
Updated Tool for Prioritizing Systemic Pedestrian and Bicycle Safety Improvements
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Oregon Department of Transportation

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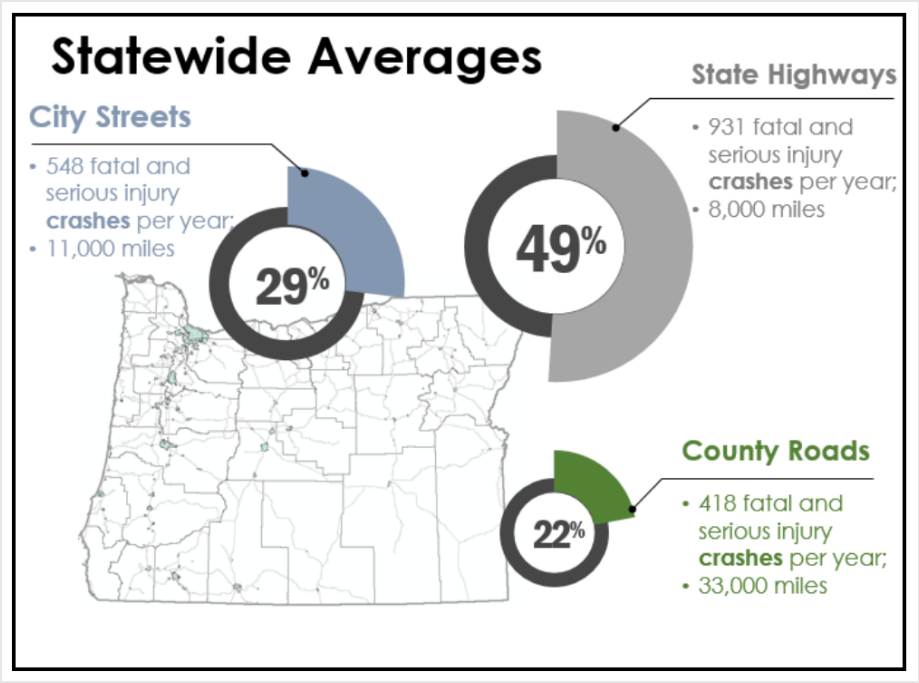
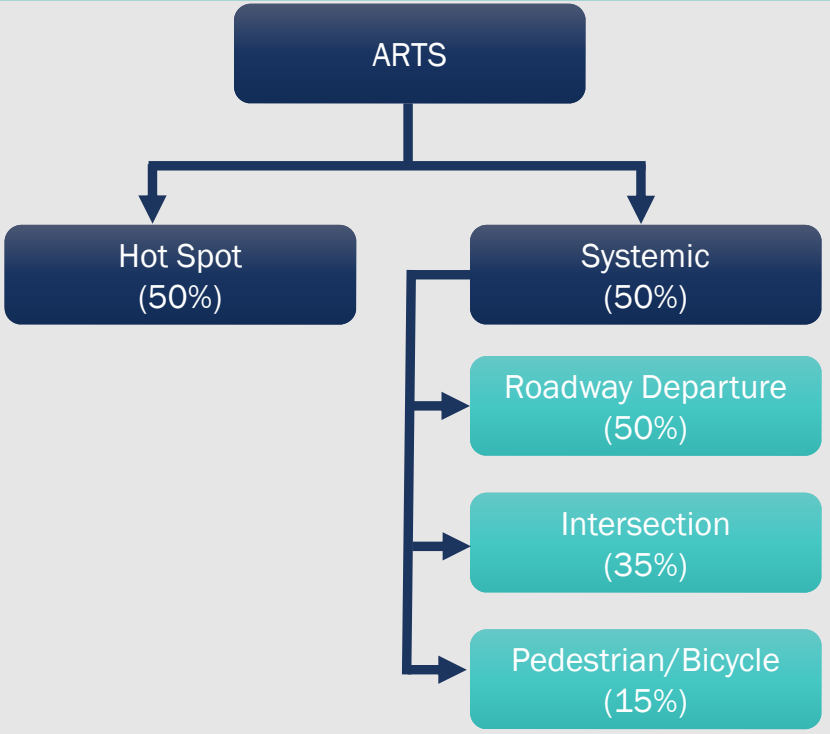
ODOT All Road Transportation Safety (ARTS) Program





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Current ODOT Cost-effectiveness Index Tool

- Modified the NCHRP 17-38 spreadsheet tool for calculating the predicted pedestrian and bicyclist crash frequency
- Used to prioritize systemic pedestrian and bicycle safety improvement projects
- Cost-effectiveness index (CEI) defined as the cost for reducing one pedestrian or bicycle crash

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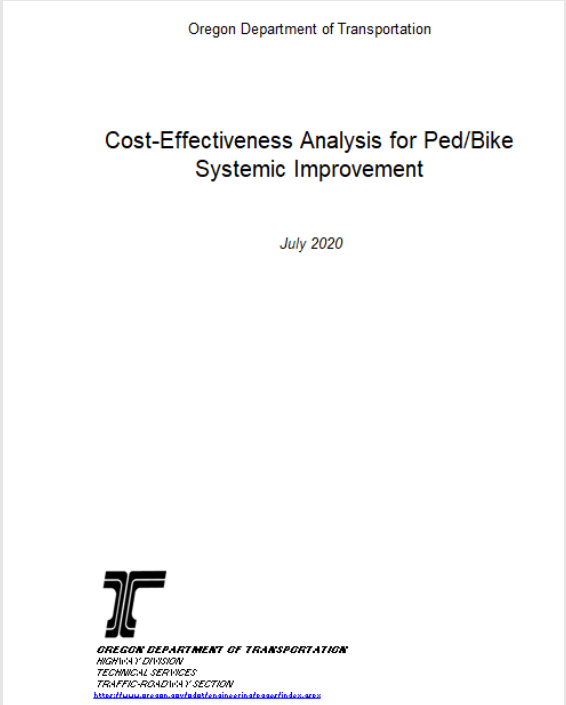
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Cost-Effectiveness Analysis for Ped/Bike Systemic Improvement

July 2020

OREGON DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
TECHNICAL SERVICES
TRAFFIC-ROADWAY SECTION

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General Procedures for Project Prioritization

- Screen the network to identify potential locations for treatment
  - Crash-based approach: 5-year pedestrian and bicycle crash data
  - Risk-based approach: Presence of risk factors for pedestrians and bicyclists
- Calculate the predicted number of crashes at priority locations
  - Select the higher value between number of predicted crashes and number of observed crashes
- Apply crash modification factors for the desired safety countermeasures
- Prioritize projects based on calculated cost-effectiveness index

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		Segment 1		Segment 2	
Analyst	Roadway				
Agency or Company	Roadway Section				
Date Performed	Analysis Year				
Input Data	**Data Source**				
Roadway type (2U, 3T, 4U, 4D, 5T)					
Length of segment, L (mi)					
AADT (veh/day)					
Type of on-street parking (none/parallel/angle)					
Curb length with on-street parking (sum of both sides of the road) (mi)					
Median width (ft) - for divided only					
Lighting (present / not present)					
Auto speed enforcement (present / not present)					
Number of Driveways		**Major** (>50 spaces)	**Minor** (≤ 50 spaces)	**Major** (>50 spaces)	**Minor** (≤ 50 spaces)
Commercial					
Industrial/Institutional					
Residential					
Other					
Posted Speed Category					
Number of Fixed Objects (total both sides of the road- DON'T' count objects in the median of divided highways)					
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input		30		30	
Observed Crashes/Year*					
Pedestrian					
Bicycle					
Proposed Pedestrian Countermeasures for the Segment			**CRF**		**CRF**
Countermeasure 1					
Countermeasure 2					
Countermeasure 3					
Proposed Bicycle Countermeasures for the Segment					**CRF**
Countermeasure 1					
Countermeasure 2					
Countermeasure 3					

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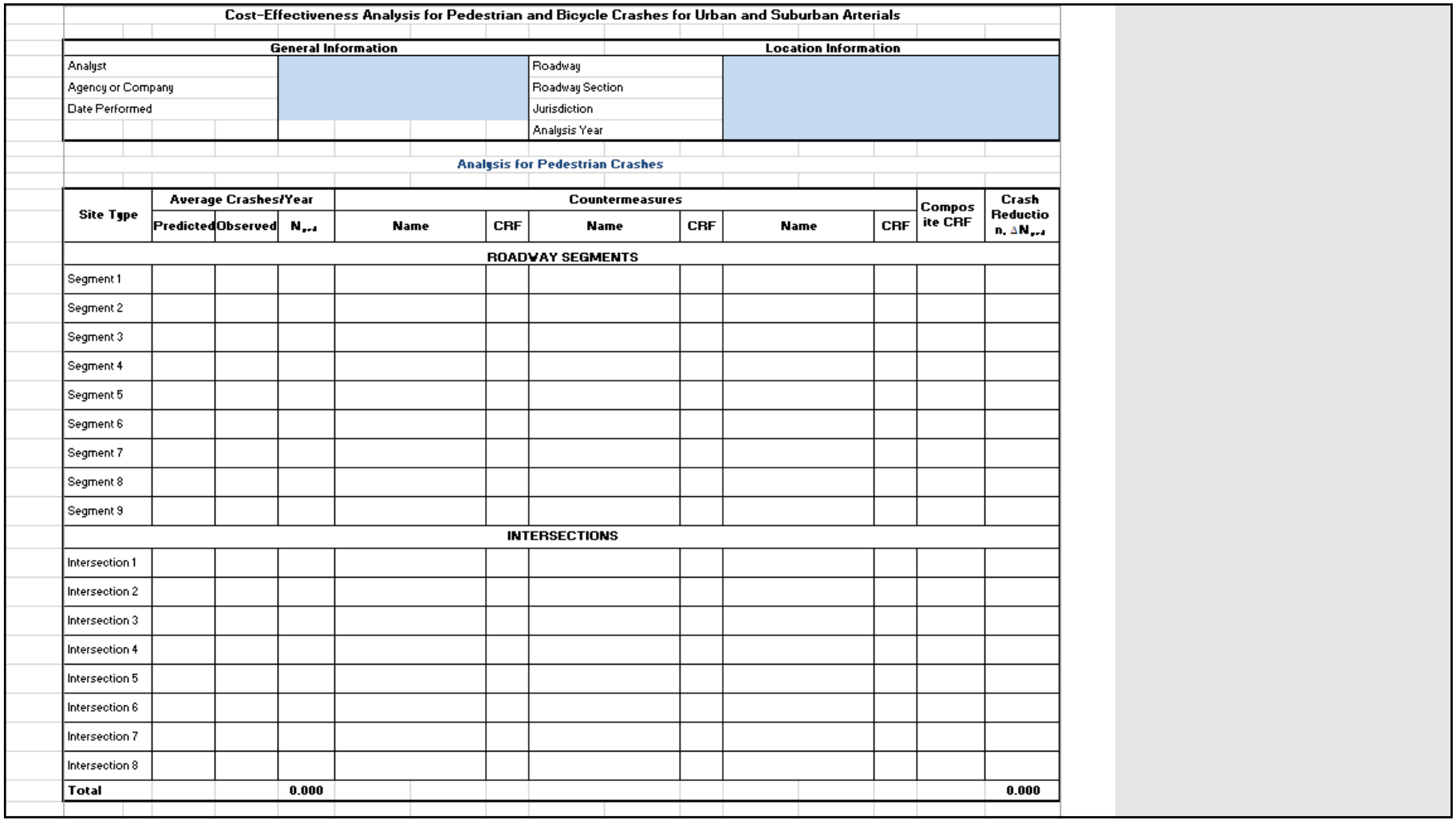
			Intersection 1	Intersection 2
Analyst	Analyst	Roadway		
Agency or Company	Agency or Company	Intersection		
Date Performed	Date Performed	Analysis Year		
Input Data	**Input Data**	**Data Source**		
Roadway type (2U, 3T, 4U, 4D, 5T)	Intersection type (3ST, 3SG, 4ST, 4SG)			
Length of segment, L (mi)	AADT $_{major}$ (veh/day)			
AADT (veh/day)	AADT $_{minor}$ (veh/day)			
Type of on-street parking (none/parallel/angle)	Intersection lighting (present/not present)			
Curb length with on-street parking (sum of both sides of the road) (mi)	**Unsignalized intersections only:**			
Median width (ft) - for divided only	Number of major-road approaches with left-turn lanes (0,1,2)			
Lighting (present / not present)	Number of major-road approaches with right-turn lanes (0,1,2)			
Auto speed enforcement (present / not present)	**Signalized intersections only:**			
Number of Driveways	Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]			
Commercial	Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]			
Industrial/Institutional	Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]			
Residential	Type of left-turn signal phasing for Leg #1			
Other	Type of left-turn signal phasing for Leg #2			
Posted Speed Category	Type of left-turn signal phasing for Leg #3			
Number of Fixed Objects (total both sides of the road- DON'T' count objects in the median of divided highways)	Type of left-turn signal phasing for Leg #4 (if applicable)			
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input	Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]			
Observed Crashes/Year*	Intersection red light cameras (present/not present)			
Pedestrian	Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			
Bicycle	Maximum number of lanes crossed by a pedestrian (n_{xxxx})			
Proposed Pedestrian Countermeasures for the Segment	Number of bus stops within 1,000 ft of the intersection			
Countermeasure 1	Schools within 1,000 ft of the intersection (present/not present)			
Countermeasure 2	Number of alcohol sales establishments within 1,000 ft of the intersection			
Countermeasure 3	**Observed Crashes/Year***			
Proposed Bicycle Countermeasures for the Segment	Pedestrian			
Countermeasure 1	Bicycle			
Countermeasure 2	**Proposed Pedestrian Countermeasures for the Intersection**		**CRF**	**CRF**
Countermeasure 3	Countermeasure 1			
	Countermeasure 2			
	Countermeasure 3			
	Proposed Bicycle Countermeasures for the Intersection		**CRF**	**CRF**
	Countermeasure 1			
	Countermeasure 2			
	Countermeasure 3			



Cost-Effectiveness Analysis for Pedestrian and Bicycle Crashes for Urban and Suburban Arterials

General Information		Location Information	
Analyst		Roadway	
Agency or Company		Roadway Section	
Date Performed		Jurisdiction	
		Analysis Year	

Analysis for Pedestrian Crashes

Site Type	Average Crashes/Year			Countermeasures						Composite CRF	Crash Reduction, $\Delta N_{p,i}$
	Predicted	Observed	$N_{p,i}$	Name	CRF	Name	CRF	Name	CRF		
ROADWAY SEGMENTS											
Segment 1											
Segment 2											
Segment 3											
Segment 4											
Segment 5											
Segment 6											
Segment 7											
Segment 8											
Segment 9											
INTERSECTIONS											
Intersection 1											
Intersection 2											
Intersection 3											
Intersection 4											
Intersection 5											
Intersection 6											
Intersection 7											
Intersection 8											
Total			**0.000**								**0.000**

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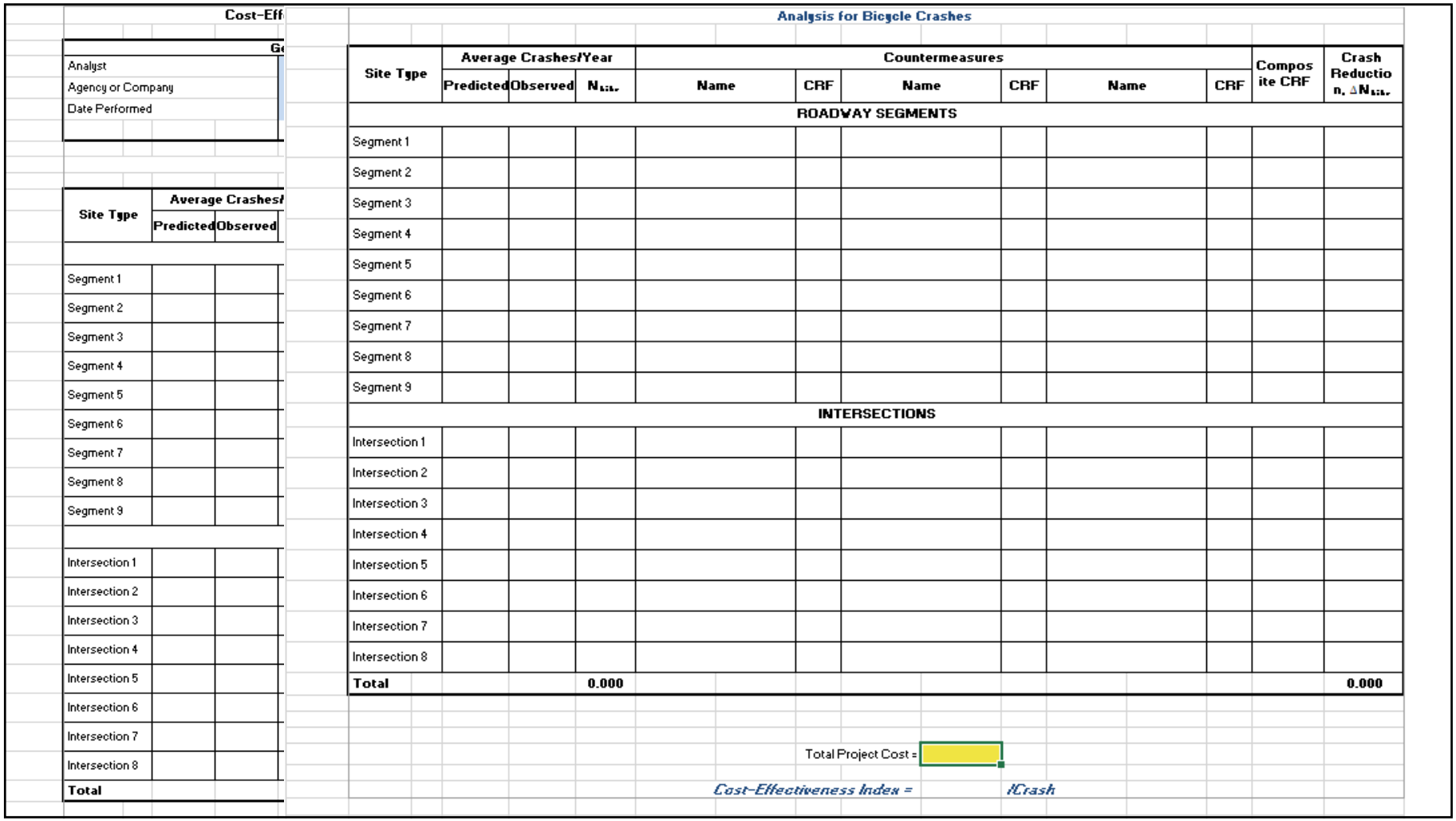

Cost-Eff

Analyst	
Agency or Company	
Date Performed	

Site Type	Average Crashes/	
	Predicted	Observed
Segment 1		
Segment 2		
Segment 3		
Segment 4		
Segment 5		
Segment 6		
Segment 7		
Segment 8		
Segment 9		
Intersection 1		
Intersection 2		
Intersection 3		
Intersection 4		
Intersection 5		
Intersection 6		
Intersection 7		
Intersection 8		
Total		

Analysis for Bicycle Crashes

Site Type	Average Crashes/Year			Countermeasures						Composite CRF	Crash Reduction, $\Delta N_{b,b}$
	Predicted	Observed	$N_{b,b}$	Name	CRF	Name	CRF	Name	CRF		
ROADWAY SEGMENTS											
Segment 1											
Segment 2											
Segment 3											
Segment 4											
Segment 5											
Segment 6											
Segment 7											
Segment 8											
Segment 9											
INTERSECTIONS											
Intersection 1											
Intersection 2											
Intersection 3											
Intersection 4											
Intersection 5											
Intersection 6											
Intersection 7											
Intersection 8											
Total			**0.000**								**0.000**

Total Project Cost =

Cost-Effectiveness Index = */Crash*

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Limitations for Current ODOT CEI Tool

- Accuracy
  - Current model cannot account for risks specific to pedestrians and bicyclists, such as high vehicle speeds and wide cross section
  - Does not differentiate between crash severities
- Complexity
  - Require a high number of data elements which do not factor into the analysis if an observed crash is present
- Usefulness
  - Very high CEI values for projects without crashes and not competitive with projects where observed crashes did occur

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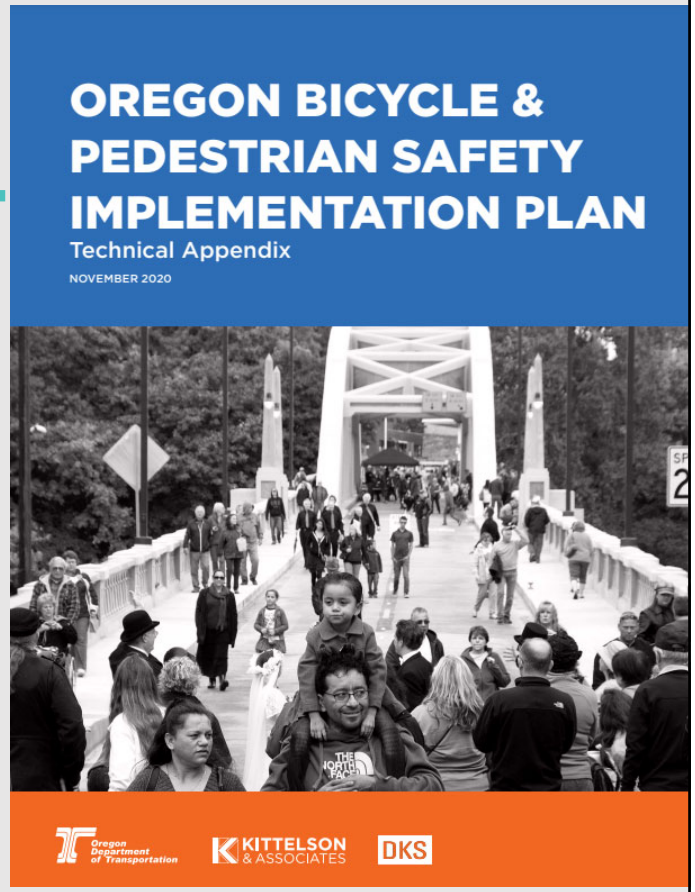
Oregon Bicycle & Pedestrian Safety Implementation Plan

- Developed under NCHRP 20-44(13) in 2020
- Provide framework for conducting systemic pedestrian and bicycle safety analysis
- List risk factors to identify locations for safety treatments
  - Risk factors used for the tool development
- Didn't generate a list of project for safety improvements



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Current Practices by Other Agencies

- City of Seattle, Washington
  - Developed SPFs to identify and prioritize locations with potential for systemic pedestrian and bicycle safety improvements
- City of Missoula, Montana
  - Use geographic data such as obesity, disability, build environment and percent of low to moderate income to prioritize new sidewalk facilities
- City of Austin, Texas
  - Generated the pedestrian safety priority network to identify and prioritize safety improvements based on crash scores, demand scores and risk characteristic scores

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Potential Risk Factors for Pedestrian & Bicyclist

- Crash history
  - Pedestrian and bicycle crashes
  - Crash severity score
- Equity
  - Population below the poverty line
  - Zero vehicle households
  - Proximity to place visited by older adults
- Exposure
  - Traffic volume
  - Proximity to transit stops
  - Attractors
- Roadway geometry
  - Sidewalk connectivity
  - Functional classification
  - Presence of midblock crosswalk
- Traffic operations
  - Posted speed limit
  - Intersection control type

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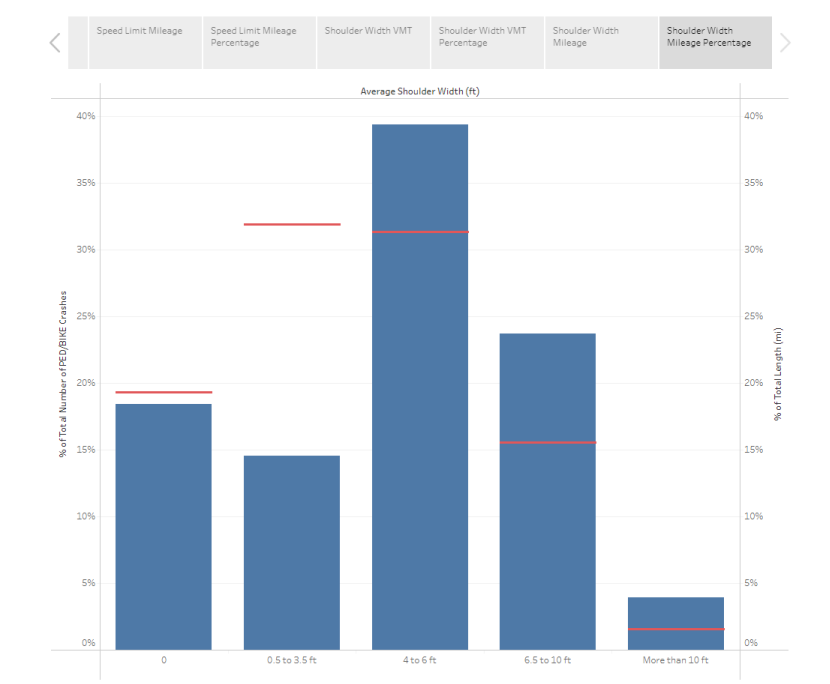
Over-representation Analysis for Risk Factors



- Over-representation
  - Difference between the percentage of crashes where the risk factor is present and the percentage of roadway mileage or VMT
- Risk factors
  - Equity
  - Sidewalk
  - Bike lane
  - Number of lanes
  - Speed limit
  - Shoulder width

Methodology for Developing New ODOT Tool

- Risk factor selection
  - Over-representation analysis
    - ❖Risk factors with data available
  - Literature review
    - ❖Risk factors with data available but counterintuitive results
    - ❖Risk factors with data unavailable
- Weight for risk factors
  - A combined weight score criteria calculated using both the total number of crashes and the crash over-representation of each risk factor

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New ODOT Tool

- New tool developed for prioritizing systemic pedestrian and bicycle safety improvement projects
- Calculate risk score and cost for each candidate projects
- Prioritize the systemic pedestrian and bicycle safety improvement projects based on reduced risk score for every $1000

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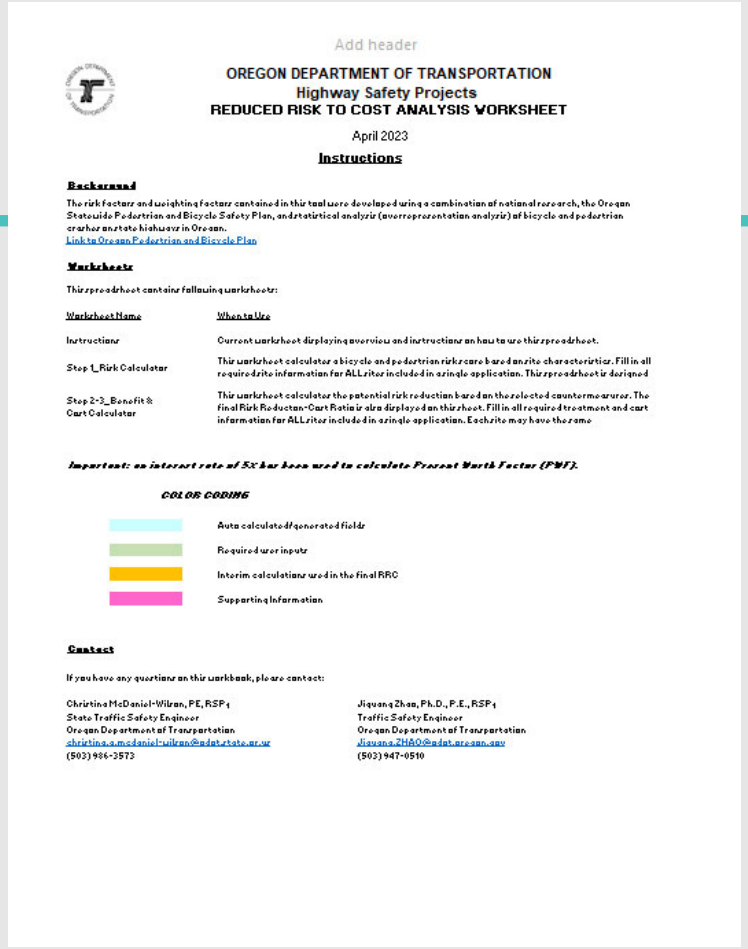

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OREGON DEPARTMENT OF TRANSPORTATION
Highway Safety Projects
REDUCED RISK TO COST ANALYSIS WORKSHEET

April 2023

Instructions

Background

The risk factors and weighting factors contained in this tool were developed using a combination of national research, the Oregon Statewide Pedestrian and Bicycle Safety Plan, and statistical analysis (over representation analysis) of bicycle and pedestrian crashes and state highways in Oregon.
Link to Oregon Pedestrian and Bicycle Plan

Worksheets

This spreadsheet contains following worksheets:

Worksheet Name	When to Use
Instructions	Current worksheet displaying overview and instructions on how to use this spreadsheet.
Step 1_Risk Calculator	This worksheet calculates bicycle and pedestrian risk scores based on site characteristics. Fill in all required site information for ALL sites included in a single application. This spreadsheet is designed
Step 2-3_Benefit & Cost Calculator	This worksheet calculates the potential risk reduction based on the selected countermeasures. The final Risk Reduction-Cost Ratio is also displayed on this sheet. Fill in all required treatment and cost information for ALL sites included in a single application. Each site may have the same

Important: an interest rate of 5% has been used to calculate Present Worth Factor (PWF).

COLOR CODING

- Auto calculated/generated fields
- Required user inputs
- Interim calculations used in the final RRC
- Supporting Information

Contact

If you have any questions on this workbook, please contact:

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	Data Input	Notes
Project Site Details	Location Description	names or segment start/end points. Include milepoints, if applicable.
	Intersection or Segment	
	Segment Length (miles)	1/4 mile minimum
	Context	Rural or Urban

Step 1: Enter location details for each site included in your application. Risk scores are automatically calculated for each site.

	Data Input	Notes	Site 1	Site 1 Risk Score	Site 2	Site 2 Risk Score	Site 3	Site 3 Risk Score
Project Site Details	Location Description	names or segment start/end points. Include milepoints, if applicable.	Main Street/2nd Street in Browntown		Main Street from A Street to B Street in Browntown		2nd Street from X Street to Y Street in Browntown	
	Intersection or Segment		Intersection		Segment		Segment	
	Segment Length (miles)	1/4 mile minimum			1		0.75	
	Context	Rural or Urban	Urban		Urban		Rural	
Crash History	Has a Minor or Possible Injury Crash involving a Bicyclist or Pedestrian occurred here?	Most recent five years of ODOT official data	Yes	10.00	No	20.00	No	0.00
	Has a Fatal or Serious Injury Crash involing a Bicyclist or Pedestrian	Most recent five years of ODOT official data	No		Yes		No	
Equity	Oregon Social Equity Index Disparity Level	Select the highest disparity adjacent to the site. Click Here for ODOT Social Equity Web Map	Med-High Disparity	11.88	High Disparity	18.00	Med-High Disparity	11.88
Exposure	Crossing Distance (Number of Lanes)	highest number of lanes on any leg. Include through and turn lanes	3	12.00	4	18.00	2	6.00
	Average Annual Daily Traffic Volume		More than 20,000	21.00	7,001-20,000	15.75	7,001-20,000	15.75
	Number of multimodal attractors within 1/4 mile	Includes: high density residential, convenience store, fast food restaurant, school, park, offices, transit stop, parking garage	1-3	6.27	1-3	6.27	4-8	12.54
Roadway Characteristics	Sidewalk Facilities		Sidewalk with Gaps	10.00	No Sidewalk	20.00	Continuous Sidewalk	0.00
	Bicycle Facilities		No Bike Lane	19.00	Bike Lane with Gaps	9.50	Continuous Bike Lane	0.00
	Adjacent Signalized Crossing Spacing		1/4 mi. or less	0.00	1/4 mi. or less	0.00	1/4 mi. or less	0.00
	Access Density (accesses per mile)	Includes driveways, alleys, and public streets		N/A	40-60	13.86	20-40	6.93
	Paved Shoulder Width	Narrowest shoulder width of any side		N/A	No Shoulder	12.00	6.5 to 10 ft.	3.00
	Posted Speed Limit	Highest posted speed limit of any side/leg	25 mph	5.00	40 mph	20.00	30 mph	10.00
Intersection Characteristics	Intersection Control Type		Signalized	0.00		N/A		N/A
	Number of Pedestrian Enhancements at Traffic Signals	Includes: LPI, protected left-turns, turn restrictions during ped calls, pedestrian-only phase, curb extentions, pedestrian lighting	1-2	13.20		N/A		N/A
	Number of Pedestrian Enhancements at Locations without a Traffic Signal	Includes: marked crossing, curb extensions, warning signs, pedestrian lighting, RRFB, PHB		N/A		N/A		N/A
	Total Risk Score		108.4		153.4		66.1	
	Normalized Risk Score		47.94		70.04		30.18	

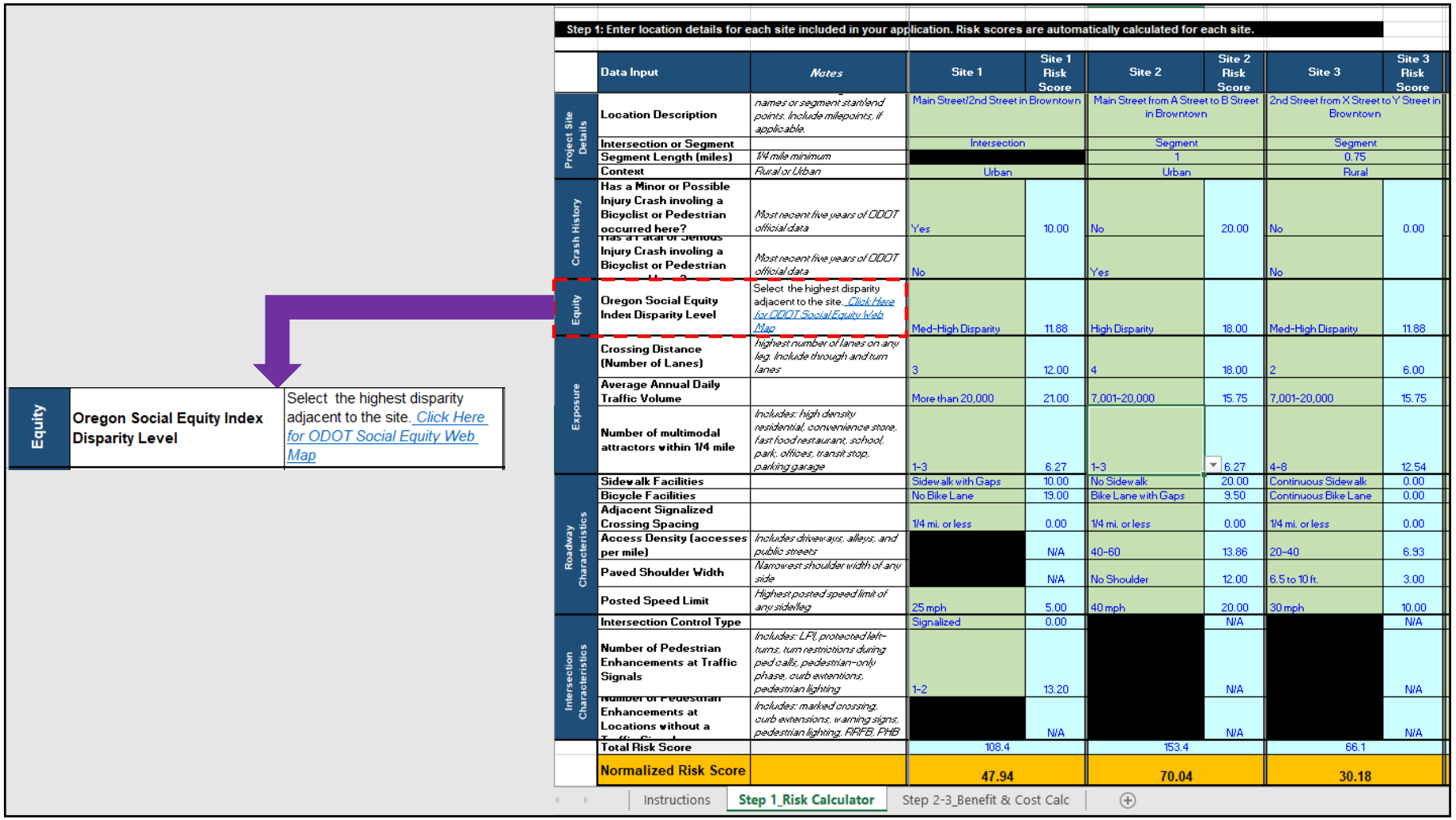
Instructions | Step 1_Risk Calculator | Step 2-3_Benefit & Cost Calc

Crash History		
	Has a Minor or Possible Injury Crash involing a Bicyclist or Pedestrian occurred here?	*Most recent five years of ODOT official data*
	Has a Fatal or Serious Injury Crash involing a Bicyclist or Pedestrian occurred here?	*Most recent five years of ODOT official data*

Step 1: Enter location details for each site included in your application. Risk scores are automatically calculated for each site.

	Data Input	Notes	Site 1	Site 1 Risk Score	Site 2	Site 2 Risk Score	Site 3	Site 3 Risk Score
Project Site Details	Location Description	*names or segment start/end points. Include milepoints, if applicable.*	Main Street/2nd Street in Browntown		Main Street from A Street to B Street in Browntown		2nd Street from X Street to Y Street in Browntown	
	Intersection or Segment		Intersection		Segment		Segment	
	Segment Length (miles)	*1/4 mile minimum*			1		0.75	
	Context	*Rural or Urban*	Urban		Urban		Rural	
Crash History	Has a Minor or Possible Injury Crash involing a Bicyclist or Pedestrian occurred here?	*Most recent five years of ODOT official data*	Yes	10.00	No	20.00	No	0.00
	Has a Fatal or Serious Injury Crash involing a Bicyclist or Pedestrian occurred here?	*Most recent five years of ODOT official data*	No		Yes		No	
Equity	Oregon Social Equity Index Disparity Level	Select the highest disparity adjacent to the site. *Click Here for ODOT Social Equity Web Map*	Med-High Disparity	11.88	High Disparity	18.00	Med-High Disparity	11.88
Exposure	Crossing Distance (Number of Lanes)	*highest number of lanes on any leg. Include through and turn lanes*	3	12.00	4	18.00	2	6.00
	Average Annual Daily Traffic Volume		More than 20,000	21.00	7,001-20,000	15.75	7,001-20,000	15.75
	Number of multimodal attractors within 1/4 mile	*Includes: high density residential, convenience store, fast food restaurant, school, park, offices, transit stop, parking garage*	1-3	6.27	1-3	6.27	4-8	12.54
Roadway Characteristics	Sidewalk Facilities		Sidewalk with Gaps	10.00	No Sidewalk	20.00	Continuous Sidewalk	0.00
	Bicycle Facilities		No Bike Lane	19.00	Bike Lane with Gaps	9.50	Continuous Bike Lane	0.00
	Adjacent Signalized Crossing Spacing		1/4 mi. or less	0.00	1/4 mi. or less	0.00	1/4 mi. or less	0.00
	Access Density (accesses per mile)	*Includes driveways, alleys, and public streets*		N/A	40-60	13.86	20-40	6.93
	Paved Shoulder Width	*Narrowest shoulder width of any side*		N/A	No Shoulder	12.00	6.5 to 10 ft.	3.00
	Posted Speed Limit	*Highest posted speed limit of any side/leg*	25 mph	5.00	40 mph	20.00	30 mph	10.00
Intersection Characteristics	Intersection Control Type		Signalized	0.00		N/A		N/A
	Number of Pedestrian Enhancements at Traffic Signals	*Includes: LPI, protected left-turns, turn restrictions during ped calls, pedestrian-only phase, curb extentions, pedestrian lighting*	1-2	13.20		N/A		N/A
	Number of Pedestrian Enhancements at Locations without a Traffic Signal	*Includes: marked crossing, curb extensions, warning signs, pedestrian lighting, RRFB, PHB*		N/A		N/A		N/A
	Total Risk Score		108.4		153.4		66.1	
	Normalized Risk Score		47.94		70.04		30.18	

Instructions | Step 1_Risk Calculator | Step 2-3_Benefit & Cost Calc



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	Intersection or Segment		Intersection		Segment		Segment	
	Segment Length (miles)	*1/4 mile minimum*			1		0.75	
	Context	*Rural or Urban*	Urban		Urban		Rural	
Crash History	Has a Minor or Possible Injury Crash involing a Bicyclist or Pedestrian occurred here?	*Most recent five years of ODOT official data*	Yes	10.00	No	20.00	No	0.00
	Has a Fatal or Serious Injury Crash involing a Bicyclist or Pedestrian	*Most recent five years of ODOT official data*	No		Yes		No	
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	Adjacent Signalized Crossing Spacing		1/4 mi. or less	0.00	1/4 mi. or less	0.00	1/4 mi. or less	0.00
	Access Density (accesses per mile)	*Includes driveways, alleys, and public streets*		N/A	40-60	13.86	20-40	6.93
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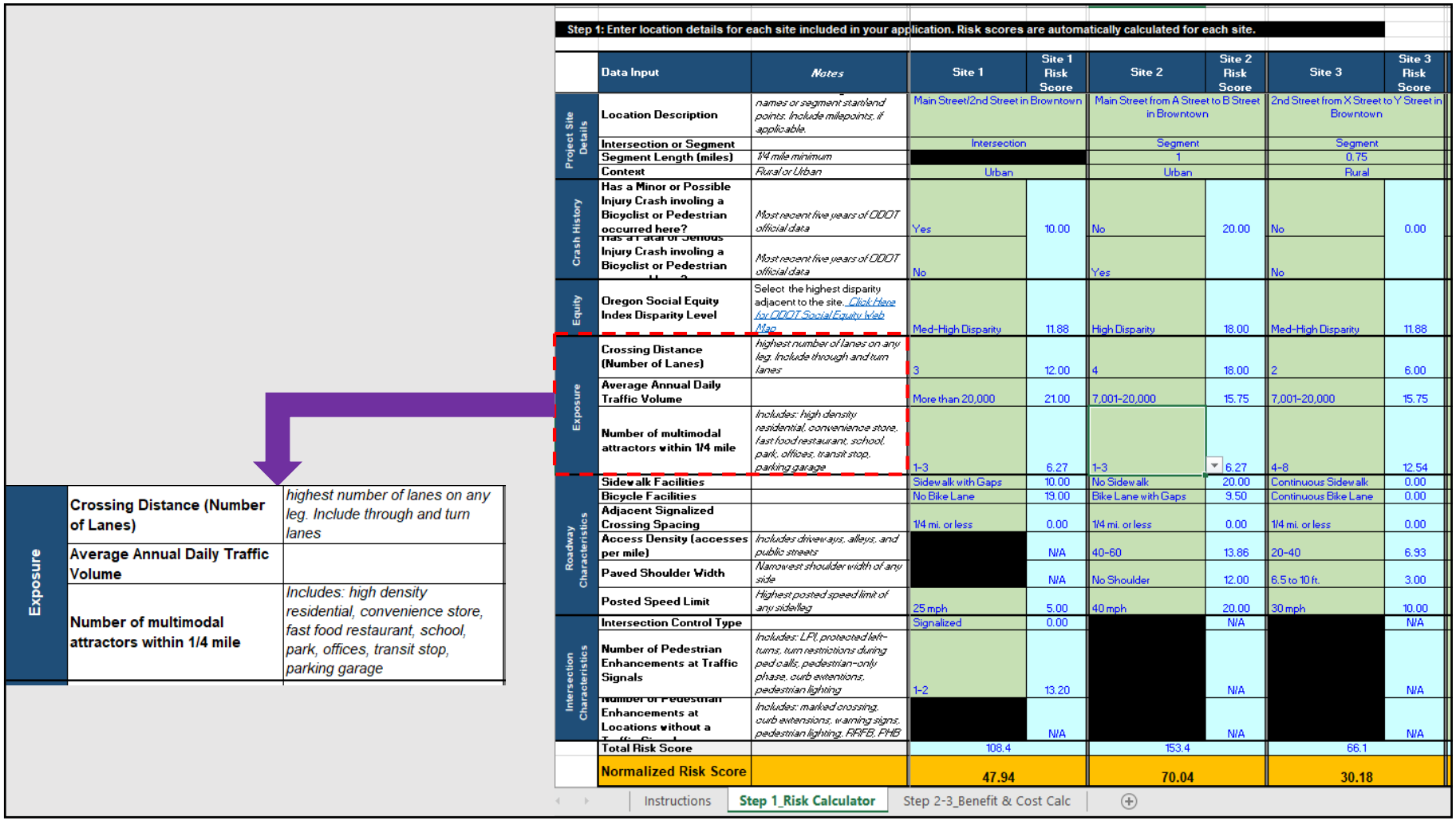

Exposure	Crossing Distance (Number of Lanes)	*highest number of lanes on any leg. Include through and turn lanes*
	Average Annual Daily Traffic Volume	
	Number of multimodal attractors within 1/4 mile	*Includes: high density residential, convenience store, fast food restaurant, school, park, offices, transit stop, parking garage*

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	Intersection or Segment		Intersection		Segment		Segment	
	Segment Length (miles)	*1/4 mile minimum*			1		0.75	
	Context	*Rural or Urban*	Urban		Urban		Rural	
Crash History	Has a Minor or Possible Injury Crash involing a Bicyclist or Pedestrian occurred here?	*Most recent five years of ODOT official data*	Yes	10.00	No	20.00	No	0.00
	Has a Fatal or Serious Injury Crash involing a Bicyclist or Pedestrian	*Most recent five years of ODOT official data*	No		Yes		No	
Equity	Oregon Social Equity Index Disparity Level	Select the highest disparity adjacent to the site. *Click Here for ODOT Social Equity Web Map*	Med-High Disparity	11.88	High Disparity	18.00	Med-High Disparity	11.88
Exposure	Crossing Distance (Number of Lanes)	*highest number of lanes on any leg. Include through and turn lanes*	3	12.00	4	18.00	2	6.00
	Average Annual Daily Traffic Volume		More than 20,000	21.00	7,001-20,000	15.75	7,001-20,000	15.75
	Number of multimodal attractors within 1/4 mile	*Includes: high density residential, convenience store, fast food restaurant, school, park, offices, transit stop, parking garage*	1-3	6.27	1-3	6.27	4-8	12.54
Roadway Characteristics	Sidewalk Facilities		Sidewalk with Gaps	10.00	No Sidewalk	20.00	Continuous Sidewalk	0.00
	Bicycle Facilities		No Bike Lane	19.00	Bike Lane with Gaps	9.50	Continuous Bike Lane	0.00
	Adjacent Signalized Crossing Spacing		1/4 mi. or less	0.00	1/4 mi. or less	0.00	1/4 mi. or less	0.00
	Access Density (accesses per mile)	*Includes driveways, alleys, and public streets*		N/A	40-60	13.86	20-40	6.93
	Paved Shoulder Width	*Narrowest shoulder width of any side*		N/A	No Shoulder	12.00	6.5 to 10 ft.	3.00
	Posted Speed Limit	*Highest posted speed limit of any side/leg*	25 mph	5.00	40 mph	20.00	30 mph	10.00
Intersection Characteristics	Intersection Control Type		Signalized	0.00		N/A		N/A
	Number of Pedestrian Enhancements at Traffic Signals	*Includes: LPI, protected left-turns, turn restrictions during ped calls, pedestrian-only phase, curb extentions, pedestrian lighting*	1-2	13.20		N/A		N/A
	Number of Pedestrian Enhancements at Locations without a Traffic Signal	*Includes: marked crossing, curb extensions, warning signs, pedestrian lighting, RRFB, PHB*		N/A		N/A		N/A
	Total Risk Score		108.4		153.4		66.1	
	Normalized Risk Score		47.94		70.04		30.18	

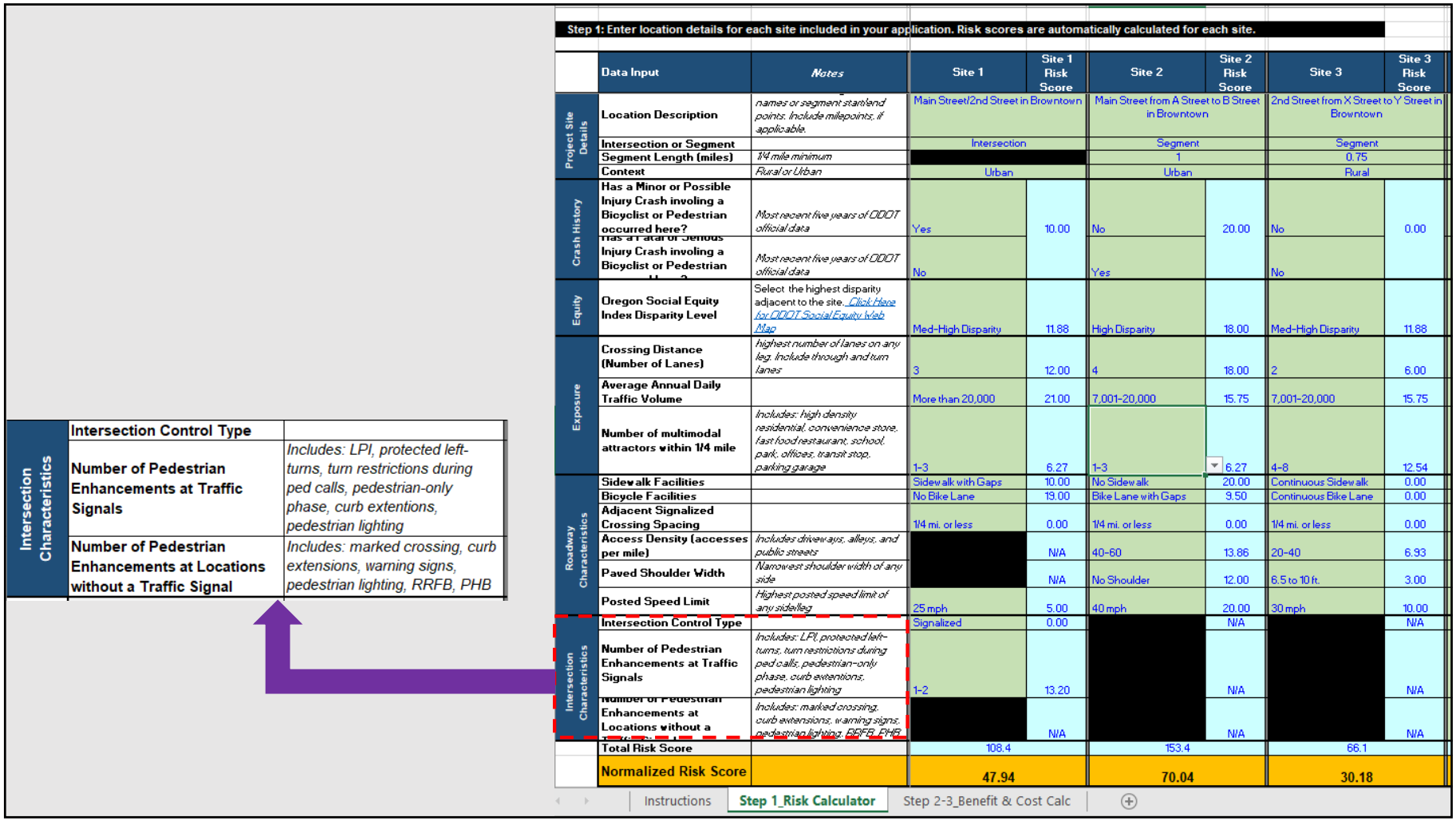
Instructions | Step 1_Risk Calculator | Step 2-3_Benefit & Cost Calc

Roadway Characteristics	Sidewalk Facilities	
	Bicycle Facilities	
	Adjacent Signalized Crossing Spacing	
	Access Density (accesses per mile)	*Includes driveways, alleys, and public streets*
	Paved Shoulder Width	*Narrowest shoulder width of any side*
	Posted Speed Limit	*Highest posted speed limit of any side/leg*

Step 1: Enter location details for each site included in your application. Risk scores are automatically calculated for each site.

	Data Input	Notes	Site 1	Site 1 Risk Score	Site 2	Site 2 Risk Score	Site 3	Site 3 Risk Score
Project Site Details	Location Description	*names or segment start/end points. Include milepoints, if applicable.*	Main Street/2nd Street in Browntown		Main Street from A Street to B Street in Browntown		2nd Street from X Street to Y Street in Browntown	
	Intersection or Segment		Intersection		Segment		Segment	
	Segment Length (miles)	*1/4 mile minimum*			1		0.75	
	Context	*Rural or Urban*	Urban		Urban		Rural	
Crash History	Has a Minor or Possible Injury Crash involing a Bicyclist or Pedestrian occurred here?	*Most recent five years of ODOT official data*	Yes	10.00	No	20.00	No	0.00
	Has a Fatal or Serious Injury Crash involing a Bicyclist or Pedestrian	*Most recent five years of ODOT official data*	No		Yes		No	
Equity	Oregon Social Equity Index Disparity Level	Select the highest disparity adjacent to the site. *Click Here for ODOT Social Equity Web Map*	Med-High Disparity	11.88	High Disparity	18.00	Med-High Disparity	11.88
Exposure	Crossing Distance (Number of Lanes)	*highest number of lanes on any leg. Include through and turn lanes*	3	12.00	4	18.00	2	6.00
	Average Annual Daily Traffic Volume		More than 20,000	21.00	7,001-20,000	15.75	7,001-20,000	15.75
	Number of multimodal attractors within 1/4 mile	*Includes: high density residential, convenience store, fast food restaurant, school, park, offices, transit stop, parking garage*	1-3	6.27	1-3	6.27	4-8	12.54
Roadway Characteristics	Sidewalk Facilities		Sidewalk with Gaps	10.00	No Sidewalk	20.00	Continuous Sidewalk	0.00
	Bicycle Facilities		No Bike Lane	19.00	Bike Lane with Gaps	9.50	Continuous Bike Lane	0.00
	Adjacent Signalized Crossing Spacing		1/4 mi. or less	0.00	1/4 mi. or less	0.00	1/4 mi. or less	0.00
	Access Density (accesses per mile)	*Includes driveways, alleys, and public streets*		N/A	40-60	13.86	20-40	6.93
	Paved Shoulder Width	*Narrowest shoulder width of any side*		N/A	No Shoulder	12.00	6.5 to 10 ft.	3.00
	Posted Speed Limit	*Highest posted speed limit of any side/leg*	25 mph	5.00	40 mph	20.00	30 mph	10.00
Intersection Characteristics	Intersection Control Type		Signalized	0.00		N/A		N/A
	Number of Pedestrian Enhancements at Traffic Signals	*Includes: LPI, protected left-turns, turn restrictions during ped calls, pedestrian-only phase, curb extentions, pedestrian lighting*	1-2	13.20		N/A		N/A
	Number of Pedestrian Enhancements at Locations without a Traffic Signal	*Includes: marked crossing, curb extensions, warning signs, pedestrian lighting, RRFB, PHB*		N/A		N/A		N/A
	Total Risk Score		108.4		153.4		66.1	
	Normalized Risk Score		47.94		70.04		30.18	

Instructions | Step 1_Risk Calculator | Step 2-3_Benefit & Cost Calc

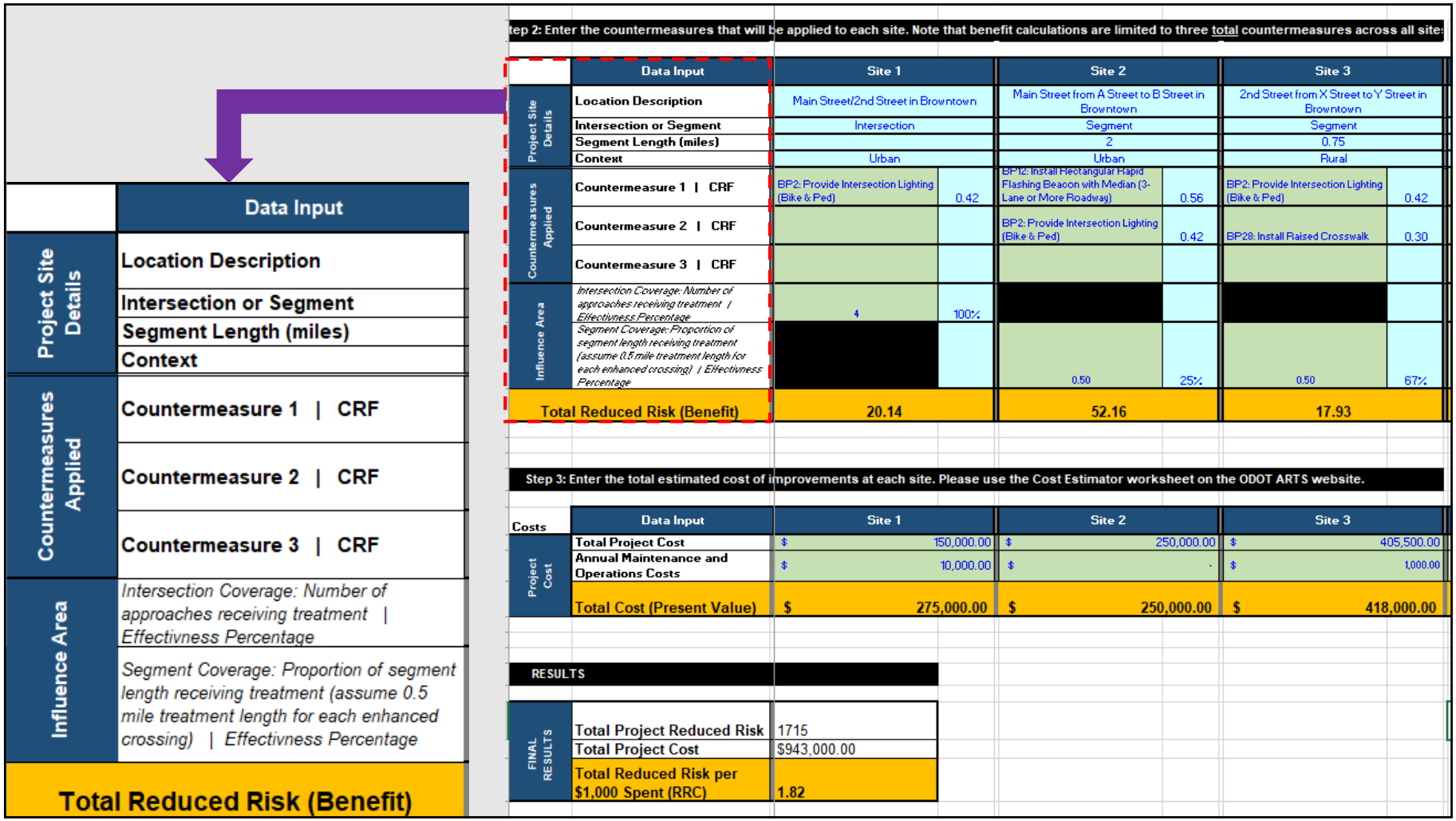


	Intersection Control Type	
Intersection Characteristics	Number of Pedestrian Enhancements at Traffic Signals	*Includes: LPI, protected left-turns, turn restrictions during ped calls, pedestrian-only phase, curb extentions, pedestrian lighting*
	Number of Pedestrian Enhancements at Locations without a Traffic Signal	*Includes: marked crossing, curb extensions, warning signs, pedestrian lighting, RRFB, PHB*

Step 1: Enter location details for each site included in your application. Risk scores are automatically calculated for each site.

	Data Input	Notes	Site 1	Site 1 Risk Score	Site 2	Site 2 Risk Score	Site 3	Site 3 Risk Score
Project Site Details	Location Description	*names or segment start/end points. Include milepoints, if applicable.*	Main Street/2nd Street in Browntown		Main Street from A Street to B Street in Browntown		2nd Street from X Street to Y Street in Browntown	
	Intersection or Segment		Intersection		Segment		Segment	
	Segment Length (miles)	*1/4 mile minimum*			1		0.75	
	Context	*Rural or Urban*	Urban		Urban		Rural	
Crash History	Has a Minor or Possible Injury Crash involing a Bicyclist or Pedestrian occurred here?	*Most recent five years of ODOT official data*	Yes	10.00	No	20.00	No	0.00
	Has a Fatal or Serious Injury Crash involing a Bicyclist or Pedestrian	*Most recent five years of ODOT official data*	No		Yes		No	
Equity	Oregon Social Equity Index Disparity Level	Select the highest disparity adjacent to the site. *Click Here for ODOT Social Equity Web Map*	Med-High Disparity	11.88	High Disparity	18.00	Med-High Disparity	11.88
Exposure	Crossing Distance (Number of Lanes)	*highest number of lanes on any leg. Include through and turn lanes*	3	12.00	4	18.00	2	6.00
	Average Annual Daily Traffic Volume		More than 20,000	21.00	7,001-20,000	15.75	7,001-20,000	15.75
	Number of multimodal attractors within 1/4 mile	*Includes: high density residential, convenience store, fast food restaurant, school, park, offices, transit stop, parking garage*	1-3	6.27	1-3	6.27	4-8	12.54
Roadway Characteristics	Sidewalk Facilities		Sidewalk with Gaps	10.00	No Sidewalk	20.00	Continuous Sidewalk	0.00
	Bicycle Facilities		No Bike Lane	19.00	Bike Lane with Gaps	9.50	Continuous Bike Lane	0.00
	Adjacent Signalized Crossing Spacing		1/4 mi. or less	0.00	1/4 mi. or less	0.00	1/4 mi. or less	0.00
	Access Density (accesses per mile)	*Includes driveways, alleys, and public streets*		N/A	40-60	13.86	20-40	6.93
	Paved Shoulder Width	*Narrowest shoulder width of any side*		N/A	No Shoulder	12.00	6.5 to 10 ft.	3.00
	Posted Speed Limit	*Highest posted speed limit of any side/leg*	25 mph	5.00	40 mph	20.00	30 mph	10.00
Intersection Characteristics	Intersection Control Type		Signalized	0.00		N/A		N/A
	Number of Pedestrian Enhancements at Traffic Signals	*Includes: LPI, protected left-turns, turn restrictions during ped calls, pedestrian-only phase, curb extentions, pedestrian lighting*	1-2	13.20		N/A		N/A
	Number of Pedestrian Enhancements at Locations without a	*Includes: marked crossing, curb extensions, warning signs, pedestrian lighting, RRFB, PHB*		N/A		N/A		N/A
	Total Risk Score		108.4		153.4		66.1	
	Normalized Risk Score		47.94		70.04		30.18	

Instructions | Step 1_Risk Calculator | Step 2-3_Benefit & Cost Calc



	Data Input
Project Site Details	Location Description
	Intersection or Segment
	Segment Length (miles)
	Context
Countermeasures Applied	Countermeasure 1 | CRF
	Countermeasure 2 | CRF
	Countermeasure 3 | CRF
Influence Area	*Intersection Coverage: Number of approaches receiving treatment | Effectivness Percentage*
	Segment Coverage: Proportion of segment length receiving treatment (assume 0.5 mile treatment length for each enhanced crossing) | Effectivness Percentage
Total Reduced Risk (Benefit)	

tep 2: Enter the countermeasures that will be applied to each site. Note that benefit calculations are limited to three total countermeasures across all site

	Data Input	Site 1		Site 2		Site 3	
Project Site Details	Location Description	Main Street/2nd Street in Browntown		Main Street from A Street to B Street in Browntown		2nd Street from X Street to Y Street in Browntown	
	Intersection or Segment	Intersection		Segment		Segment	
	Segment Length (miles)			2		0.75	
	Context	Urban		Urban		Rural	
Countermeasures Applied	Countermeasure 1 | CRF	BP2: Provide Intersection Lighting (Bike & Ped)	0.42	BP12: Install Rectangular Rapid Flashing Beacon with Median (3-Lane or More Roadway)	0.56	BP2: Provide Intersection Lighting (Bike & Ped)	0.42
	Countermeasure 2 | CRF			BP2: Provide Intersection Lighting (Bike & Ped)	0.42	BP28: Install Raised Crosswalk	0.30
	Countermeasure 3 | CRF						
Influence Area	*Intersection Coverage: Number of approaches receiving treatment / Effectivness Percentage*	4	100%				
	Segment Coverage: Proportion of segment length receiving treatment (assume 0.5 mile treatment length for each enhanced crossing) / Effectivness Percentage			0.50	25%	0.50	67%
Total Reduced Risk (Benefit)		**20.14**		**52.16**		**17.93**	

Step 3: Enter the total estimated cost of improvements at each site. Please use the Cost Estimator worksheet on the ODOT ARTS website.

Costs	Data Input	Site 1	Site 2	Site 3
Project Cost	Total Project Cost	$ 150,000.00	$ 250,000.00	$ 405,500.00
	Annual Maintenance and Operations Costs	$ 10,000.00	$ -	$ 1,000.00
	Total Cost (Present Value)	**$ 275,000.00**	**$ 250,000.00**	**$ 418,000.00**

RESULTS

FINAL RESULTS		
	Total Project Reduced Risk	1715
	Total Project Cost	$943,000.00
	Total Reduced Risk per $1,000 Spent (RRC)	**1.82**

Costs	Data Input
Project Cost	Total Project Cost
	Annual Maintenance and Operations Costs
	Total Cost (Present Value)
RESULTS	
FINAL RESULTS	Total Project Reduced Risk
	Total Project Cost
	Total Reduced Risk per $1,000 Spent (RRC)

Step 2: Enter the countermeasures that will be applied to each site. Note that benefit calculations are limited to three total countermeasures across all sites

	Data Input	Site 1		Site 2		Site 3	
Project Site Details	Location Description	Main Street/2nd Street in Browntown		Main Street from A Street to B Street in Browntown		2nd Street from X Street to Y Street in Browntown	
	Intersection or Segment	Intersection		Segment		Segment	
	Segment Length (miles)			2		0.75	
	Context	Urban		Urban		Rural	
Countermeasures Applied	Countermeasure 1 | CRF	BP2: Provide Intersection Lighting (Bike & Ped)	0.42	BP12: Install Rectangular Rapid Flashing Beacon with Median (3-Lane or More Roadway)	0.56	BP2: Provide Intersection Lighting (Bike & Ped)	0.42
	Countermeasure 2 | CRF			BP2: Provide Intersection Lighting (Bike & Ped)	0.42	BP28: Install Raised Crosswalk	0.30
	Countermeasure 3 | CRF						
Influence Area	*Intersection Coverage: Number of approaches receiving treatment / Effectiveness Percentage*	4	100%				
	Segment Coverage: Proportion of segment length receiving treatment (assume 0.5 mile treatment length for each enhanced crossing) / Effectiveness Percentage			0.50	25%	0.50	67%
Total Reduced Risk (Benefit)		20.14		52.16		17.93	

Step 3: Enter the total estimated cost of improvements at each site. Please use the Cost Estimator worksheet on the ODOT ARTS website.

Costs	Data Input	Site 1	Site 2	Site 3
Project Cost	Total Project Cost	$ 150,000.00	$ 250,000.00	$ 405,500.00
	Annual Maintenance and Operations Costs	$ 10,000.00	$ -	$ 1,000.00
	Total Cost (Present Value)	$ 275,000.00	$ 250,000.00	$ 418,000.00

RESULTS

FINAL RESULTS	Total Project Reduced Risk	1715
	Total Project Cost	$943,000.00
	Total Reduced Risk per $1,000 Spent (RRC)	1.82

Next Step

- Share the new tool with ODOT Regions for next round ARTS program projects application
- Adjust the weight for risk factor based on feedbacks from Regions

Oregon Department of Transportation

QUESTIONS?

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