SAFETY INVESTIGATION MANUAL WORKSHEET

CASE STUDY: OR-43 AND RICHARDSON CT.

Online Training

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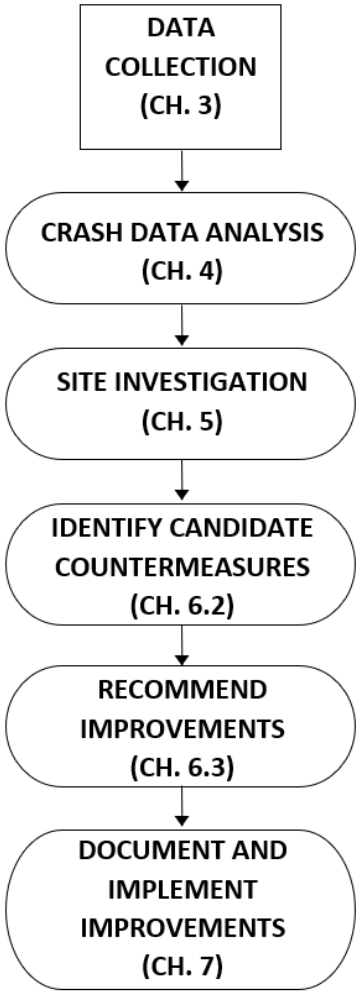
Case Study #1: OR-43 and Richardson Ct.

- Unsignalized intersection
- Six-year study period
- 1/1/2011 – 12/31/2016
  - MP 1.11 to MP 1.15 on OR-43



Step 1: Data Collection

- In-Office Data
  - Crash Data
  - Oregon Traffic Data Explorer
  - Safety Priority Index System (SPIS) (SPIS Brochure)
  - Highway Inventory Reports
  - Facility Functional Class
    - TransGIS
  - Traffic Volumes
  - Digital Video Log
  - Google Maps
- Field Data

Obtain Crash Data

- Obtain crash data
  - https://tvc.odot.state.or.us/tvc/
- 21 total crashes

Functional Class and Traffic Volumes

- Highway Inventory Reports

Roadway	Mileage Type	Overlap Code	Mile Point	Dup	Roadway Codes	Description	# of Lanes	Total Lane Width	Total Surface Width	L1 SR TP	Engineering Station Code	Engineering Station ID	MEDIAN TYPE	MEDIAN WIDTH
Highway #: 003 OSWEGO Hwy														
1			1.15				4	48	48	AU			2	12
1			1.13		| = C	SW RICHARDSON CT.	4	48	60	AU	F	35+78	0	0

Please note that on this report, median width does NOT include the width of inside shoulders.

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Functional Class and Traffic Volumes

- Facility Functional Class
  - Functional Classification Table by Highway and MP

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Functional Classification and National Highway System Status
As of October 2021* on Oregon State Highways

https://www.oregon.gov/ODOT/Data/Documents/FC_NHS_State_Highway_List.pdf

LRS	Hwy	Rdwy ID	Mlge Type	Begin MP	End MP	NHS	FC Code	Historic FC Code	FC Description	HPMS Area	Urban Area
00200I00	002	1		186.85	203.28	No	4	06	Minor Arterial	1	
00300D00	003	2		0	0.76	Yes	3	14	Other Principal Arterial	4	PORTLAND
00300I00	003	1		0	0.94	Yes	3	14	Other Principal Arterial	4	PORTLAND
00300I00	003	1		1	2.53	Yes	3	14	Other Principal Arterial	4	PORTLAND
00300I00	003	1		2.53	6.13	No	4	16	Minor Arterial	4	PORTLAND

Functional Class and Traffic Volumes

- Traffic Volumes
  - Oswego Highway, No. 003
  - Milepost indicates distance from Mt. Hood Highway (US-26) in Portland
  - Closest mile point is 1.00 (just north of case study location by ≈ 0.11 miles

Year	MP	AADT (All Vehicles)	Location
2011	1.00	23,700	0.02 mi north of SW Julia Street
2012	1.00	25,900	0.02 mi north of SW Julia Street
2013	1.00	26,200	0.02 mi north of SW Julia Street
2014	1.00	26,500	0.02 mi north of SW Julia Street
2015	1.00	22,300	0.02 mi north of SW Julia Street
2016	1.00	22,900	0.02 mi north of SW Julia Street

OSWEGO HIGHWAY NO. 3

Milepoint indicates distance from Mt. Hood Highway (US26), in Portland

SOUTHBOUND - ONE-WAY TRAFFIC

On S.W. Hood Avenue

0.02	*4200*	0.02 mile south of US26
0.22	*4500*	0.02 mile west of S.W. Hood Avenue
0.41	*12300*	0.18 mile south of connection to Pacific Highway (I-5)

NORTHBOUND - ONE-WAY TRAFFIC

On S.W. Macadam Avenue

0.43	*22300*	0.06 mile south of S.W. Curry Street
0.63	*15200*	0.01 mile south of S.W. Thomas Street

RESUME TWO-WAY TRAFFIC

1.00	*23700*	0.02 mile north of S.W. Julia Street

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Digital Video Log

- Digital Video Log

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Google Maps and Streetview

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1. Download data and process data in the SIM Worksheet
2. Complete all necessary fields and selections in the SIM Worksheet
3. Assess and identify crash patterns on the intersections tab. Which crash types and patterns are highlighted?

OR-43 and Richardson Ct. – SIM Output

Severity	Crash	Obs %	Ex %	P(Norm)
Fatal+ Inj A	1	4.8%	2.9%	46.4%
Injury B+C	12	57.1%	50.7%	35.5%
PDO	8	38.1%	46.4%	83.7%
	21	100.0%	100.0%	

Collision Type (All)	Crash	Obs %	Ex %	P(Norm)
Angle	1	4.8%	5.3%	68.4%
Head-on	0	0.0%	0.5%	
Rear	1	4.8%	27.0%	99.9%
Sideswipe-Meet	0	0.0%	0.4%	
Sideswipe-Over	0	0.0%	2.0%	
Turn	18	85.7%	52.2%	**0.1%**
Parked	0	0.0%	0.3%	
NonCollision	0	0.0%	0.4%	
Backing	0	0.0%	1.3%	
Pedestrian	0	0.0%	2.2%	
Fixed Object	1	4.8%	8.0%	82.7%
Other	0	0.0%	0.3%	
	21	100%	100%	

Month	Crash	Obs %	Ex %	P(Norm)
January	9	42.9%	8.0%	**0.0%**
February	1	4.8%	7.0%	78.3%
March	2	9.5%	7.3%	45.7%
April	1	4.8%	8.2%	83.6%
May	0	0.0%	8.2%	
June	3	14.3%	8.4%	25.4%
July	0	0.0%	8.3%	
August	1	4.8%	8.4%	84.0%
September	4	19.0%	8.3%	9.1%
October	0	0.0%	10.0%	
November	0	0.0%	8.9%	
December	0	0.0%	9.1%	
UNK	0	0.0%		
	21	100%	100%	

Older Drivers Involved	Crash	Obs %	Ex %	P(Norm)
Older Drivers Involved	7	17.1%	7.6%	**3.3%**
NA	34	82.9%		
	41	100.0%	7.6%	

Cause Codes	Proj	Obs %	Ex %	P(Norm)
CARELESS	0	0.0%	3.0%	
DEF BRKE	0	0.0%	0.3%	
DEF STER	0	0.0%	0.1%	
DIS TCD	0	0.0%	0.1%	
DIS--RAG	0	0.0%	0.3%	
FATIGUE	0	0.0%	0.6%	
IMP LN C	0	0.0%	1.8%	
IMP-OVER	0	0.0%	1.6%	
IMP-TURN	0	0.0%	8.1%	
IN RDWY	0	0.0%	0.5%	
INATTENT	0	0.0%	5.3%	
LEFT-CTR	0	0.0%	0.7%	
LOADSHFT	0	0.0%	0.0%	
MECH-DEF	0	0.0%	0.1%	
NO-YIELD	18	85.7%	53.3%	**0.2%**
NT VISBL	0	0.0%	0.3%	
OTHER	0	0.0%	0.4%	
OTHR-IMP	1	4.8%	3.5%	52.2%
PAS-STOP	1	4.8%	4.8%	64.7%
PHANTOM	0	0.0%	0.7%	
RECKLESS	0	0.0%	2.3%	
SPEED	0	0.0%	0.8%	
TOO-CLOS	0	0.0%	6.7%	
TOO-FAST	1	4.8%	4.6%	62.8%
WRNG WAY	0	0.0%	0.2%	
	21	100%	100%	

**P(norm) values in* ▭ *indicate overrepresentation*

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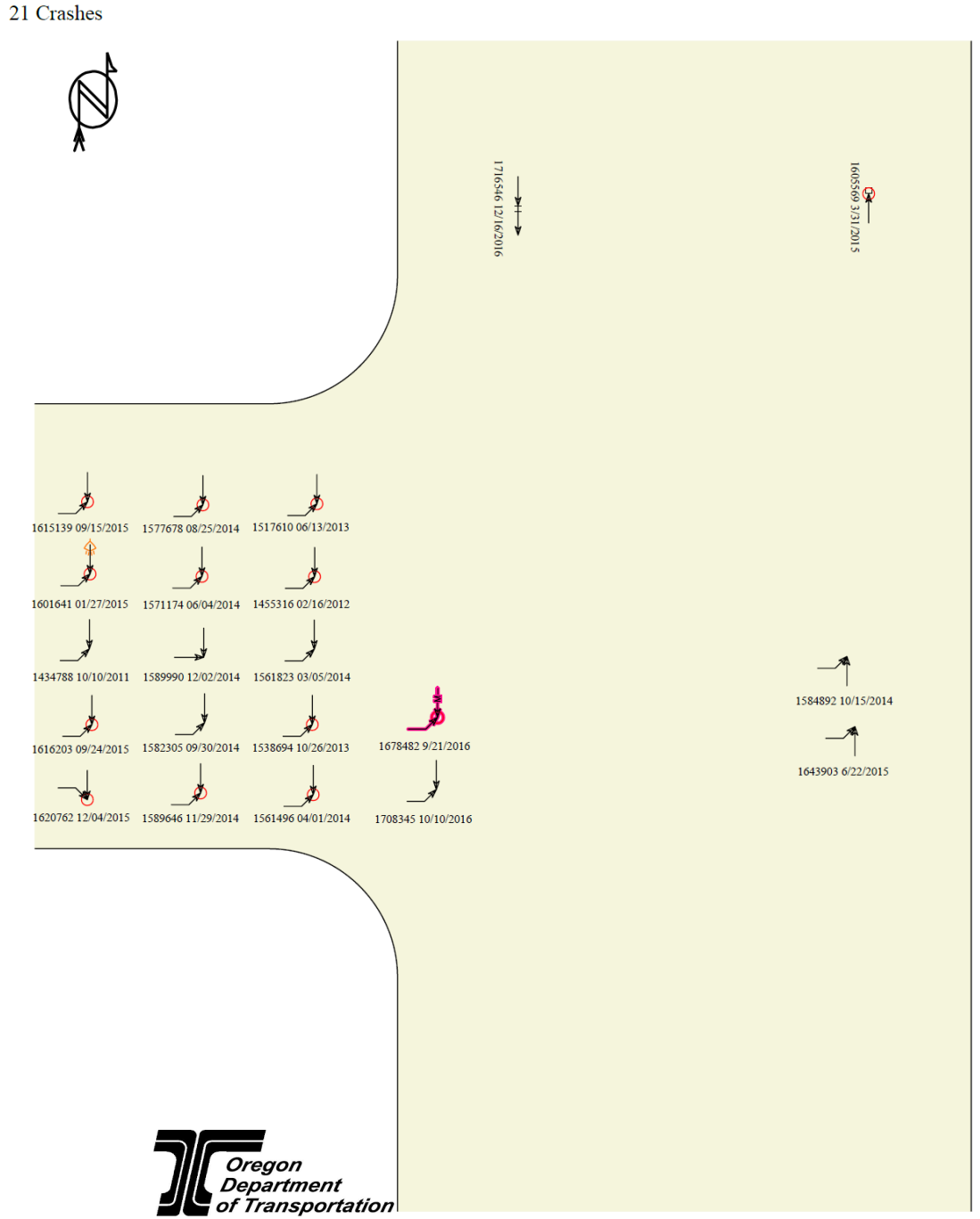
Collision Diagram



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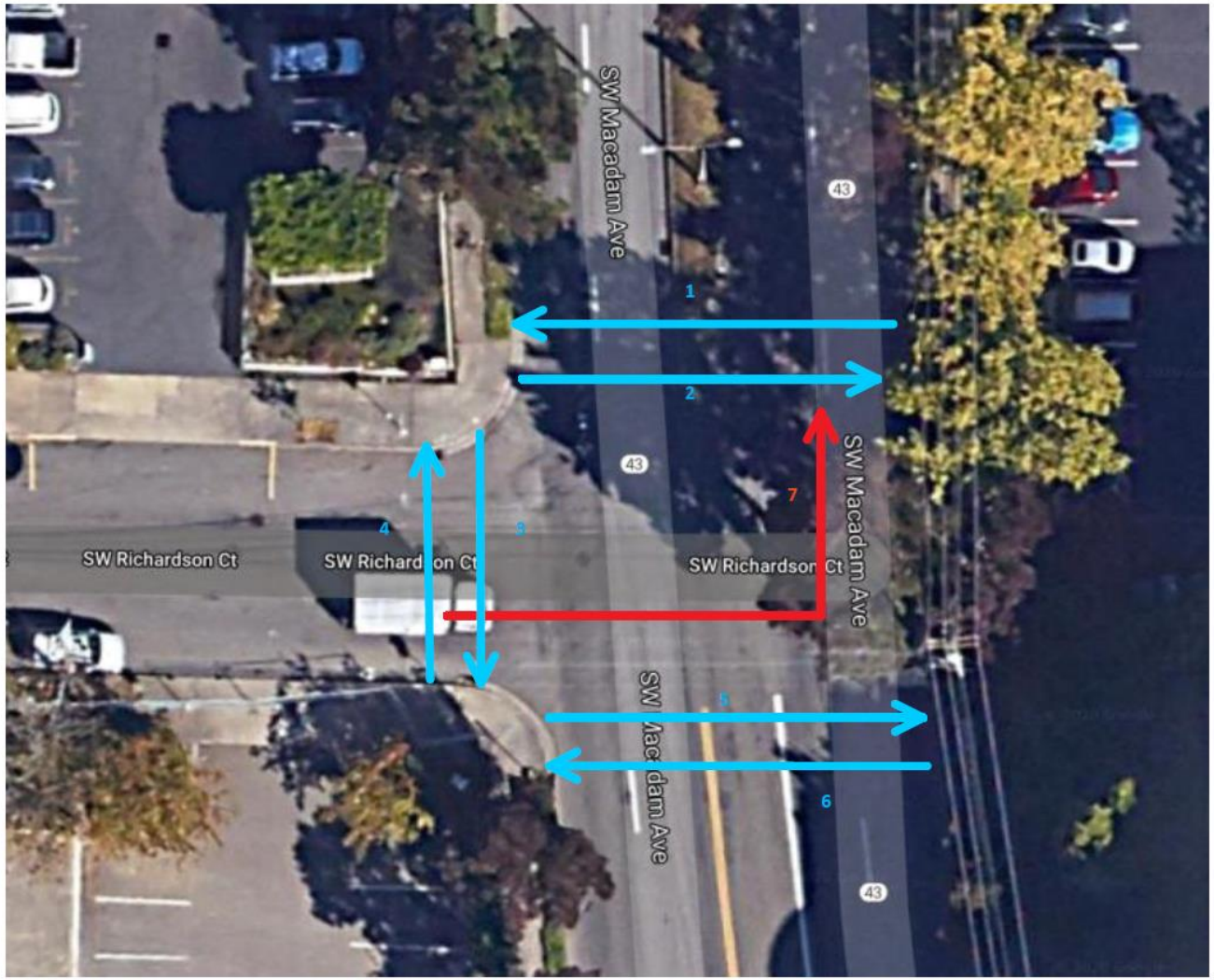
1. Does the collision diagram follow the patterns identified from the SIM Worksheet analysis?

Step 3: Site Visit



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Summary of Site Investigation

- 18 turning movement crashes
- Leading cause = failed to yield right-of-way
- All turning movement crashes were vehicles turning left from Richardson Ct. onto OR-43

Step 4: Identify Countermeasure

- Table 3 in Safety Investigation Manual
  - Investigation and Diagnosis for Intersection Crashes

Crash Pattern	Probable Cause	What to Document	General Countermeasures
Left-turn collisions at intersections	• Large volume of traffic or left turns • Restricted sight distance • Over capacity vehicle movements	• Number of lanes / lane width / lane usage • Traffic signal timing and operating sequence • Location and visibility of signs related to lane usage or turning movements • Sight distance obstructions • Coordination, gap time, max green times, % max outs • v/c ratios of each movement	• Provide left-turn signal phases • Prohibit left turns • Increase/add left turn lane and provide left-turn signal if warranted • Re-route left-turn traffic • Provide adequate channelization • Create one-way streets • Install “STOP” signs • Adjust signal timing or install traffic signal • Improve approach visibility • Widen road • Adjust/Extend amber or all-red • Prohibit parking • Reduce number of pedestrian crossings • Remove obstacles • Install warning signs • Reduce speed limit on approaches • Replace signal with roundabout

Step 4: Identify Countermeasure

- FHWA Intersection Safety
- CMF Clearinghouse
- ARTS Crash Reduction Factor (CRF) List
- ARTS Crash Countermeasure Selection Tool

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1. Follow links on the previous slide and identify potential countermeasures based on the site characteristics and identified crash patterns

Expected Effectiveness of Identified Countermeasures

- I21: Improve Intersection Warning
  - No right turn regulatory sign and striping
  - Crash type = all
  - Injury severity = all
  - Service life = 10 years
  - Unsignalized
  - Urban or rural
  - CRF
    - 25%
    - Range: 11% - 55%
  - Caltrans/Intersection Implementation Plan/Engineering Judgement

Expected Effectiveness of Identified Countermeasures

- I17: Improve Triangle Sight Distance
  - Install 6 ft. or greater raised divider on stop approach
  - Crash type = all
  - Injury severity = all (excluding no injury, PDO)
  - Service life = 10 years
  - Signalized or unsignalized
  - Urban or rural
  - CRF
    - 48
    - Range: 11% - 56%
  - CMF Clearinghouse (CMF ID: 307)

Step 5: Recommended Solution

- Implemented Solution
  - Two rows of polyethylene traffic separators across the intersection to extend the median island.
  - Restrict Richardson Ct. to right in, right out, and left in.
  - Selected to restrict left turns and the number of associated crashes.
  - Closed northerly crosswalk due to extension of median island.

Step 6: Documentation and Implementation

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