane on single major road approach, urban, signalized	EA	\$ 150,000	\$ 321,000	\$ 310,860	\$ 117,740	\$ 96,300	\$ 996,000.00



# Benefit/Cost Ranking

- Utilized ODOT's Benefit/Cost Calculation Spreadsheet (see ARTS website)
- Projects Ranked Based on Benefit/Cost Ratio
- Combined Benefit/Cost Ratio when Multiple Countermeasures Proposed

	<b>OREGON DEPARTMENT OF TRANSPORTATION HIGHWAY SAFETY PROJECTS BENEFIT/COST ANALYSIS WORKSHEET</b>						
Project Name:	<input type="text"/>	Region:	<input type="text"/>	Date:	<input type="text"/>		
<i>Project on Local Agency Facility</i>							
Route Number:	<input type="text"/>	Street Name:	<input type="text"/>	MP Range or Cross Street:	<input type="text"/>		
<i>Project on State Highway</i>							
Route Number:	<input type="text"/>	Hwy Name:	<input type="text"/>	MP From:	<input type="text"/>	To:	<input type="text"/>
Road Character:	<input type="text" value="URBAN"/>	Facility Type:	<input type="text" value="OTHER STATE HIGHWAY"/>				
County:	<input type="text" value="BAKER"/>	City:	<input type="text"/>	Crash Data From:	<input type="text"/>	To:	<input type="text"/>



All Roads Transportation Safety

# Benefit/Cost Calculation

		Fatal Crash Reduction Factor	Injury Crash Reduction Factor	PDO Crash Reduction Factor
Countermeasure 1	112	25%	25%	25%
Countermeasure 2	110	48%	48%	
Countermeasure 3				

Do not enter a CRF value for PDO Crashes if a countermeasure targets "All Injury" crashes only.

	Number of Crashes	Number of Preventable	Economic Value per	Total Economic Value
Fatal Crashes	1	0.6	\$1,680,000	= \$ 1,025,000
Severe (Injury A) Injury Crashes	1	0.6	\$1,680,000	= \$ 1,025,000
Moderate (Injury B) Injury Crashes	1	0.6	\$81,900	= \$ 50,000
Minor (Injury C) Injury Crashes	4	2.4	\$81,900	= \$ 200,000
PDO Crashes	8	2.0	\$19,400	= \$ 39,000

Comprehensive Economic Value per Crash		
Highway Type	Urban	Rural
PDO <sup>3</sup>		
All facilities	\$19,400	\$19,400
Moderate (Injury B) and Minor (Injury C) Injury <sup>4</sup>		
Interstate	\$69,300	\$79,200
Other State Highway	\$70,600	\$81,900
Off System	\$72,400	\$83,900
Fatal and Severe (Injury A) Injury <sup>4</sup>		
Interstate	\$1,150,000	\$2,330,000
Other State Highway	\$1,170,000	\$1,680,000
Off System	\$870,000	\$1,670,000

Uniform Series Present Worth Factor (5%)		
5 years	10 years	20 years
4.33	7.72	12.46

Total Crash Value for 60 Months = \$ 2,339,000

Annual Benefits =  $\frac{\text{Total Crash Value}}{\text{Total Months} / 12}$  = \$ 468,000

Estimated Project Cost = \$ 400,000

B/C Ratio =  $\frac{\text{Annual Benefits} \times \text{Present Worth Factor (10 or 20 years)}}{\text{Estimated Project Cost}}$

B/C Ratio =  $\frac{\$ 468,000 \times 7.72}{\$ 400,000}$  = 9.03



All Roads Transportation Safety



# Next Steps



All Roads Transportation Safety

# Hot Spot 300% List

- Panel of reviewers evaluated crash trends and potential countermeasures at each hot spot location
- Some locations had no feasible countermeasures or had improvements already identified (funded or recently completed) and were removed from 300% list
- Any project to be considered for hot spot funding must be on the final 300% list
- Did a hot spot location get missed?



# Hot Spot Location Appeal Proposal

- Requirements:
  - ✓ Must be the same crash data set used in the screening process
  - ✓ Locations shall have **at least** one Fatal or Serious Injury crash from 2009 to 2013
  - ✓ Countermeasures from ODOT CRF List
  - ✓ Use ARTS Hot Spot Cost Estimates
  - ✓ Prioritized/categorized based on B/C Ratio (using ODOT method)



# Hot Spot Location Appeal Proposal Online

- Maximum 2 proposals per agency

[Print Form](#) [Reset Form](#) [Save As](#)



**Oregon Department of Transportation**  
**All Roads Transportation Safety (ARTS) Program**  
**Hotspot Supplemental Application**

Date:

Agency:  ODOT Region:

City:  County:

**Contact Information**

Name:  Title:

Address:

Email:  Phone:

**Project Location**

Hwy/Street Name:  Hwy No.:

Intersecting Street/MP:

**Crash Information (From ODOT Database)**

The proposed location must have at least one Fatal or Serious Injury Crash between 2009 and 2013.

Number of Crashes between 01/01/2009 and 12/31/2013:

Fatal and Injury A:  Weight: 0.0

Injury B and Injury C:  (This value will be calculated automatically)

Property Damage Only:

Provide a brief description of crash pattern:

**Proposed Countermeasure(s) (Refer to [ODOT CRF List](#))**

Countermeasure No. 1:

Countermeasure No. 2:

Countermeasure No. 3:

**Benefit Cost Analysis (Attach ODOT [Benefit/Cost Analysis Worksheet](#))**

Total Expected Benefit for the Project:

Total Project Cost:

Benefit/Cost Ratio of the Project:

Page 1 of 1



All Roads Transportation Safety

# Next Steps

- Hot Spot Appeal Proposals Due Apr 8th (3 weeks)
- Hot Spot Countermeasure Comments Due Apr 8th (3 weeks)
- Draft Report and Project List in (May)
- Final Region Meetings with Local Agencies (May-June)
- Final Report and Project List (June)





# Questions? and Hot Spot Break out



<http://www.oregon.gov/ODOT/HWY/TRAFFIC-ROADWAY/Pages/ARTS.aspx>