

All Roads Transportation Safety (ARTS) Program

ODOT Region 4 Kick-Off Meeting
March 11, 2015

Agenda

- Introductions
- Purpose of the Meeting
- Project Background
- Hot Spot Analysis Process
- Supplemental Application Process
- Next Steps





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

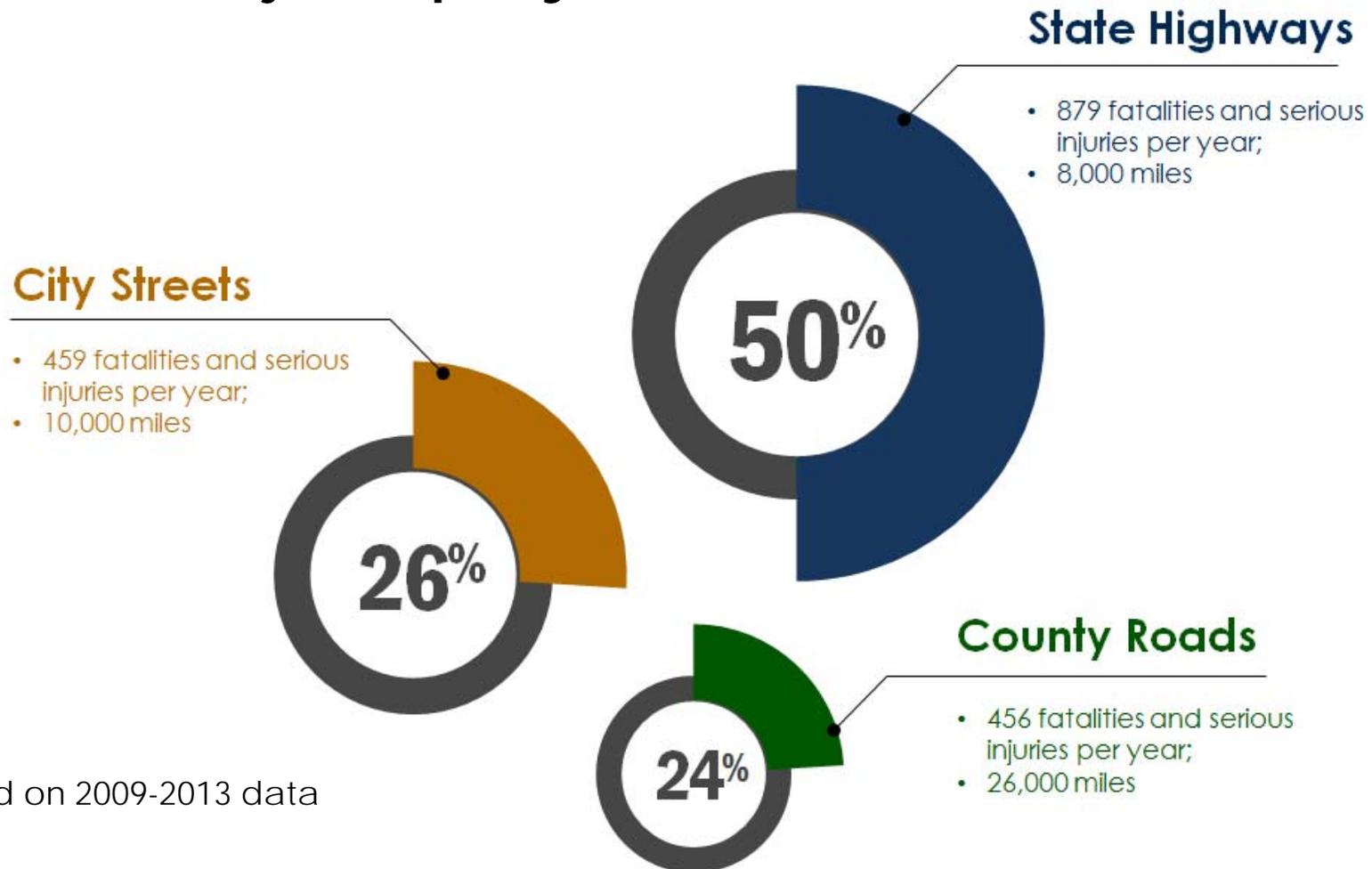


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HSIP funding was traditionally only spent on State Highways, but 50% of our Fatal and Serious Injury crashes occur on local agency roads

Oregon averages 1,800 fatalities and serious injuries per year



Based on 2009-2013 data



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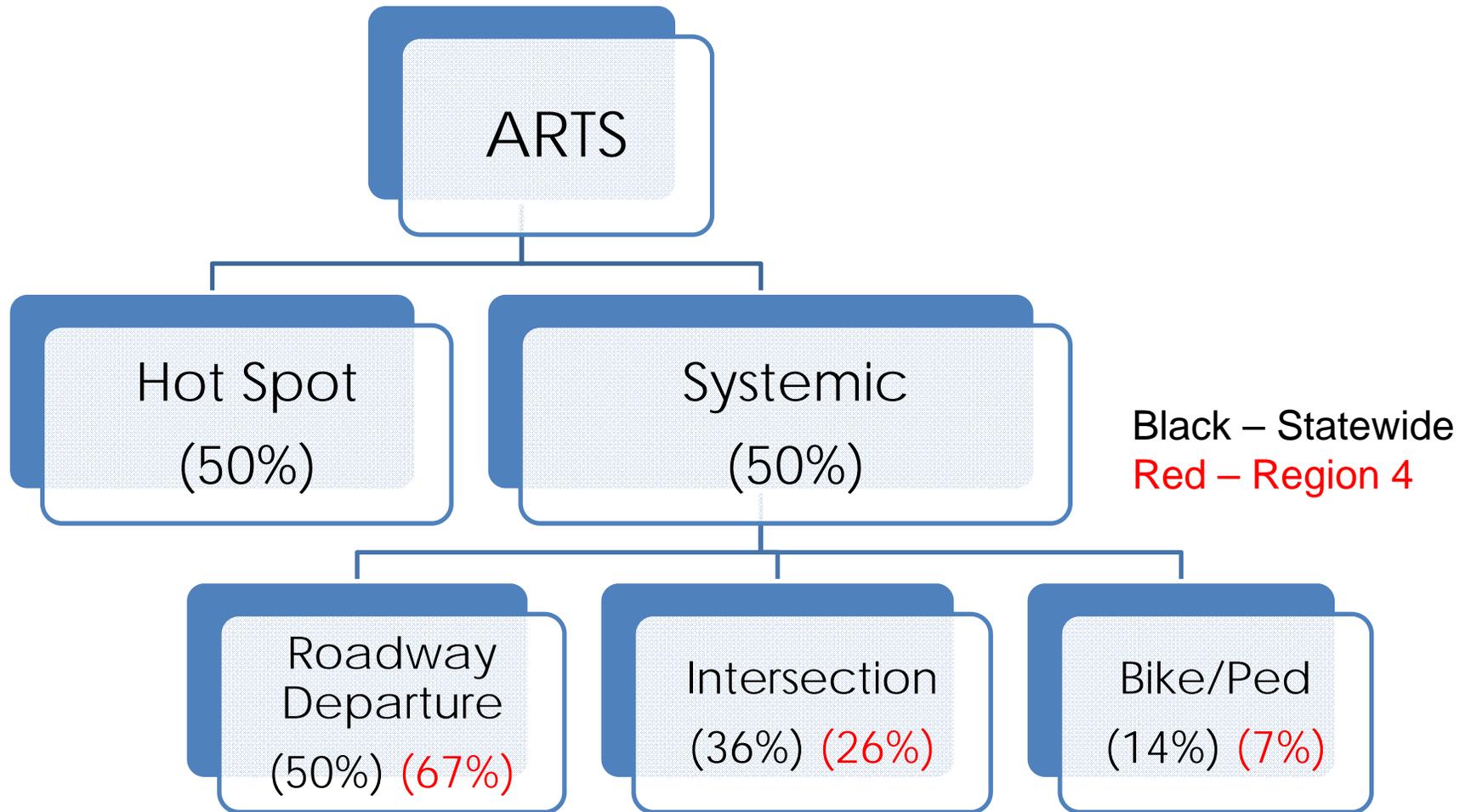
ARTS Program Goals

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



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ARTS Program



Numbers in () represent approximate funding split (statewide)



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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
Total	\$18,461,500	\$18,461,500	\$15,422,784	\$15,422,784	\$15,422,784	\$83,191,352



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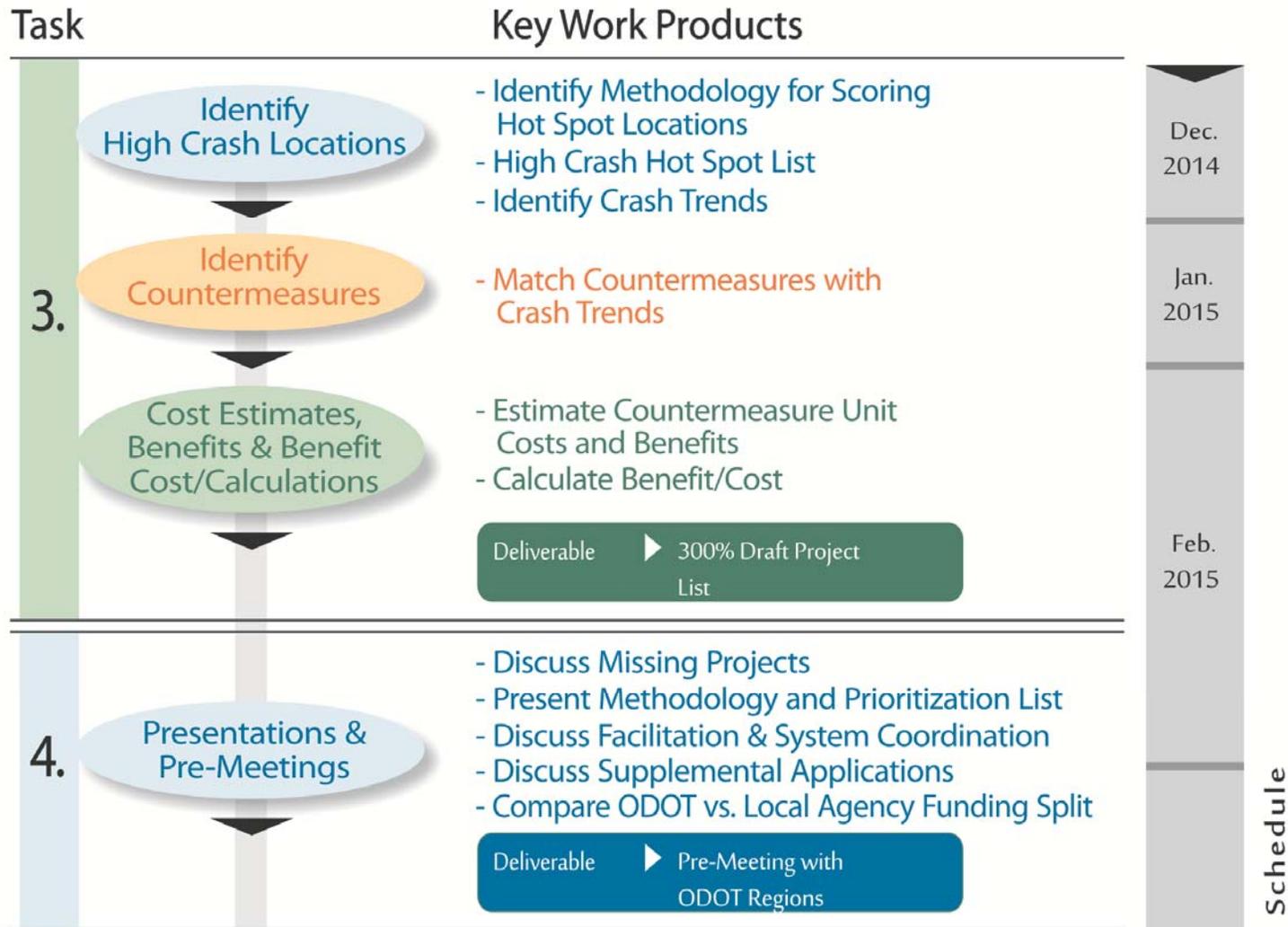


Hot Spot Analysis Process



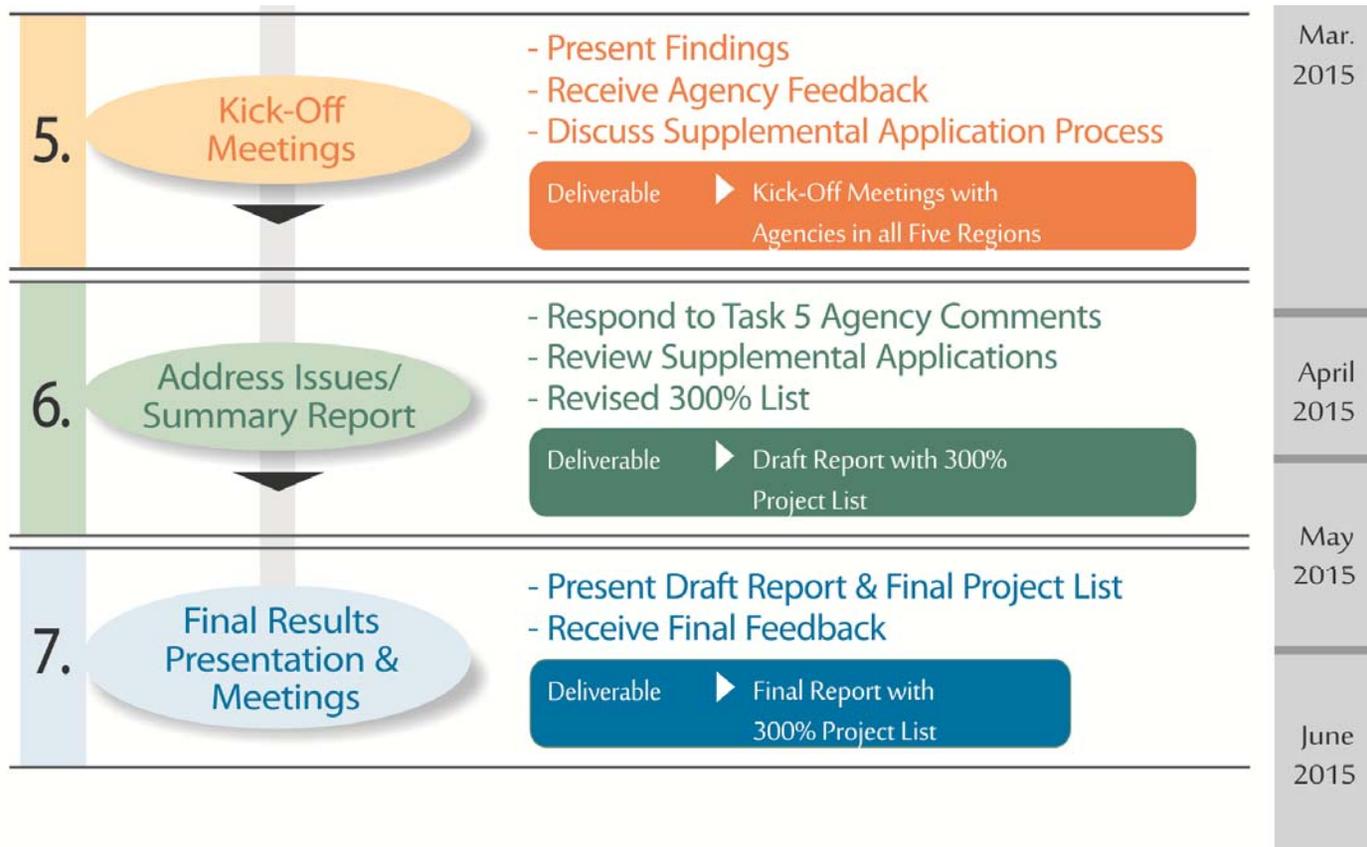
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ARTS Process and Timeline

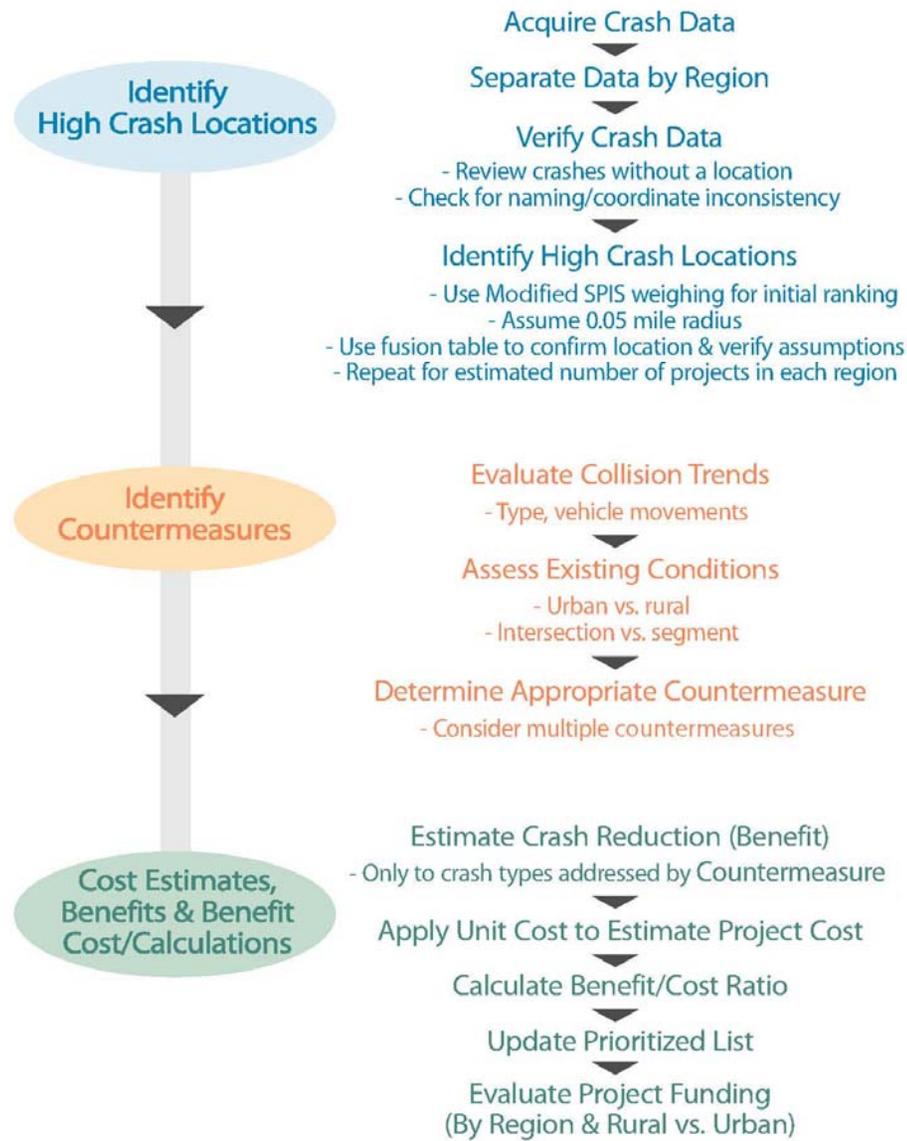


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ARTS Process and Timeline



ARTS Process and Timeline



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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



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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
- Countermeasures split into 4 categories:
 - Hot Spot
 - Intersection Systemic
 - Bike/Pedestrian Systemic
 - Roadway Segment Systemic

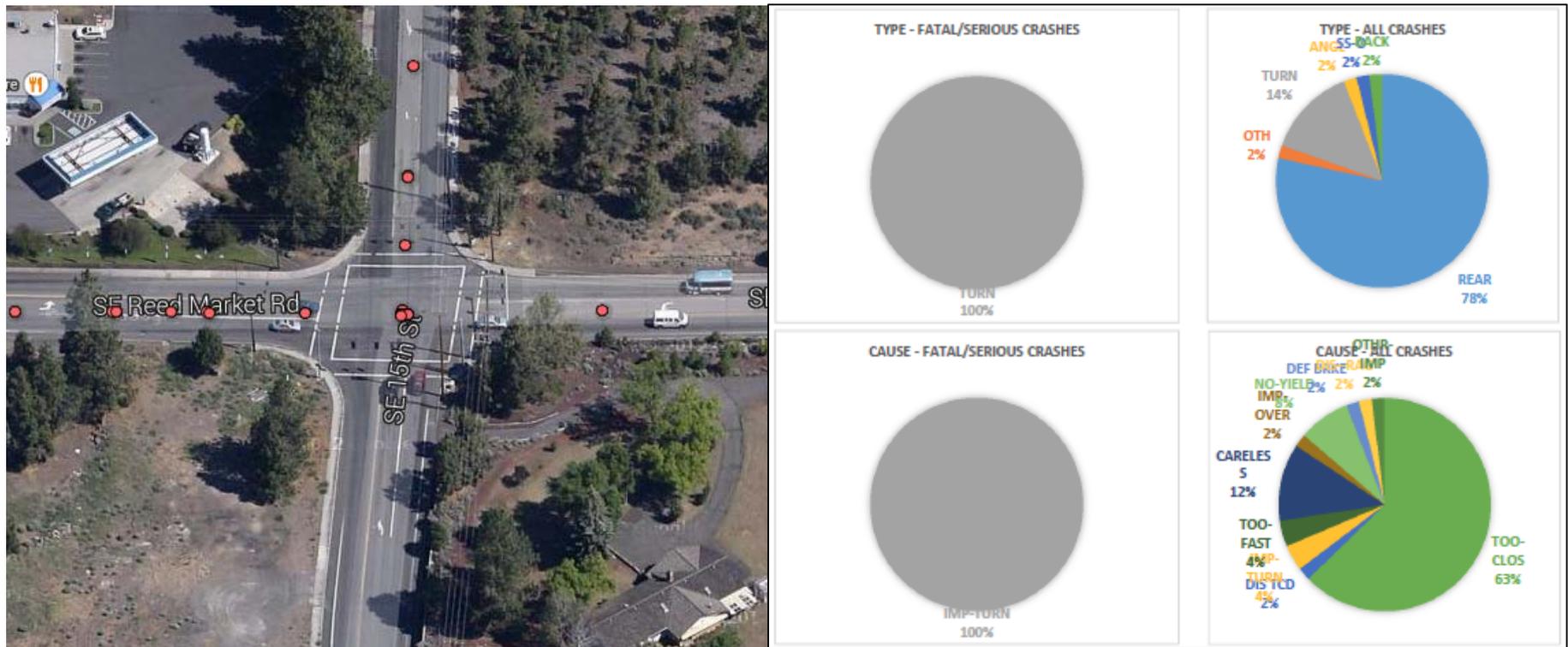


Systemic or Hotspot	Consider for Hotspot	Countermeasure Number	Countermeasure	Crash Type	Injury, PDO or All	Service Life (Yea	Existing Intersection Traffic Control	Urban or Rural	CRF %
Hotspot	NA	H1	Median U-Turn Intersection Treatment	All	All Injury	20	Signal or Non Signal	Either	30
Hotspot	NA	H4	Right 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



Countermeasure Identification

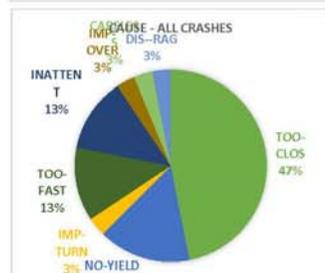
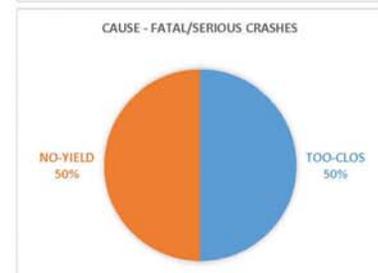
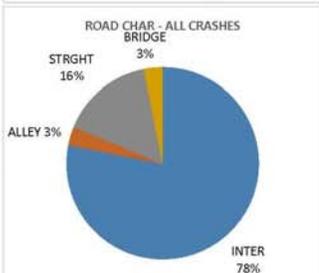
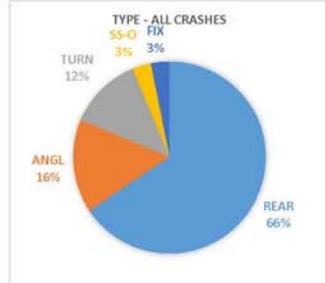
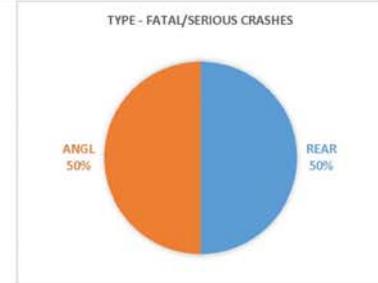
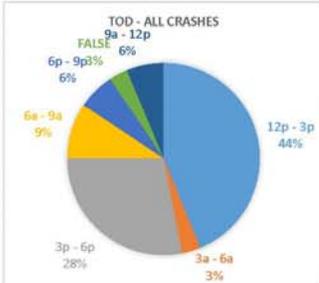
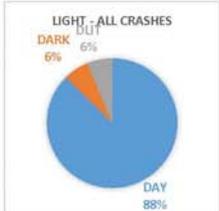
- Evaluated crash trends at each location to determine appropriate countermeasures



ARTS - Region 4

Draft Hot Spot Cut Sheet

Location ID: 8
 Road Control: URBAN CITY STREET
 County: Wasco
 City: The Dalles
 Urban Area: THE DLLS UA
 Route Name: 0
 Route M.P.: 0
 Street Name: WEBBER ST
 Intersecting Street: 6TH ST
 Number of Crashes: 32 (2 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
1355859	Inj A	REAR	DRY	CLR	DAY	TOO-CLOS	STRGHT	NW	SE	STOP	NW	SE	0	0	0 / 0 / 0	11/16/2009	6a - 9a	STRGHT
1442190	Inj A	ANGL	DRY	CLR	DAY	NO-YIELD	STRGHT	SW	NE	STRGHT	NW	SE	0	0	0 / 0 / 0	9/30/2011	12p - 3p	INTER

Countermeasures

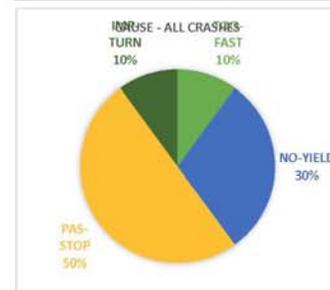
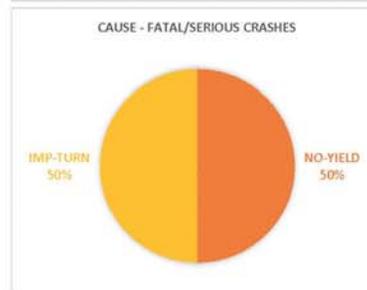
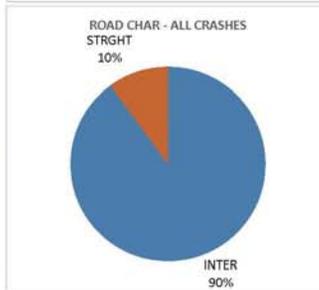
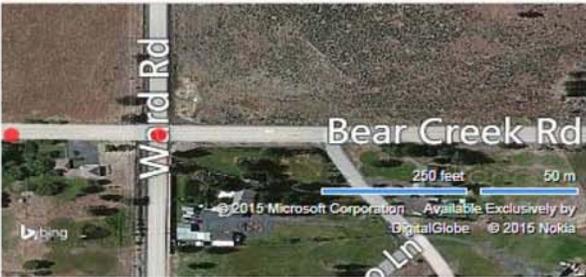
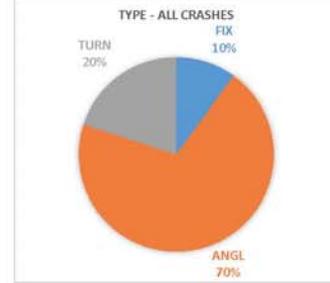
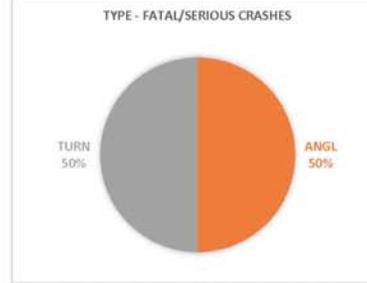
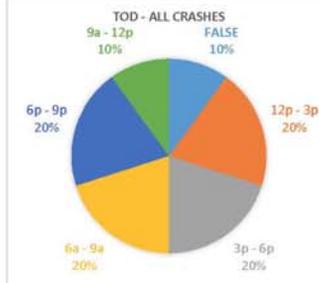
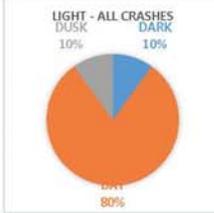
ID	Description	Notes	Project Group #	Estimated Benefit	Estimated Cost	Estimated B/C Ratio	Other Notes
H15	Channelized Left Turn Lane with Raised Median on All Approaches (3- or 4-leg)	northbound and southbound approaches consist of shared thru/left turn lane (rear end crashes). Align approaches to intersection	1	\$ 1,707,000.00	\$ 2,837,000.00	0.6	
I4	Replace Urban Permissive or Protected/Permissive Left Turns to Protected Only	Paired with H12. Alignment shift through intersection	1	\$ 453,000.00	\$ 12,000.00	37.8	



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Draft Hot Spot Cut Sheet

Location ID 18
Road Control SUBURBAN COUNTY ROAD
County Deschutes
City 0
Urban Area BEND UA
Route Name 0
Route M.P. 0
Street Name 0
Intersecting Street BEAR CREEK RD
Number of Crashes 10 (2 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
1375755	Inj A	TURN	DRY	CLD	DAY	IMP-TURN	U-TURN	W	W	STRGHT	W	E	0	0	0 / 0 / 0	7/2/2010	3p - 6p	STRGHT
1529427	Inj A	ANGL	DRY	CLR	DAY	NO-YIELD	STRGHT	W	E	STRGHT	N	S	0	0	0 / 0 / 0	7/11/2013	6p - 9p	INTER

Countermeasures

ID	Description	Notes	Project Group #	Estimated Benefit	Estimated Cost	Estimated B/C Ratio	Other Notes
I10	Increase Triangle Sight Distance	Grade might reduce sight distance	1	\$ 1,611,000.00	\$ 334,000.00	4.8	
I12	Improve Intersection Warning: Stop Ahead Pavement Markings, Stop Ahead Signs, Larger Signs, Additional Stop Signs and/or Other Intersection Warning or Regulatory Signs		1	\$ 854,000.00	\$ 14,000.00	61.0	
I15	Provide Actuated Flashing Beacons Triggered by Approaching Vehicles at Unsignalized Intersections		1	\$ 259,000.00	\$ 300,000.00	0.9	
H19	Convert to All-Way Stop Control (From Rural 2-Way or Yield Control)		2	\$ 1,640,000.00	\$ 7,000.00	234.3	



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Cost Estimates

- Develop standard cost for each countermeasure, including:
 - 66% Markup for Design, Contingency and Temporary Traffic Control
 - 30% Markup for HAZMAT Mitigation (countermeasures that involve earthwork)
- 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

	OREGON DEPARTMENT OF TRANSPORTATION HIGHWAY SAFETY PROJECTS BENEFIT/COST ANALYSIS WORKSHEET						
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"/>



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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 ³		
All facilities	\$19,400	\$19,400
Moderate (Injury B) and Minor (Injury C) Injury ⁴		
Interstate	\$69,300	\$79,200
Other State Highway	\$70,600	\$81,900
Off System	\$72,400	\$83,900
Fatal and Severe (Injury A) Injury ⁴		
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



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Systemic Process



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Supplemental Applications and Next Steps



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Supplemental Application Process

- Requirements:
 - ✓ ODOT approved screening method using ODOT reported crashes only
 - ✓ Locations shall have **at least** one Fatal or Serious Injury crash from 2009 to 2013
 - ✓ Countermeasures from ODOT CRF List
 - ✓ Prioritized/categorized based on B/C Ratio (using ODOT method)



Supplemental Application Form Online



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:



Next Steps

- Supplemental Applications Due Apr 1st (3 weeks)
- Hot Spot Countermeasure Comments Due Apr 1st (3 weeks)
- Draft Report and Project List in (May)
- Final Region Meetings with Local Agencies (May-June)
- Final Report and Project List (June)



Questions?



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