Appendix A: Lower Columbia River Rail Corridor Inventory Master Summary

LOWER COLUMBIA RIVER RAIL CORRIDOR - TASK 3 - EXISTING CONDITIONS DATA SUMMARY

HDR Photo File #	Crossing # (1995 Track Chart)	U.S. DOT No.	Street Name	Milepost	Public/Private	AADT	Summer 2008 ODOT AADT	Number of Lanes	Sidewalks	Bicycle Lane	Protection	Traffic Control Devices	Stop Bar	Cross Bucks	Crossing Surface Type	Roadway Surface	Storage: Rt. Turn from Hwy 30	Storage: Lt. Turn to Hwy 30	Average Length of Rail Cars	Current Conditions (As of August 2008): 3,600 ft Local Trains Per Day	# Locomotives Per Local Train	Local Trains and Non-Loaded Unit Trains	Loaded Unit Trains	Local Trains Blockage Duration	6,600 ft Unit Trains Per Week	# Locomotives Per Unit Train	Unit Trains Blockage Duration	10-Year Growth @ 8%/yr: 6,000 ft Local Trains Per Day	6,600 ft Unit Trains Per Week	Speed Limit All Trains	Local Trains Blockage Duration	Unit Trains Blockage Duration	Bus Crossings: Morning 6:45am-7:45am	Midday 11am-12pm	Afternoon 2:30pm-4:30pm
1	57893T		Watson Rd.	17.37	Private														60 ft	6	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
2	57895G	057895G	St. Johns Landing (Dike Rd.)	18.05	Public	100		2	No	No	Active	Signalized with Gate	Yes	Yes	Asphalt	Asphalt	200 ft	100 ft	60 ft	6	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	7.7	3.2	25 mph	3.37 min	3.64 min			
3	57896N		Havlik Rd.	18.78	Private														60 ft	6	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
4	57897V		Candlestick Factory	18.88	Private														60 ft	6	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
5	101358B	101854W	High School Rd.	19.38	Public	3919	3900	3	Yes	No	Active	Signalized, Gate, & Cantilever	Yes	Yes	Concrete & Timber	Asphalt	172 ft	31 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
6	57900B	057900B	Santosh St.	19.61	Public	978		3	Yes	No	Passive	Stop Sign	Yes	Yes	Rubber	Asphalt & Concrete	180 ft	43 ft	60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.66 min	5.2	3.2	25 mph	2.79 min	3.07 min			
7	57901H	057901H	Maple St.	19.67	Public	595	1800	3	Yes	No	Active	Signalized with Gate	Yes	Yes	Concrete & Timber	Asphalt & Concrete	245 ft	38 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
8	57902P	057902P	Columbia Ave.	19.90	Public	4664	4900	3	Yes	No	Active	Signalized, Gate, & Cantilever	Yes	Yes	Concrete & Timber	Asphalt & Concrete	160 ft	37 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
9		916564S	Crown Zellerbach Rd.	20.31	Public	425		3	Yes	Yes	Active	Signalized, Gate, & Cantilever	Yes	Yes	Concrete	Asphalt	310 ft	43 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
10	57906S			20.84	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
11	57910G	057910G	West Lane Rd.	21.48	Public	1450	1000	2	No	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	400 ft	56 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
12		057911N	Columbia Mem. Gardens (Cemetery Rd)	21.94	Public	99		2	No	No	Passive	Stop Sign	No	Yes	Asphalt	Asphalt	55 ft	55 ft	60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
13	57913C			22.33	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
14	57914J			22.59	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
15	57915R			22.68	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
16	57917E			23.29	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
17	57918L			23.48	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
18	57919T			23.56	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
19				23.61	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
20	57920M			23.72	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
21	57921U	057921U	Old Portland Rd. (Berg Rd.)	23.98	Public	300	100	2	No	No	Passive	Yield Sign and Stop Sign	Yes	Yes	Asphalt	Asphalt	44 ft	53 ft	60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
22	57924P	057924P	Old Portland Rd. (Bennet Rd.)	24.78	Public	1050	2700	2	No	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	500 ft	50 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
23	57927K	057927K	Millard Rd.	25.92	Public	300	800	3	No	No	Active	Signalized, Gate, & Cantilever	Yes	Yes	Concrete	Asphalt & Concrete	200 ft	47 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
24	57930T	057930T	Gable Rd.	26.67	Public	2500	8900	3	Yes	Yes	Active	Signalized, Gate, & Cantilever	Yes	Yes	Concrete	Asphalt	320 ft	34 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
25	57937R	057932G	Columbia Blvd.	27.54	Public	8300	5800	2	Yes	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	400 ft	N/A	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
26	97938X	057938X	St. Helens St.	27.65	Public	7160	6800	3	No	No	Active	Signalized, Gate, & Cantilever	Yes	Yes	Concrete	Asphalt & Concrete	N/A	41 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
27	57941F	057941F	Wyeth St.	27.94	Public	63		2	Yes	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	300 ft	48 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
28	57943U	057943U	Deer Island Rd.	28.42	Public	8065	3400	2	Yes	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	280 ft	45 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
29	57946P	057946P	I St.	29.75	Public	627	900	2	No	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	200 ft	46 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
30	57947W	057947W	E St.	30.03	Public	932	400	2	Yes	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	110 ft	40 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
31	57948D	057948D	Pacific St.	30.58	Public	175		2	No	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	105 ft	56 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
32	57951L			31.25	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
33	57954G			31.45	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
34	57955N		Kinder Cemetery	31.62	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
35	910156L			31.76	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
36	57956V			32.04	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
37	57957C		Island Dr.	32.66	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
38	57958J			33.16	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
39	57959R		Morse Bros.	33.61	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
40	57961S			34.13	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
41	57963F			35.50	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
42	57964M			35.83	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
43	57966B			37.25	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
44	57967H			37.99	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
45	57968P			38.91	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
46	57969W	057969W	Goble Landing (Lake St.)	39.41	Public	100	800	2	No	No	Passive	Yield Sign and Stop Sign	Yes	No	3/4" Minus	Asphalt	58 ft	58 ft	60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min	2	0	2
47	57970R			39.86	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
48	57971X			40.60	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
49	57972E			41.16	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
50	57973L			41.20	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
51	57974T	057974T	Graham Rd.	41.85	Public	220		2	No	No	Passive	Stop Sign	Yes	Yes	Rubber	Asphalt			60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min	2 reg, 2 spec. needs	0	2 reg, 2 spec. needs
52	57975A	057975A	6th St.	45.54	Public	24		2	Yes	No	Passive	Yield Sign	Yes	No	Asphalt	Gravel			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
53	57976G	057976G	5th St.	45.60	Public	210		2	Yes	No	Passive	Yield Sign	Yes	Yes	Asphalt	Asphalt			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
54	57977N	057977N	4th St.	45.65	Public	283		2	Yes	No	Passive	Yield Sign	Yes	Yes	Asphalt	Asphalt			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
55	57978V	057978V	3rd St.	45.71	Public	900		2	Yes	No	Passive	Yield Sign	Yes	Yes	Asphalt	Asphalt			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
56	57999C	057979C	2nd St.	45.76	Public	1043		2	Yes	No	Passive	Yield Sign	Yes	Yes	Asphalt	Asphalt			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
57	57980W	057980W	1st St.	45.82	Public	1255		2	Yes	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
58	57981D	057981D	2nd St.	45.88	Public	2188		2	Yes	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
59		916561W	Veterans Way	46.19	Public	1320	800	3	Yes	Yes	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	160 ft	149 ft	60 ft	6	1	10 mph	10 mph	4.84 min	1.5	4 (2 front, 2 rear)	8.25 min	7.7	3.2	25 mph	3.38 min	3.65 min	2	0	2
60	57982K			46.65	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
61	57983S			47.00	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
62	57985F			47.33	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
63	57987U			47.38	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
64				47.44	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
65		916559V	Dike Rd.	48.48	Public	99		2	No	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt			60 ft	6	1	10 mph	10 mph	4.82 min	1.5	4 (2 front, 2 rear)	8.23 min	7.7	3.2	25 mph	3.37 min	3.64 min			
66	57991J			51.29	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
67	57992R			55.66	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
68	57993X	057993X	Mayger Fill Rd.	55.80	Public	300		2	No	No	Passive	Stop Sign	Yes	Yes	Gravel	Asphalt			60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
69	57994E			57.00	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
70	957995L			57.19	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
71	57996T	057996T	Kallunki Rd.	58.02	Public	250		2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		2	0	4
72	57997A			58.32	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
73	57998G			58.60	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
74	58001V			59.11	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
75	58002C	058002C	Hermo Rd.	59.32	Public	750		2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		1	0	2
76	58004R	058003J	Beaver Dike Rd.	59.57	Public	150		2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		1	0	2
77	58006E	058006E	Depot St.	62.20	Public	756		2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		2	2	2
78	910159G			62.35	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
79	58007L			62.45	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
80				63.20	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
81	58008T			63.71	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
82	58009A			64.00	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
83	58010U	058010U	Pt. Adams Rd. (Midland Rd)	64.30	Public	12		2	No	No	Passive	Signalized, but no Gate	Yes	Yes	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.82 min				2.6		10 mph	7.55 min		3	1	4
84	58011B			65.73	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
85	58012H	058012H	Marshland Rd. (Co. Rd. 198)	66.60	Public	50	100	2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt	78 ft	72 ft	60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		1	1	2
86	58013D			67.26	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
87	58014W			67.75	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
88	58015D			68.11	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
89	58016K	058016K	Marshland Dist. Rd. #4119	68.41	Public	80		2	No	No	Passive	Stop Sign	Yes	One Side	Gravel & Timber	Asphalt & Gravel	46 ft	55 ft	60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
90	58017S	058017S	Woodson Rd.	68.51	Public	300	300	2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt	73 ft	63 ft	60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		4	0	8
91	58018Y			69.89	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
92	910160B			70.14	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
93	58020A	058020A	Old Mill Rd. (Westport Ramp Rd.)	71.11	Public	20	400	2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		1	1	2
94	058021G	058021G	Westport Ferry Rd. (Westport Dock Rd.)	71.27	Public	438	300	2	No	No	Passive	Signalized, but no Gate	Yes	One Side	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.82 min				2.6		10 mph	7.55 min		1	1	2
95	58022N	058022N	Driscoll Slough Rd.	72.88	Public	10		1	No	No	Passive	Stop Sign	Yes	No	Gravel & Timber	Gravel			60 ft	2	1	10 mph	10 mph	4.22 min				2.6		10 mph	6.95 min				
96	910162P			73.11	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
97	58023V			73.25	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
98	58024C			73.53	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
99	910163W			73.71	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
100	58025J			73.82	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
101	58028E			73.26	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
102	58029L			76.82	Private																	10 mph	10 mph							10 mph					
103	58030F	058030F	Clifton Rd.	78.40	Private	5																10 mph	10 mph							10 mph					
104	58031M	058031M	Clifton Ferry Rd.	78.58	Private	5																10 mph	10 mph							10 mph					
105	58032U	058032U	Aldrich Pt. Rd.	81.75	Public	20		2	No	No	Passive	One Stop Sign	No	No	Rubber	Asphalt						10 mph	10 mph							10 mph					
106	58033B	05833B	Gertula Rd.	82.74	Public	49																10 mph	10 mph							10 mph					
107	58034H	058034H	Brownsmead Dike Rd.	83.35	Public	120		2	No	No	Passive	None	One Side	Yes	Asphalt	Asphalt						10 mph	10 mph							10 mph					
108	58035P			84.60	Private																	10 mph	10 mph							10 mph					
109	910165K			84.90	Private																	10 mph	10 mph							10 mph					
110	58037D	058037D	Waterhouse Rd.	86.56	Public	30		2	No	No	Passive	None	One Side	Yes	Asphalt	Asphalt						10 mph	10 mph							10 mph					
111	58038K	058038K	Svenson Island Rd.	90.22	Private	62																10 mph	10 mph							10 mph					
112	910169M			91.25	Private																	10 mph	10 mph							10 mph					
113	910170G			92.66	Private																	10 mph	10 mph							10 mph					
114	910171N			92.95	Private																	10 mph	10 mph							10 mph					
115	910172V			92.99	Private																	10 mph	10 mph							10 mph					
116	58040L	058040L	Liberty Ln. (Maritime Rd.)	95.71	Public	170		2	No	No	Passive	Signalized, but no Gate	Yes	Yes	Timber	Asphalt						10 mph	10 mph							10 mph					
117	58041T			96.43	Private																	10 mph	10 mph							10 mph					
118	58042A			96.82	Private																	10 mph	10 mph							10 mph					
119	58045V		39th St.	98.67	Public			2	No	No	Passive	One Stop Sign	Yes	Yes	Rubber	Asphalt																			

HDR

Appendix B: Portland & Western Railroad Safety Initiatives Fact Sheet and Emergency Response Plan

a Genesee & Wyoming Company

Safety Initiatives

Operation Lifesaver

Oregon Operation Lifesaver is a not-for-profit Oregon corporation that is part of an international family of organizations devoted to ending tragic collisions, fatalities and injuries at highway-railroad crossings and on railroad rights-of-way. To accomplish our mission, we promote the 3 E's:

Education: Operation Lifesaver strives to increase public awareness about the dangers around the rails. The program seeks to educate both drivers and pedestrians to make safe decisions at crossings and around railroad tracks.

Enforcement: Operation Lifesaver promotes active enforcement of traffic laws relating to crossing signs and signals and private property laws related to trespassing.

Engineering: Operation Lifesaver encourages continued engineering research and innovation to improve the safety of railroad crossings.

Oregon OL is funded almost entirely by voluntary contributions for Oregon's railroads, and a small amount of grant money provided by the Federal Railroad Administration, administered through OLI.

More than 40 Certified Operation Lifesaver Presenters volunteer throughout the state of Oregon, offering free programs to a wide variety of audiences. Operation Lifesaver Presenters receive rigorous training and have access to a range of sophisticated curriculum developed by OLI. OLI is constantly reviewing and improving the materials designed to educated children from pre-school to teens, mature drivers, bicyclists and the general public. Special programs are available for school bus drivers, commercial drivers, emergency responders, and law enforcement.

For more information about Oregon's Operation Lifesaver, go to www.oregonol.org. You can contact the State Coordinator to request a presentation.

Portland and Western's Emergency Response Plan

Our Plan is actually three plans in one: Emergency Response, Security, and Environmental Response. A current copy of each is located at each of our facilities. Responsibilities, contacts and protocols are set out in each plan.

For example, our Emergency Response Plan is designed to work in conjunction with our training on Hazardous Materials. Every employee completes Hazardous Materials training which ensures:

1. Hazardous Materials recognition
2. Hazardous Materials handling
3. Hazardous Materials incident response

Railroad and local fire, hospital, and police contact information is included in the plans. Of course, the contacts are specific to the area. For Columbia County, NWFF Environmental in Philomath and Jammies Environmental in Longview are the 24-hr emergency contacts for a hazardous materials spill.

Each plan contains maps of our main yards, information regarding commonly transported commodities, and reporting protocols.

Hazardous Materials Training

Every P & W employee is trained annually on recognition, handling (switching and placement in train), and spill response. The training includes additional information on TIH/PIH handling (Toxic/Poison Inhalation Hazard) and the security issues associated with transporting hazardous materials through a High Urban Threat Area.

Other Safety Initiatives

The Portland and Western has sponsored and participated in Railroad Emergency Response training for the Scappoose, St. Helens, and Clatskanie Fire/Rescue departments. This included classroom and hands-on training.

Environmental concerns are a serious issue for our railroad. We have strict spill prevention and storm water pollution controls. This training is also an annual requirement.

CHIEF / TRAIN DISPATCHER'S EMERGENCY CALL LIST AND PROCEDURES:

The ***Chief/ Train Dispatcher*** must be sure the appropriate people and agencies are notified in the event of a derailment, injury, hazardous materials release, accident, terrorist act or incident. In order to contact all the required parties the calling procedure identified in the following pages must be followed. It is also very important to gather as much information as possible, from the person making the initial notification, in order to properly complete the form as stated in the procedure.

In the event of a major incident, the dispatcher will not have the ability to handle making all the necessary calls and continue taking care of the normal dispatching activities. Therefore, the dispatcher will contact a local manager who will immediately report to the dispatcher's office and handle the remaining notification calls. That manager must stay at the dispatcher's office and render assistance as necessary.

Date_____ Time_____ Location_____

Portland & Western Railroad

Type of Emergency: (Check as necessary)

☐ Derailment ☐ Employee Injury

☐ Grade Crossing Collision ☐ Trespasser Injury

☐ Hazardous Materials Release ☐ Other_____

Train Symbol_____ On Duty_____ Cond_____

Engines_____ Engr_____

Loads_____ Empties_____ Tons_____ Brkm_____

Number of cars derailed_____ Number of Haz-Mat cars derailed_____

Engines derailed_____ Location of derailed cars in train_____

Identity all Haz-Mat leaking_____

Estimated Quantity of Haz-Mat derailed_____

Is there a danger of Haz-Mat reaching water or the public?_____

Reported to the Dispatcher by_____

Description of incident_____

_____

_____

PROCEED TO NEXT PAGE

Did the incident result in:

a. injury to anyone
b. fire
c. danger to the public
d. disruption of highway traffic
e. blockage of main track
f. major track or equipment damage

YES

Refer to "Appendix B" in this Plan. Based on the nature of the accident, call the nearest **Hospital, Police Department** and/or **Fire Department**. Provide all information available to assist in providing emergency services to any injured personnel.

NEXT

NO

Is the incident **minor** but involves the derailment of a Haz-Mat car that is not leaking or a non-HazMat car that is leaking? If YES, go the on the next page.

PROCEED TO NEXT PAGE

Company Personnel: In the event of a serious incident where the ***Chief / Train Dispatcher*** does not have the time to make the required notifications, the ***Chief/ Train Dispatcher*** should contact the nearest available Manager / Employee for assistance.

Did the incident involve **Haz-Mat** and:
a. There is an **unintentional release** of hazardous material, or
b. derailed cars are **not upright,** or
c. the **car body** or **tank shell** is damaged

AND

Did the incident involve a **Haz-Mat** car and the car is not leaking?

AND

Did the incident involve a non-**Haz-Mat** car and the car is leaking?

AND

Does the incident involve?

a. The death of a person
b. Injury to five or more people
c. Injuries that require hospitalization
d. Fatality at a grade-crossing
e. $25,000 damage to non-railroad property
f. $150,000 or more total damage
g. damage to tank cars resulting in a leak or evacuation
h. Failure of a locomotive or parts thereof, including electrical that cause an injury or incident
i. Spill of any liquid, including fuel oil, into any waterway
j. **In doubt, make the call**

YES

Call: **CHEMTREC**
at: **(800) 424-9300**
Name:_____
Time:_____

Also refer to Appendix B and call the nearest Emergency Response Specialists and request their immediate presence at the site.

AND

YES

Call: Mike Lundell, ***Emergency Coordinator*** at (503) 480-7765 or (503) 816-6001

Name:_____

Time:_____

YES

Call: NRC (National Response Center) at **(800) 424-8802**. Ask them to notify the **FRA** and regional **EPA** if the accident involves a Haz-Mat spill

Name:_____

Time:_____

YES

Also call: **911** and the nearest **Hospital, Fire Department, and Police Department**. Provide all information available to assist in providing emergency services to any injured personnel.

PROCEED TO NEXT PAGE

For any major train accident or an accident involving hazardous materials, also make the following calls:

CALL: **FRA Region 8**
Vancouver, WA Office
At: (800) 724-5998

Name:_____
Time:_____

AND

Call local authorities as required.

AND

CALL: **Oregon Emergency Management Division (OEMD)**
At: (800) 452-0311

Name:_____
Time:_____

AND CALL BELOW AS NEEDED

FRA – Hazardous Materials Division

Hazardous Materials Divison, Vancouver, WA, (360) 696-7537

DEQ – Oregon, Salem Office

Western Region
750 Front St, Ste 120
Salem, OR 97310
(503) 378-8240 or
(800) 452-4011

U.S. EPA – Region 10 Office

1200 Sixth Ave.
Seattle, WA 98101
(800) 424-4372

END OF PROCEDURE

Appendix C: Lower Columbia River Rail Corridor/Traffic Analysis (December 2008)

Lower Columbia Corridor Rail Study

Columbia County, Oregon

December 2008

Lower Columbia Corridor Rail Study

Columbia County, Oregon

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Project No. 9464.00

December, 2008

Table of Contents

List of Tables

Appendices

Appendix 1 Queue Analysis Results Summary

Appendix 2 High School Way

Appendix 3 Maple Street

Appendix 4 Columbia Avenue

Appendix 5 West Lane

Appendix 6 Old Portland Road

Appendix 7 Bennett Road

Appendix 8 Millard Road

Appendix 9 Gable Road

Appendix 10 Columbia Boulevard

Appendix 11 St. Helens Road

Appendix 12 Deer Island Road

Appendix 13 I Street

Appendix 14 E Street

Appendix 15 Nicolai Road/Goble RV Access

Appendix 16 Veterans Way

Appendix 17 Marshall District Road, South

Appendix 18 Marshall District Road, North

Appendix 19 Woodson Road

Appendix 20 Old Mill Town Road

Appendix 21 Westport Ferry Road

Section 1
Executive Summary

Executive Summary

This study investigates twenty key intersections along US-30 in Columbia and Clatsop Counties. Each intersection is in the vicinity of a railroad grade crossing along the Lower Columbia River Rail Corridor. The intersections are so close to the railroad grade crossing that vehicles intending to turn from US-30 onto the cross street must queue on the highway while trains pass. The intersections were identified by Oregon Department of Transportation (ODOT) staff as potentially being impacted if rail traffic increased or if the duration of rail crossings increased.

The investigation was precipitated by the anticipated addition of "unit" train operations along the Rail Corridor. The Portland & Western Railroad will upgrade the Corridor's track in 2009 to accommodate the increase in train traffic and delays at rail crossings due to the unit trains serving Port Westward. Columbia County has hired HDR Engineering to prepare a Lower Columbia Rail Corridor Study to address the impact on local community transportation and emergency response due to the increase in train traffic and potential rail crossing closures.

The report will be used by ODOT and Columbia County to help identify and prioritize improvements that should be considered in the broader Lower Columbia Rail Corridor Study.

Unit trains are expected to travel the corridor an average of three times per week. The unit train's schedule is expected to be unpredictable but the probability of any given driver being delayed by a unit train is small. For those who are delayed by a unit train, their average delay will be twice as long as the delay created by existing trains. For the purposes of this study, grade crossing durations for existing trains were assumed to be five minutes. Crossing durations for unit trains were assumed to be ten minutes.

The physical and operational characteristics of the twenty US-30 intersections were studied, but the most fundamental characteristic under review was each intersection's ability to accommodate the increased vehicle queues caused by longer train crossing times. The study looked at the performance of each intersection during the most demanding 15-minutes of the a.m. and p.m. peak traffic periods, with and without the influence of trains passing through at the same time.

The following table identifies the intersections that were studied and qualitatively summarizes each intersection's performance in the areas of capacity to serve peak hour traffic, crash history, and ability to keep US-30 through lanes clear while a unit train passes. A more detailed one-page summary for each of the twenty studied intersections is provided in the Appendix.

The study identified three signalized intersections that do not meet ODOT operations standards for signalized intersections as well as one unsignalized intersection (Bennett Rd) whose minor cross streets experience significant delay during peak traffic periods. It is recommended that, as resources allow, these intersections be studied more thoroughly to see how their performance might be enhanced. These locations received a "C" in the Peak Hour Capacity portion of the Executive Summary table.

The study identified four locations where, if a unit train passed through during the peak traffic period, the northbound outside through lane of US-30 could be blocked by delayed right-turning vehicles. The intersections of most concern received a "C" in the Right Turn Queue Capacity portion of the Executive Summary table. Similarly, given the same circumstance, some driveways and public cross streets could be blocked by train-delayed vehicles waiting to turn left from US-30. The five intersections of most concern received a "B" in the Left Turn Queue Capacity portion of the Executive Summary table.

The study also noted five intersections where vehicles must wait in a US-30 through lane while a train passes. At some intersections, US 30 is only two lanes wide. In each case the cross street's traffic volumes appear to be very light. This is an existing condition, but the increased delay associated with unit trains makes this a notable concern. These locations received a "Cx" in the Executive Summary table.

Table 1 Summary of Intersection Performance

Intersection	Intersection Control Type	Peak hour Capacity	Crash History	Rt. Turn Queue Capacity *	Lt. Turn Queue Capacity **	Overall Rating
High School Way	Signalized	C	C	C	B	C
Maple St	Signalized	C	C	A	A	B
Columbia Avenue	Signalized	C	C	C	B	C
West Lane	Unsignalized	A	A	A	A	A
Old Portland Road	Unsignalized	A	A	Cx	A	A/Cx
Bennett Road	Unsignalized	C	C	C	A	B
Millard Road	Unsignalized	A	B	A	A	A
Gable Road	Signalized	B	C	B	B	B
Columbia Blvd	Signalized	B	C	C	B	C
St. Helens Rd (1-way Wbnd)	Signalized	A	A	n.a.	n.a.	A
Deer Island Road	Signalized	A	B	B	B	B
I Street	Unsignalized	A	A	A	A	A
E Street	Signalized	A	B	A	A	A
Nicolai Rd	Unsignalized	A	C	Cx	Cx	B/Cx
Veterans Way	Unsignalized	A	B	A	A	A
Marshland Dist. Rd /- Schroeder Rd	Unsignalized	A	A	Cx	A	A/Cx
Marshland District Rd	Unsignalized	A	C	Cx	Cx	A/Cx
Woodson Rd	Unsignalized	A	A	Cx	Cx	A/Cx
Old Mill Town Road	Unsignalized	A	C	A	A	A
Westport Ferry Road	Unsignalized	A	B	A	A	A

A = Little concern. B = Some concern. C = Most concern.

Cx = There is no exclusive turn lane to queue in. Queuing occurs in a US 30 through lane

* Rt. Turn Queue Capacity = Ability to hold US 30's unit train-delayed right-turning vehicles

** Lt. Turn Queue Capacity = Ability to hold US 30's unit train-delayed left-turning vehicles

Section 2
Introduction

Introduction

PROJECT DESCRIPTION

This study investigates twenty key intersections along US-30 in Columbia and Clatsop Counties. Each intersection is in the vicinity of a railroad grade crossing along the Lower Columbia River Rail Corridor. The intersections were identified by Oregon Department of Transportation (ODOT) staff as potentially being impacted if rail traffic increased or if the duration of rail crossings increased. This study focuses on the physical and operational characteristics of the twenty US-30 intersections identified the scope of work below.

The investigation was precipitated by the anticipated addition of "unit" train operations along the Rail Corridor. The Portland & Western Railroad will upgrade the corridor's track in 2009 to accommodate the increase in train traffic and delays at rail crossings due to the unit trains serving Port Westward. Columbia County has hired HDR Engineering to prepare a Lower Columbia Rail Corridor Study to address the impact on local community transportation and emergency response due to the increase in train traffic and potential rail crossing closures.

The report will be used by ODOT and Columbia County to help identify and prioritize improvements that should be considered in the broader Lower Columbia Rail Corridor Study.

SCOPE OF THE REPORT

This report looks at each intersection and its related railroad grade crossing and assesses current conditions and future conditions after the longer unit trains begin traveling the corridor. The US-30 (Columbia River Highway) intersections considered in this report are at the following cross streets:

- High School Way
- Maple Street
- Columbia Avenue
- West Lane
- Old Portland Road
- Bennett Road
- Millard Road
- Gable Road
- Columbia Boulevard
- Saint Helens Road
- Deer Island Road
- I Street
- E Street
- Goble RV Park Access/Nicolai Road
- Veterans Way
- Marshland District Rd/Schroeder Rd
- Marshland District Road
- Woodson Road
- Old Milltown Road
- Westport Ferry Road

The scope of work for this report consists of:

- **Site Visit/Inventory-** Undertake a site visit to all study intersections and rail crossings and identify their existing physical and operational characteristics, including lane configurations, sight distances, street widths, posted speeds, and pedestrian and bicycle facilities. The inventory of each site also includes a qualitative evaluation of available queue storage, traffic control, and current active and passive grade crossing protection devices. Relevant safety concerns in the vicinity of each site are also identified.
- **Traffic Counts-** For each intersection, gather a.m. and p.m. peak hour traffic turning movement count data from ODOT.
- **Existing Conditions Analysis-** Conduct an operational analysis of each of the study intersections under their respective current weekday a.m. and p.m. peak hour conditions. Use the *2000 Highway Capacity Manual* analysis methodology to determine existing level of service, volume/capacity ratio, and queue lengths. This existing condition analysis assumes no train crossing events during the peak hours.
- **Crash Data Review-** Review ODOT crash data for each intersection and railroad grade crossing.
- **Queue Storage Assessment -** Estimate the greatest possible existing and future queue storage needs at the highway/rail grade crossings. Existing train crossing durations are assumed to be five minutes long. With the introduction of unit trains, future train crossing durations are assumed to be ten minutes long. For the sake of being conservative, both of these assumed durations are greater than actually anticipated.

  The queuing analyses assume that train crossings occur during the peak fifteen minutes of the a.m. and p.m. peak hours, vehicles arrive at the crossing at a uniform rate, and none of the existing traffic redirects to alternate routes during the train crossing event.
- **Mitigation Alternatives Analysis -** For intersections that do not meet ODOT mobility standards and/or for railroad crossings where forecasted vehicle queues exceed available storage, identify and qualitatively summarize potential mitigation measures.
- **Summary of Inventory, Analysis and Recommendations –** For each intersection and rail crossing site summarize the site inventory, existing and future conditions analysis, and recommended operational and safety improvements.

REPORT STRUCTURE

This report contains a relatively large amount of data and analysis results. In order to present a clear and concise summary of the evaluation's methodology, findings, and recommendations; the report is structured to summarize the evaluation of all twenty intersections in the main body of the report. The appendix provides a more focused look at each individual site. Each appendix includes details about the site inventory, notable operational and safety observations, and site specific recommendations. More specifically, for each of the twenty locations the appendix contains a one-page summary of figures documenting the site inventory details, intersection and rail grade crossing lane configurations, existing a.m. and p.m. peak hour operational analysis, crash data

analysis, site location, site aerial, site photograph, notes on observed safety concerns and options for mitigations.

Section 3
Project Methodology

Project Methodology

The methodology used to obtain and analyze data for this report is summarized herein. This work consisted of four main activities:

- Obtaining data from external and internet resources;
- Collecting site specific data during a site visit;
- Analyzing the data to determine the impact of unit train operation upon US-30 operations; and,
- Making quantitative and qualitative recommendations.

This study's scope is limited to considering the impact of unit train-related delays on existing traffic volumes. The study does not consider future traffic growth on the US-30 corridor or substantial increases in rail services beyond the introduction of unit trains to the rail corridor.

Data Obtained from External and Internet resources:

- Intersection turning movement volumes for the a.m. and p.m. peak hour (provided by ODOT) – The peak hour turning movement volumes are included in the site summary figures shown in Appendix 2 – 21. Note that the north-south traffic volumes on US-30 were collected in late Spring 2008 and are seasonally adjusted (i.e., increased) by 6%;
- Traffic signal timing plans (provided by ODOT);
- US-30 corridor crash history data (provided by ODOT) – Summarized herein;
- Aerial photography of site vicinity and intersection layout (sourced from maps.live.com) and provided in Appendix 2-21; and,
- Information regarding existing and future Portland & Western Railroad operations (provided by HDR Engineering).

Data obtained during site visit

- Intersection configurations, traffic control devices and available queue storage lengths;
- Rail crossing configuration, control devices and available queue storage (on both east and west approaches);
- Notable trip generators and facilities of interest in vicinity of site (e.g. schools and emergency services);
- Safety concerns and features of interest; and,
- Photographs of site and vicinity.

Analysis of Data

- Operational analysis of each of the study intersections under the respective current weekday a.m. and p.m. peak hour conditions. For the purposes of evaluation, the intersection volume/capacity ratio, average delay and Level of Service are determined following the *2000 Highway Capacity Manual* analysis methodology. Note that in some instances, a.m. peak hour turning movement volumes were not provided.
- Safety analysis of historic crash data was undertaken to determine the crash frequency, crash rate and crash types and severities occurring at each of the intersections and their related railroad grade crossing. Intersections with notable concerns have been identified.
- Queuing analysis was conducted for three different scenarios. To be conservative, the worst case scenarios were assumed.
    - 95th percentile queues were calculated for the a.m. and p.m. peak 15 minutes, assuming no train event occurred.
    - 95th percentile queues were calculated for the a.m. and p.m. peak 15 minutes, assuming a typical 5-minute train event occurred during those timeframes, and
    - 95 percentile queues were calculated for the a.m. and p.m. peak 15 minutes, assuming a 10-minute unit train event.

For signalized intersections, Synchro 7 was used to determine 95th percentile queues. For unsignalized intersections the ODOT "two-minute" rule was applied to turning traffic volumes to determine 95th percentile queues. Note that while the ODOT methodology requires that this rule is usually applied to left turning movements, for the purposes of evaluation of the 'with' and 'without' train scenario, the "two-minute" rule has been applied to right turn movements.

The duration of train crossing events varies with the speed and length of the train. To provide conservative analysis, it was assumed that typical train crossings last five minutes and that unit train crossings take ten minutes at all sites.

Notable Concerns

Notable safety and operational concerns for each intersection and its related railroad grade crossing are documented in the Figures presented in Appendix 2 – 21 and are summarized herein.

Recommended Options for Mitigation

Options for improving the safety and operational performance of each site are documented in Figures presented in Appendix 2 -21 and summarized herein.

Section 4
Site Inventory and Existing Conditions Analysis

Site Inventory and Existing Conditions Analysis

SITE INVENTORY

In addition to data provided by ODOT, a site inventory for each of the twenty intersections and rail crossings was conducted on Friday August 1, 2008. At each site, geometric features of the site were recorded, photographs taken, and observations regarding the signage, pavement markings, sight distances, notable concerns, and general recommendations where recorded. Sight distances where only recorded in the case of uncertainty as to whether sufficient sight distance existed.

Appendix 2 through Appendix 21 of this report contains a detailed site inventory of each site. Table 2, below, summarizes how each location's highway intersection and railroad grade crossing is controlled. Each highway intersection is either controlled by a traffic signal (Signalized) or the minor cross street is controlled by a STOP sign (Unsignalized). Each railroad grade crossing is protected by automatic gates and flashing lights (Active) or simply distinguished with cross-bucks and pavement markings (Passive).

Table 2 Site Summary

Intersection Name	US-30 Milepoint	Intersection Type	Rail Grade Crossing Type
High School Way	20.35	Signalized	Active
Maple Street	20.67	Signalized	Active
Columbia Avenue	20.9	Signalized	Active
West Lane	22.49	Unsignalized	Active
Old Portland Road	25	Unsignalized	Passive
Bennett Road	25.8	Unsignalized	Active
Millard Road	26.96	Unsignalized	Active
Gable Road	27.69	Signalized	Active
Columbia Boulevard	28.56	Signalized	Active
St. Helens Road	28.67	Signalized	Active
Deer Island Road	29.42	Signalized	Active
I Street	30.75	Unsignalized	Active
E Street	31.02	Signalized	Active
Nicolai Road	40.47	Unsignalized	Passive
Veterans Way	47.34	Unsignalized	Active
Marshland District Road /Schroeder Road	65.99	Unsignalized	Passive
Marshland District Road	67.84	Unsignalized	Passive
Woodson Road	67.95	Unsignalized	Passive
Old Mill Town Road	70.46	Unsignalized	Passive
Westport Ferry Road	70.68	Unsignalized	Passive

EXISTING TRAFFIC OPERATIONS ANALYSIS

The Figures in Appendix 2 through Appendix 21 of this study contain details about the a.m. and p.m. peak hour traffic operations at each intersection. The information assumes no train-related impacts. Tables 3, below, summarizes the operational performance of all twenty study intersections during the a.m. peak hour and p.m. peak hour. Operational analysis was undertaken for the highest 15 minute period of each peak hour. For analysis purposes, traffic volumes on US-30 were seasonally adjusted by 6% for through movement traffic only. Results below were calculated using the methodologies specified in the *2000 Highway Capacity Manual*.

The *1999 ODOT Highway Plan* evaluates intersections based on the volume-to-capacity (v/c) ratio. For signalized intersections on US-30, the ODOT requirement is a maximum v/c of 0.75. For unsignalized intersections, the ODOT requirement is a maximum v/c of 0.85 (on the critical movement).

In the a.m. peak hour, the signalized intersections of High School Way and Maple Street currently exceed the ODOT v/c ratio requirements.

In the p.m. peak hour, the signalized intersections of High School Way, Maple Street and Columbia Avenue currently exceed the ODOT v/c requirements.

Table 3 Summary of Peak Hour Intersection Operations Analysis (without rail crossing)

		A.M. Peak Hour		P.M. Peak Hour	
Intersection	**Intersection Control Type**	**V/C Ratio**	**Average Delay (sec)**	**V/C Ratio**	**Average Delay (sec)**
High School Way	Signalized	**0.8**	16.3	**0.85**	20.7
Maple St	Signalized	**0.8**	18	**0.87**	13.7
Columbia Avenue	Signalized	0.64	13.8	**0.82**	24.3
West Lane	Unsignalized	0.43	>50	0.45	>50
Old Portland Road	Unsignalized	0.03	25.3	0.05	>50
Bennett Road	Unsignalized	0.77	>50	>1.0	>50
Millard Road	Unsignalized	0.19	>50	0.45	>50
Gable Road	Signalized	0.6	40.8	0.77	42.5
Columbia Blvd	Signalized	0.59	48.4	0.62	26.1
St. Helens Rd	Signalized	0.42	13.7	0.47	16.9
Deer Island Road	Signalized	0.52	17.9	0.56	13.5
I Street	Unsignalized	0.6	>50	0.24	35.2
E Street	Signalized	0.39	7.8	0.41	4.8
Nicolai Rd	Unsignalized	NA	NA	0.05	18.6
Veterans Way	Unsignalized	0.13	15.5	0.12	26.1
Marshland Dist. Rd /- Schroeder Rd	Unsignalized	NA	NA	0.01	14
Marshland District Rd	Unsignalized	NA	NA	0.01	12
Woodson Rd	Unsignalized	NA	NA	0.01	13.6
Old Mill Town Road	Unsignalized	NA	NA	0.08	15.4
Westport Ferry Road	Unsignalized	NA	NA	0.03	15.5

Bolded values exceed ODOT threshold of acceptability.

QUEUING ANALYSIS

The primary concern related to queuing is whether sufficient storage capacity exists on US-30 for northbound right turns and southbound left turns, and on minor street approaches associated with the rail grade crossing. Note that in order to present intersections and analysis in a consistent manner, US-30 is assumed to run north-south with northbound in the direction of Astoria and southbound in the direction of Portland.

The analysis of queuing has been undertaken considering three scenarios for both the a.m. peak hour and p.m. peak hour. These scenarios are:

- The 95th percentile queue lengths expected during the a.m. and p.m. peak hour without a train event occurring. For signalized intersections, the Synchro methodology was used to determine the 95 percentile queues. For unsignalized intersections, the ODOT "two-minute" rule has been used (assumption that turning movements are stopped for two minutes at the peak hour flow rate).
- The maximum predicted queue lengths expected if an existing train crossing event occurs during the peak fifteen minutes of the a.m. and p.m. peak hours. For the existing train events, a five minute duration has been assumed at all crossings. This represents the maximum existing train event duration.
- The maximum predicted queue lengths expected if a unit train crossing event occurs during the peak fifteen minutes of the a.m. and p.m. peak hours. For the unit train events, a ten minute duration has been assumed at all crossings. This represents the maximum anticipated unit train event duration, which occurs where the unit train speed is slowest.

A tabular summary of all queuing analysis information is included at Appendix 1. The table summarizes the available storage lengths, predicted 95th percentile queue during an existing train crossing event, and predicted 95th percentile queue during a unit train crossing event. These queues are shown only for the turning movements associated with the rail grade crossing (northbound right turn – NBRT, southbound left turn – SBLT, eastbound – EB, westbound left turn – WBLT, westbound through – WBT, westbound right turn – WBRT).

The eastbound (EB) and westbound (WB) queue storage distances refer to the available queue space between US-30 and the nearest rail of the railroad crossing. The available westbound queue storage distance is only relevant for analysis of unsignalized intersections, where westbound queues may spill back across the tracks. Available eastbound queue storage is only relevant at locations where eastbound queues might spill back into US-30.

At signalized intersections, a pre-emptive signal phase prior to the lowering of the crossing gates ensures that westbound queues have time to clear. Therefore EB and WB storage availability is not a consideration but has been presented throughout the table in Appendix 1 for consistency.

Note that consideration has only been given to whether there is sufficient storage capacity available to meet the peak hour demands with and without train events. No consideration is given to deceleration lane requirements, which should be provided in addition to queue storage capacity.

A summary of notable queuing concerns is presented in Table 4.

Table 4 Notable Queuing Concerns

High School Way	During the p.m. peak period, the queue during a 10-minute train crossing has the potential to exceed the storage capacity of the Northbound Right Turn lane by up to 300 feet. The southbound left turn queue storage was measured as the distance to the nearest intersection or driveway. While the analysis of the p.m. peak shows it is exceeded by 100 feet, in practice there is additional storage capacity available, but access into and out of the nearest driveway may be restricted during the p.m. peak.
Columbia Avenue	The p.m. peak period queues during a 5-minute train crossing potentially exceed the northbound right turn lane storage by 110 feet. The predicted queues during a 10-minute train crossing in the p.m. peak may potentially exceed the northbound right turn lane storage capacity by 460 feet. The southbound left turn queue storage was measured as the distance to the nearest intersection or driveway. While the analysis of the p.m. peak shows it is exceeded by 170 feet, in practice there is additional storage capacity available but access into and out of the nearest driveway may be restricted during the p.m. peak.
West Lane	West Lane is used by a significant number of trucks. The queuing distance for the westbound approach to US-30 is 56 feet. As this is an unsignalized intersection, a large vehicle could potentially be trapped behind another vehicle, unable to turn onto US-30. This situation applies regardless of the duration of the train crossing event.
Bennett Road	Westbound left turns are likely to queue across the tracks during the existing a.m. & p.m. peak periods, representing a significant safety concern. During a 10-minute train crossing in the p.m. peak, the predicted queues for the northbound right turn lane could potentially exceed the queue storage available by 320 feet.
Gable Road	There is a two-way left-turn lane in this location that provides queuing capacity. During a 10-minute train crossing in the p.m. peak period, queues may extend up to 560 feet beyond the nearest driveway. This will impact access and egress to all driveways blocked by the queue. During a 10-minute train crossing, the queues may exceed the northbound right turn lane storage capacity by 100 feet.
Columbia Boulevard	During a 5-minute train crossing in the a.m. peak, the predicted queues could potentially exceed the southbound left-turn lane storage capacity by 215 feet. During a 10-minute train crossing in the a.m. peak period the southbound left turn queue could potentially exceed the storage capacity by 540 feet. As the southbound left turn lane is a two-way left-turn lane, additional storage capacity exists but queuing may impact the access to local driveways During the a.m. peak period, the queues during 5-minute train crossings may exceed the northbound right turn lane by 65 feet. During a 10-minute train crossing in the a.m. peak period, the predicted queues could potentially exceed the northbound right turn capacity by 640 feet.
Deer Island Road	In the a.m. the predicted queue during a 5-minute train event may exceed the southbound left turn by 150 feet in the a.m. peak and by 400 feet during a 10-minute train crossing event. The southbound left-turn queue storage was measured as the distance to the nearest intersection or driveway. While the analysis of the a.m. peak shows it is exceeded by 400 feet, in practice there is additional storage capacity available, but access into and out of the nearest driveway may be restricted during the p.m. peak. The predicted queue for the northbound right turn lane during a 10-minute train event may exceed the storage by 110 feet in the p.m. peak.
Nicolai Road/Goble RV access	The intersection is unsignalized and the storage distance between US-30 and the rail crossing is 60 feet. Due to the high number of long and slow moving heavy vehicles (such as SUVs towing trailers) using this intersection, there is a concern that vehicles may queue across the rail crossing or make an inappropriate turning movement onto US-30 to avoid an approaching train.

Marshland District Road / Schroeder Road	Tall vegetation parallels the railroad in this location. As the Marshland Road approach to the rail crossing runs parallel to the track and turns a sharp horizontal curve to approach the rail crossing, the sight distance in this location was noted as a concern. There is no center line on the approach to US-30 in the vicinity of the railroad crossing. There is no street lighting at the intersection or rail crossing.
Woodson Road	US-30 is a two-lane cross section in this location. Due to the proximity of the rail crossing to the intersection, during a train event a turning vehicle may block traffic on US-30 until the train passes.

CRASH DATA ANALYSIS

Five years of crash data (2002 -2007) for the US-30 corridor between MP 20.35 and 70.68 were provided by ODOT. For each intersection in the study the number of accidents, accident types, accident severity, crash rate, and crash frequency is presented in Table 5. The crash rate was calculated as the number of crashes per million entering vehicles (MEV). Entering volumes were estimated using the assumption that observed p.m. peak hour volumes typically equal 10% of the daily total volume. Intersections that are on the ODOT 2008 Top 10% SPIS List are indicated in bold in Table 5.

Table 5 Crash Data Summary

Intersection	Type	Number of Crashes	Lane Change/Turning	Rear End	Angle	Pedestrian	Other	FATALITY (K)	Personal Injury (A + B + C)	Property Damage Only	Crash rate (Crashes/MEV)	>1 Crash/MEV
High School Way	**Signalized**	**68**	**26**	**38**	**3**		**1**		**48**	**20**	**1.2**	**Yes**
Maple Street	**Signalized**	**114**	**13**	**96**			**5**		**80**	**34**	**2.0**	**Yes**
Columbia Avenue	Signalized	65	17	39	4		5		37	28	1.3	Yes
West Lane	Unsignalized	17	10	2		2	3	2	9	6	0.4	
Old Portland Road	Unsignalized	16	4	7			5		10	6	0.4	
Bennett Road	**Unsignalized**	**47**	**27**	**8**	**9**		**3**		**35**	**12**	**1.1**	**Yes**
Millard Road	Unsignalized	18	7	7	2	2	0	2	10	6	0.5	
Gable Road	**Signalized**	**89**	**24**	**45**	**15**		**5**		**33**	**56**	**1.8**	**Yes**
Columbia Blvd	Signalized	61	29	20	10		2		33	28	1.4	Yes
St. Helens Rd	Signalized	12	6		4	2	0		8	4	0.3	
Deer Island Road	Signalized	18	4	8			6		13	5	0.6	
I Street	Unsignalized	8	7				1		7	1	0.3	
E Street	Signalized	17	5	7	7		0		13	4	0.8	
Nicolai Rd	Unsignalized	20	9	9	2		0		16	4	1.5	Yes
Veterans Way	Signalized	15	7	2	4		2		7	8	0.7	
Marshland/Schroeder Rd	Unsignalized	3		2			1	1	2		0.3	
Marshland District Rd 4119	Unsignalized	23	4	12			7		23		2.2	
Woodson Rd	Unsignalized	3		3			0		3		0.3	
Old Mill Town Road	Unsignalized	16	5	6	4		1		14	2	1.5	Yes
Westport Ferry Road	Unsignalized	7		4			3		6	1	0.7	

The intersections of High School Way, Maple Street, Bennett Road and Gable Road are on the ODOT 2008 Top 10% SPIS List. All of the sites on the SPIS list have a crash rate of greater than 1.0 crashes per million entering vehicles (MEV). Columbia Avenue, Nicolai Road and Old Mill Town Road were also identified as having crash rates in excess of 1.0 crashes /MEV.

Section 5
Summary of
Notable Concerns

Summary of Notable Concerns

A summary of reconnaissance level notable safety concerns is provided in Table 6 below. Note that locations where little or no concern was identified are not included in the Table. A complete list of notable concerns for each location is presented in Appendix 2 – Appendix 21.

Table 6 Summary of Notable Concerns

High School Way	No pedestrian warning signage or automatic gates to control pedestrian crossings when a train is present. Significant numbers of high school and elementary school students are likely to use the southerly sidewalk. "DO NOT STOP ON TRACKS SIGN" on westbound approach is obscured by vegetation. The response times for police and emergency services may be affected by the increase in rail crossing duration.
Maple Street	The westbound approach to the rail crossing is very steep and may cause problems for commercial vehicles. Due to the steepness of grade, drivers unfamiliar with the area may not realize that there is only sufficient storage for one vehicle on the area between the tracks and US-30. The westbound approach lanes to the crossing are very narrow (9 feet). No pedestrian warning signage or automatic gates to control pedestrian crossings when a train is present. Significant numbers of school students are likely to use this sidewalk.
Columbia Avenue	One rail crossing is signal-and gate-controlled while the other is a yield-controlled rail crossing. The separation between the two tracks allows for a westbound vehicle to potentially be trapped between the two rail crossings. While only one train operates on the line at this time, the addition of a unit train may lead to a situation where both rail crossings will be occupied by trains at the same time. No pedestrian warning signage or automatic gates to control pedestrian crossings when a train is present. Significant numbers of pedestrians are likely to use this pedestrian facility due to the shops in the vicinity of the intersection. The response times for police and emergency services may be affected by the increase in rail crossing duration.
West Lane	A significant numbers of trucks use West Lane. The distance between the westbound approach's stop line at US-30 and the rail crossing is 56 feet. As this is an unsignalized intersection, a large vehicle could potentially be trapped behind another vehicle, unable to turn onto US-30. The response times for police and emergency services may be affected by the increase in rail crossing duration.
Old Portland Road	The westbound approach to this rail crossing has very steep grade, and extremely narrow lane widths. Vegetation hinders sight distances for the rail crossing. Very low traffic volume was observed at the intersection. The overall geometry of the crossing is poor. Vehicles using Old Portland Road have the option to access US-30 via Bennett Road.
Bennett Road	A number of articulated trucks from the Port of Saint Helens were observed using this road for access to US-30. Due to limited queue storage, an articulated vehicle may be unable to completely cross the tracks while waiting to access US-30. The estimated AADT of this crossing is approximately 2,700vpd. This intersection exceeds a v/c ratio of 1.0 in the PM peak hour, and is identified as being on the ODOT 2008 Top 10% SPIS List. Because of heavy traffic volumes on US-30, westbound left turning vehicles are likely to queue across the tracks during the a.m. and p.m. peak periods.

Millard Road	The STOP sign for the southbound McNulty Way approach is obscured by a tree. The YIELD sign for Millard Road's eastbound approach is obscured (surrounded) by a tree. Pavement markings for the eastbound approach are very faint. Sight distance for the east bound approach of Millard was measured as 120 feet. There are no lane markings between US-30 and the rail crossing.
Deer Island Road	The current traffic controls are set up for a second defunct rail crossing that formed a siding into industrial premises. As the second crossing is now defunct, the complexity of the current railroad crossing traffic control features could be reduced.
I Street	The intersection layout of I Street and 4th Street is confusing as there is a crosswalk on I street at the intersection with 4th but there are no sidewalks on either street. There is a significant uphill grade approaching US-30.
Nicolai Road/Goble RV access	This is a STOP-controlled rail grade crossing which provides access and egress to an RV park and a quarry. The intersection is unsignalized and the storage distance between US-30 and the rail crossing is 60 feet. Due to the high number of long and slow moving heavy vehicles (such as SUVs towing trailers) using this intersection, there is a concern that vehicles may queue across the rail crossing or make an inappropriate turning movement onto US-30 to avoid an approaching train. The signage and pavement markings at the rail grade crossing are generally deficient.
Marshland District Road / Schroeder Road	Tall vegetation parallels the rail in this location. As the Marshland Road approach to the rail crossing runs parallel to the line and makes a sharp horizontal curve to approach the rail crossing, the sight distance in this location is a concern. No center line on the approach to US-30 is provided which may cause vehicles to verge into the opposing lane. There is no lighting at the intersection or rail crossing.
Marshland District Road	STOP sign is missing from the approach to US-30. The grade crossing material in the rail crossing consists of wood and dirt. Erosion of the material is likely to occur and a vehicle may become stuck in the tracks.
Woodson Road	US-30 is a two-lane cross section in this location. Due to the proximity of the rail crossing to the intersection, during a train event a turning vehicle may block traffic on US-30 until the train passes (this could occur for either a left or right turn). Some pavement markings and signage are deficient at this intersection.
Westport Ferry Road	While there are no notable safety concerns with this rail grade crossing, the intersection geometry at the US-30/Westport Ferry Dock Road intersection is unorthodox and substandard.

Section 6
Mitigation Options
& Safety
Enhancements

Mitigation Options & Safety Enhancements

Options to address notable concerns and queuing impacts are recommended for each location with notable concerns. Note that these options are not extensive, nor are they mutually exclusive (i.e., more than one option can be implemented). When selecting an appropriate option for implementation at the site, consideration should be given to the degree of risk associated with the safety concerns identified, the volume of vehicular and pedestrian traffic at the site, and the economic cost associated with each option. A summary of options for mitigating safety concerns is provided in Table 7. Where no safety concerns were identified, the site has been excluded from the table.

Table 7 Summary of Mitigation Options

High School Way	Option 1. Improve pedestrian facilities at this crossing. Consider installing an automatic pedestrian gate, tactile yellow strips, and/or warning signs for pedestrians. Option 2. Remove vegetation obscuring signage. Option 3. Apply Intelligent Transportation Systems (ITS) technologies to inform emergency services of the direction, duration, and arrival time of an approaching train to limit the impact of train crossings on emergency service response times. Option 4. Explore capacity improvements that will improve peak hour v/c ratios during the peak traffic periods of the day. Option 5. Investigate whether the northbound right turn lane storage capacity can be increased.
Maple Street	Option 1. Close the Santosh Street rail crossing. Detouring Santosh Street traffic to Maple is unlikely to significantly increase traffic volumes and travel times. Option 2. Reduce the approach grade on Maple Street by closing 1st Street's access to Maple Street. This would allow Maple Street to be rebuilt to a flatter grade. Option 3. Improve pedestrian facilities at this crossing. Consider installing automatic pedestrian gates, tactile yellow strips, and/or warning signs for pedestrians. Option 4. Apply ITS technologies to inform emergency services of the direction, duration, and arrival time of an approaching train to limit the impact of train crossings on emergency service response times. Option 5. Explore capacity improvements that will improve peak hour v/c ratios during the peak traffic periods of the day.
Columbia Avenue	Option 1. Investigate whether a signal and automatic gate is appropriate on the westbound approach to the west most rail crossing (replacing existing yield control on the first rail crossing). Option 2. Improve pedestrian facilities at this crossing. Consider installing automatic pedestrian gate, tactile yellow strips. and/or warning signs for pedestrians. Option 3. . Apply ITS technologies to inform emergency services of the direction, duration, and arrival time of an approaching train to limit the impact of train crossings on emergency service response times. Option 4. Investigate whether the northbound right turn lane storage capacity can be increased Option 5. The future traffic demands and operational characteristics of this intersection further investigated.

West Lane	Option 1. Improve pavement markings. Add signage at crossing to advise drivers of longer vehicles to avoid stopping on tracks. Option 2. Consider adding an emergency right turn bay for vehicles that are unable to enter US-30 before an approaching train arrives.
Old Portland Road	Option 1. Close the crossing. Traffic currently using this intersection would be diverted to the US-30/Bennett Road intersection. Option 2. Upgrade crossing to ODOT standards. Provide adequate sight distance and cross-section at the rail crossing.
Bennett Road	Option 1. Signalize the intersection to address both safety and operational concerns. Option 2. Investigate safety or operational improvements at the intersection which do not involve signalization. Option 3. Investigate whether the northbound right turn lane storage capacity can be increased.
Millard Road	Option 1. Replace existing YIELD sign on eastbound approach with STOP sign, restripe stop line, and remove vegetation obstructing sight distance.
Gable Road	Option 1. Investigate whether the northbound right turn lane storage capacity can be increased.
Columbia Boulevard	Option 1. Investigate whether the northbound right turn lane storage capacity can be increased.
St. Helens Road	Option 1. Add pavement marking on N Milton Way approach to Saint Helens Road to indicate left through movement only.
Deer Island Road	Option 1. Remove defunct rail line and restripe the intersection of Deer Island Road/Oregon Road. Option 2. Move the active rail crossing control closer to the grade crossing. This will provide more storage on Deer Island Road (westbound) and prevent obstruction of Deer Island Road during rail crossings. Option 3. Investigate whether the northbound right turn lane storage capacity can be increased.
I Street	Option 1. Remove crosswalk markings and restripe intersection appropriately. Option 2. Consider adding an emergency right turn bay for vehicles that are unable to enter US-30 before an approaching train arrives.

Nicolai Road/Goble RV access	Option 1 Consider adding an emergency right turn bay for vehicles that are unable to enter US-30 before an approaching train arrives. Option 2. Increase the separation distance between US-30 and the rail crossing.
Marshland District Road / Schroeder Road	Option 1. Improve the alignment of Marshland Road approaching the rail crossing to improve approach sight distance. Option 2. Provide rail crossing warning signs on Marshland Road to let drivers know they are approaching a rail crossing. Option 3. Remove vegetation that is blocking sight distance at the rail crossing. Option 4. Add lighting and improve pavement markings at the intersection with US-30.
Marshland District Road	Option 1. Install STOP sign on approach to US-30. Option 2. Replace grade crossing material with concrete or asphalt.
Woodson Road	Option 1. Install short left and right turn lanes on US-30 to get vehicles that are waiting for a train to pass out of the through lanes. Option 2. Provide a gravel parking bay along US-30 so vehicles can be moved out of the through traffic while waiting for a train to pass. Option 3. Improve the signage and pavement markings at the rail grade crossing.
Old Mill Town Road	Option 1. Remove vegetation on US-30 to improve sight distance for westbound left turners.
Westport Ferry Road	Option 1. Restripe the intersection to ODOT standards. This is not associated with safety concerns relating to the crossing.

Section 7
Conclusions

Conclusions

This study investigates twenty key intersections along US-30 in Columbia and Clatsop Counties. Each intersection is in the vicinity of a railroad grade crossing along the Lower Columbia River Rail Corridor. The intersections are so close to the railroad grade crossing that vehicles intending to turn from US-30 onto the cross street must queue on the highway while trains pass. The intersections were identified by Oregon Department of Transportation (ODOT) staff as potentially being impacted if rail traffic increased or if the duration of rail crossings increased.

The investigation was precipitated by the anticipated addition of "unit" train operations along the Rail Corridor. The Portland & Western Railroad will upgrade the Corridor's track in 2009 to accommodate the increase in train traffic and delays at rail crossings due to the unit trains serving Port Westward. Columbia County has hired HDR Engineering to prepare a Lower Columbia Rail Corridor Study to address the impact on local community transportation and emergency response due to the increase in train traffic and potential rail crossing closures.

The report will be used by ODOT and Columbia County to help identify and prioritize improvements that should be considered in the broader Lower Columbia Rail Corridor Study.

Unit trains are expected to travel the corridor an average of three times per week. The unit train's schedule is expected to be unpredictable but the probability of any given driver being delayed by a unit train is small. For those who are delayed by a unit train, their average delay will be twice as long as the delay created by existing trains. For the purposes of this study, grade crossing durations for existing trains were assumed to be five minutes. Crossing durations for unit trains were assumed to be ten minutes.

The physical and operational characteristics of the twenty US-30 intersections were studied, but the most fundamental characteristic under review was each intersection's ability to accommodate the increased vehicle queues caused by longer train crossing times. The study looked at the performance of each intersection during the most demanding 15-minutes of the a.m. and p.m. peak traffic periods, with and without the influence of trains passing through at the same time.

The following table identifies the intersections that were studied and qualitatively summarizes each intersection's performance in the areas of capacity to serve peak hour traffic, crash history, and ability to keep US-30 through lanes clear while a unit train passes. A more detailed one-page summary for each of the twenty studied intersections is provided in the Appendix.

The study identified three signalized intersections that do not meet ODOT operations standards for signalized intersections as well as one unsignalized intersection (Bennett Rd) whose minor cross streets experience significant delay during peak traffic periods. It is recommended that, as resources allow, these intersections be studied more thoroughly to see how their performance might be enhanced. These locations received a "C" in the Peak Hour Capacity portion of the Executive Summary table.

The study identified four locations where, if a unit train passed through during the peak traffic period, the northbound outside through lane of US-30 could be blocked by delayed right-turning vehicles. The intersections of most concern received a "C" in the Right Turn Queue Capacity portion of the Executive Summary table. Similarly, given the same circumstance, some driveways and public cross streets could be blocked by train-delayed vehicles waiting to turn left from US-30. The five intersections of most concern received a "B" in the Left Turn Queue Capacity portion of the Executive Summary table.

The study also noted five intersections where vehicles must wait in a US-30 through lane while a train passes. At some intersections, US 30 is only two lanes wide. In each case the cross street's traffic volumes appear to be very light. This is an existing condition, but the increased delay associated with unit trains makes this a notable concern. These locations received a "Cx" in the Executive Summary table.

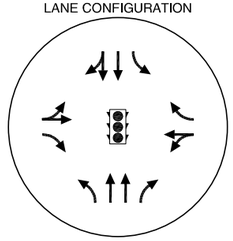
Appendix 1
Queue Analysis
Results Summary

Queue Analysis Results Summary

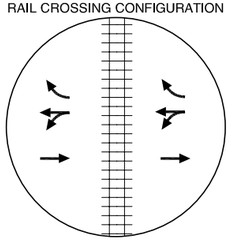
		Existing 95%ile Queue (ft) without Xing						Existing Train Event Duration - Max Queue (ft)						UNIT Train Event Duration Max Queue (ft)					
Intersection		Northbound Right Turn	Southbound Left Turn	Westbound Left Turn	Westbound Through	Westbound Right	Eastbound Through	Northbound Right Turn	Southbound Left Turn	Westbound Left Turn	Westbound Through	Westbound Right	Eastbound Through	Northbound Right Turn	Southbound Left Turn	Westbound Left Turn	Westbound Through	Westbound Right	Eastbound Through
High School Way	Storage	300	200	32		32	19	300	200	32		32	19	300	200	32		32	19
	AM	8	22	58		121	41	25	25	75		25	25	25	50	125		75	25
	PM	31	100	130		45	46	300	150	225		175	25	600	300	400		350	25
	Storage Exceeded	OK	OK	N/A (Signals)		N/A (Signals)	N/A (Signals)	OK	OK	N/A (Signals)		N/A (Signals)	N/A (Signals)	PM by 300	PM by 100	N/A (Signals)		N/A (Signals)	N/A (Signals)
Maple Street	Storage	440	175	25		25	25	440	175	25		25	25	440	175	25		25	25
	AM	7	33	124		16	124	25	25	250		25	125	50	75	475		50	250
	PM	12	42	98		22	119	100	50	150		50	50	225	100	300		75	100
	Storage Exceeded	OK	OK	N/A (Signals)		N/A (Signals)	N/A (Signals)	OK	OK	N/A (Signals)		N/A (Signals)	N/A (Signals)	OK	OK	N/A (Signals)		N/A (Signals)	N/A (Signals)
Columbia Avenue	Storage	240	180	80	80		NA	240	180	80	80		NA	240	180	80	80		NA
	AM	16	64	173	0		NA	100	100	275	125		NA	200	200	575	225		NA
	PM	56	113	251	0		NA	350	175	300	250		NA	700	350	575	475		NA
	Storage Exceeded	OK	OK	N/A (Signals)	N/A (Signals)		N/A (Signals)	PM by 110	OK	N/A (Signals)	N/A (Signals)		N/A (Signals)	PM by 460	AM by 20 & PM by 170	N/A (Signals)	N/A (Signals)		N/A (Signals)
West Lane	Storage	800	400	56			40	800	400	56			40	800	400	56			40
	AM	48	26	20			2	75	25	75			25	125	75	150			25
	PM	28	48	11			0	50	75	125			25	75	125	225			25
	Storage Exceeded	OK	OK	OK			OK	OK	OK	AM by 19 & PM by 69			OK	OK	OK	AM by 94 & PM by 169			OK
Old Portland Road	Storage	NA	400	53			NA	NA	400	53			NA	NA	400	53			NA
	AM	6	0	6			NA	25	25	75			NA	25	25	75			NA
	PM	12	0	3			NA	25	25	75			NA	25	25	75			NA
	Storage Exceeded	OK	OK	OK			OK	OK	OK	AM by 22 & PM by 22			OK	OK	OK	AM by 22 & PM by 22			OK
Bennett Road	Storage	480	300	52			36	480	300	52			36	480	300	52			36
	AM	122	2	88			2	175	25	175			25	350	25	300			25
	PM	280	25	91			3	400	25	175			25	800	75	300			25
	Storage Exceeded	OK	OK	AM by 36 & PM by 39			OK	OK	OK	AM by 123 & PM by 123			OK	PM by 320	OK	AM by 248 & PM by 248			OK
Millard Road	Storage	280	290	48		48	36	280	290	48			36	280	290	48			36
	AM	42	12	8		17	3	50	25	50			25	125	25	50			25
	PM	11	55	20		26	5	25	75	50			25	25	150	75			25
	Storage Exceeded	OK	OK	OK		OK	OK	OK	OK	AM by 2 & PM by 2			OK	OK	OK	AM by 2 & PM by 27			OK
Gable Road	Storage	400	140	28	28		16	400	140	28	28		16	400	140	28	28		16
	AM	38	194	234	333		293	250	350	400	525		300	500	700	775	1025		600
	PM	39	146	206	375		262	225	275	400	625		350	450	550	800	1300		700
	Storage Exceeded	OK	AM by 54 & PM by 6	N/A (Signals)	N/A (Signals)		N/A (Signals)	OK	AM by 210 & PM by 135	N/A (Signals)	N/A (Signals)		N/A (Signals)	AM by 100 & PM by 50	AM by 560 & PM by 410	N/A (Signals)	N/A (Signals)		N/A (Signals)
Columbia Boulevard	Storage	510	110	NA			NA	510	110	NA			NA	510	110	NA			NA
	AM	23	114	NA			425	575	325	NA			675	1150	650	NA			1350
	PM	39	120	NA			394	525	275	NA			500	1050	550	NA			1000
	Storage Exceeded	OK	AM by 4 & PM by 10	NA			N/A (Signals)	AM by 65 & PM by 15	AM by 215 & PM by 165	NA			N/A (Signals)	AM by 640 & PM by 540	AM by 540 & PM by 440	NA			N/A (Signals)
St. Helens Road	Storage	NA	NA	40	NA	40	NA	NA	NA	40	NA	40	NA	NA	NA	40	NA	40	NA
	AM	NA	0	141	NA	31	NA	NA	0	900	NA	250	NA	NA	0	1800	NA	500	NA
	PM	NA	0	169	NA	94	NA	NA	0	975	NA	500	NA	NA	0	1950	NA	1025	NA
	Storage Exceeded	OK	OK	N/A (Signals)	N/A (Signals)	N/A (Signals)	N/A (Signals)	OK	OK	N/A (Signals)	N/A (Signals)	N/A (Signals)	N/A (Signals)	OK	OK	N/A (Signals)	N/A (Signals)	N/A (Signals)	N/A (Signals)
Deer Island Road	Storage	390	100	41			27	390	100	41			27	390	100	41			27
	AM	15	111	148			15	125	250	450			25	225	500	875			25
	PM	27	70	150			19	250	125	400			25	500	225	800			25
	Storage Exceeded	OK	AM by 11	N/A (Signals)			N/A (Signals)	OK	AM by 150 & PM by 25	N/A (Signals)			N/A (Signals)	PM by 110	AM by 400 & PM by 125	N/A (Signals)			N/A (Signals)
I Street	Storage	230	230	46			32	230	230	46			32	230	230	46			32
	AM	62	8	112			6	125	25	250			25	225	25	475			25
	PM	66	15	37			2	100	25	100			25	200	50	150			25
	Storage Exceeded	OK	OK	AM by 66			OK	OK	OK	AM by 204 & PM by 54			OK	OK	OK	AM by 429 & PM by 104			OK
E Street	Storage	204	230	41			22	204	230	41			22	204	230	41			22
	AM	13	22	55			28	175	25	175			25	325	50	275			25
	PM	4	11	31			24	25	25	75			25	25	25	125			25
	Storage Exceeded	OK	OK	N/A (Signals)			N/A (Signals)	OK	OK	N/A (Signals)			N/A (Signals)	AM by 121	OK	N/A (Signals)			N/A (Signals)
Nicolai Road	Storage	NA	NA	60			60	NA	NA	60			60	NA	NA	60			60
	AM	NA	NA	NA			NA	NA	NA	NA			NA	NA	NA	NA			NA
	PM	12	6	5			2	25	25	75			25	50	25	75			25
	Storage Exceeded	OK	OK	OK			OK	OK	OK	PM by 15			OK	OK	OK	PM by 15			OK
Veterans Way	Storage	150	200	100	150		138	150	200	100	150		138	150	200	100	150		138
	AM	9	23	3	22		15	25	25	25	50		25	25	75	25	75		50
	PM	8	49	9	51		8	25	75	25	75		25	25	125	25	150		25
	Storage Exceeded	OK	OK	OK	OK		OK	OK	OK	OK	OK		OK	OK	OK	OK	OK		OK
Marshland District Road/Schroeder Rd	Storage	NA	NA	74			85	NA	NA	74			85	NA	NA	74			85
	AM	NA	NA	NA			NA	NA	NA	NA			NA	NA	NA	NA			NA
	PM	2	3	5			2	25	25	75			25	25	25	75			25
	Storage Exceeded	OK	OK	OK			OK	OK	OK	PM by 1			OK	OK	OK	PM by 1			OK
Marshland District Road	Storage	NA	NA	68			52	NA	NA	68			52	NA	NA	68			52
	AM	NA	NA	NA			NA	NA	NA	NA			NA	NA	NA	NA			NA
	PM	2	3	2			0	25	25	25			25	25	25	25			25
	Storage Exceeded	OK	OK	OK			OK	OK	OK	OK			OK	OK	OK	OK			OK
Woodson Rd	Storage	NA	NA	92			76	NA	NA	92			76	NA	NA	92			76
	AM	NA	NA	NA			NA	NA	NA	NA			NA	NA	NA	NA			NA
	PM	11	18	9			2	25	25	75			25	25	50	75			25
	Storage Exceeded	OK	OK	OK			OK	OK	OK	OK			OK	OK	OK	OK			OK
Old Mill Town Road	Storage	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	AM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PM	22	0	29	NA	6	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Storage Exceeded	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Westport Ferry Road	Storage	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	AM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PM	11	3	15	NA	8	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Storage Exceeded	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Appendix 2
High School Way

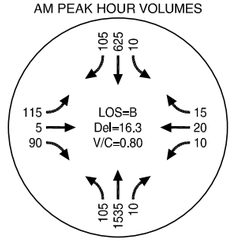
LANE CONFIGURATION



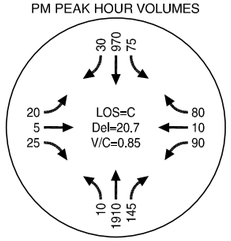
RAIL CROSSING CONFIGURATION



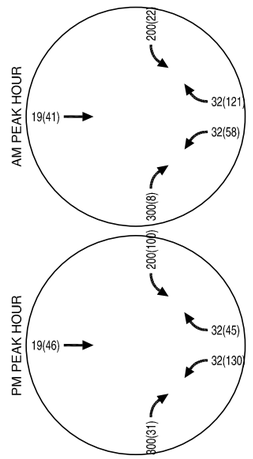
AM PEAK HOUR VOLUMES



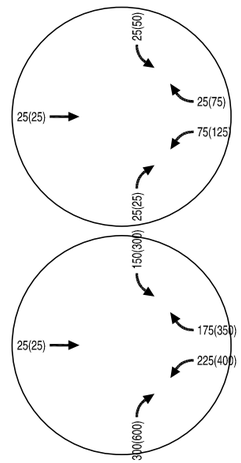
PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)



EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)



Site Number #	1
Intersection Name	High School Way
US-30 Milepoint	20.35
Intersection ODOT ID	5A-019.35
US Dot Crossing ID	101854W
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	High school, Elementary School,
Emergency Facilities in Vicinity	Scappoose Fire Station
Pedestrian Facilities at Crossing	Yes
Estimated AADT (vpd)	3,930
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.8	0.85
Average Delay	16.3	20.7
Level Of Service	B	C

Crash Analysis (2002 - 2007)	
Total Crashes in period	23
Crashes per Year	7.7
Peak Hour Total Entering Vehicles	3,190
Million Entering Vehicles(MEV)/Year	11.6
Crashes/MEV	0.7
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	13
Rear End	7
Angle	3
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	11
Property Damage Only (O)	12

NOTABLE CONCERNS

No pedestrian warning signage or automatic gates to control pedestrian crossings when a train is present. Significant numbers of high school and elementary school students are likely to use the southerly sidewalk.
"DO NOT STOP ON TRACKS SIGN" on westbound approach is obscured by vegetation.
The response times for police and emergency services may be affected by the increase in rail crossing duration.

OPTIONS FOR MITIGATION

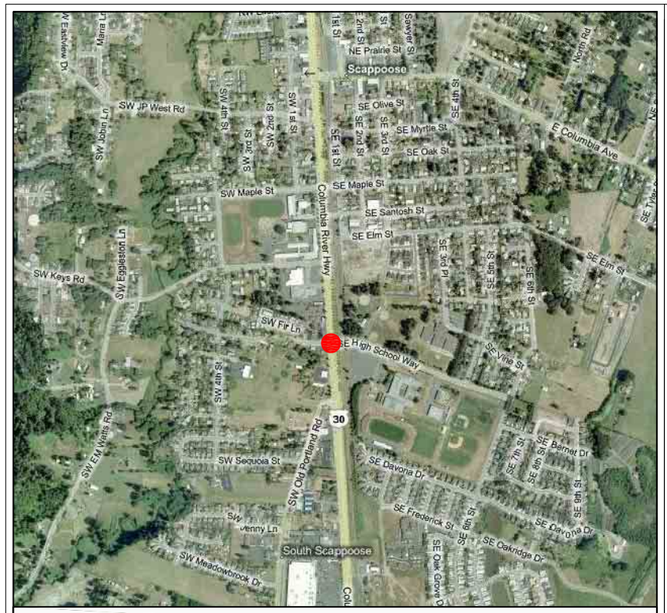
Option 1. Improve pedestrian facilities at this crossing. Consider installing an automatic pedestrian gate, tactile yellow strips, and/or warning signs for pedestrians.
Option 2. Remove vegetation obscuring signage.
Option 3. Add ITS system to inform emergency services of the direction, duration, and arrival time of an approaching train to limit the impact of train crossings on emergency service response times.
Option 4. The future traffic demands and operational characteristics of this intersection should be further investigated.
Option 5. Investigate whether the northbound right turn lane storage capacity can be increased.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

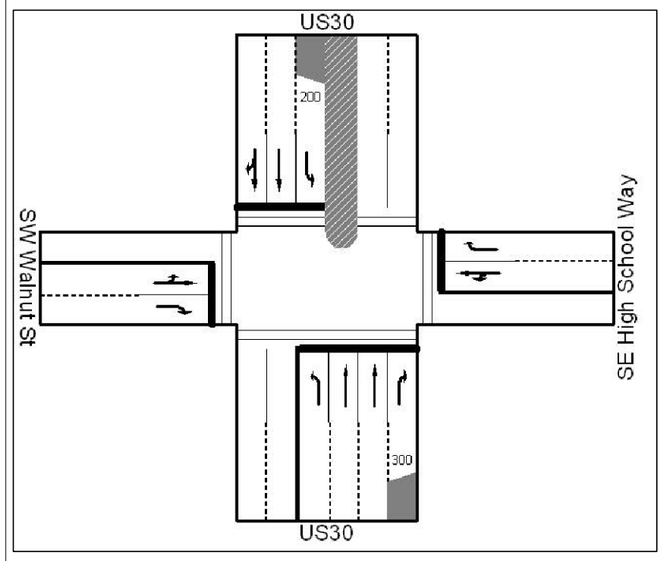
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / HIGH SCHOOL WAY
COLUMBIA RIVER RAIL CROSSING
SCAPPOOSE, OREGON

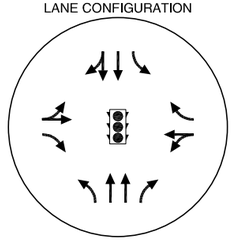
FIGURE 1

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

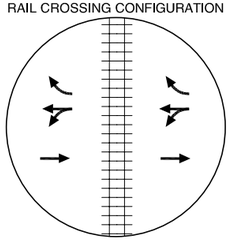
Layout Tab: Fig01
H:\profile\9464 - Lower Columbia Corridor Rail Study\dwgs\figs\9464Fig02.dwg Dec 22, 2008 - 4:19pm - mbell

Appendix 3
Maple Street

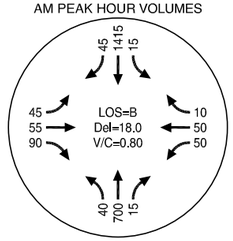
LANE CONFIGURATION



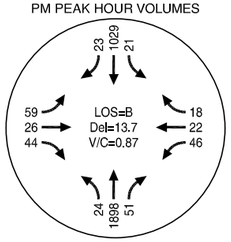
RAIL CROSSING CONFIGURATION



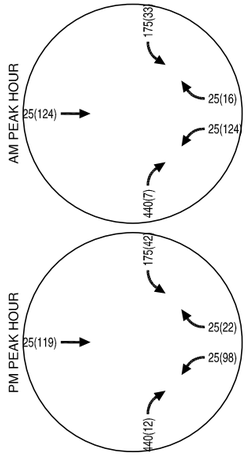
AM PEAK HOUR VOLUMES



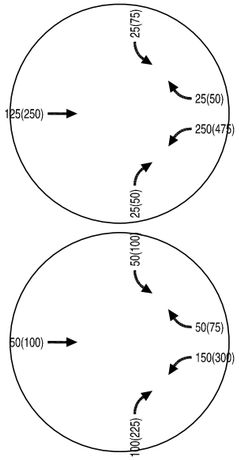
PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)



EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)



Site Number #	2
Intersection Name	Maple Street
US-30 Milepoint	20.67
Intersection ODOT ID	5A-019.67
US Dot Crossing ID	057901H
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	NE 1st Street
Secondary Intersection Type	Unsignalized
Notable Trip Generators	Middle School. Residential Traffic
Emergency Facilities in Vicinity	Scappoose Fire Station
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	1,840
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methedelogy	AM	PM
v/c	0.8	0.87
Average Delay	18	13.7
Level Of Service	B	B

Crash Analysis (2002 - 2007)	
Total Crashes in period	12
Crashes per Year	4.0
Peak Hour Total Entering Vehicles	3,096
Million Entering Vehicles(MEV)/Year	11.3
Crashes/MEV	0.4
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	12
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	9
Property Damage Only (O)	3

NOTABLE CONCERNS

The westbound approach to the rail crossing is very steep and may cause problems for commercial vehicles. Due to the steepness of grade, drivers unfamiliar with the area may not realize that there is only sufficient storage for one vehicle on the east (US-30) side of the tracks.

OPTIONS FOR MITIGATION

Option 1. Close the Santosh Street rail crossing. Detouring Santosh Street traffic to Maple is unlikely to significantly increase traffic volumes and travel times.
Option 2. Reduce the approach grade on Maple Street by closing 1st Street's access to Maple Street. This would allow Maple Street to be rebuilt to a flatter grade.
Option 3. Improve pedestrian facilities at this crossing. Consider installing automatic pedestrian gates, tactile yellow strips, and/or warning signs for pedestrians.
Option 4. Add ITS system to inform emergency services of the direction, duration, and arrival time of an approaching train to limit the impact of train crossings on emergency service response times.
Option 5. The future traffic demands and operational characteristics of this intersection further investigated.

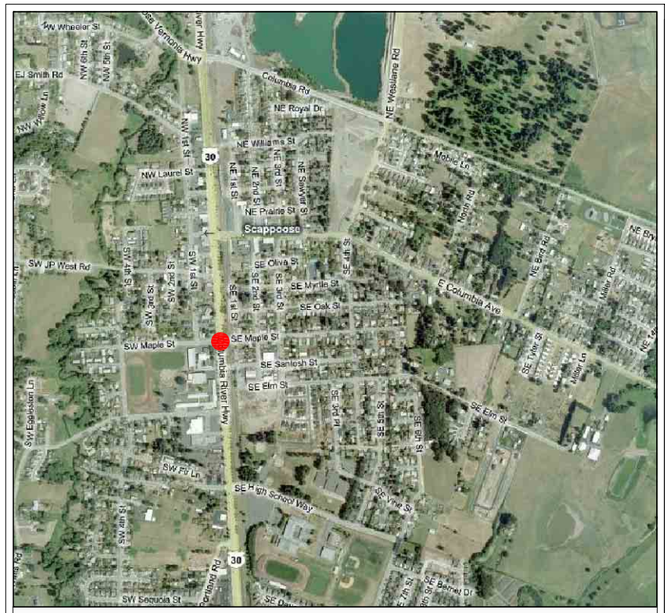
LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

 - STOP SIGN

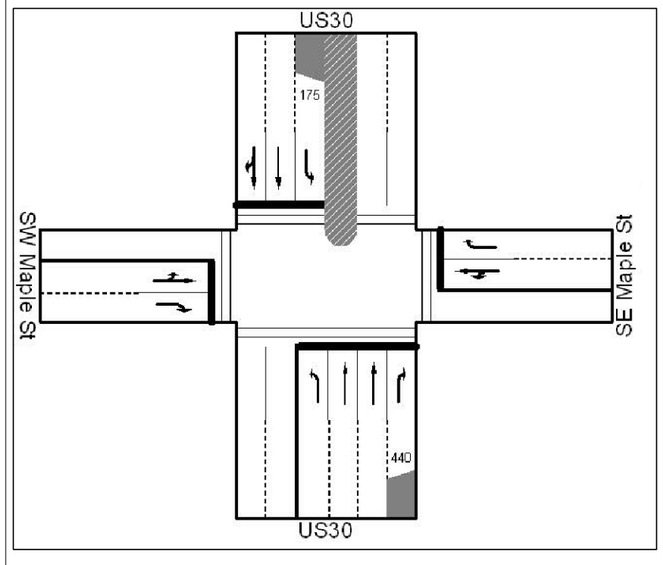
 - TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

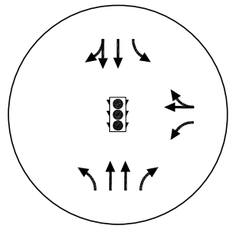
PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / MAPLE STREET
COLUMBIA RIVER RAIL CROSSING
SCAPPOOSE, OREGON

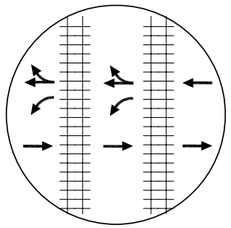
FIGURE 2

Appendix 4
Columbia Avenue

LANE CONFIGURATION



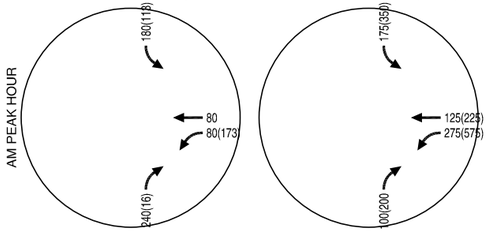
RAIL CROSSING CONFIGURATION



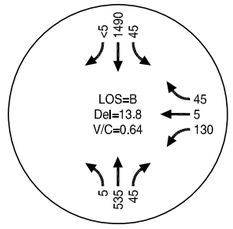
EXISTING QUEUE STORAGE
LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE
QUEUE (FT) = (XX)

EXISTING TRAIN EVENT DURATION
MAXIMUM = XX
UNIT TRAIN EVENT DURATION
MAXIMUM QUEUE (FT)= (XX)

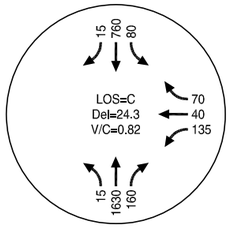
AM PEAK HOUR



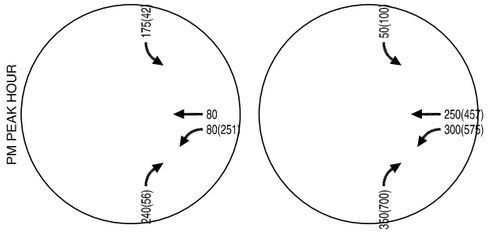
AM PEAK HOUR VOLUMES



PM PEAK HOUR VOLUMES



PM PEAK HOUR



Site Number #	3
Intersection Name	Columbia Avenue
US-30 Milepoint	20.9
Intersection ODOT ID	5A-019.90
US Dot Crossing ID	057902P
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	2
Secondary intersection	NE 1st Street
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	Restaurants, Gas Station, Shops, Vet
Emergency Facilities in Vicinity	Police Station, Scappoose Fire Station?
Pedestrian Facilities at Crossing	Yes
Estimated AADT (vpd)	4,900
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methedology	AM	PM
v/c	0.64	0.82
Average Delay	13.8	24.3
Level Of Service	B	C

Crash Analysis (2002 - 2007)	
Total Crashes in period	6
Crashes per Year	2.0
Peak Hour Total Entering Vehicles	2,774
Million Entering Vehicles(MEV)/Year	10.1
Crashes/MEV	0.2
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	2
Rear End	2
Angle	2
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (F)	0
Personal Injury (A + B + C)	2
Property Damage Only (O)	4

NOTABLE CONCERNS

One rail crossing is signal-and gate-controlled while the other is a yield-controlled rail crossing. The separation between the two tracks allows for a westbound vehicle to potentially be trapped between the two rail crossings. While only one train operates on the line at this time, the addition of a unit train may lead to a situation where both rail crossings will be occupied by trains at the same time.

OPTIONS FOR MITIGATION

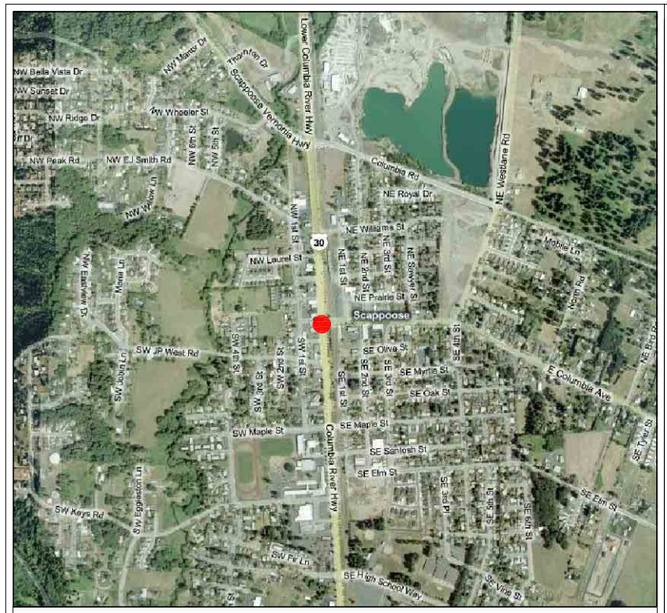
Option 1. Investigate whether a signal and automatic gate is appropriate on the westbound approach to the west most rail crossing (replacing existing yield control on the first rail crossing).
Option 2. Improve pedestrian facilities at this crossing. Consider installing automatic pedestrian gate, tactile yellow strips. and/or warning signs for pedestrians.
Option 3. Add ITS system to inform emergency services of the direction, duration, and arrival time of an approaching train to limit the impact of train crossings on emergency service response times. .
Option 4. Investigate whether the northbound right turn lane storage capacity can be increased
Option 5. The future traffic demands and operational characteristics of this intersection further investigated.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

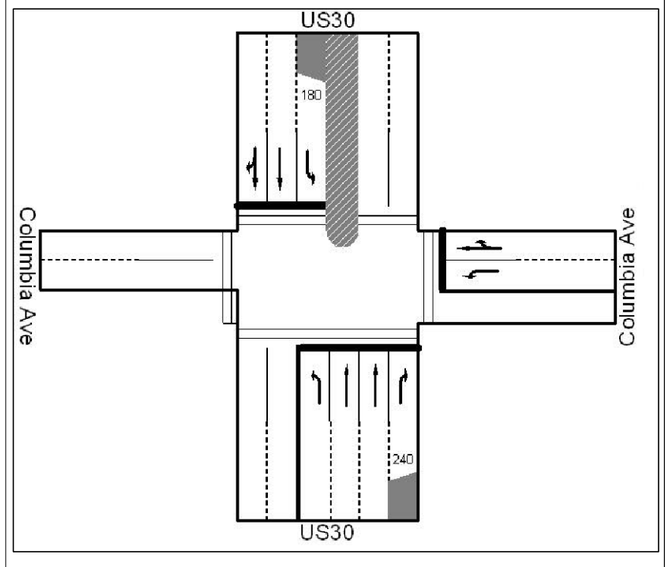
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

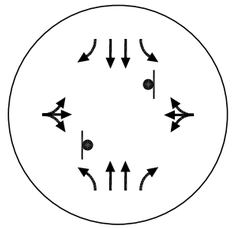
US-30 / COLUMBIA AVENUE
COLUMBIA RIVER RAIL CROSSING
SCAPPOOSE, OREGON

FIGURE 3

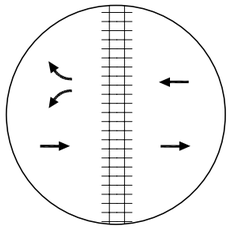
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 5
West Lane

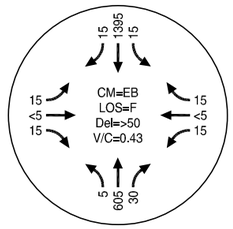
LANE CONFIGURATION



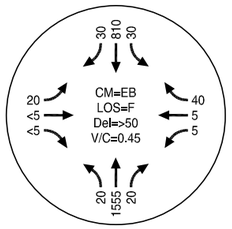
RAIL CROSSING CONFIGURATION



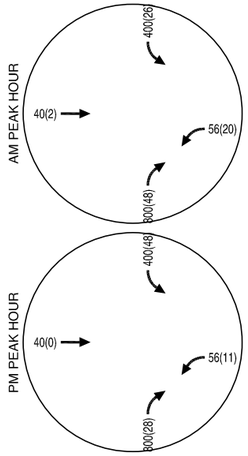
AM PEAK HOUR VOLUMES



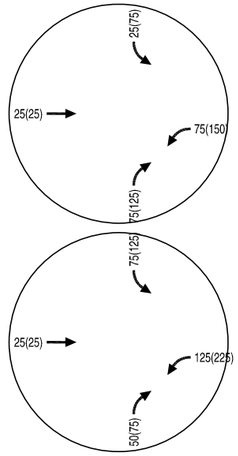
PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)



EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)



Site Number #	4
Intersection Name	West Lane
US-30 Milepoint	22.49
Intersection ODOT ID	5A-021.50
US Dot Crossing ID	057910G
Intersection Type	Unsignalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	Paradise Lane
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	Scappoose Airfield, City Dump
Emergency Facilities in Vicinity	Fire Station
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	1,000
Sight Distance Issue Noted	Westlane Westbound approach to
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.43	0.45
Average Delay	>50	>50
Level Of Service	F	F

Crash Analysis (2002 - 2007)	
Total Crashes in period	9
Crashes per Year	3.0
Peak Hour Total Entering Vehicles	2,395
Million Entering Vehicles(MEV)/Year	8.7
Crashes/MEV	0.3
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	4
Rear End	0
Angle	0
Pedestrian	2
Single Vehicle	3
	Severity Types
Fatalities (K)	2
Personal Injury (A + B + C)	7
Property Damage Only (O)	0

NOTABLE CONCERNS

A significant numbers of trucks use West Lane. The distance between the westbound approach's stop line at US-30 and the rail crossing is 56 feet. As this is an unsignalized intersection, a large vehicle could potentially be trapped behind another vehicle, unable to turn onto US-30. The response times for police and emergency services may be affected by the increase in rail crossing duration.

OPTIONS FOR MITIGATION

Option 1. Improve pavement markings. Add signage at crossing to advise drivers of longer vehicles to avoid stopping on tracks.
Option 2. Consider adding an emergency right turn bay for vehicles that are unable to enter US-30 before an approaching train arrives.

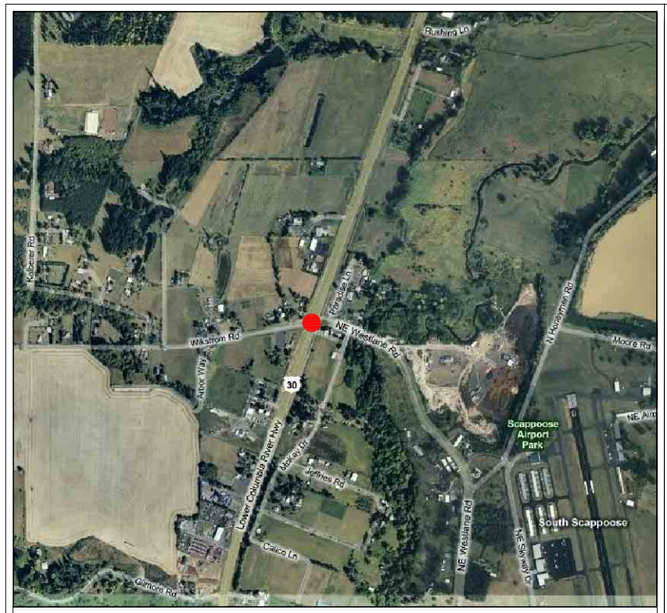
LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

 - STOP SIGN

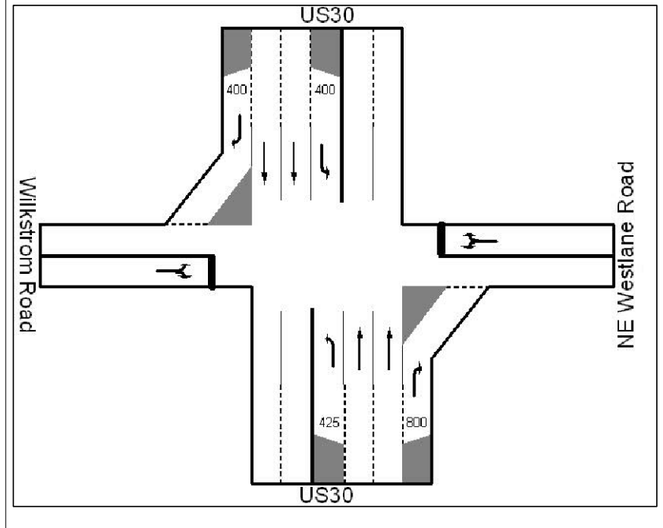
 - TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

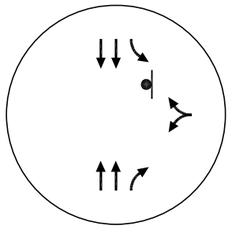
US-30 / WESTLANE ROAD
COLUMBIA RIVER RAIL CROSSING
COLUMBIA COUNTY, OREGON

FIGURE 4

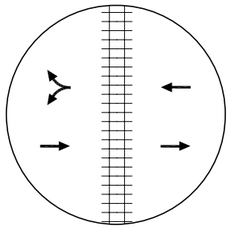
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 6
Old Portland Road

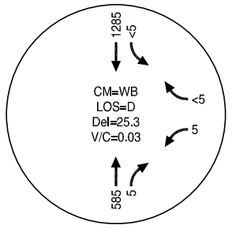
LANE CONFIGURATION



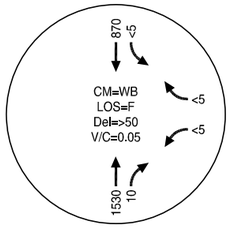
RAIL CROSSING CONFIGURATION



AM PEAK HOUR VOLUMES

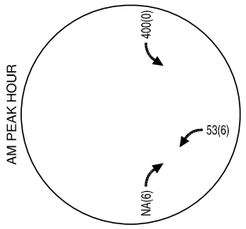


PM PEAK HOUR VOLUMES

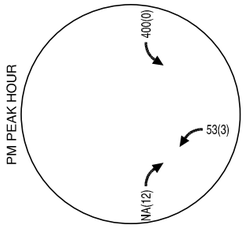


EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)

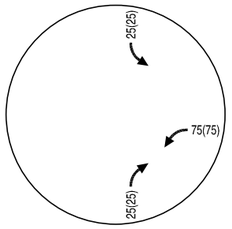
AM PEAK HOUR

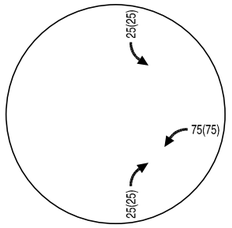


PM PEAK HOUR



EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)





(NO SCALE)

Site Number #	5
Intersection Name	Old Portland Road
US-30 Milepoint	25
Intersection ODOT ID	5A-026.60-C
US Dot Crossing ID	057936J
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	0
Secondary Intersection Type	0
Notable Trip Generators	nil - Access to farms
Emergency Facilities in Vicinity	NA
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	110
Sight Distance Issue Noted	Due to curvature of Old Portland
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.03	0.05
Average Delay	25.3	>50
Level Of Service	D	F

Crash Analysis (2002 - 2007)	
Total Crashes in period	0
Crashes per Year	0.0
Peak Hour Total Entering Vehicles	2,273
Million Entering Vehicles(MEV)/Year	8.3
Crashes/MEV	0.0
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	0
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	0

NOTABLE CONCERNS

The westbound approach to this rail crossing has very steep grade, and extremely narrow lane widths. Vegetation hinders sight distances for the rail crossing. Very low traffic volume was observed at the intersection. The overall geometry of the crossing is poor. Vehicles using Old Portland Road have the option to access US-30 via Bennett Road.

OPTIONS FOR MITIGATION

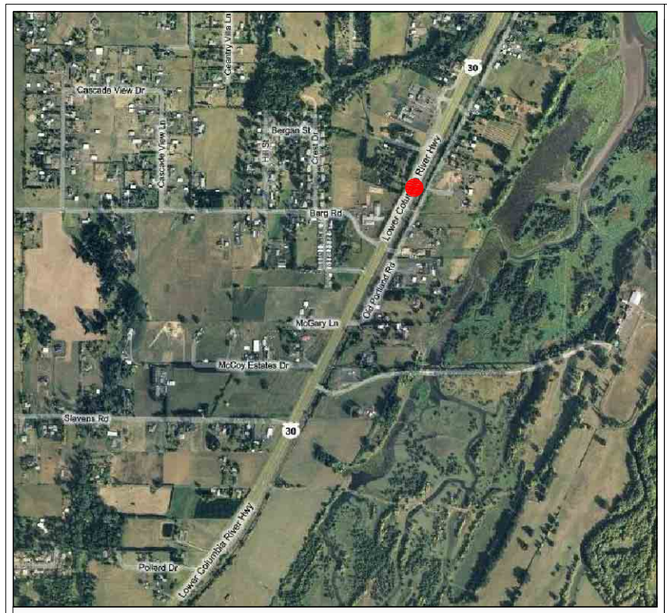
Option 1. Close the crossing. Traffic currently using this intersection would be diverted to the US-30/Bennett Road intersection.
Option 2. Upgrade crossing to ODOT standards. Provide adequate sight distance and cross-section at the rail crossing.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

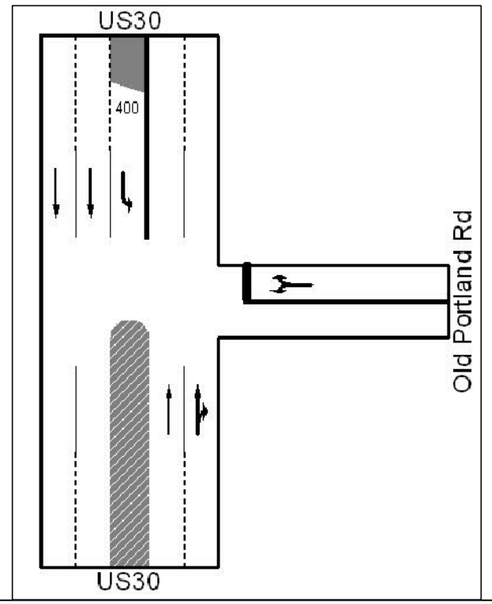
- STOP SIGN

- TRAFFIC SIGNAL



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (EASTBOUND)

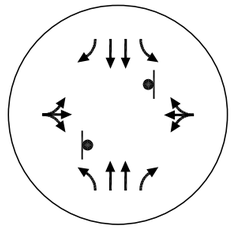
US-30 / OLD PORTLAND ROAD
COLUMBIA RIVER RAIL CROSSING
COLUMBIA COUNTY, OREGON

FIGURE 5

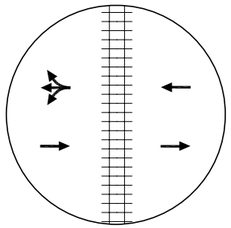
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 7
Bennett Road

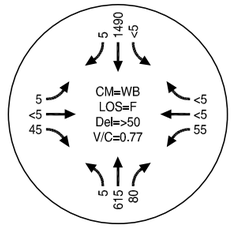
LANE CONFIGURATION



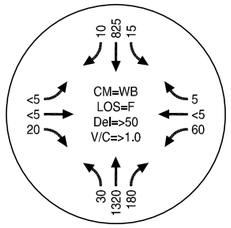
RAIL CROSSING CONFIGURATION



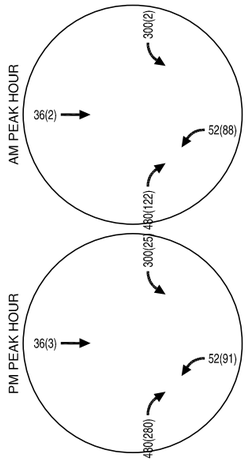
AM PEAK HOUR VOLUMES



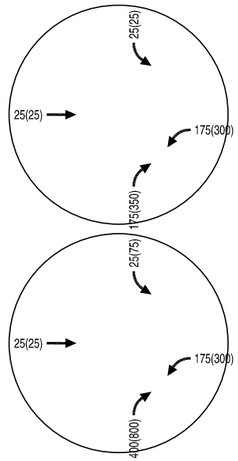
PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)



EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)



Site Number #	6
Intersection Name	Bennett Road
US-30 Milepoint	25.8
Intersection ODOT ID	5A-024.80
US Dot Crossing ID	057924P
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	Old Portland Road
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	Port of Saint Helens
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	2,640
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.77	>1.0
Average Delay	>50	>50
Level Of Service	F	F

Crash Analysis (2002 - 2007)	
Total Crashes in period	27
Crashes per Year	9.0
Peak Hour Total Entering Vehicles	2,344
Million Entering Vehicles(MEV)/Year	8.6
Crashes/MEV	1.1
>1 Crash/MEV	Yes
	Collision Types
Lane Change/Turning	17
Rear End	4
Angle	6
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	21
Property Damage Only (O)	6

NOTABLE CONCERNS

A number of articulated trucks from the Port of Saint Helens were observed using this road for access to US-30. Due to limited queue storage, an articulated vehicle may be unable to completely cross the tracks while waiting to access US-30. The estimated AADT of this crossing is approximately 2,700vpd. This intersection exceeds a v/c ratio of 1.0 in the PM peak hour, and is identified as being on the ODOT 2008 Top 10% SPIS List. Because of heavy traffic volumes on US-30, westbound left turning vehicles are likely to queue across the tracks during the a.m. and p.m. peak periods.

OPTIONS FOR MITIGATION

Option 1. Signalize the intersection to address both safety and operational concerns.
Option 2. Investigate safety or operational improvements at the intersection which do not involve signalization.
Option 3. Investigate whether the northbound right turn lane storage capacity can be increased.

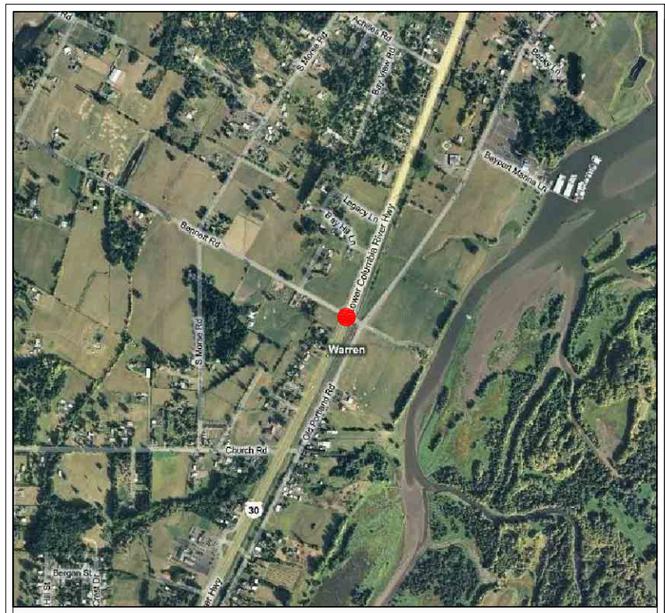
LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO


- STOP SIGN

- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION

EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / BENNETT ROAD
COLUMBIA RIVER RAIL CROSSING
WARREN, OREGON

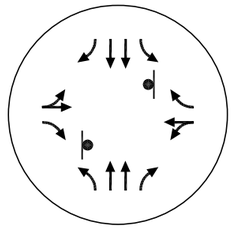
FIGURE 6

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

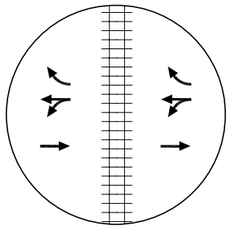
H:\profile\9464 - Lower Columbia Corridor Rail Study\dwgs\figs\9464Fig02.dwg Dec 22, 2008 - 4:19pm - mbell Layout Tab: Fig06

Appendix 8
Millard Road

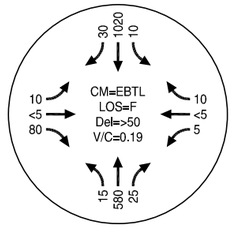
LANE CONFIGURATION



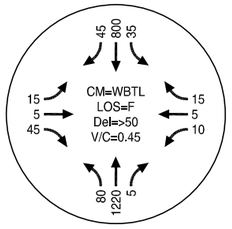
RAIL CROSSING CONFIGURATION



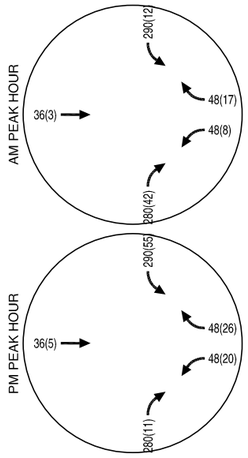
AM PEAK HOUR VOLUMES



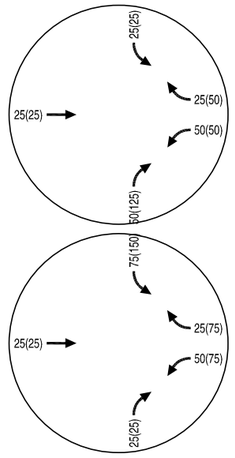
PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)



EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)



Site Number #	7
Intersection Name	Millard Road
US-30 Milepoint	26.96
Intersection ODOT ID	5A-025.94
US Dot Crossing ID	057927K
Intersection Type	Unsignalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	S McNulty Way
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	Port of Saint Helens
Emergency Facilities in Vicinity	n a
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	760
Sight Distance Issue Noted	Eastbound - existing approach is
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.19	0.45
Average Delay	>50	>50
Level Of Service	F	F

Crash Analysis (2002 - 2007)	
Total Crashes in period	2
Crashes per Year	0.7
Peak Hour Total Entering Vehicles	2,170
Million Entering Vehicles(MEV)/Year	7.9
Crashes/MEV	0.1
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	2
Rear End	0
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	2

NOTABLE CONCERNS

The STOP sign for the southbound McNulty Way approach is obscured by a tree. The YIELD sign for Millard Road's eastbound approach is obscured (surrounded) by a tree. Pavement markings for the eastbound approach are very faint. Sight distance for the east bound approach of Millard was measured as 120 feet. There are no lane markings between US-30 and the rail crossing.

OPTIONS FOR MITIGATION

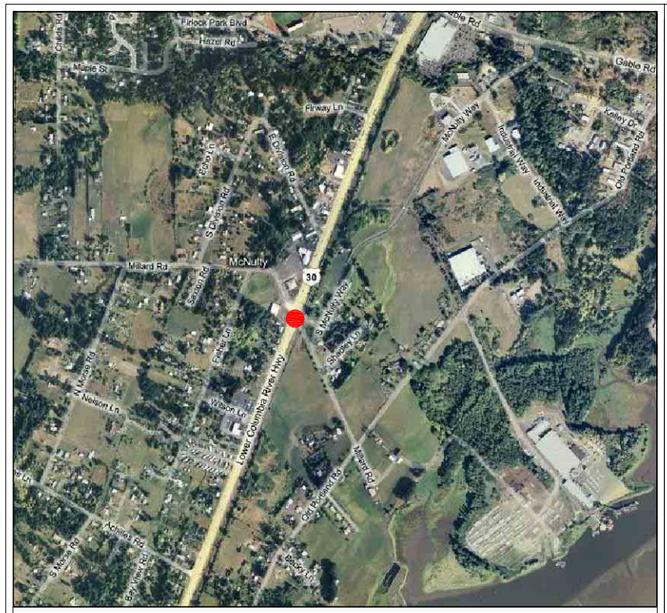
Option 1. Replace existing YIELD sign on eastbound approach with STOP sign, restripe stop line, and remove vegetation obstructing sight distance.

LEGEND

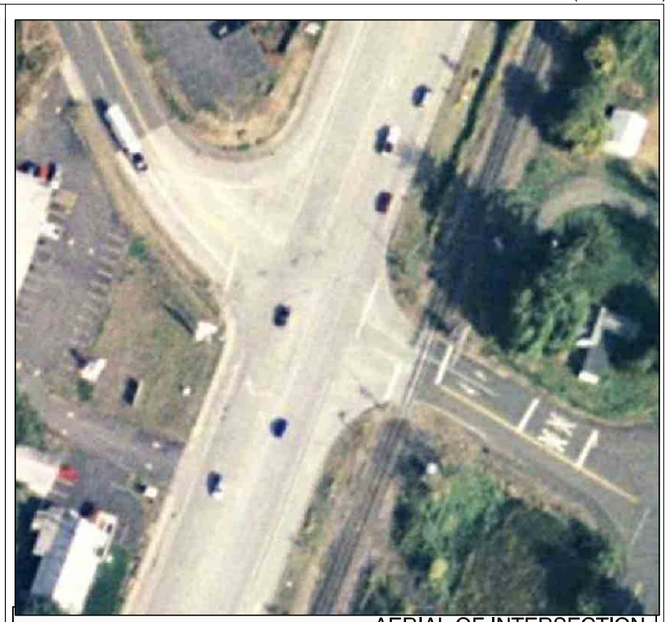
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

- STOP SIGN
- TRAFFIC SIGNAL

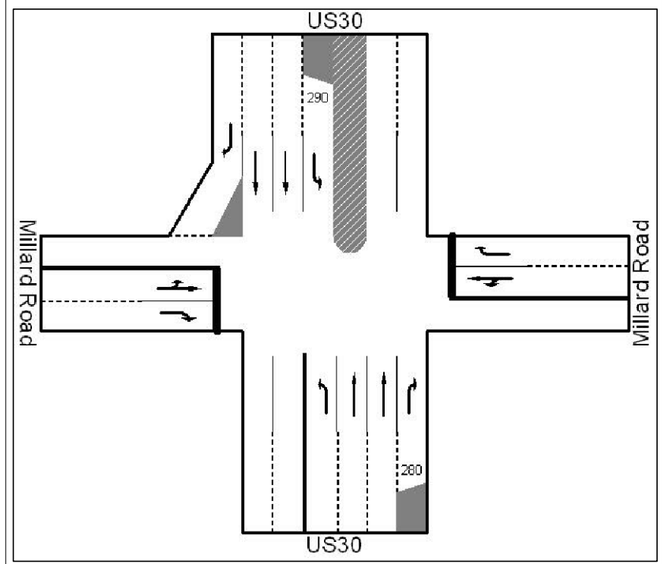
(NO SCALE)



SITE VICINITY



AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / MILLARD ROAD
COLUMBIA RIVER RAIL CROSSING
MCNULTY, OREGON

FIGURE 7

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Layout Tab: Fig07
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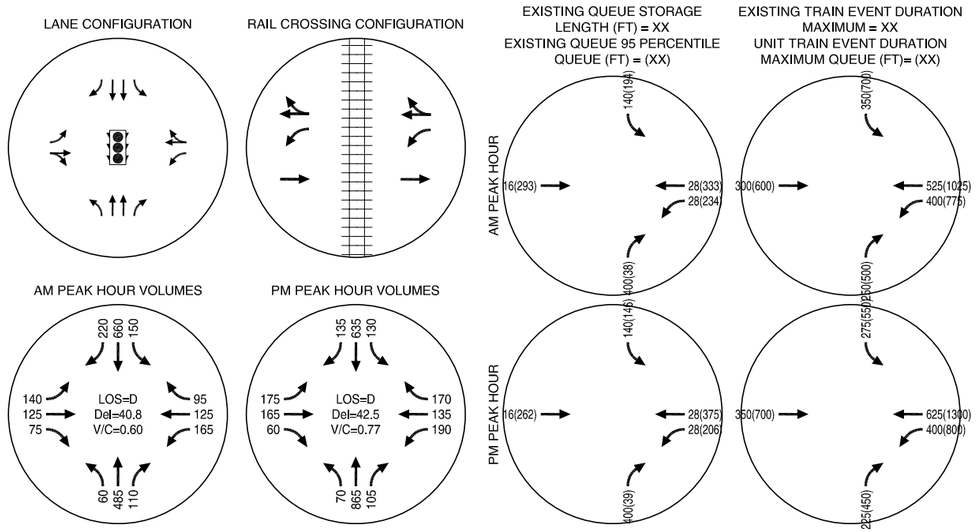
Appendix 9
Gable Road



Site Number #	8
Intersection Name	Gable Road
US-30 Milepoint	27.69
Intersection ODOT ID	5A-026.70
US Dot Crossing ID	057930T
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	Commercial centre access of Gable
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	Yes
Estimated AADT (vpd)	8,910
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.6	0.77
Average Delay	40.8	42.5
Level Of Service	D	D

Crash Analysis (2002 - 2007)	
Total Crashes in period	42
Crashes per Year	14.0
Peak Hour Total Entering Vehicles	2,747
Million Entering Vehicles(MEV)/Year	10.0
Crashes/MEV	1.4
>1 Crash/MEV	Yes
	Collision Types
Lane Change/Turning	15
Rear End	14
Angle	13
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	21
Property Damage Only (O)	21

NOTABLE CONCERNS

No safety concerns were noted at this site. This intersection is identified as being on the ODOT 2008 Top 10% SPIS List. Queuing of the southbound left turn was identified as an issue, however as there is a two way left turn lane in this location additional queuing capacity exists, but queues may affect access and egress to driveways - queuing up to 560 feet beyond the available capacity (but within the two way left turn lane). Due to the conservative nature of this analysis it is considered that the risks associated with impacts to local driveway access and egress are low. During the unit train event, the queues may exceed the northbound right turn lane storage capacity by 100 feet.

OPTIONS FOR MITIGATION

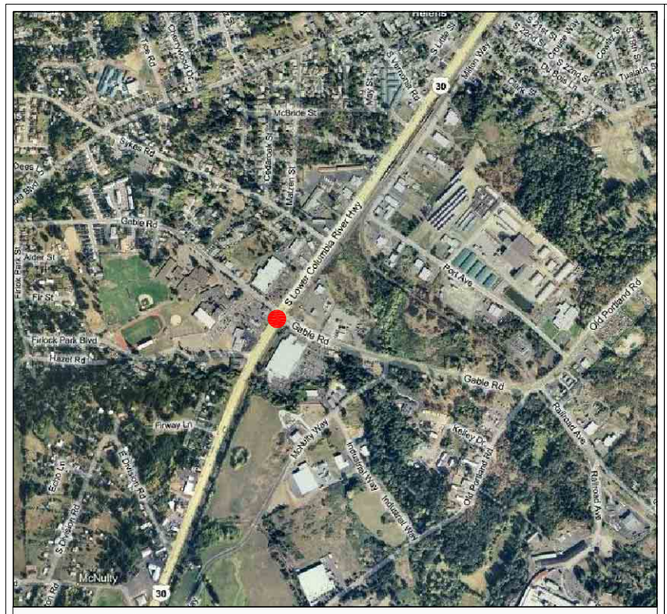
Option 1. Investigate whether the northbound right turn lane storage capacity can be increased.

LEGEND

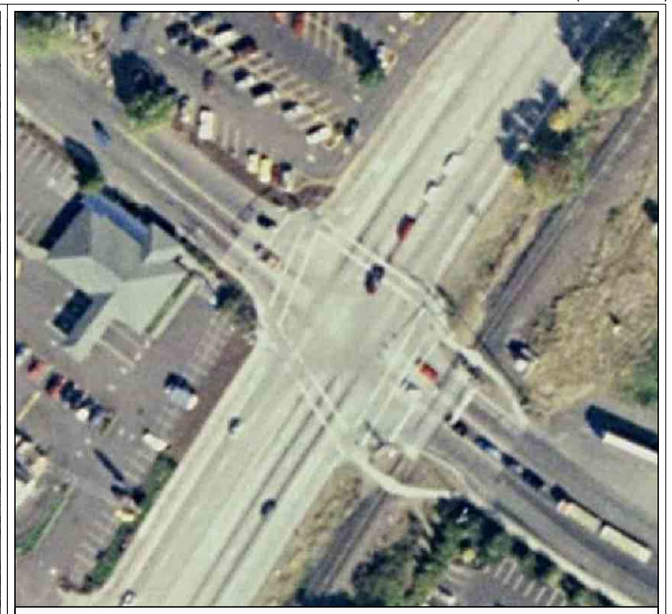
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

- STOP SIGN
- TRAFFIC SIGNAL

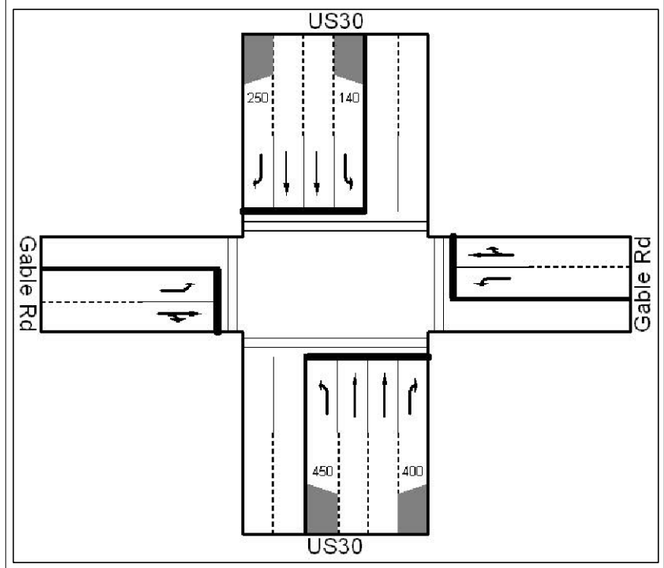
(NO SCALE)



SITE VICINITY



AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

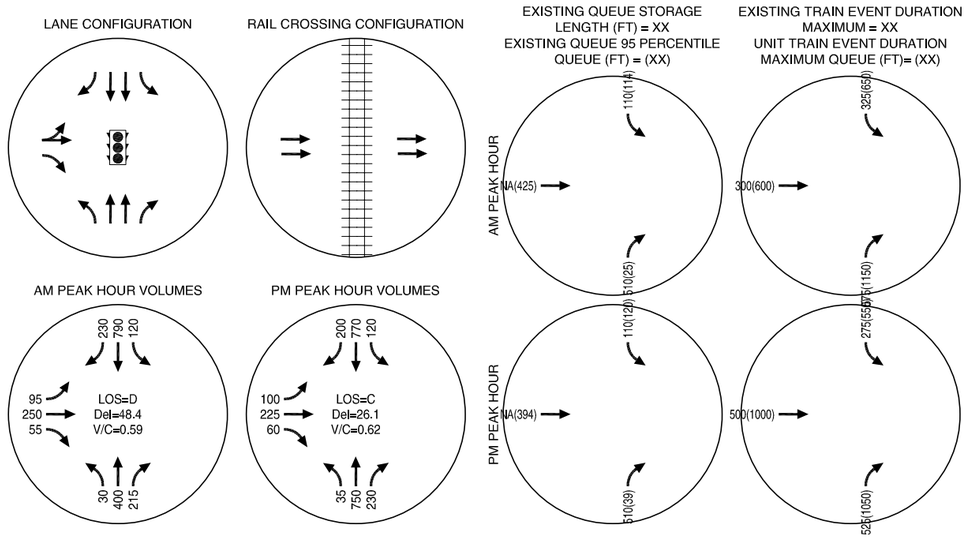
PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / GABLE ROAD
COLUMBIA RIVER RAIL CROSSING
WEST SAINT HELENS, OREGON

FIGURE 8

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 10
Columbia Boulevard



Site Number #	9
Intersection Name	Columbia Boulevard
US-30 Milepoint	28.56
Intersection ODOT ID	5A-027.50
US Dot Crossing ID	057932G
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	Milton Way
Secondary Intersection Type	Unsignalized
Notable Trip Generators	City of Saint Helens
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	yes
Estimated AADT (vpd)	5,780
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.59	0.62
Average Delay	48.4	26.1
Level Of Service	D	C

Crash Analysis (2002 - 2007)	
Total Crashes in period	6
Crashes per Year	2.0
Peak Hour Total Entering Vehicles	2,410
Million Entering Vehicles(MEV)/Year	8.8
Crashes/MEV	0.2
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	4
Angle	2
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	2
Property Damage Only (O)	4

NOTABLE CONCERNS

No safety concerns were noted at this site.

OPTIONS FOR MITIGATION

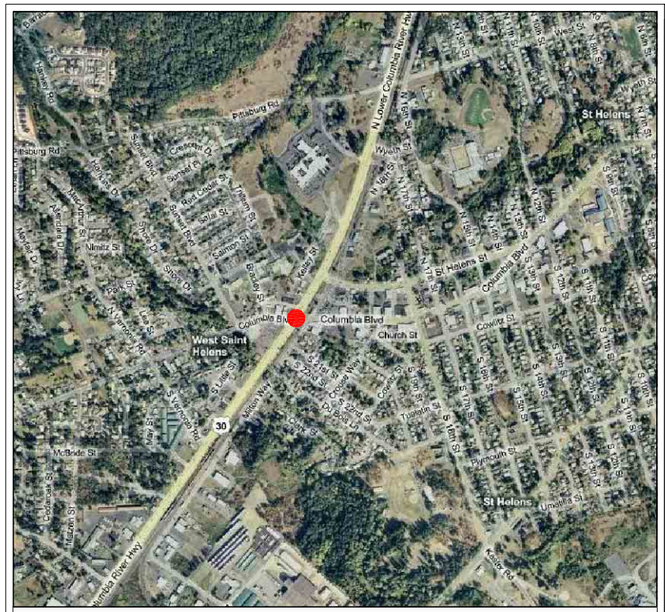
Option 1. Investigate whether the northbound right turn lane storage capacity can be increased.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

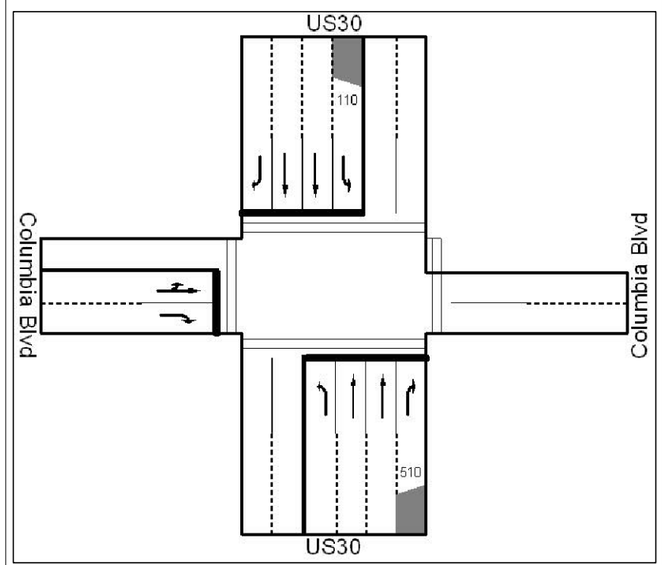
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



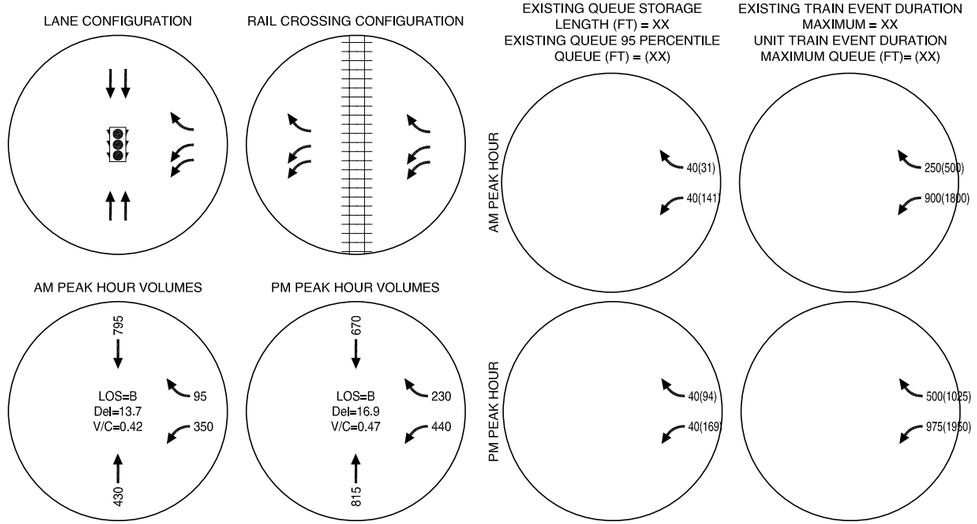
EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / COLUMBIA BOULEVARD
COLUMBIA RIVER RAIL CROSSING
WEST SAINT HELENS, OREGON

FIGURE 9

Appendix 11
St. Helens Road



Site Number #	10
Intersection Name	St. Helens Road
US-30 Milepoint	28.67
Intersection ODOT ID	5A-027.60
US Dot Crossing ID	057938X
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	N Milton Way
Secondary Intersection Type	Unsignalized
Notable Trip Generators	City of Saint Helens
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	Yes
Estimated AADT (vpd)	6,730
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.42	0.47
Average Delay	13.7	16.9
Level Of Service	B	B

Crash Analysis (2002 - 2007)	
Total Crashes in period	10
Crashes per Year	3.3
Peak Hour Total Entering Vehicles	2,072
Million Entering Vehicles(MEV)/Year	7.6
Crashes/MEV	0.4
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	6
Rear End	0
Angle	4
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	4
Property Damage Only (O)	6

NOTABLE CONCERNS

Pavement marking on N Milton Way could be improved to indicate that Saint Helens Road is one way. No significant safety concerns with site were noted.

OPTIONS FOR MITIGATION

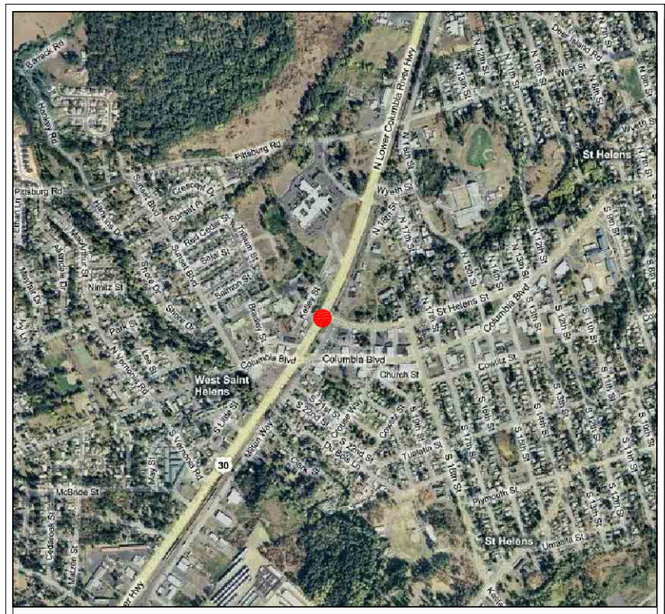
Option 1. Add pavement marking on N Milton Way approach to Saint Helens Road to indicate left through movement only.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

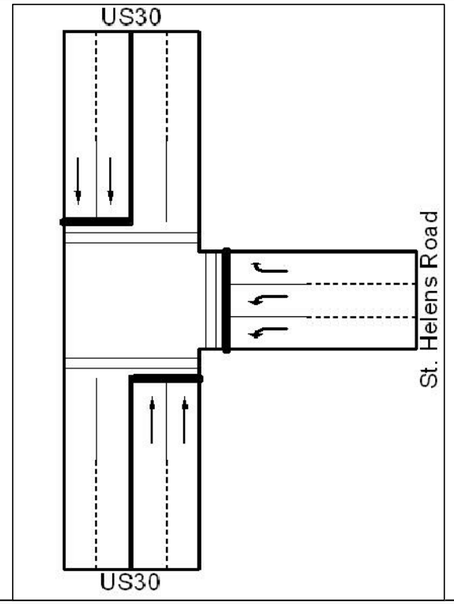
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

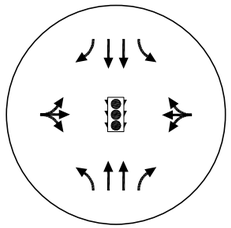
PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / SAINT HELENS ROAD
COLUMBIA RIVER RAIL CROSSING
SAINT HELENS, OREGON

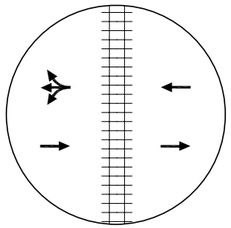
FIGURE 10

Appendix 12
Deer Island Road

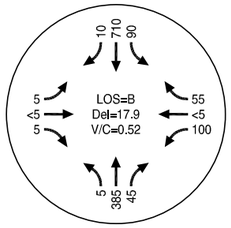
LANE CONFIGURATION



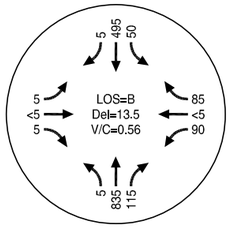
RAIL CROSSING CONFIGURATION



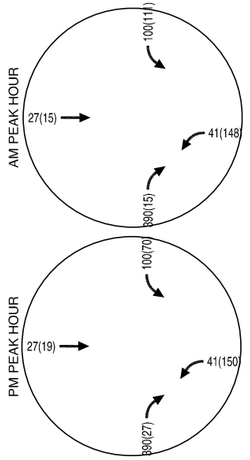
AM PEAK HOUR VOLUMES



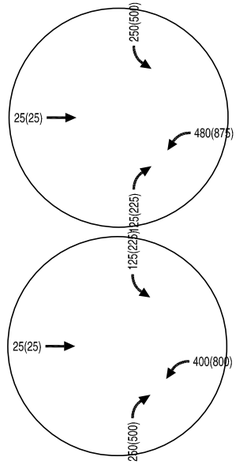
PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)



EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)



Site Number #	11
Intersection Name	Deer Island Road
US-30 Milepoint	29.42
Intersection ODOT ID	5A-028.40
US Dot Crossing ID	057943U
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	2
Secondary intersection	Oregon St
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	City of Saint Helens
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	Yes
Estimated AADT (vpd)	3,430
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.52	0.56
Average Delay	17.9	13.5
Level Of Service	B	B

Crash Analysis (2002 - 2007)	
Total Crashes in period	4
Crashes per Year	1.3
Peak Hour Total Entering Vehicles	1,624
Million Entering Vehicles(MEV)/Year	5.9
Crashes/MEV	0.2
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	2
Rear End	2
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	2
Property Damage Only (O)	2

NOTABLE CONCERNS

The current traffic controls are set up for a second defunct rail crossing that formed a siding into industrial premises. As the second crossing is now defunct, the complexity of the current railroad crossing traffic control features could be reduced.

OPTIONS FOR MITIGATION

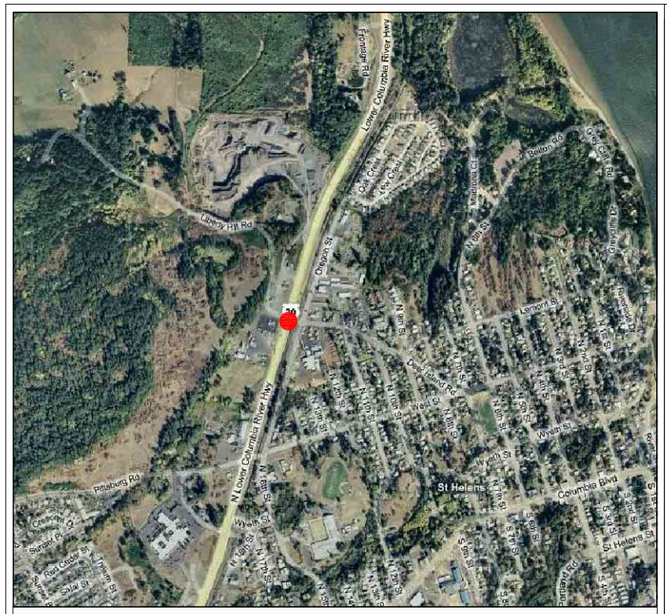
Option 1. Remove defunct rail line and restripe the intersection of Deer Island Road/Oregon Road.
Option 2. Move the active rail crossing control closer to the grade crossing. This will provide more storage on Deer Island Road (westbound) and prevent obstruction of Deer Island Road during rail crossings.
Option 3. Investigate whether the northbound right turn lane storage capacity can be increased.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

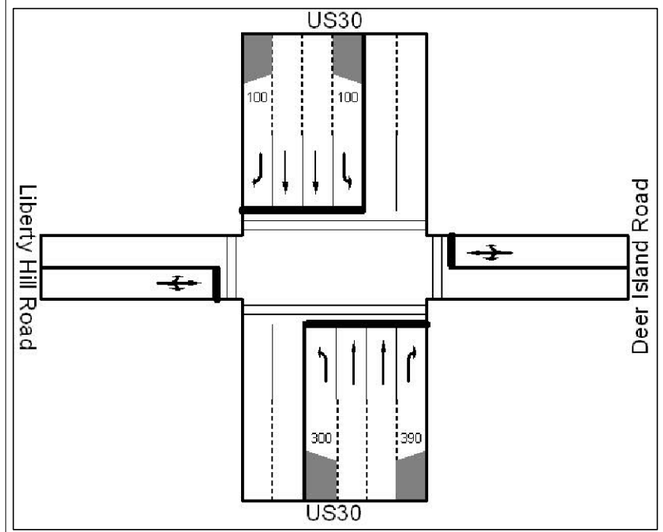
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / DEER ISLAND ROAD
COLUMBIA RIVER RAIL CROSSING
ST HELENS, OREGON

FIGURE 11

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

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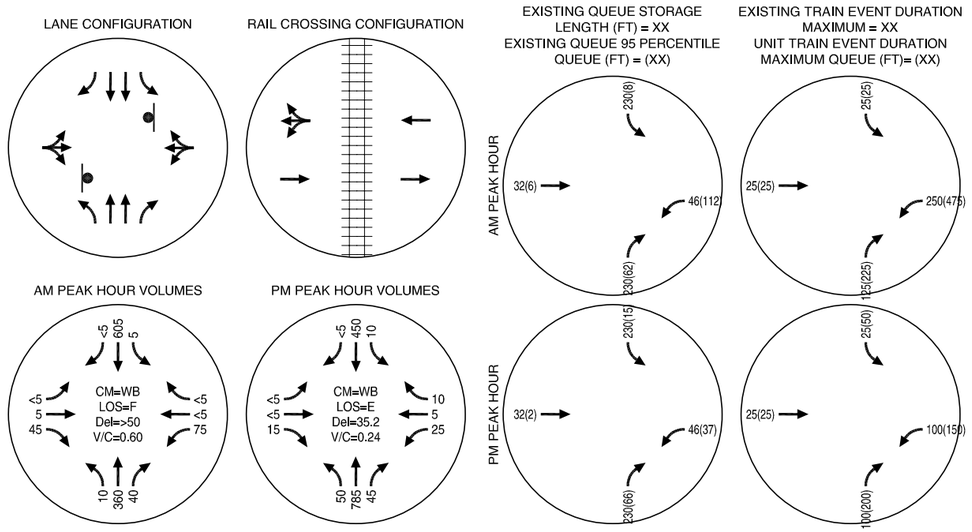
Appendix 13
I Street



Site Number #	12
Intersection Name	I Street
US-30 Milepoint	30.75
Intersection ODOT ID	5A-029.80
US Dot Crossing ID	057946P
Intersection Type	Unsignalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	4th Street
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	Columbia City Residential Traffic
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	890
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.6	0.24
Average Delay	>50	35.2
Level Of Service	F	E

Crash Analysis (2002 - 2007)	
Total Crashes in period	4
Crashes per Year	1.3
Peak Hour Total Entering Vehicles	1,319
Million Entering Vehicles(MEV)/Year	4.8
Crashes/MEV	0.3
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	2
Rear End	0
Angle	2
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	2
Property Damage Only (O)	2

NOTABLE CONCERNS

The intersection layout of I Street and 4th Street is confusing as there is a crosswalk on I street at the intersection with 4th but there are no sidewalks on either street. There is a significant uphill grade approaching US-30.

OPTIONS FOR MITIGATION

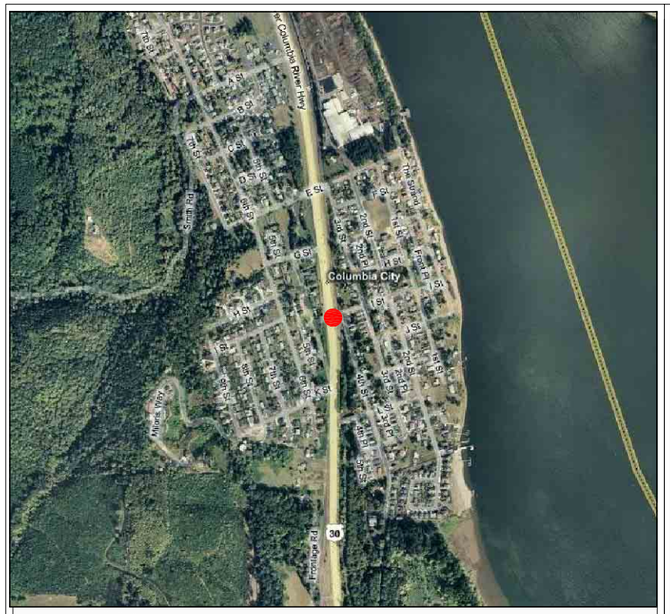
Option 1. Remove crosswalk markings and restripe intersection appropriately.
Option 2. Consider adding an emergency right turn bay for vehicles that are unable to enter US-30 before an approaching train arrives.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

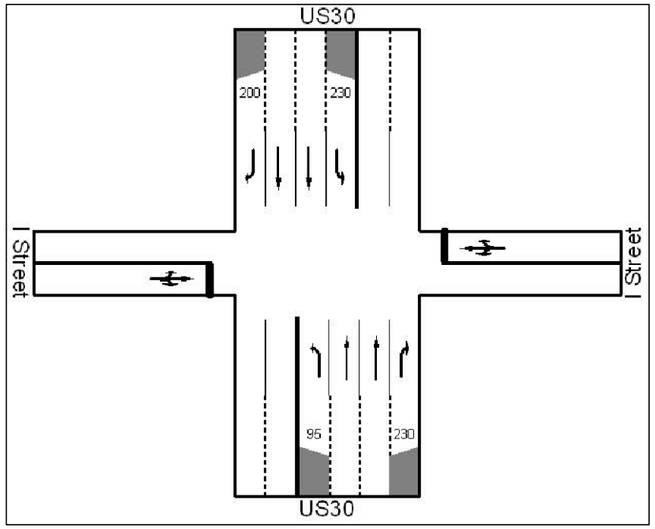
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

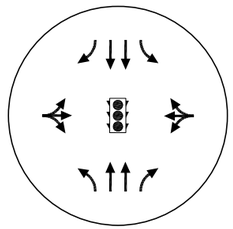
PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / I STREET
COLUMBIA RIVER RAIL CROSSING
COLUMBIA CITY, OREGON

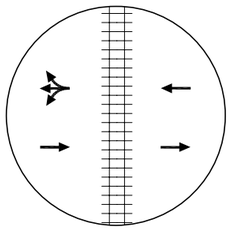
FIGURE 12

Appendix 14
E Street

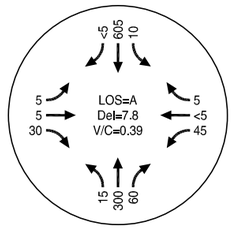
LANE CONFIGURATION



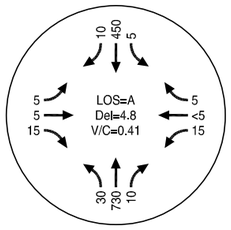
RAIL CROSSING CONFIGURATION



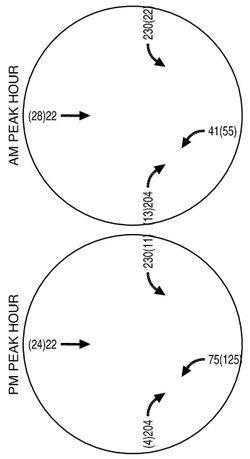
AM PEAK HOUR VOLUMES



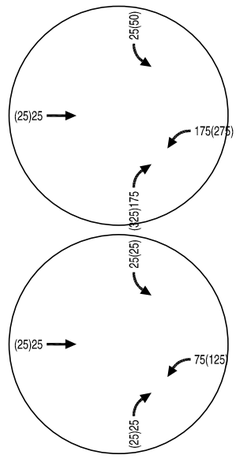
PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE
LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE
QUEUE (FT) = (XX)



EXISTING TRAIN EVENT DURATION
MAXIMUM = XX
UNIT TRAIN EVENT DURATION
MAXIMUM QUEUE (FT)= (XX)



Site Number #	13
Intersection Name	E Street
US-30 Milepoint	31.02
Intersection ODOT ID	5A-030.00
US Dot Crossing ID	057947W
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	3rd Street
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	Port of Saint Helens, Columbia City
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	0
Estimated AADT (vpd)	390
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.39	0.41
Average Delay	7.8	4.8
Level Of Service	A	A

Crash Analysis (2002 - 2007)	
Total Crashes in period	5
Crashes per Year	1.7
Peak Hour Total Entering Vehicles	1,213
Million Entering Vehicles(MEV)/Year	4.4
Crashes/MEV	0.4
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	5
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	3
Property Damage Only (O)	2

NOTABLE CONCERNS

No safety concerns were noted at this site.

OPTIONS FOR MITIGATION

No recommendation required.

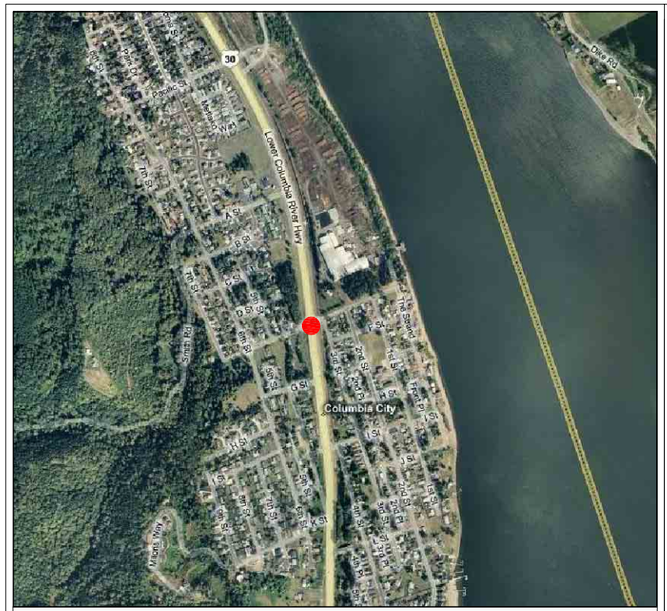
LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

 - STOP SIGN

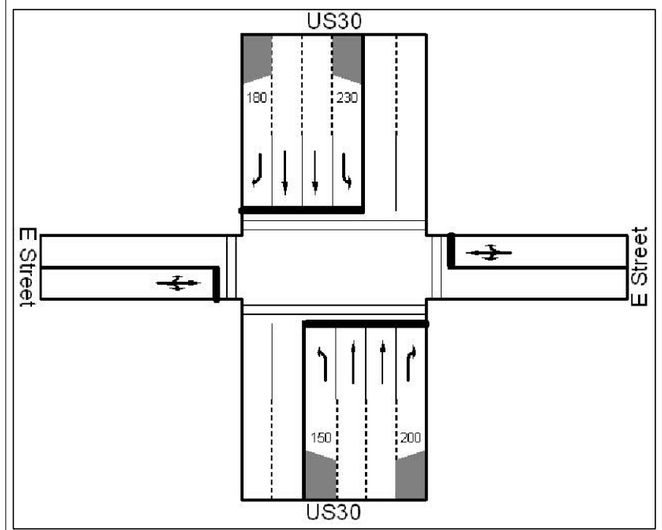
 - TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (EASTBOUND)

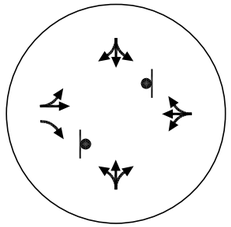
US-30 / E STREET
COLUMBIA RIVER RAIL CROSSING
COLUMBIA CITY, OREGON

FIGURE 13

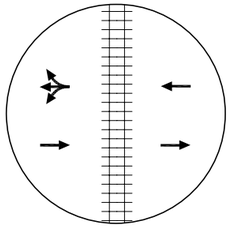
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 15
Nicolai Road/Goble RV Access

LANE CONFIGURATION

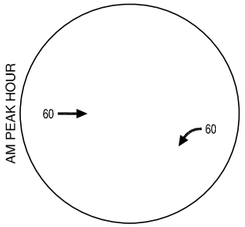


RAIL CROSSING CONFIGURATION



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)

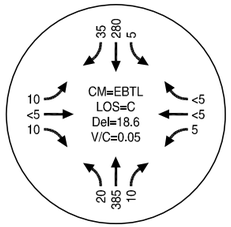
AM PEAK HOUR



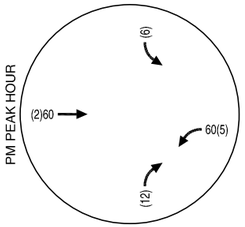
EXISTING TRAIN EVENT DURATION
MAXIMUM = XX
UNIT TRAIN EVENT DURATION
MAXIMUM QUEUE (FT)= (XX)

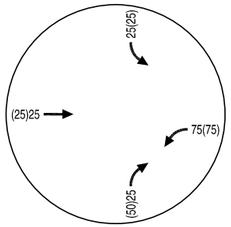
AM PEAK HOUR VOLUMES

PM PEAK HOUR VOLUMES



PM PEAK HOUR





Site Number #	14
Intersection Name	Nicolai Road/Goble RV access
US-30 Milepoint	40.47
Intersection ODOT ID	0
US Dot Crossing ID	0
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	Quarry , RV Park
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	190
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	NA	0.05
Average Delay	NA	18.6
Level Of Service	NA	C

Crash Analysis (2002 - 2007)	
Total Crashes in period	11
Crashes per Year	3.7
Peak Hour Total Entering Vehicles	719
Million Entering Vehicles(MEV)/Year	2.6
Crashes/MEV	1.4
>1 Crash/MEV	Yes
	Collision Types
Lane Change/Turning	7
Rear End	2
Angle	2
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	11
Property Damage Only (O)	0

NOTABLE CONCERNS

This is a STOP-controlled rail grade crossing which provides access and egress to an RV park and a quarry. The intersection is unsignalized and the storage distance between US-30 and the rail crossing is 60 feet. Due to the high number of long and slow moving heavy vehicles (such as SUVs towing trailers) using this intersection, there is a concern that vehicles may queue across the rail crossing or make an inappropriate turning movement onto US-30 to avoid an approaching train. The signage and pavement markings at the rail grade crossing are generally deficient.

OPTIONS FOR MITIGATION

Option 1 Consider adding an emergency right turn bay for vehicles that are unable to enter US-30 before an approaching train arrives.
Option 2. Increase the separation distance between US-30 and the rail crossing.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

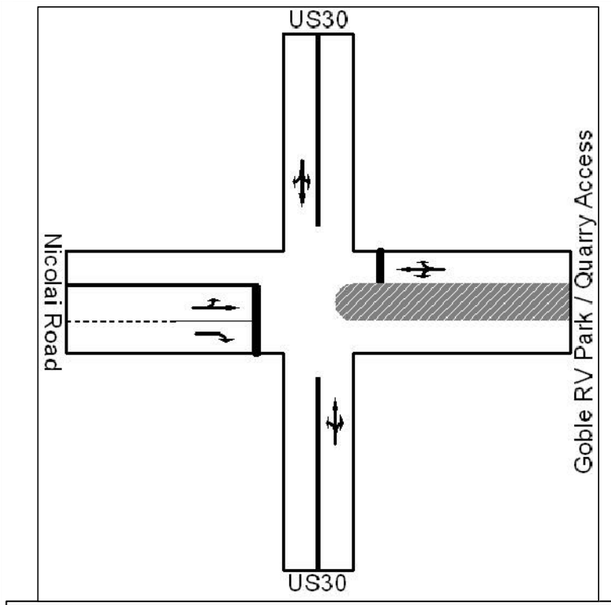

- STOP SIGN

- TRAFFIC SIGNAL

(NO SCALE)

SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (SOUTHBOUND)

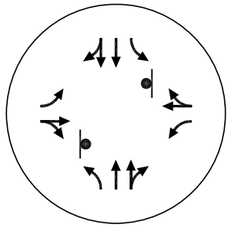
US-30 / NICOLAI ROAD
COLUMBIA RIVER RAIL CROSSING
GOBLE, OREGON

FIGURE 14

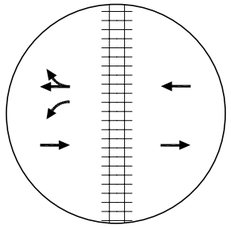
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 16
Veterans Way

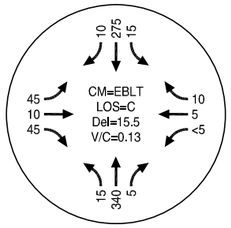
LANE CONFIGURATION



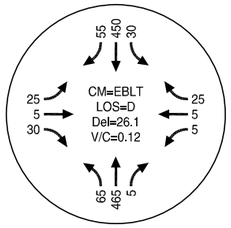
RAIL CROSSING CONFIGURATION



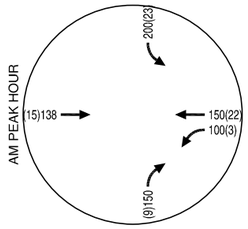
AM PEAK HOUR VOLUMES



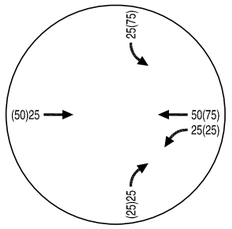
PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)



EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)



Site Number #	15
Intersection Name	Veterans Way
US-30 Milepoint	47.34
Intersection ODOT ID	5A-046.17
US Dot Crossing ID	916561W
Intersection Type	Unsignalised
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	0
Secondary Intersection Type	0
Notable Trip Generators	Recreational Parks
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	Yes
Estimated AADT (vpd)	810
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.13	0.12
Average Delay	15.5	26.1
Level Of Service	C	D

Crash Analysis (2002 - 2007)	
Total Crashes in period	4
Crashes per Year	1.3
Peak Hour Total Entering Vehicles	1,114
Million Entering Vehicles(MEV)/Year	4.1
Crashes/MEV	0.3
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	2
Rear End	0
Angle	2
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	4

NOTABLE CONCERNS

No safety concerns were noted at this site.

OPTIONS FOR MITIGATION

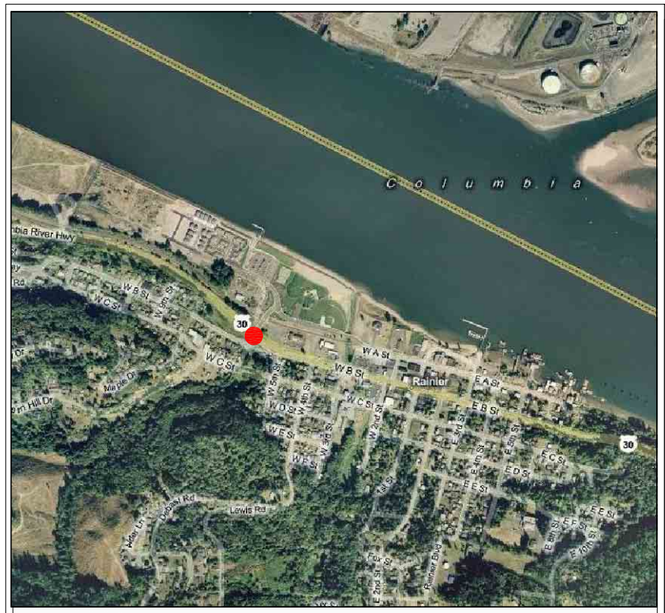
No recommendation made during site inspection

LEGEND

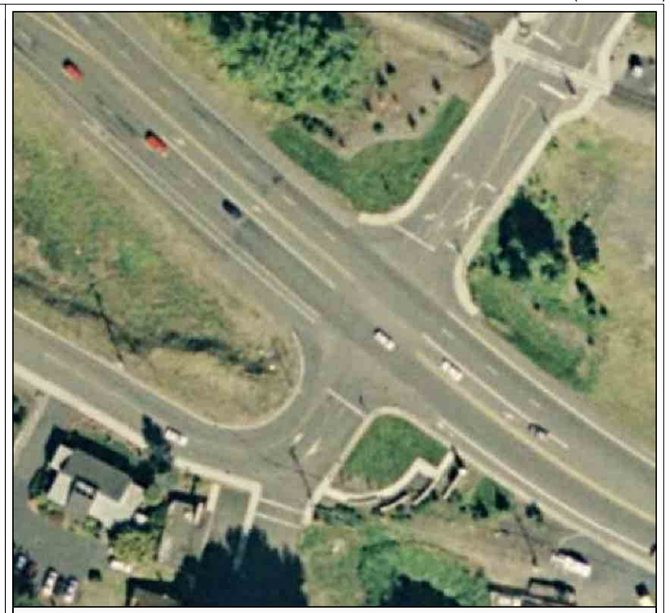
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

- STOP SIGN
- TRAFFIC SIGNAL

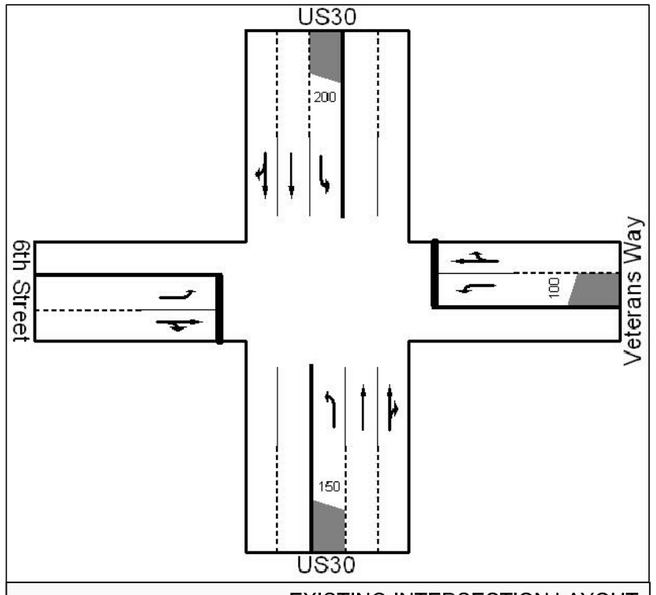
(NO SCALE)



SITE VICINITY



AERIAL OF INTERSECTION



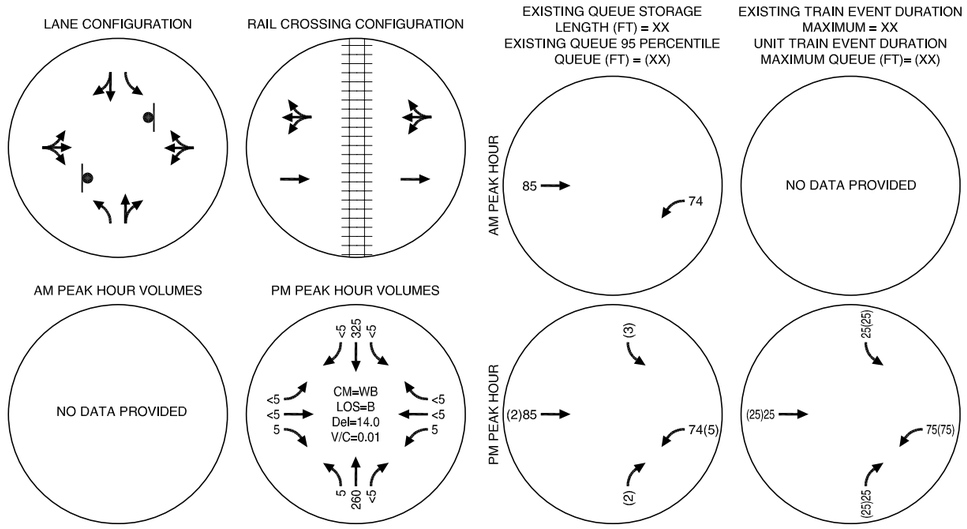
EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / VETERANS WAY
COLUMBIA RIVER RAIL CROSSING
RAINIER, OREGON

FIGURE 15

Appendix 17
Marshall District Road,
South



Site Number #	16
Intersection Name	arshland District Road / Schroeder Roa
US-30 Milepoint	65.99
Intersection ODOT ID	5A-066.60
US Dot Crossing ID	058012H
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	Hanhi Dr
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	na
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	90
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	NA	0.01
Average Delay	NA	14
Level Of Service	NA	B

Crash Analysis (2002 - 2007)	
Total Crashes in period	0
Crashes per Year	0.0
Peak Hour Total Entering Vehicles	572
Million Entering Vehicles(MEV)/Year	2.1
Crashes/MEV	0.0
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	0
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	0

NOTABLE CONCERNS

Tall vegetation parallels the rail in this location. As the Marshland Road approach to the rail crossing runs parallel to the line and makes a sharp horizontal curve to approach the rail crossing, the sight distance in this location is a concern. No center line on the approach to US-30 is provided which may cause vehicles to verge into the opposing lane. There is no lighting at the intersection or rail crossing.

OPTIONS FOR MITIGATION

Option 1. Improve the alignment of Marshland Road approaching the rail crossing to improve approach sight distance.
Option 2. Provide rail crossing warning signs on Marshland Road to let drivers know they are approaching a rail crossing.
Option 3. Remove vegetation that is blocking sight distance at the rail crossing.
Option 4 Add lighting and improve pavement markings at the intersection with US-30.

LEGEND

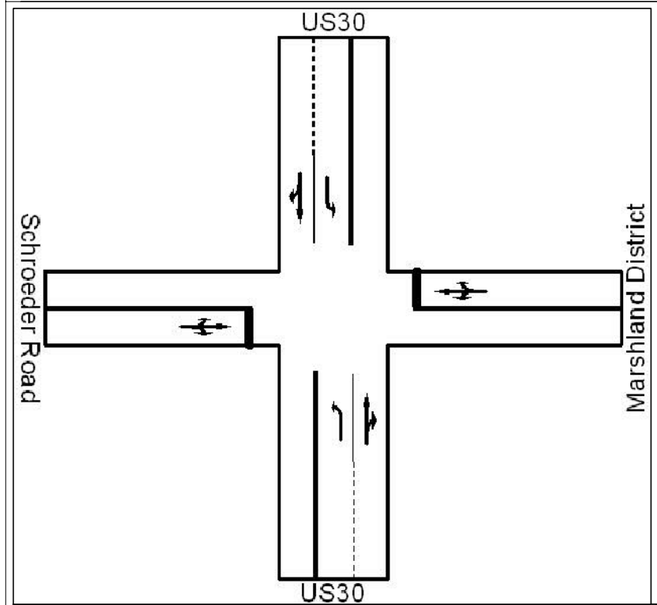
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)

SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

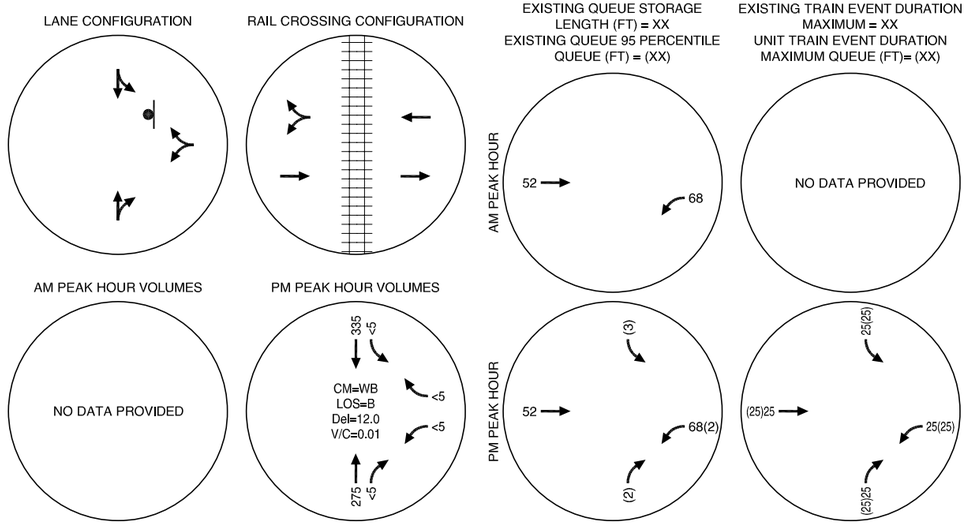
PHOTOGRAPH OF SITE (WESTBOUND)

US-30 /MARSHLAND ROAD/ SCHROEDER ROAD
COLUMBIA RIVER RAIL CROSSING
COLUMBIA COUNTY, OREGON

FIGURE 16

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 18
Marshall District Road,
North



Site Number #	17
Intersection Name	Marshland District Road
US-30 Milepoint	67.84
Intersection ODOT ID	5A-068.37
US Dot Crossing ID	058016K
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	na
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	50
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	NA	0.01
Average Delay	NA	12
Level Of Service	NA	B

Crash Analysis (2002 - 2007)	
Total Crashes in period	10
Crashes per Year	3.3
Peak Hour Total Entering Vehicles	580
Million Entering Vehicles(MEV)/Year	2.1
Crashes/MEV	1.6
>1 Crash/MEV	Yes
	Collision Types
Lane Change/Turning	4
Rear End	6
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	10
Property Damage Only (O)	0

NOTABLE CONCERNS

STOP sign is missing from the approach to US-30. The grade crossing material in the rail crossing consists of wood and dirt. Erosion of the material is likely to occur and a vehicle may become stuck in the tracks.

OPTIONS FOR MITIGATION

Option 1. Install STOP sign on approach to US-30.
Option 2. Replace grade crossing material with concrete or asphalt

LEGEND

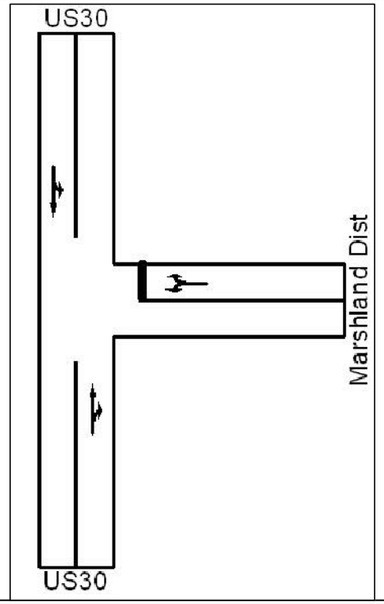
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

- STOP SIGN
- TRAFFIC SIGNAL

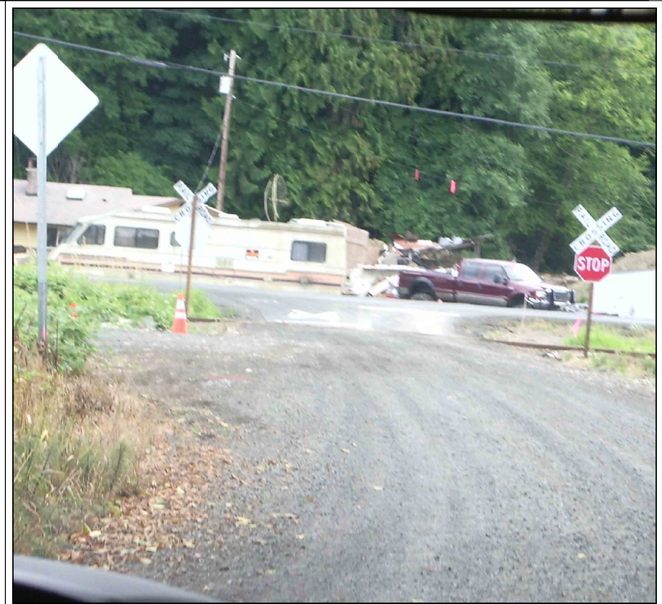
(NO SCALE)

SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT



PHOTOGRAPH OF SITE (WESTBOUND)

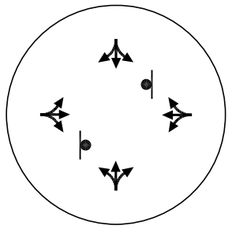
US-30 / MARSHLAND ROAD
COLUMBIA RIVER RAIL CROSSING
MARSHLAND, OREGON

FIGURE 17

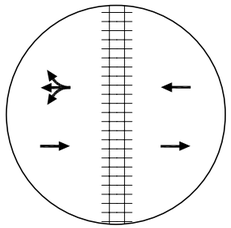
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 19
Woodson Road

LANE CONFIGURATION

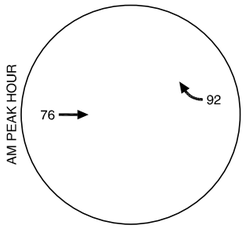


RAIL CROSSING CONFIGURATION

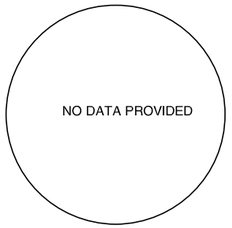


EXISTING QUEUE STORAGE
LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE
QUEUE (FT) = (XX)

AM PEAK HOUR

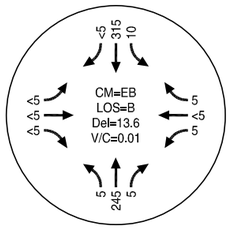


EXISTING TRAIN EVENT DURATION
MAXIMUM = XX
UNIT TRAIN EVENT DURATION
MAXIMUM QUEUE (FT)= (XX)

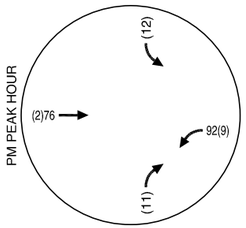


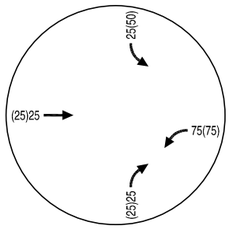
AM PEAK HOUR VOLUMES

PM PEAK HOUR VOLUMES



PM PEAK HOUR





Site Number #	18
Intersection Name	Woodson Road
US-30 Milepoint	67.95
Intersection ODOT ID	5A-068.50
US Dot Crossing ID	058017S
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	na
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	320
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	NA	0.01
Average Delay	NA	13.6
Level Of Service	NA	B

Crash Analysis (2002 - 2007)	
Total Crashes in period	0
Crashes per Year	0.0
Peak Hour Total Entering Vehicles	563
Million Entering Vehicles(MEV)/Year	2.1
Crashes/MEV	0.0
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	0
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	0

NOTABLE CONCERNS

US-30 is a two-lane cross section in this location. Due to the proximity of the rail crossing to the intersection, during a train event a turning vehicle may block traffic on US-30 until the train passes (this could occur for either a left or right turn). Some pavement markings and signage are deficient at this intersection .

OPTIONS FOR MITIGATION

Option 1. Install short left and right turn lanes on US-30 to get vehicles that are waiting for a train to pass out of the through lanes.
Option 2. Provide a gravel parking bay along US-30 so vehicles can be moved out of the through traffic while waiting for a train to pass.
Option 3. Improve the signage and pavement markings at the rail grade crossing.

LEGEND

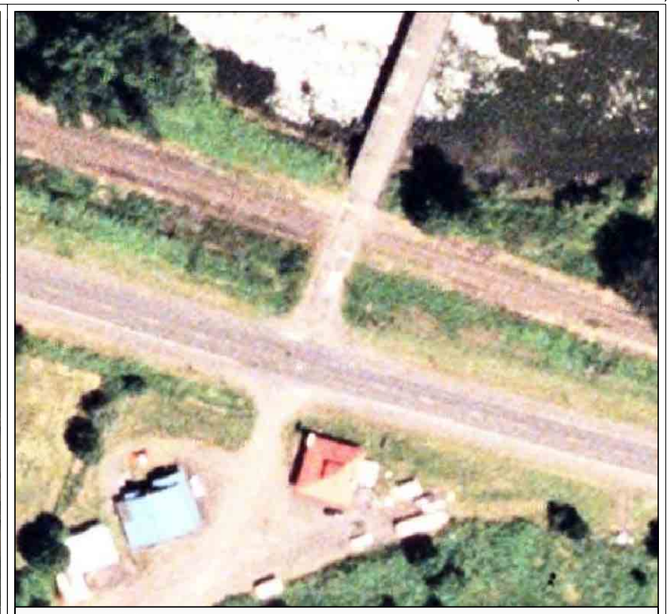
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

- STOP SIGN

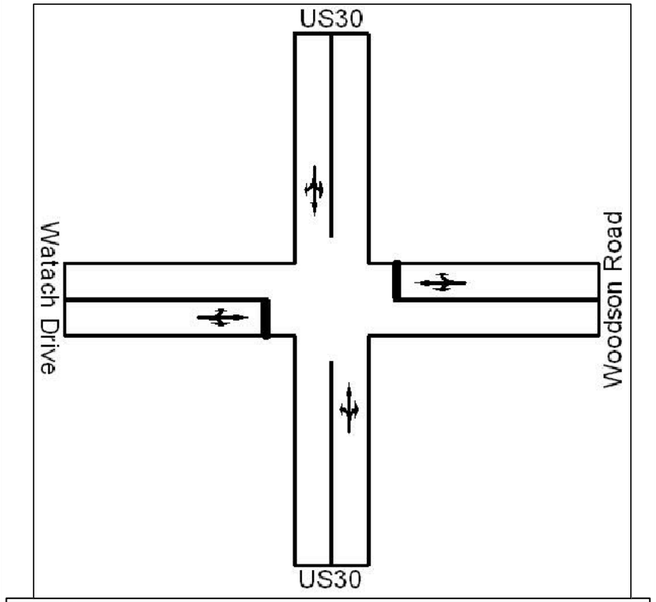
- TRAFFIC SIGNAL

(NO SCALE)

SITE VICINITY



AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

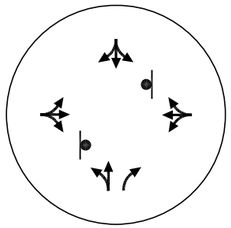
US-30 / WOODSON ROAD
COLUMBIA RIVER RAIL CROSSING
MARSHLAND, OREGON

FIGURE 18

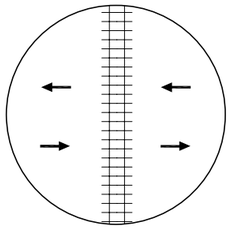
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 20
Old Mill Town Road

LANE CONFIGURATION



RAIL CROSSING CONFIGURATION



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)

EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)

AM PEAK HOUR

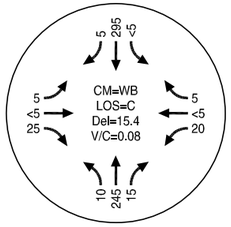
NO DATA PROVIDED

NO DATA PROVIDED

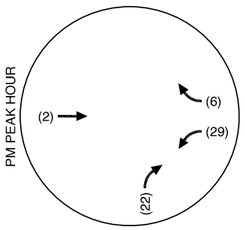
AM PEAK HOUR VOLUMES

NO DATA PROVIDED

PM PEAK HOUR VOLUMES



PM PEAK HOUR



NO DATA PROVIDED

NO DATA PROVIDED

Site Number #	19
Intersection Name	Old Mill Town Road
US-30 Milepoint	70.46
Intersection ODOT ID	5A-071 20
US Dot Crossing ID	058020A
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	Westport, Service Station
Emergency Facilities in Vicinity	Volunteer Fire Service
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	380
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	NA	0.08
Average Delay	NA	15.4
Level Of Service	NA	C

Crash Analysis (2002 - 2007)	
Total Crashes in period	0
Crashes per Year	0.0
Peak Hour Total Entering Vehicles	585
Million Entering Vehicles(MEV)/Year	2.1
Crashes/MEV	0.0
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	0
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	0

NOTABLE CONCERNS

Vegetation on US-30 restricts the sight distance for the Westbound Left Turn onto US-30. No safety concerns associated with the rail crossing were identified.

OPTIONS FOR MITIGATION

Option 1. Remove vegetation on US-30 to improve sight distance for westbound left turners.

LEGEND

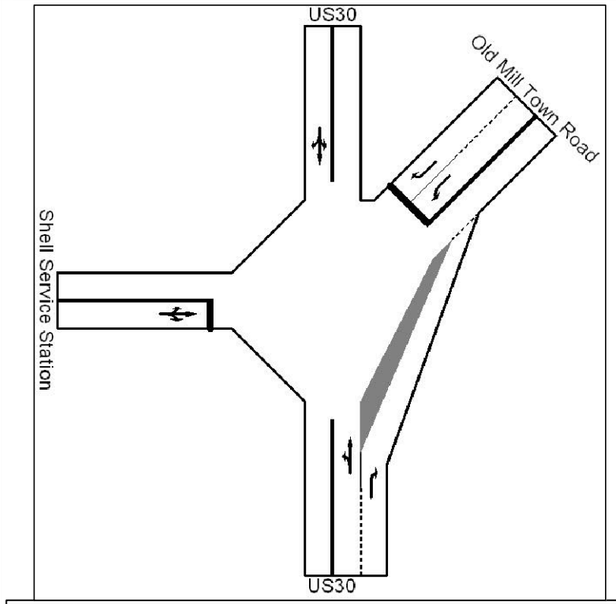
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)

SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

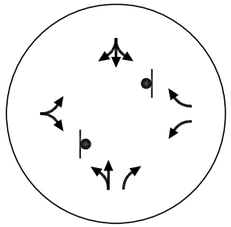
US-30 / OLD MILL TOWN ROAD
COLUMBIA RIVER RAIL CROSSING
WESTPORT, OREGON

FIGURE 19

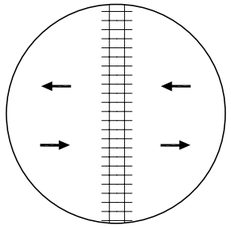
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 21
Westport Ferry Road

LANE CONFIGURATION



RAIL CROSSING CONFIGURATION



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)

AM PEAK HOUR

NO DATA PROVIDED

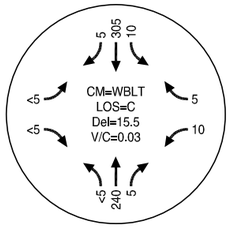
EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)

NO DATA PROVIDED

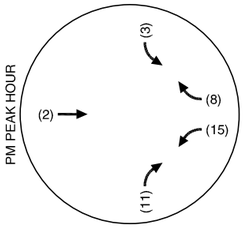
AM PEAK HOUR VOLUMES

NO DATA PROVIDED

PM PEAK HOUR VOLUMES



PM PEAK HOUR



NO DATA PROVIDED

Site Number #	20
Intersection Name	Westport Ferry Road
US-30 Milepoint	70.68
Intersection ODOT ID	5A-071.30
US Dot Crossing ID	058021G
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	Westport
Emergency Facilities in Vicinity	Volunteer Fire Service
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	250
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	NA	0.03
Average Delay	NA	15.5
Level Of Service	NA	C

Crash Analysis (2002 - 2007)	
Total Crashes in period	0
Crashes per Year	0.0
Peak Hour Total Entering Vehicles	556
Million Entering Vehicles(MEV)/Year	2.0
Crashes/MEV	0.0
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	0
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (F)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	0

NOTABLE CONCERNS

While there are no notable safety concerns with this rail grade crossing, the intersection geometry at the US-30/Westport Ferry Dock Road intersection is unorthodox and substandard.

OPTIONS FOR MITIGATION

Option 1. Restripe the intersection to ODOT standards. This is not associated with safety concerns relating to the crossing.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

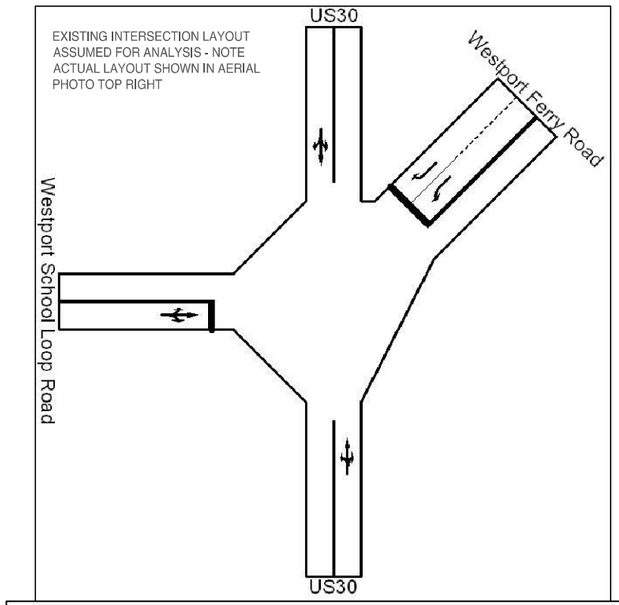
 - STOP SIGN

 - TRAFFIC SIGNAL

(NO SCALE)

SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / WESTPORT FERRY ROAD
COLUMBIA RIVER RAIL CROSSING
WESTPORT, OREGON

FIGURE 20

Appendix D: Train Crossing Delay Calculations (February 28, 2009)

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 P 503.228.5230 F 503.273.8169

MEMORANDUM

Date: February 27, 2009 Project #: 9225

To: Deb Redman
HDR
1001 SW 5th Avenue, Suite 1800
Portland, OR 97204-1134

From: Mike Coleman P.E. and Rohit Rai
Project: PNWRR Lower Columbia Corridor Railroad Study
Subject: Train Crossing Delay Calculations

INTRODUCTION

Kittelson & Associates has completed the attached tables ranking the public railroad grade crossings along the Lower Columbia Corridor according to their anticipated motor vehicle delay associated with train crossings.

The key highway/rail crossings reviewed in conjunction with this study are located adjacent to Highway 30. There currently is no definitive delay analysis procedure for evaluating highway/rail crossings operating in close proximity to other highway intersections short of creating detailed simulation modeling. Simulation modeling was not within the scope of work for this project so a basic delay analysis methodology was used to generate a relative comparison of intersection delay. The approximate daily vehicular delay per grade crossing was calculated using the delay analysis methodology described in *Traffic Flow Fundamentals (Adolph D. May 1990).*

Specifically, the following equation was used to approximate delay:

$$Delay=f \times ((t^2 \times C \times V))/(2(C-V)))$$

Where:

- D = vehicle-hours of delay per day
- f = the frequency of train crossing events per day
- C = the roadway's capacity to serve vehicles (vehicles-per-hour)
- V = the volume of traffic that crossing the grade crossing (vehicles-per-hour)
- t = the duration of the train crossing event (hours per event)

PURPOSE

The delay calculations provide a methodical basis for comparing the relative impact of train activity upon motor vehicle delay at each of the Corridor's grade crossings. The resulting tables compare and rank the grade crossings according to vehicular delay caused by anticipated train activity.

METHODOLOGY & CONSIDERATIONS

The calculated values for delay should not be taken as the absolute literal vehicle delays that will be experienced. The accuracy of the results is only as reliable as the accuracy of the delay formula itself and the accuracy of the values assigned to the formula's variables. Given that the table is only intended for relative comparison purposes at a planning level, basic assumptions and conventions were applied when assigning values to the delay formula's variables. Specific assumptions and conventions include:

- Unit train frequency (f) was converted from the expressed events-per-week (epw) to events-per-day (epd) by dividing it by seven (1.5 epw / 7 days per week = .21 epd = f).

- In the case where loaded and unloaded unit trains travel at different speeds and block grade crossings for different durations, the frequency (f) for each was assumed to be one half of the assumed frequency (.10 epd = f).

- At grade crossings in the vicinity of signalized intersections, the grade crossing's capacity (C) to serve traffic demand is influenced by the signalized intersection. Based on general assumptions made about the Corridor's signalized intersections, the value of C near signalized intersections was assumed to be 1,575 vehicles-per-hour (vph) with one westbound approach lane and 1,925 with two westbound approach lanes.

- At grade crossings in the vicinity of STOP-controlled intersections, the grade crossing's capacity (C) to serve traffic demand is influenced by the STOP controlled intersection. The capacity at unsignalized intersections can vary widely depending on the turn movement patterns, lane configuration, and through traffic volumes on the highway. Lacking actual turn movement counts at most intersections, four estimated capacity values (vehicles per hour) were assumed for unsignalized intersections based on detailed capacity analysis conducted at unsignalized intersections along US 30 for a separate ODOT report. The assumptions are as follows:

Number of Lanes on US 30	Number of Lanes on Minor Street	Capacity
Area Between Linnton and Rainier		
5	2	1,085 vph
5	3	1,450 vph
Intersections in Rainier and Points North		
5	2	1,150 vph
2	2	1,400 vph

- The duration of a crossing event (t) was calculated using an assumed train length and train speed.

- The value for traffic demand (V) varies with each grade crossing. Most of the available traffic demand data was expressed as average daily traffic (ADT, vpd). The age of the available data varies but, absent a basis for adjusting traffic volumes, the values were used without regard for age. Twenty of the crossings have afternoon peak hour volume information that was collected in August 2008.

- Where ADT's were used, the value for V was converted from vehicles-per-day (vpd) to vehicles-per-hour (vph) by dividing by 18 for use in the delay formula. Dividing by 18 instead of 24 acknowledges that traffic volumes are not uniform from hour to hour. Applying an average hourly volume, rather than a peak hour volume, acknowledges that train crossing events occur randomly during at day. Where peak hour volumes were used, an average hourly volume was assumed to be 55% of the peak hour volume.

The approach described above achieves the objectives of the vehicle delay analysis in a methodical and economical way. While the individual crossing-specific results should not be taken literally, the tables are useful for comparing and ranking the relative train-induced motor vehicle delay at the Corridor's grade crossings.

FINDINGS

Unit trains, because of their greater length and slower speeds, create greater delay than a local train. Because unit trains travel the corridor an average of only 3 times per week, their influence on total train-related delay per day is small compared to the influence of the more frequent local trains.

Table 1 ranks the public crossings according to the cumulative total motor vehicle delay expected during a typical day as a result of train activity. The total daily delay at any given crossing location varies depending on the volume of motor vehicles and the amount of delay caused by the train crossings that occur during the day.

Table 2 ranks the public crossings according to the cumulative amount of motor vehicle delay caused by a single local train or unit train. Table 2 considers and attempts to compare the total delay a group of drivers would experience if they arrived at a crossing while a train was passing.

Table 1 considers the total driver delay over an entire day. Table 2 considers the driver delay during a single event, when a local or unit train passes through a given crossing.

Appendices A and B show the detailed crossing-specific data and delay calculation results for tables 1 and 2 respectively.

Public Crossing Rankings based on Total Daily Delay (*in vehicle-hours per day*) due to Local and Unit Trains Blockage*

Portland and Western Railroad (MP 18.05 to 72.88)

Table 1.

U.S. DOT No.	Crossing's Street Name	Railroad Milepost	Current Conditions[1]	Post Connect Oregon Improvements[2]	10-year Growth @ 8%/yr[3]
057895G	Johnsons Landing Road (Dike Rd.)	18.05	35	31	34
101854W	*High School Rd.*	19.38	6	5	5
057900B	Santosh St.	19.61	21	20	19
057901H	*Maple St.*	19.67	13	8	8
057902P	*Columbia Ave.*	19.90	5	4	4
916564S	Crown Zellerbach Rd.	20.31	24	22	24
057910G	*West Lane Rd.*	21.48	14	13	13
057911N	Columbia Mem. Gardens (Cemetery Rd)	21.94	38	39	38
057921U	*Old Portland Rd. (Berg Rd.)*	23.98	34	37	37
057924P	*Old Portland Rd. (Bennet Rd.)*	24.78	10	7	7
057927K	*Millard Rd.*	25.92	17	15	17
057930T	*Gable Rd.*	26.67	1	1	1
057932G	*Columbia Blvd.*	27.54	3	3	3
057938X	*St. Helens St.*	27.65	2	2	2
057941F	Wyeth St.	27.94	39	38	39
057943U	*Deer Island Rd.*	28.42	7	6	6
057946P	*I St.*	29.75	16	14	14
057947W	*E St.*	30.03	26	23	25
057948D	Pacific St.	30.58	30	28	30
057969W	*Goble Landing (Lake St.)*	39.41	31	31	31
057974T	Graham Rd.	41.85	32	34	33
057975A	6th St.	45.54	40	41	42
057976G	5th St.	45.60	22	35	34
057977N	4th St.	45.65	19	29	28
057978V	3rd St.	45.71	12	21	21
057979C	2nd St.	45.76	11	18	18
057980W	1st St.	45.82	9	15	15
057981D	2nd St.	45.88	4	9	9
916561W	*Veterans Way*	46.19	8	12	12
916559V	Dike Rd.	48.48	23	31	36
057993X	Mayger Fill Rd.	55.80	15	26	26
057996T	Kallunki Rd.	58.02	28	24	22
058002C	Hermo Rd.	59.32	20	11	11
058003J	Beaver Dike Rd.	59.57	33	27	27
058006E	Depot St.	62.20	18	10	10
058010U	Pt. Adams Rd. (Midland Rd)	64.30	41	40	40
058012H	*Marshland Rd. (Co. Rd. 198)*	66.60	36	30	29
058016K	*Marshland Dist. Rd. #4119*	68.41	37	35	32
058017S	*Woodson Rd.*	68.51	28	24	22
058020A	*Old Mill Rd. (Westport Ramp Rd.)*	71.11	24	17	16
058021G	*Westport Ferry Rd. (Westport Dock Rd.)*	71.27	27	19	20
058022N	Driscoll Slough Rd.	72.88	42	41	41

The rankings are based on afternoon peak hour volume information collected in August 2008 for the crossings in *italics* and volume information provided by ODOT Rail for the remaining crossings.

* Relative ranking of public crossings (1 = greatest total delay per day)

[1] Current Conditions: Current traffic and train operations (as of August 2008)

[2] Post Connect Oregon Improvement: Railroad improvements that accommodate faster train speeds

[3] 10-year Growth @8%/yr: Anticipated increase in local and unit train lengths and/or frequency

Public Crossing Rankings based on Delay per Single Crossing Event (*in vehicle-hours*) due to Local and Unit Trains Blockage*

Portland and Western Railroad (MP 18.05 to 72.88)

Table 2.

U.S. DOT No.	Crossing's Street Name	Railroad Milepost	Current Conditions[1]		Post Connect Oregon Improvements[2]		10-year Growth @ 8%/yr[3]	
			Local Train	Unit Train	Local Train	Unit Train	Local Train	Unit Train
057895G	Johnsons Landing Road (Dike Rd.)	18.05	36	27	35	27	36	27
101854W	*High School Rd.*	19.38	7	5	5	5	5	5
057900B	Santosh St.	19.61	26	14	22	16	22	16
057901H	*Maple St.*	19.67	15	9	10	8	11	8
057902P	*Columbia Ave.*	19.90	5	4	4	4	4	4
916564S	Crown Zellerbach Rd.	20.31	29	18	25	18	25	18
057910G	*West Lane Rd.*	21.48	18	11	14	10	14	10
057911N	Columbia Mem. Gardens (Cemetery Rd)	21.94	40	29	39	29	38	29
057921U	*Old Portland Rd. (Berg Rd.)*	23.98	36	26	35	25	35	25
057924P	*Old Portland Rd. (Bennet Rd.)*	24.78	12	7	7	7	9	7
057927K	*Millard Rd.*	25.92	24	16	18	14	19	14
057930T	*Gable Rd.*	26.67	1	1	1	1	1	1
057932G	*Columbia Blvd.*	27.54	4	3	3	3	3	3
057938X	*St. Helens St.*	27.65	3	2	2	2	2	2
057941F	Wyeth St.	27.94	38	30	38	30	38	30
057943U	*Deer Island Rd.*	28.42	8	6	6	6	6	6
057946P	*I St.*	29.75	19	12	15	11	17	11
057947W	*E St.*	30.03	30	19	26	19	27	19
057948D	Pacific St.	30.58	33	25	29	22	31	22
057969W	*Goble Landing (Lake St.)*	39.41	34	22	31	22	31	22
057974T	Graham Rd.	41.85	35	23	33	24	33	24
057975A	6th St.	45.54	38	31	41	31	42	31
057976G	5th St.	45.60	25	24	33	25	33	25
057977N	4th St.	45.65	21	21	31	21	30	21
057978V	3rd St.	45.71	11	15	23	17	23	17
057979C	2nd St.	45.76	9	13	21	13	21	13
057980W	1st St.	45.82	6	10	20	12	18	12
057981D	2nd St.	45.88	2	8	12	9	12	9
916561W	*Veterans Way*	46.19	10	16	18	14	19	14
916559V	Dike Rd.	48.48	28	27	35	27	36	27
057993X	Mayger Fill Rd.	55.80	19	20	29	20	29	20
057996T	Kallunki Rd.	58.02	22	**	16	**	15	**
058002C	Hermo Rd.	59.32	14	**	9	**	8	**
058003J	Beaver Dike Rd.	59.57	27	**	23	**	24	**
058006E	Depot St.	62.20	13	**	8	**	7	**
058010U	Pt. Adams Rd. (Midland Rd)	64.30	40	**	39	**	40	**
058012H	*Marshland Rd. (Co. Rd. 198)*	66.60	31	**	27	**	25	**
058016K	*Marshland Dist. Rd. #4119*	68.41	32	**	28	**	28	**
058017S	*Woodson Rd.*	68.51	22	**	16	**	15	**
058020A	*Old Mill Rd. (Westport Ramp Rd.)*	71.11	16	**	11	**	10	**
058021G	*Westport Ferry Rd. (Westport Dock Rd.)*	71.27	17	**	13	**	13	**
058022N	Driscoll Slough Rd.	72.88	42	**	41	**	41	**

The rankings are based on afternoon peak hour volume information collected in August 2008 for the crossings in *italics* and volume information provided by ODOT Rail for the remaining crossings.

* Relative ranking of public crossings (1 = greatest delay per crossing event)

** Unit trains do not pass through the crossing

[1] Current Conditions: Current traffic and train operations (as of August 2008)

[2] Post Connect Oregon Improvement: Railroad improvements that accommodate faster train speeds

[3] 10-year Growth @8%/yr: Anticipated increase in local and unit train lengths and/or frequency

Appendix “A”
Delay per Day at Public Crossings

Lower Columbia Corridor Rail Study - Delay at Public Crossings (Vehicle-hours/day)

S. No.	U.S. DOT No.	Street Name	AADT	Capacity (veh/hr)	Demand (veh/hr)*	Current Conditions (As of August 2008)					Post Connect Oregon Improvements		10-Year Growth @ 8%/yr				Current Conditions (As of August 2008)				Post Connect Oregon Improvements			10-year Growth @ 8%/yr		
						3,600 ft Local Trains Per Day	Local Trains Blockage Duration (hr)	6,600 ft Unit Trains Per Day	Loaded Unit Trains Blockage Duration (hr)	Empty Unit Trains Blockage Duration (hr)	Local Trains Blockage Duration (hr)	Unit Trains Blockage Duration (hr)	6,000 ft Local Trains Per Day	6,600 ft Unit Trains Per Day	Local Trains Blockage Duration (hr)	Unit Trains Blockage Duration (hr)	Delay due to Local Trains (D1)	Delay due to Loaded Unit Trains (D2)	Delay due to Empty Unit Trains (D3)	Total Delay (D1+D2+D3)	Delay due to Local Trains (D4)	Delay due to Unit Trains (D5)	Total Delay (D4+D5)	Delay due to Local Trains (D6)	Delay due to Unit Trains (D7)	Total Delay (D6+D7)
1	057895G	Johnsons Landing Road (Dike Rd.)	100	1575	6	6	0.04	0.21	0.14	0.06	0.04	0.06	7.7	0.5	0.06	0.06	0.024	0.006	0.001	0.031	0.024	0.002	0.026	0.068	0.005	0.073
2	101854W	High School Rd.	4050	1925	225	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.739	0.516	0.101	1.356	0.739	0.101	0.840	2.082	0.218	2.300
3	057900B	Santosh St.	978	1450	54	4	0.03	0.21	0.13	0.05	0.03	0.05	5.2	0.5	0.05	0.05	0.091	0.099	0.016	0.205	0.091	0.016	0.107	0.316	0.034	0.350
4	057901H	Maple St.	1840	1925	102	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.313	0.219	0.043	0.575	0.313	0.043	0.356	0.882	0.092	0.974
5	057902P	Columbia Ave.	4850	1925	269	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.909	0.634	0.124	1.668	0.909	0.124	1.033	2.560	0.268	2.828
6	916564S	Crown Zellerbach Rd.	425	1925	24	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.069	0.048	0.009	0.127	0.069	0.009	0.079	0.195	0.020	0.216
7	057910G	West Lane Rd.	1050	1575	58	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.175	0.122	0.024	0.321	0.175	0.024	0.199	0.493	0.052	0.545
8	057911N	Columbia Mem. Gardens (Cemetery Rd)	99	1085	6	4	0.03	0.21	0.13	0.05	0.03	0.05	5.2	0.5	0.05	0.05	0.009	0.010	0.002	0.020	0.009	0.002	0.010	0.031	0.003	0.034
9	057921U	Old Portland Rd. (Berg Rd.)	200	1085	11	4	0.03	0.21	0.13	0.05	0.03	0.05	5.2	0.5	0.05	0.05	0.018	0.020	0.003	0.041	0.018	0.003	0.021	0.062	0.007	0.069
10	057924P	Old Portland Rd. (Bennet Rd.)	2650	1575	147	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.469	0.327	0.064	0.860	0.469	0.064	0.533	1.322	0.139	1.460
11	057927K	Millard Rd.	750	1925	42	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.124	0.086	0.017	0.227	0.124	0.017	0.140	0.348	0.036	0.384
12	057930T	Gable Rd.	8950	1925	497	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	1.946	1.357	0.266	3.569	1.946	0.266	2.211	5.477	0.574	6.051
13	057932G	Columbia Blvd.	6050	1575	336	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	1.233	0.862	0.169	2.263	1.233	0.169	1.401	3.477	0.364	3.842
14	057938X	St. Helens St.	6700	1925	372	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	1.339	0.934	0.183	2.456	1.339	0.183	1.522	3.770	0.395	4.165
15	057941F	Wyeth St.	63	1575	4	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	0.010	0.007	0.001	0.019	0.010	0.001	0.012	0.029	0.003	0.032
16	057943U	Deer Island Rd.	3450	1575	192	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	0.630	0.440	0.086	1.156	0.630	0.086	0.716	1.776	0.186	1.962
17	057946P	I St.	1000	1575	56	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	0.166	0.116	0.023	0.305	0.166	0.023	0.189	0.469	0.049	0.518
18	057947W	E St.	400	1575	22	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	0.065	0.045	0.009	0.119	0.065	0.009	0.074	0.183	0.019	0.203
19	057948D	Pacific St.	175	1575	10	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	0.028	0.020	0.004	0.052	0.028	0.004	0.032	0.080	0.008	0.088
20	057969W	Goble Landing (Lake St.)	250	1085	14	4	0.03	0.21	0.13	0.05	0.03	0.05	5.16	0.46	0.05	0.05	0.022	0.024	0.004	0.051	0.022	0.004	0.026	0.078	0.008	0.087
21	057974T	Graham Rd.	220	1085	12	4	0.03	0.21	0.13	0.05	0.03	0.05	5.16	0.46	0.05	0.05	0.020	0.022	0.003	0.045	0.020	0.003	0.023	0.069	0.007	0.076
22	057975A	6th St.	24	1085	1	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	0.013	0.002	0.002	0.018	0.002	0.000	0.003	0.007	0.001	0.008
23	057976G	5th St.	210	1085	12	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	0.118	0.021	0.021	0.159	0.019	0.003	0.022	0.066	0.007	0.073
24	057977N	4th St.	283	1085	16	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	0.159	0.028	0.028	0.215	0.025	0.004	0.030	0.089	0.010	0.098
25	057978V	3rd St.	900	1085	50	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	0.523	0.091	0.091	0.706	0.084	0.015	0.098	0.292	0.032	0.323
26	057979C	2nd St.	1043	1085	58	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	0.611	0.107	0.107	0.824	0.098	0.017	0.115	0.341	0.037	0.377
27	057980W	1st St.	1255	1085	70	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	0.744	0.130	0.130	1.003	0.119	0.021	0.140	0.415	0.045	0.459
28	057981D	2nd St.	2188	1085	122	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	1.366	0.238	0.238	1.843	0.219	0.038	0.257	0.762	0.082	0.844
29	916561W	Veterans Way	750	1925	42	6	0.08	0.21	0.14	0.14	0.04	0.06	7.74	0.46	0.06	0.06	0.831	0.086	0.086	1.004	0.185	0.017	0.202	0.522	0.036	0.558
30	916559V	Dike Rd.	99	1575	6	6	0.08	0.21	0.14	0.14	0.04	0.06	7.74	0.46	0.06	0.06	0.107	0.011	0.011	0.129	0.024	0.002	0.026	0.067	0.005	0.072
31	057993X	Mayger Fill Rd.	300	1400	17	6	0.07	0.21	0.13	0.13	0.03	0.05	7.74	0.46	0.05	0.05	0.253	0.029	0.029	0.311	0.040	0.005	0.045	0.141	0.010	0.151
32	057996T	Kallunki Rd.	250	1400	14	2	0.07				0.07		2.58		0.12		0.070			0.070	0.070		0.070	0.244		0.244
33	058002C	Hermo Rd.	750	1400	42	2	0.07				0.07		2.58		0.12		0.214			0.214	0.214		0.214	0.747		0.747
34	058003J	Beaver Dike Rd.	150	1400	8	2	0.07				0.07		2.58		0.12		0.042			0.042	0.042		0.042	0.146		0.146
35	058006E	Depot St.	756	1400	42	2	0.07				0.07		2.58		0.12		0.216			0.216	0.216		0.216	0.753		0.753
36	058010U	Pt. Adams Rd. (Midland Rd)	12	1575	1	2	0.08				0.08		2.58		0.13		0.004			0.004	0.004		0.004	0.014		0.014
37	058012H	Marshland Rd. (Co. Rd. 198)	100	1400	6	2	0.07				0.07		2.58		0.12		0.028			0.028	0.028		0.028	0.097		0.097
38	058016K	Marshland Dist. Rd. #4119	80	1400	4	2	0.07				0.07		2.58		0.12		0.022			0.022	0.022		0.022	0.078		0.078
39	058017S	Woodson Rd.	250	1400	14	2	0.07				0.07		2.58		0.12		0.070			0.070	0.070		0.070	0.244		0.244
40	058020A	Old Mill Rd. (Westport Ramp Rd.)	450	1400	25	2	0.07				0.07		2.58		0.12		0.127			0.127	0.127		0.127	0.443		0.443
41	058021G	Westport Ferry Rd. (Westport Dock Rd.)	300	1575	17	2	0.08				0.08		2.58		0.13		0.109			0.109	0.109		0.109	0.344		0.344
42	058022N	Driscoll Slough Rd.	10	1400	1	2	0.07				0.07		2.6		0.12		0.003			0.003	0.003		0.003	0.010		0.010

* Calculated from KAI 2008 counts for 20 selected crossings; otherwise calculated from available ODOT AADT

Appendix “B”
Delay per Crossing Event
at Public Crossings

Lower Columbia Corridor Rail Study - Delay at Public Crossings (Vehicle-hours/Crossing Event)

S. No.	U.S. DOT No.	Street Name	AADT	Capacity (veh/hr)	Demand (veh/hr)*	Current Conditions (As of August 2008)					Post Connect Oregon Improvements		10-Year Growth @ 8%/yr				Current Conditions (As of August 2008)			Post Connect Oregon Improvements		10-year Growth @ 8%/yr	
						3,600 ft Local Trains Per Day	Local Trains Blockage Duration (hr)	6,600 ft Unit Trains Per Day	Loaded Unit Trains Blockage Duration (hr)	Empty Unit Trains Blockage Duration (hr)	Local Trains Blockage Duration (hr)	Unit Trains Blockage Duration (hr)	6,000 ft Local Trains Per Day	6,600 ft Unit Trains Per Day	Local Trains Blockage Duration (hr)	Unit Trains Blockage Duration (hr)	Delay due to Local Trains (D1)	Delay due to Loaded Unit Trains (D2)	Delay due to Empty Unit Trains (D3)	Delay due to Local Trains (D4)	Delay due to Unit Trains (D5)	Delay due to Local Trains (D6)	Delay due to Unit Trains (D7)
1	057895G	Johnsons Landing Road (Dike Rd.)	100	1575	6	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.004	0.052	0.010	0.004	0.010	0.009	0.010
2	101854W	High School Rd.	4050	1925	225	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.185	2.407	0.471	0.185	0.471	0.403	0.471
3	057900B	Santosh St.	978	1450	54	1.0	0.03	1.00	0.13	0.05	0.03	0.05	1.0	1.0	0.05	0.05	0.023	0.461	0.074	0.023	0.074	0.061	0.074
4	057901H	Maple St.	1840	1925	102	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.078	1.020	0.200	0.078	0.200	0.171	0.200
5	057902P	Columbia Ave.	4850	1925	269	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.227	2.960	0.579	0.227	0.579	0.496	0.579
6	916564S	Crown Zellerbach Rd.	425	1925	24	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.017	0.226	0.044	0.017	0.044	0.038	0.044
7	057910G	West Lane Rd.	1050	1575	58	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.044	0.570	0.112	0.044	0.112	0.096	0.112
8	057911N	Columbia Mem. Gardens (Cemetery Rd)	99	1085	6	1.0	0.03	1.00	0.13	0.05	0.03	0.05	1.0	1.0	0.05	0.05	0.002	0.045	0.007	0.002	0.007	0.006	0.007
9	057921U	Old Portland Rd. (Berg Rd.)	200	1085	11	1.0	0.03	1.00	0.13	0.05	0.03	0.05	1.0	1.0	0.05	0.05	0.004	0.091	0.015	0.004	0.015	0.012	0.015
10	057924P	Old Portland Rd. (Bennet Rd.)	2650	1575	147	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.117	1.528	0.299	0.117	0.299	0.256	0.299
11	057927K	Millard Rd.	750	1925	42	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.031	0.402	0.079	0.031	0.079	0.067	0.079
12	057930T	Gable Rd.	8950	1925	497	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.486	6.334	1.240	0.486	1.240	1.062	1.240
13	057932G	Columbia Blvd.	6050	1575	336	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.308	4.021	0.787	0.308	0.787	0.674	0.787
14	057938X	St. Helens St.	6700	1925	372	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.335	4.360	0.853	0.335	0.853	0.731	0.853
15	057941F	Wyeth St.	63	1575	4	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.003	0.033	0.006	0.003	0.006	0.006	0.006
16	057943U	Deer Island Rd.	3450	1575	192	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.157	2.053	0.402	0.157	0.402	0.344	0.402
17	057946P	I St.	1000	1575	56	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.042	0.542	0.106	0.042	0.106	0.091	0.106
18	057947W	E St.	400	1575	22	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.016	0.212	0.042	0.016	0.042	0.036	0.042
19	057948D	Pacific St.	175	1575	10	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.007	0.092	0.018	0.007	0.018	0.015	0.018
20	057969W	Goble Landing (Lake St.)	250	1085	14	1.0	0.03	1.00	0.13	0.05	0.03	0.05	1.0	1.0	0.05	0.05	0.006	0.114	0.018	0.006	0.018	0.015	0.018
21	057974T	Graham Rd.	220	1085	12	1.0	0.03	1.00	0.13	0.05	0.03	0.05	1.0	1.0	0.05	0.05	0.005	0.100	0.016	0.005	0.016	0.013	0.016
22	057975A	6th St.	24	1085	1	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.003	0.011	0.011	0.001	0.002	0.001	0.002
23	057976G	5th St.	210	1085	12	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.029	0.096	0.096	0.005	0.015	0.013	0.015
24	057977N	4th St.	283	1085	16	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.040	0.130	0.130	0.006	0.021	0.017	0.021
25	057978V	3rd St.	900	1085	50	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.131	0.426	0.426	0.021	0.068	0.057	0.068
26	057979C	2nd St.	1043	1085	58	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.153	0.497	0.497	0.024	0.080	0.066	0.080
27	057980W	1st St.	1255	1085	70	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.186	0.605	0.605	0.030	0.097	0.080	0.097
28	057981D	2nd St.	2188	1085	122	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.342	1.112	1.112	0.055	0.178	0.148	0.178
29	916561W	Veterans Way	750	1925	42	1.0	0.08	1.00	0.14	0.14	0.04	0.06	1.0	1.0	0.06	0.06	0.139	0.402	0.402	0.031	0.079	0.067	0.079
30	916559V	Dike Rd.	99	1575	6	1.0	0.08	1.00	0.14	0.14	0.04	0.06	1.0	1.0	0.06	0.06	0.018	0.052	0.052	0.004	0.010	0.009	0.010
31	057993X	Mayger Fill Rd.	300	1400	17	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.042	0.137	0.137	0.007	0.022	0.018	0.022
32	057996T	Kallunki Rd.	250	1400	14	1.0	0.07				0.07		1.0		0.12		0.035			0.035		0.095	
33	058002C	Hermo Rd.	750	1400	42	1.0	0.07				0.07		1.0		0.12		0.107			0.107		0.289	
34	058003J	Beaver Dike Rd.	150	1400	8	1.0	0.07				0.07		1.0		0.12		0.021			0.021		0.056	
35	058006E	Depot St.	756	1400	42	1.0	0.07				0.07		1.0		0.12		0.108			0.108		0.292	
36	058010U	Pt. Adams Rd. (Midland Rd)	12	1575	1	1.0	0.08				0.08		1.0		0.13		0.002			0.002		0.005	
37	058012H	Marshland Rd. (Co. Rd. 198)	100	1400	6	1.0	0.07				0.07		1.0		0.12		0.014			0.014		0.038	
38	058016K	Marshland Dist. Rd. #4119	80	1400	4	1.0	0.07				0.07		1.0		0.12		0.011			0.011		0.030	
39	058017S	Woodson Rd.	250	1400	14	1.0	0.07				0.07		1.0		0.12		0.035			0.035		0.095	
40	058020A	Old Mill Rd. (Westport Ramp Rd.)	450	1400	25	1.0	0.07				0.07		1.0		0.12		0.064			0.064		0.172	
41	058021G	Westport Ferry Rd. (Westport Dock Rd.)	300	1575	17	1.0	0.08				0.08		1.0		0.13		0.054			0.054		0.133	
42	058022N	Driscoll Slough Rd.	10	1400	1	1.0	0.07				0.07		1.0		0.12		0.001			0.001		0.004	

*Calculated from KAI 2008 counts for 20 selected crossings; otherwise calculated from available ODOT AADT

Appendix E: Stakeholder Issues Matrix

Lower Columbia River Rail Corridor Safety Study--Draft Stakeholder Issues Summary (9/16/08)	Safety & Emergency Response												Rail Operations (Freight and Passenger)									Highway/Local Road Operations (All Modes)						Local Planning, Regulatory and Circulation						Community & Environ-mental	Business & Industry			Economic Development			Project Implementation & Funding			Non-Project Issues
REVIEW DRAFT SUMMARY OF STAKEHOLDER ISSUES**	Provide safety upgrades at more crossings	Ensure ability to meet fire and medical emergency response time goals and honor mutual aid agreements	Ensure law enforcement agencies' ability to meet response time goals	Educate public (focus on young people) about rail safety (Operation Life Saver)	Ensure safety for school access (bus, bike, pedestrian and vehicle)	Develop or update plan and precautions for hazmat on rail	Educate public about federal requirements for horns, and general RR rights/responsibilities	Develop or update derailment response plans	Improve safety-related communications between P&W and responders	Minimize duration that community is exposed to hazardous rail cargo	Make sure that increased emergency response resource needs are met	Increase velocity, capacity and reliability of rail	Maintain highway capacity, safety and reliability	Address trespasser issues	More separation of vehicles from trains in Rainier	Ensure adequate maintenance and inspection of rail	Improve Clatsop County rail segment to Class 2	Close public crossings, as possible	Close private crossings, as possible	Install automatic gates and lights interconnected to US 30 traffic lights	Minimize vehicle delay (including school and transit bus) at grade crossings	Address impact of more/longer trains on vehicle diversion, ped/bike mobility and safety	Address back-up of vehicle traffic into traffic lanes (safety and mobility)	Improve safety for hazmat trucks crossing rail	Develop local through-streets parallel to US 30	More signals on truck routes (Clatskanie, Beaver Falls)	Plan for higher speed freight and passenger trains over next 20 years	Support existing and plan for future transit (bus and rail)	Plan for future grade separations	Develop vision for future multimodal corridor & associated development	Identify and preserve industrial land along rail corridor	Maintain or improve cross-track connectivity	Reduce Noise/Examine Quiet Zone potential	Maintain or improve access to business or industrial sites for customers and shippers/suppliers	Ensure good rail service to existing and smaller rail users	Reduce train-related diversion through commercial parking lots	Promote industrial development along rail corridor by providing rail access	Shift freight from highway to rail	Take advantage of existing funding offers (Rainier/ODOT Rail)	Obtain funding for needed safety and mobility improvements	Seek contributions from all parties, including railroads, to mitigate impacts	Begin to identify uses for ConnectOregon III funds	Widen beach access trestle in Columbia City
Federal Government																																								
Homeland Security (Chris Greenhill)		⊙	⊙			⊙				⊙																														
State of Oregon																																								
ODOT Rail (Charles Kettenring, C. David Lanning)	⊙			⊙								⊙								⊙							⊙		⊙		⊙		⊙					⊙			
Odot Highway (D.Kim, R.Kroop, K.Freitag, M.Danielson, T.Wilson)	⊙	⊙	⊙		⊙							⊙	⊙							⊙	⊙	⊙	⊙	⊙			⊙	⊙	⊙	⊙	⊙	⊙					⊙			
Office of the Governor (Mark Ellsworth)	⊙											⊙	⊙		⊙						⊙									⊙									⊙		
Oregon State Police (Sgt. Larry Lucas)	⊙		⊙			⊙								⊙									⊙	⊙																
Railroad																																								
Portland & Western (Dale Hansen, Mike Lundell, Mark Warner, Diane Young)	⊙			⊙			⊙					⊙		⊙	⊙	⊙	⊙	⊙	⊙																		⊙			⊙			
Washington State																																								
Cowlitz-Wahkiakum Council of Governments, WA (Rosemary Siipoloa)	⊙	⊙	⊙			⊙						⊙																					⊙			⊙				⊙		
Columbia County Government																																								
County of Columbia (Tony Hyde, Rita Bernard, Janet Wright, Lonny Welter)	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙					⊙									⊙	⊙					⊙		⊙	⊙	⊙						⊙	⊙			
Scappoose (Jon Hanken)	⊙	⊙	⊙	⊙			⊙						⊙									⊙	⊙				⊙			⊙	⊙	⊙	⊙				⊙	⊙	⊙				
St. Helens (Jacob Graichen)	⊙												⊙	⊙								⊙	⊙															⊙					
Rainier (Lars Gare)	⊙												⊙									⊙	⊙												⊙			⊙					
Clatskanie (Greg Hinkelman)	⊙											⊙	⊙									⊙	⊙			⊙		⊙									⊙	⊙				
Columbia City (Leahnette Rivers)	⊙	⊙	⊙			⊙		⊙					⊙									⊙	⊙				⊙		⊙							⊙			⊙				⊙
Columbia County Rider (Henry Heimuller)	⊙				⊙								⊙									⊙		⊙					⊙										⊙			
Columbia County Emergency Services																																								
Columbia County Emergency Management (Vicki Harguth)	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙												⊙																⊙				
Columbia River Fire & Rescue (Jay Tappan)		⊙	⊙			⊙			⊙													⊙																⊙				
Scappoose Fire District (Mike Greisen)		⊙							⊙													⊙													⊙			⊙				
Rainier Police Department (Ralph Painter)		⊙	⊙												⊙							⊙													⊙			⊙				
Columbia County Schools																																								
Rainier School District (Kathy Murphy)					⊙																	⊙																				
Clatskanie Schools (Frank Walling)					⊙																	⊙																				
Columbia County Business/Industry																																								
Columbia County Economic Development (Janet Wright)	⊙	⊙	⊙	⊙	⊙		⊙					⊙										⊙						⊙									⊙	⊙	⊙	⊙	⊙		
South Columbia County Chamber of Commerce (Dan Garrison)												⊙										⊙					⊙	⊙							⊙			⊙	⊙				
Teevin Brothers (Paul Langner)				⊙								⊙						⊙				⊙														⊙			⊙				
United Pacific Forest Products (Adam Taylor)		⊙	⊙									⊙																								⊙	⊙						
Stimson Mill (Mark Nickerson)																						⊙														⊙			⊙				
Boise Paper Solutions (Kim Cernak)																						⊙														⊙			⊙				
Foss Maritime (Tim Stewart)																						⊙														⊙			⊙				
REDCO (Terry Deaton)																						⊙						⊙										⊙	⊙			
River's Bend Marina (Jan Hamer)				⊙																		⊙														⊙			⊙				⊙
Siva Weilert, Larry Huang		⊙																				⊙														⊙			⊙				⊙
Dyno Nobel (Greg Godfrey, Chuck Davidson)												⊙										⊙															⊙			⊙				
Columbia County Community Groups																																								
Columbia County Citizen Transportation Advisory Committee	⊙																					⊙						⊙									⊙						
Clatsop County Government																																								
Clatsop County Public Works (Ed Wegner, Ron Ash)												⊙																													⊙		
Clatsop County Emergency Services																																								
Clatsop County Sheriff (Paul Williams, Gene Strong)		⊙	⊙												⊙																											
Knappa Fire District (Paul Olheiser)		⊙	⊙					⊙			⊙																															
Clatsop County Schools																																								
Superintendant Ed Sera (provided crossing information)					⊙																	⊙																				
Clatsop County Business/Industry																																								
Port of Astoria (Jack Crider)												⊙					⊙																			⊙			⊙	⊙				
Floyd Holcom (Consultant to County)	⊙											⊙	⊙																							⊙				⊙			
Total Count	17	15	14	8	8	7	5	4	3	2	1	14	9	3	3	2	2	2	1	2	27	7	3	2	1	1	8	4	4	4	4	2	5	9	4	2	16	13	4	2	2	1	3

Note: Issues are presented from left-to-right, beginning with comments of highest frequency. Absence of an "⊙" in any box does not necessarily mean that a given stakeholder isn't concerned about an issue; it simply means the stakeholder did not specifically mention it during the interview.

Source: HDR Engineering Stakeholder Interviews, 2008

Appendix F: Conceptual Cost Estimate Worksheets

Lower Columbia River Rail Corridor/Rail Safety Study Highway-Related Conceptual Cost Estimate Detail (February 2009) HDR

Notes	Project	Pavement	6' Sidewalks	RR Crossing Panels	Bridge	Embankment	Retaining Wall	Contingency, Mobilization, CE, PE	Project Cost (excl. R/W or signals)
1	2 lane road - add turn bays - not in CL	$758,400						$379,200.00	**$1,137,600**
2	4 lane grade separation over US30 & RR tracks - St Helens	$176,000	$30,000		$2,240,000	$225,000	$1,050,000	$1,860,500.00	**$5,581,500**
3	bike/ped overpass - ADA compliant - not in CL	$54,600			$350,000	$28,000	$3,630,900	$2,031,750.00	**$6,095,250**
4	repairing/resurface grade crossing for 2-lane road	$6,720		$18,000				$12,360.00	**$37,080**
5	repairing/resurface grade crossing for 4-lane road	$13,440		$30,000				$21,720.00	**$65,160**
6	pedestrian grade crossing		$6,000	$24,000				$15,000.00	**$45,000**
Escape Bay	75 feet at $165/ft.	$12,375						$6,187.50	**$18,563**
High School Way	100 ft NBRT	$16,500						$8,250.00	**$24,750**
Maple St.	Flatten grade-50 ft. pavement	$35,200						$17,600.00	**$52,800**
Columbia Ave.	110 NBRT Lane	$18,150						$9,075.00	**$27,225**
Gable Rd	210 SBLT queue	$36,960						$18,480.00	**$55,440**
Columbia Blvd	215 SBLT queue	$37,840						$18,920.00	**$56,760**
Columbia Blvd	65 Ft NBRT queue	$11,440						$5,720.00	**$17,160**
Deer Island Rd.	SBLT 150 Ft	$24,750						$12,375.00	**$37,125**
								$0.00	**$0**
								$0.00	**$0**
								$0.00	**$0**

1	Assume 300 ft length left turn and right turn X $176/linear foot for left turn and $165/linear foot for right turn; for individual NBRT/SBLT queues, 235 foot taper and acceleration lane included
2	Bridge (4 lane grade separation): $175/sq ft X 64 ft wide X 200 length
2	Assume $11/sf X 250 ft length X 64 ft wide each end ramp for pavement cost
3	Pavement would be 10' by (455+455) X $5/sf
3	Bridge: square foot cost estimated at $175/sq ft X 10 ft. width for multi-use X 200 length (ROW of RR & US30)
6	6' wide walks X 100 ft length X $5/sf X 2 walks
6	Crossing panels 20 ft (10' panels) X $600/panel X 2 sets
	Earthwork: assume guardrail will be used and 2:1 slopes
	Retaining wall: assuming walls along entire embankment length will keep ROW purchases to a minimum
	No roadway signal, RR signal or ROW costs included

PNWR - Astoria Branch - Dibblee Siding					
Preliminary Cost Estimate			**MP: 48.75 - 50.35**		**8,500' Siding**
Item	**Description**	**Units**	**Unit Cost**	**Quantity**	**Total Cost**
	Trackwork				
1	F&I No. 11 Turnouts (136 RE)	EA	$125,000	2	$250,000
2	F&I Timber Crossing Surface (24')	EA	$4,000	1	$4,000
3	Construct track - with 10' cuts & fills	Mile	$1,400,000	2	$2,240,000
				Sub Total	**$2,494,000**
	Train Control/Signals				
4	None				
				Sub Total	**$0**
	Structures				
5	None				
				Sub Total	**$0**
	Other				
6	Environmental Allowance - 3%				$74,820
7	Construction Management - 4%				$99,760
8	Design Engineering Allowance - 7%				$174,580
9	Contingencies - 25%				$623,500
			Total Cost Estimate		**$3,466,660**

Planning Level Construction Cost Opinion
Relocation of PNWR St. Helens Yard

Item	Units	Unit Cost	Quantity	Estimated Cost
New Yard				
No. 9 Turnout	EA.	$ 75,000	9	$ 675,000.00
Remove Track	T.F.	$ 15	200	$ 3,000.00
Construct Track	T.F.	$ 135	8,750	$ 1,181,250.00
Walkway Ballast*	C.Y.	$ 5	750	$ 3,750.00
Sub-ballast (assumed 8" deep w/ extra for access road)	C.Y.	$ 25	5,400	$ 135,000.00
				$ 1,998,000.00
Old Yard				
Remove & Salvage Track	T.F.	$ 15	8,750	$ 131,250.00
Remove & Salvage Turnouts	EA.	$ 5,000	9	$ 45,000.00
Replace Turnout w/ track	T.F.	$ 135	250	$ 33,750.00
Connect Port Lead to Main Track				$ -
Construct Track1	T.F.	$ 135	750	$ 101,250.00
No. 9 Turnout	EA.	$ 75,000	1	$ 75,000.00
				$ 386,250.00
Civil Quantities				
Clearing/Grubbing*	Ac.	$ 5,000	2	$ 7,500
Earthwork*	C.Y.	$ 15	3,000	$ 45,000
				$ 52,500
Other				
Chain-link fence along highway side of yard	L.F.	$28	3,000	$ 84,000.00
Office Trailer*	L.S.	$ 50,000	1	$ 50,000
				$ 134,000
			Subtotal	$ 2,570,750
			Engineering @ 8%	$ 205,660
			Construction Administration @ 5%	$ 128,538
			Construction Contingency Factor @ 30%	$ 771,225
			Total Construction Cost Estimate	**$ 3,676,173**

Notes: Assumes that private contractor will perform all work
* Indicates placeholder item. No basis for estimation at this time
Assumes new yard to be same configuration as existing yard
Assumes that current locomotive tie-up track and office will also be relocated
Assumes all new track materials

Costs Not Included: Real estate acquisition, permitting, environmental remediation, utility relocation, yard air, yard lighting, signal systems, grade crossings

Lower Columbia River Rail Corridor/Safety Study

Conceptual Cost Estimate Detail Worksheets

Rail Cost Estimates

February 2009

The comparative cost used to estimate the cost of a signalized crossing on Portland & Western Railroad Astoria Line in Columbia County was based on the bid price for Veterans Way in Rainier, OR, in October 2002, with an annual increase in the cost of labor and material of 6 percent.

Additional project cost estimates (conceptual) were based on Hall Blvd. project, January 2006, provided courtesy of Alan Sovey, ODOT Rail Division.

4. **Bid Prices** August 2003 CORY ST.

BID ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT PRICE	AMOUNT
00700-1	Performance and Payment Bond	1	LS	$ 1,000.00	$1,000.00
00800-1	Railroad protective insurance liability	1	LS	$ 500.00	$ 500.00
01500-1	Mobilization	1	LS	$ 7,000.00	$7,000.00
02300-1	Crossing Sub-excavation and Backfill	1	M^3	$ 56.50	$ 56.50
02300-2	Excavation	1965	M^3	$ 33.75	$66,318.75
02300-3	Excavation at Existing Crossing	140	M^3	$ 34.75	$4,865.00
02600-1	Install 300mm Pipe	10	LM	$ 145.00	$1,450.00
02722-1	Sub-ballast	68	M^3	$ 53.00	$3,604.00
03484-1	Furnish and Install Concrete Grade Crossing Panels, Complete	28	TM	$ 630.00	$17,640.00
05660-1	Reconstruct Track	55	TM	$ 590.00	$32,450.00
05660-2	Raise Existing Track	104	TM	$ 41.00	$4,264.00
05660-3	Surface, Line, And Dress	61	TM	$ 23.00	$1,403.00
06132-1	Crosstie Replacement in Raise	65	EA	$ 78.50	$5,102.50
13200-1	Install Crossing Signal System At Cory Street	1	LS	$ 127,169.00	$127,169.00
13200-2	Signal Support for Track Forces Working in Conjunction with this	80	HR	$ 25.00	$2,000.00
13200-3	Retire Existing Crossing Signal Warning System at Hornecker	1	LS	$ 4,000.00	$4,000.00
				Total Bid for Bid Items :	$278,822.75

Two Hundred Seventy Eight Thousand Eight Hundred Twenty Two Dollars and Seventy Five Cents

SECTION 00400

BID FORM

TO: MR. CHARLES KETTENRING
PORTLAND & WESTERN RAILROAD
650 HAWTHORNE AVENUE SE
SUITE 220
SALEM, OR 97301

RE: PORTLAND & WESTERN RAILROAD
6TH AVENUE GRADE CROSSING IMPROVEMENT PROJECT
CONSTRUCTION AND ASSOCIATED WORK
RAINIER, OREGON

Gentlemen:

The undersigned Bidder, having examined the plans and specifications and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of materials and labor, hereby proposes to furnish all labor, equipment, tools, supplies, insurance, taxes, materials except as identified in Section 01100 as Owner supplied, and all other necessary incidentals to construct the project in accordance with the Contract Documents, within the time set forth therein, and at the following unit prices:

October 2002 6th Ave Rainier OR.

ITEM NO.	ITEM	ESTIMATED QUANTITY	UNIT	UNIT BID PRICE	AMOUNT BID
01500-1	Mobilization	1	LS	$ 1,700.00	$ 1,700.00
02220-1	Remove Existing Asphalt Pavement Crossing	958	FT^2	$ 1.00	$ 958.00
02300-1	Ditching And Drainage Grading	1120	LF	$ 2.00	$ 2,240.00
02300-2	Crossing Sub-excavation and Backfill	0	CY	$ 24.00	$ 0.00
02722-1	Construct Signal House Pad	27	CY	$ 45.00	$ 1,215.00
03484-1	Furnish and Install Concrete Grade Crossing Panels, Complete	90	TF	$ 200.00	$ 18,000.00
05660-1	Reconstruct Track with 136 RE CWR	180	TF	$ 155.00	$ 27,900.00
05660-2	Raise Existing Track	112	TF	$ 16.00	$ 1,792.00
05660-3	Surface, Line, And Dress	304	TF	$ 3.00	$ 912.00
13200-1	Install Crossing Signal System At 6th Ave.	1	LS	$ 124,000.00	$ 124,000.00
				TOTAL BID:	**$178,717.00**

Payment for Bid items shall constitute total compensation for all labor, equipment, tools and incidentals necessary to complete the work as specified and shown on the Drawings. No additional compensation will be made for unauthorized work, which is outside of the limits of this Contract. Any material removed without authorization shall be replaced at no added cost to the Owner. Any existing facilities damaged by the Contractor will be restored to their original condition or replaced as approved by the Engineer at no added cost to the Owner. The method of measurement and the basis of payment for Bid items will be in accordance with these Specifications.

SECTION 00400

BID FORM

TO: MR. CHARLES KETTENRING
PORTLAND & WESTERN RAILROAD
650 HAWTHORNE AVENUE SE
SUITE 220
SALEM, OR 97301

RE: PORTLAND & WESTERN RAILROAD
6TH AVENUE GRADE CROSSING IMPROVEMENT PROJECT
CONSTRUCTION AND ASSOCIATED WORK
RAINIER, OREGON

Gentlemen:

The undersigned Bidder, having examined the plans and specifications and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of materials and labor, hereby proposes to furnish all labor, equipment, tools, supplies, insurance, taxes, materials except as identified in Section 01100 as Owner supplied, and all other necessary incidentals to construct the project in accordance with the Contract Documents, within the time set forth therein, and at the following unit prices:

ITEM NO.	ITEM	ESTIMATED QUANTITY	UNIT	UNIT BID PRICE	AMOUNT BID
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02722-1	Construct Signal House Pad	27	CY	$ 45.00	$ 1,215.00
03484-1	Furnish and Install Concrete Grade Crossing Panels, Complete	90	TF	$ 200.00	$ 18,000.00
05660-1	Reconstruct Track with 136 RE CWR	180	TF	$ 155.00	$ 27,900.00
05660-2	Raise Existing Track	112	TF	$ 16.00	$ 1,792.00
05660-3	Surface, Line, And Dress	304	TF	$ 3.00	$ 912.00
13200-1	Install Crossing Signal System At 6th Ave.	1	LS	$ 124,000.00	$ 124,000.00
				TOTAL BID:	**$178,717.00**

Payment for Bid items shall constitute total compensation for all labor, equipment, tools and incidentals necessary to complete the work as specified and shown on the Drawings. No additional compensation will be made for unauthorized work, which is outside of the limits of this Contract. Any material removed without authorization shall be replaced at no added cost to the Owner. Any existing facilities damaged by the Contractor will be restored to their original condition or replaced as approved by the Engineer at no added cost to the Owner. The method of measurement and the basis of payment for Bid items will be in accordance with these Specifications.

PERFORMANCE AND PAYMENT BOND

The undersigned hereby states that he can furnish a Performance and Payment Bond in the full amount of the Contract. The undersigned, if he is requested, agrees to furnish the said Bond. The undersigned has not included the cost of this Bond in his base Bid. The additive cost of the Bond to the Contract is **$ 1,950.00.**

RAILROAD PROTECTIVE INSURANCE LIABILTY

The undersigned will maintain Railroad Protective Insurance Liability per Section 00800, Supplementary Conditions, Paragraph 4b, in the "Agreement for Contractor's Right of Entry." The undersigned has not included the cost of this insurance in his base Bid. The additive cost of the insurance to the Contract is **$ 1,950.00.**

LIST OF SUB-CONTRACTORS

The undersigned hereby states that he proposes to use the following sub-contractors:

	CONTRACTOR NAME	DISCIPLINE
1.	MJG, Inc.	Railroad Signal Construction
2.		
3.		
4.		

GENERAL

The undersigned Bidder hereby acknowledges receipt of these Contract Documents.

The undersigned Bidder agrees to substantially complete the project in accordance with the following schedule:

Contract Award and Notice to Proceed	September 26, 2002
Begin Construction	October 1st, 2002
Substantial Completion	**November 21st, 2002**
Project Completion	November 30th, 2002

The undersigned Bidder further agrees that this Bid may not be revoked or withdrawn after the time set for receipt of Bids, but shall remain open for acceptance for a period of seven (7) days following such time.

NAME OF BIDDER: RAILWORKS TRACK SYSTEMS

SIGNATURE OF AUTHORIZED PERSON _____

TITLE: _____

BUSINESS ADDRESS OF BIDDER _____

BUSINESS PHONE NUMBER: _____ DATE: _____

END OF SECTION

SECTION 00301
BID FORM

PROJECT IDENTIFICATION: CORY ST. GRADE CROSSING IMPROVEMENT PROJECT
CONSTRUCTION AND ASSOCIATED WORK
HILLSBORO, OREGON

THIS BID IS SUBMITTED TO: PORTLAND & WESTERN RAILROAD, herein after referred to as OWNER.

1. Enter Into Agreement

The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Bid Price and within the Bid Times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. BIDDER Accepts

BIDDER accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 10 days {the period specified for Notice of Award} after the day of Bid opening. BIDDER will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Bidding Requirements within {15} days after the date of OWNER's Notice of Award.

3. BIDDER's Representations

In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

a. BIDDER has examined and carefully studied the Bidding Documents and the following Addenda receipt of all which is hereby acknowledged: (List Addenda by Number and Date)

ADDENDA NO

b. BIDDER has visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance and furnishing of the Work.

c. BIDDER is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.

d. BIDDER has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by BIDDER and safety precautions and programs incident thereto.

e. BIDDER does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Contract Documents.

f. BIDDER has correlated the information known to BIDDER, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.

g. BIDDER has given ENGINEER written notice of all conflicts, errors, ambiguities or discrepancies in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to BIDDER, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

Where conflicts, errors, ambiguities or discrepancies have been discovered in or between Contract Documents and/or other related documents, and where said conflicts, etc., have not been resolved through the interpretations or clarifications by ENGINEER as described in the Instructions to Bidders, because of insufficient time or otherwise, BIDDER has included in the Bid the greater quantity or better quality of Work, or compliance with the more stringent requirement resulting in a greater cost.

h. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other BIDDER to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other BIDDER or over OWNER.

4. Bid Prices

BID ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT PRICE	AMOUNT
00700-1	Performance and Payment Bond	1	LS	$ 1,000.00	$1,000.00
00800-1	Railroad protective insurance liability	1	LS	$ 500.00	$ 500.00
01500-1	Mobilization	1	LS	$ 7,000.00	$7,000.00
02300-1	Crossing Sub-excavation and Backfill	1	M^3	$ 56.50	$ 56.50
02300-2	Excavation	1965	M^3	$ 33.75	$66,318.75
02300-3	Excavation at Existing Crossing	140	M^3	$ 34.75	$4,865.00
02600-1	Install 300mm Pipe	10	LM	$ 145.00	$1,450.00
02722-1	Sub-ballast	68	M^3	$ 53.00	$3,604.00
03484-1	Furnish and Install Concrete Grade Crossing Panels, Complete	28	TM	$ 630.00	$17,640.00

05660-1	Reconstruct Track	55	TM	$ 590.00	$32,450.00
05660-2	Raise Existing Track	104	TM	$ 41.00	$4,264.00
05660-3	Surface, Line, And Dress	61	TM	$ 23.00	$1,403.00
06132-1	Crosstie Replacement in Raise	65	EA	$ 78.50	$5,102.50
13200-1	Install Crossing Signal System At Cory Street	1	LS	$ 127,169.00	$127,169.00
13200-2	Signal Support for Track Forces Working in Conjunction with this	80	HR	$ 25.00	$2,000.00
13200-3	Retire Existing Crossing Signal Warning System at Hornecker	1	LS	$ 4,000.00	$4,000.00
				Total Bid for Bid Items :	$278,822.75

Two Hundred Seventy Eight Thousand Eight Hundred Twenty Two Dollars and Seventy Five Cents

BIDDER will complete the Work in accordance with the Contract Documents for the following price(s):

All specific cash allowances are included in the price(s) set forth above and have been computed in accordance with paragraph 11.02. of the General Conditions.

TOTAL BID FOR ALL UNIT PRICES Two Hundred Seventy Eight Thousand Eight Hundred Twenty Two Dollars and Seventy Five Cents ; ($278,822.75)

Unit Prices have been computed in accordance with paragraph 11.03B of the General Conditions.

BIDDER acknowledges that quantities are not guaranteed and final payment will be based on actual quantities determined as provided in the Contract Documents.

5. Completion

BIDDER agrees that the Work will be substantially completed and ready for final payment in accordance with paragraph 14.07B of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

BIDDER accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified in the Agreement.

6. Attached Documents

The following documents are attached to and made a condition of this Bid:

8. Address for Communications

Eric Winters
HDR Engineering
1001 SW 5th Ave.
Portland OR, 97204
(503) 423-3700

9. Defined Terms

Terms used in this Bid which are defined in the General Conditions or Instructions will have the meanings indicated in the General Conditions or Instructions.

SUBMITTED on August 21st, 2003.

If BIDDER is:

A Corporation

By QUALITY SIGNAL
(Corporation name)

CALIFORNIA
(State of incorporation)

By Bernard Bunny
(Name of person authorized to sign)

Vice President
(Title)

Business address: _____

_____

END OF SECTION

Green clear-out.
Hall Blvd., Progress

Mile Post FD - 753.30
DOT No. 749205R

Estimate date: 1/12/2006

MATERIAL

MANUFACTURER	MATERIAL	PART NUMBER	UNIT	QUANTITY	UNIT COST	COST
Safetran Systems	500 ohm HD Line Relay	ST 400023-17X	EA	2	$ 795.00	$ 1,590.00
1-800-328-3337	GCP 4000 2-Track box for single track use.	82A0-80465-00010	EA	1	$ 22,885.00	$ 22,885.00
	Wall mounted Surge Panel	80026-01	EA	1	$ 245.00	$ 245.00
	Mulltl-Frequency Shunt	62775-XXXX	EA	2	$ 563.00	$ 1,126.00
SAFT 480-563-9650	Saft SPL storage battery	SPL 380	Cell	10	$ 460.00	$ 4,600.00
Cragg Railcharger 612-623-8804	40 Amp. ETC Charger	40ETC-12V	EA	1	$ 590.00	$ 590.00
The Okonite Company	Case & Tower Wire #14	112-11-3024	FT	200	$ 0.34	$ 68.00
	Case & Tower Wire #10	112-11-3038	FT	300	$ 0.22	$ 66.00
Graybar Electric	Ground Rod Clamp		EA	4	$ 1.00	$ 4.00
	Duct Seal		LB	10	$ 5.00	$ 50.00
	1/4 in. Ring Eyelet #6	Panduit PV6-14R	EA	10	$ 0.45	$ 4.50
	1/4 in. Ring Eyelet #10	Panduit PV10-14R	EA	20	$ 0.25	$ 5.00
	1/4 in. Ring Eyelet #14	Panduit PV14-14R	EA	40	$ 0.20	$ 8.00
ERICO 1-800-447-7245	Bond Strand		FT	550	$ 0.60	$ 330.00

Shipping, handling		$ 6,248.30
Material Total		**$ 37,819.80**
Labor Total		**$ 15,000.00**
Signal Design Total		**$ 10,000.00**
CONTIGENCY OF 10%		$ 6,281.98
Project Total		**$ 69,101.78**

LABOR

DESIGN

Green clear-out.
Scholl Ferry Rd., Progress

Mile Post FD - 752.60
DOT No. 749204J

Estimate date: 1/12/2006

MATERIAL

MANUFACTURER	MATERIAL	PART NUMBER	UNIT	QUANTITY	UNIT COST	COST
Safetran Systems	500 ohm HD Line Relay	ST 400023-17X	EA	2	$ 795.00	$ 1,590.00
1-800-328-3337	GCP 4000 2-Track box for single track use.	82A0-80465-00010	EA	1	$ 22,885.00	$ 22,885.00
	Wall mounted Surge Panel	80026-01	EA	1	$ 245.00	$ 245.00
	Mullti-Frequency Shunt	62775-XXXX	EA	2	$ 563.00	$ 1,126.00
SAFT 480-563-9650	Saft SPL storage battery	SPL 380	Cell	10	$ 460.00	$ 4,600.00
Cragg Railcharger 612-623-8804	40 Amp. ETC Charger	40ETC-12V	EA	1	$ 590.00	$ 590.00
The Okonite Company	Case & Tower Wire #14	112-11-3024	FT	200	$ 0.34	$ 68.00
	Case & Tower Wire #10	112-11-3038	FT	300	$ 0.22	$ 66.00
Graybar Electric	Ground Rod Clamp		EA	4	$ 1.00	$ 4.00
	Duct Seal		LB	10	$ 5.00	$ 50.00
	1/4 in. Ring Eyelet #6	Panduit PV6-14R	EA	10	$ 0.45	$ 4.50
	1/4 in. Ring Eyelet #10	Panduit PV10-14R	EA	20	$ 0.25	$ 5.00
	1/4 in. Ring Eyelet #14	Panduit PV14-14R	EA	40	$ 0.20	$ 8.00
ERICO 1-800-447-7245	Bond Strand		FT	550	$ 0.60	$ 330.00

Shipping, handling		$ 6,248.30
Material Total		**$ 37,819.80**
LABOR		
Labor Total		**$ 15,000.00**
DESIGN		
Signal Design Total		**$ 10,000.00**
CONTIGENCY OF 10%		$ 6,281.98
Project Total		**$ 69,101.78**

Appendix G: Dibblee Point Siding Location Map


ASTORIA
#11
MP 50.5
8,500'
#10
MP 48.5
RAINIER
Image State of Oregon
©2009 Tele Atlas
Image ©2009 DigitalGlobe
©2008 Google

PORTLAND DIVISION — A LINE SUBDIVISION

PA-24 LS-440 (4)

CONSTRUCTED 1898 | WILLBRIDGE → | ← ASTORIA | CONSTRUCTED 1898

.87 BR 58.9 BDPT 43'
.55 TUNNEL 3 189'
.31 BR 51.3 STCS 138' RINEARSON SLOUGH
.39 OH PUB XING 579986M LEWIS & CLARK BR
.88 BR A-46.0 BDPT 83'

2146+75.7 | 2199+55.7 | 2252+35.7 | 2305+15.7 | 2357+99.5 | 2410+90.8 | 2463+64.1 | 2516+44.4 | 2568+20.4 | 2622+12.7 | 2674+93.5 | 2727+75.5 | 2780+57.0 | 2833+52.1 | 2846+55.4 / 2846+32.9 | 2880+77.9 / 2880+69.7 | 2886+22.9 | 2939+05.0

60 | 55 | 50 | 45

TWC | TWC

F25 | F25 | F10 | F25

.79 PVT XING 910158A
.57 PUB XING 580D4R
KEWAUNEE DIKE RD.
.53 24" CP 36'
.32 PUB XING 580D2C
KEWAUNEE DIKE RD.
.16 30" CP 45'
.11 PVT XING 58001V

.96 24" CP 36'

.69 24" CP 32'
.69 PVT XING 57998G
.58 24" CP 33'
.32 PVT XING 57997A
.31 24" CP 24'
.16 12" CP 21'
.10 24" CP 48'
.02 PUB XING 57986T
XBUCKS,CALLUNKI RD

.83 24" CP 52'

.71 PT SW #11-90
.62 24" CP 55'
.53 24" CP 52'

.34 30" CP 52'

.19 PVT XING 57995L
.06 24" CP 28'
.00 PVT XING 57994E

.97 30" CP 32'

.41 PT SW #9-90
.35 36" CP 48'

.20 24" CP 58'

.06 30" CP 48'

.81 PT SW #9-90
.80 PUB XING 57993X
.68 24" CP 27'
.66 PVT XING 57992R
.58 4-72" CMP 70'

.37 24" CIP 56'

.61 1'x1' TP 20'

.33 18" CP 20'

.96 18" CP 21'

.64 18" CP 21'

.50 18" CP 18'

.31 36" CIP 63'

.10 24" CMP 60'

.90 12" CIP 16'

.29 PVT XING 57991J

.40 PVT XING 910157T

.73 PVT XING 57990C

.01 PVT XING 57988B

.38 PVT XING 57987U
.33 PVT XING 57985F
.11 PT SW #9-90
.02 PT SW #9-90
.00 PVT XING 57983S

.65 PVT XING 57982K
.53 PT SW #9-90

.19 PUB XING 101359H
XBUCKS, 6TH ST. W.
.17 72" CMP 74'

.88 PUB XING 57981D
18'x18' WB 52'
.82 PUB XING 57980W
.76 PUB XING 57999C
.71 PUB XING 57978V
.65 PUB XING 57977N
.60 PUB XING 57976G
.54 PUB XING 57975A
.47 24" CP 48'
.17 24" CP 52'
.01 30" CP 69'

225' | 100' | 200' | 150'

CAP 2304'

CAP 2595'

DIBBLEE SIDING - 8,500'
MP 48.75 TO 50.35

PORT WESTWARD
MP 57.8

MAYGER
MP 56.1

AVON
MP 46.8

C-60 3-00' | C-59A 4-00' | C-59 3-00' | C-58 4-00' | C-57 1-45' | C-56C 3-00' | C-56B 2-00' | C-56A 1-00' | C-56 0-45' | C-55B 3-00' | C-55 2-30' | C-55 1-30' 2-30' | C-54B 3-30' | C-54A 2-00' | C-54 2-30' | C-53D 3-00' | C-53C 3-00' | C-53B 3-00' | C-53A 3-00' | C-53 4-00' | C-52C 4-00' | C-52B 4-00' | C-52A 7-00' | C-52 2-45' | C-51A 3-00' | C-51 2-00' | C-49A 1-00' | C-49 2-00' | C-48 2-00' | C-47 0-30' | C-46B 2-00' | C-46A 2-00' | C-46 3-00' | C-45C 0-20' | C-45A 1-00' | C-45B 2-00' | C-45 3-00'

858 39 | 131B 60 | 90B 48 | 90B 44 | 90B 48 | 90B 44 | 90B-48 | 90B 44 | 90B-48 | 112B 76 / 90B 49 | 90B-48 | 131B 60 | 90B-48 | 90B-49 | 90B-48 | 112B-68 | 90B 46 | 112--71 | 90B-48

TIES 91 | 238 TIES/MILE | 238 TIES/MILE | TIES 91

SURF 91 | SURF 91

01-01-95 P4402404

Appendix H: Quiet Zone Regulations

QUIET ZONE RULE SUMMARY

Overview

The Final Rule on "quiet zones" is intended to:

- Maintain a high level of public safety.
- Respond to the varied concerns of many communities that have sought relief from unwanted horn noise.
- Take into consideration the interests of localities with existing whistle bans.

The public authority responsible for traffic control or law enforcement at the highway-rail grade crossing is the only entity that can designate or apply for quiet zone status.

Mandated by law, the Final Rule:[1]

- Defines engineering solutions known as "supplementary safety measures" (SSMs) for use without FRA approval.
- Provides explicit flexibility for the modification of SSMs to receive credit as "alternative safety measures" (ASMs) (for instance, shorter traffic channelization arrangements can be used with reasonable effectiveness estimates).
- Includes a provision that provides risk reduction credit for pre-existing SSMs and pre-existing modified SSMs that were implemented prior to December 18, 2003.
- Allows use of education and enforcement options, including photo enforcement, subject to verification of effectiveness.

Local public authorities may designate or request approval of quiet zones in which train horns may not be routinely sounded. The details for establishment of quiet zones differ depending on the type of quiet zone to be created (pre-rule or new) and the type of safety improvements implemented (if required).

Once a quiet zone is established (including the continuation of pre-rule quiet zones pending any required improvements), the railroad is barred from routine sounding of the horn at the affected highway-rail grade crossings.

FRA provides a Web-based tool for communities to use in performing "what if" calculations and preparing submissions necessary to create or retain quiet zones. The tool may be found on the FRA Website.

To ensure proper application of the risk index, the National Highway-Rail Crossing Inventory must be accurate and complete. In the absence of timely filings to the inventory by the states or railroads, local authorities may file updated inventory information, and railroads must cooperate in providing railroad-specific data.

FRA regional personnel are available to participate in diagnostic teams evaluating options for quiet zones.

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1 49 U.S.C. 20153.

Requirement to Sound the Locomotive Horn

Outside of quiet zones, railroads must sound the horn 15–20 seconds prior to a train's arrival at the highway-rail grade crossing but not more than one-quarter-mile in advance of the crossing.

Note: Most existing state laws and railroad rules required that the horn be sounded beginning at a point one-quarter-mile in advance of the highway-rail grade crossing and continued until the crossing is occupied by the locomotive. Under the quiet zone rule, for trains running at less than 45 miles per hour, this reduces the time and distance over which the horn is sounded, thereby reducing noise impacts on local communities.

The pattern for sounding the horn will remain as it currently exists today (two long, one short, one long repeated or prolonged until the locomotive occupies the highway-rail grade crossing).

Train operators may vary this pattern as necessary where highway-rail grade crossings are closely spaced; they will also be empowered (but not required) to sound the horn in the case of an emergency, even in a quiet zone.

The rule addresses use of the horn only with respect to highway-rail grade crossings. Railroads remain free to use the horn for other purposes as prescribed in railroad operating rules on file with FRA, and railroads must use the horn as specified in other FRA regulations (in support of roadway worker safety and in the case of malfunctions of highway-rail grade crossing active warning devices).

The rule prescribes both a minimum and a maximum volume level for the train horn. The minimum level is retained at 96 dB(A), and the new maximum will be 110 dB(A). This range is intended to permit railroads to address safety needs in their operating territory (this issue is addressed in the preamble text of the Final Rule).

The protocol for testing the locomotive horn is altered to place the sound-level meter at a height of 15 feet above the top of the rail rather than the previous 4 feet above the top of the rail. (Cab-mounted and low-mounted horns continue to have the sound-level meter placed 4 feet above the top of the rail.)

Note: The effect of this change is to permit center-mounted horns to be "turned down" in some cases. The previous test method was influenced by the "shadow effect" created by the body of the locomotive to indicate a lower sound level than would otherwise be expected several hundred feet in front of the locomotive (where the crossing and approaching motorists are located).

The effect of these changes is expected to reduce noise impacts for 3.4 million of the 9.3 million people currently affected by train horn noise.

Creation of Quiet Zones

The rule provides significant flexibility to communities to create quiet zones, both where there are existing whistle bans and in other communities that heretofore have had no opportunity to do so.

The Final Rule permits implementation of quiet zones in low-risk locales without requiring the addition of safety improvements.

- This concept utilizes a risk index approach that estimates expected safety outcomes (that is, the likelihood of a fatal or non-fatal casualty resulting from a collision at a highway-rail crossing).
- Risk may be averaged over crossings in a proposed quiet zone.
- Average risk within the proposed quiet zone is then compared with the average nationwide risk at gated crossings where the horn is sounded (the "National Significant Risk Threshold" (NSRT)). FRA will compute the NSRT annually.

The effect of this approach is that horns can remain silenced in more than half of pre-rule quiet zones without significant expense; many new quiet zones can be created without significant expense where flashing lights and gates are already in place at the highway-rail grade crossings.

If the risk index for a proposed new quiet zone exceeds the NSRT, supplementary or alternative safety measures must be used to reduce that risk (to fully compensate for the absence of the train horn or to reduce risk below the NSRT).

Maintenance of Pre-Rule Quiet Zones

Train horns will not sound in existing whistle ban areas if authorities state their intention to maintain pre-rule quiet zones and do whatever is required (see above) within five years of the effective date (June 24, 2005; eight years if the state agency provides at least some assistance to communities in that state).

To secure pre-rule quiet zone status, communities must provide proper notification to FRA and other affected parties by June 3, 2005 and file a plan with FRA by June 24, 2008 (if improvements are required).

Horns may continue to be silenced at pre-rule quiet zones if:

- The average risk at the crossings is less than the NSRT; or
- The average risk is less than twice the NSRT and no relevant collisions have occurred within the past five years; or
- The community undertakes actions to compensate for lack of the train horn as a warning device (or at least to reduce average risk to below the NSRT).

Creation of New Quiet Zones

New quiet zones may be created if all public highway-rail grade crossings are equipped with flashing lights and gates; and either:

- After adjusting for excess risk created by silencing the train horn, the average risk at the crossings is less than the NSRT; or
- SSMs are present at each public crossing; or
- Safety improvements are made that compensate for loss of the train horn as a warning device (or at least to reduce average risk to below the NSRT).

Detailed instructions for establishing or requesting recognition of a quiet zone are provided in the regulation.

Length of Quiet Zones

Generally, a quiet zone must be at least one-half-mile in length and may include one or more highway-rail grade crossings.

Pre-rule quiet zones may be retained at the length that existed as of October 9, 1996, even if less than one-half-mile. A pre-rule quiet zone that is greater than one-half-mile may be reduced in length to no less than one-half-mile and retain its pre-rule status. However, if its length is increased from pre-rule length by the addition of highway-rail grade crossings that are not pre-rule quiet zone crossings, pre-rule status will not be retained.

Supplementary and Alternative Safety Measures

SSMs are engineering improvements that clearly compensate for the absence of the train horn. If employed at every highway-rail grade crossing in the quiet zone, they automatically qualify the quiet zone (subject to reporting requirements). They also may be used to reduce the average risk in the corridor to fully compensate for the lack of a train or to below the NSRT.

- Temporary closure used with a partial zone.
- Permanent closure of a highway-rail grade crossing.
- Four-quadrant gates.
- Gates with traffic channelization arrangements (for example, non-mountable curb or mountable curb with delineators) at least 100 feet in length on each side the crossing (60 feet where there is an intersecting roadway) and no commercial driveways included.
- One-way street with gate across the roadway.

ASMs may be applied such that the combination of measures at one or more highway-rail grade crossings reduces the average risk by the required amount across the quiet zone (so-called "corridor approach").

- Any modified SSM (such as barrier gate and median; shorter channelization; raised median islands; longitudinal median separators); or
- Education and/or enforcement programs (including photo enforcement) with verification of effectiveness; or
- Engineering improvements, other than modified SSMs; or
- Combination of the above.

The rule provides that pre-existing SSMs and pre-existing modified SSMs will be counted toward risk reduction.

Recognition of the Automated Wayside Horn

The rule authorizes use of the automated wayside horn at any highway-rail grade crossing with flashing lights and gates (inside or outside a quiet zone) as a one-to-one substitute for the train horn.

Certain technical requirements apply, consistent with the successful demonstrations of this technology.

The Federal Highway Administration (FHWA) has issued an interim approval for the use of wayside horns as traffic control devices. Communities interested in employing this option should contact FHWA to ensure that they comply with the provisions of the interim approval.

Special Circumstances

A community or railroad that views the provisions of the rule inapplicable to local circumstances may request a waiver from the rule from FRA.

A railroad or community seeking a waiver must first consult with the other party and seek agreement on the form of relief. If agreement cannot be achieved, the party may still request the relief by a waiver, provided the FRA associate administrator determines that a joint waiver petition would not be likely to contribute significantly to public safety.

FRA grants waivers if in the public interest and consistent with the safety of highway and railroad users of the highway-rail grade crossings.

Other Provisions

The Final Rule addresses quiet zones that prohibit sounding of horns during the evening and/or nighttime hours. These are referred to as partial quiet zones.

The Final Rule requires diagnostic team reviews of pedestrian crossings located within proposed new quiet zones and new partial quiet zones.

The Final Rule requires quiet zone communities to retain automatic bells at public highway-rail grade crossings that are subject to pedestrian traffic.

The Final Rule extends "recognized state agency" status to state agencies that wish to participate in the quiet zone development process.

The Final Rule contains a 60-day comment period on quiet zone applications.

The Final Rule requires public authorities to provide notification of their intent to create a new quiet zone. During the 60-day period after the Notice of Intent is mailed, comments may be submitted to the public authority.

The Final Rule provides quiet zone risk reduction credit for certain pre-existing SSMs.

The Final Rule provides quiet zone risk reduction credit for pre-existing modified SSMs.

The Final Rule contains a new category of ASMs that addresses engineering improvements other than modified SSMs.