SW 53rd Street Railroad Overcrossing

Benefit Cost Analysis

Project description:

SW 53rd Street is currently routed under the Union Pacific Railroad's Toledo line; however, the trestle supporting the railroad bridge is located between the two travel lanes and the undercrossing frequently floods and ices over in the winter, all of which creates a hazard to the driving public and the railroad operators. The undercrossing also has a vertical clearance limit of 13'6", so freight cannot travel through this route. The proposed project would realign SW 53rd to the east of the existing alignment and construct an overcrossing of the railroad.

Project objectives:

The project intends to address two problems: 1) a vertical clearance limitation so that freight cannot travel through the corridor and 2) remove the non-standard vertical curve under the railroad as it routinely gathers rainwater and ices over in the winter months causing a safety hazard. Objective – make the corridor safer and open to freight, improve mobility. Impacts – property acquisition, wetland impacts, lower GHG, provide options other than state highway that is congested. Improved stream habitat, water pollution reductions, habitat protection, support economic development.

Analysis Purpose:

To determine if the SW 53rd Street Railroad Overcrossing is cost effective and provides net benefits compared with the base case.

Perspective:

Benefits being sought are improved safety, reduced GHG, and more transportation options. Those that will benefit are the travelling public and freight movers.

Time period:

The time period for this BCA is over the life-cycle of 20 years for the road improvements, even though a bridge such as this has more than a 50 year life-cycle.

Defining Alternatives:

The base case includes freight staying on the highways and therefore being at the mercy of the existing congestion. It also includes the worst case scenario of accidents and even potentially deaths due to collisions with the train trestle. It could also include deterioration of the train trestle, which the County has no control of, and therefore there is risk of rail cars or loads falling onto the cars below.

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Region:

This project affects Corvallis, Philomath, Benton County and those freight operators and public travelling between I-5 and the beach along Hwy 20/34.

EXPECTED BENEFITS:

Reduced Travel Time. Potentially save five minutes with 53rd Street "by-pass" rather than going downtown. Freight could save up to 8 on the clock minutes.

Vehicle Costs. Existing undercrossing is very rough, so new roadway reduces vehicle wear. Grades are extended over longer stretch of road, so less energy output. Project improves alternative modes and provides connections to regional path system, therefore potentially reducing car ownership in the area.

Safety. Railroad crossing moved from an underpass to an overpass, removing obstacle in between travel lanes. Below standard vertical curve will be removed and flooding/icing addressed. Also removing driveway accesses from SW 53rd St

Emissions/Greenhouse Gas. There will be a reduction in emissions for the freight industry and other travelling public utilizing SW 53rd St instead of the state highway system.

Habitat and Water Quality. By building a longer bridge, able to realign Dunawi Creek and make better fish and critter habitat. Also will construct water quality treatment so impacts will be negligible.

Community Impacts. With the construction of the overpass, the existing SW 53rd Street will be converted into a local street and dead end at the railroad tracks. This will enable the residents in the area to access the road at one point. Also, we plan to landscape the area between the old road and new overpass including access to Dunawi Creek as a de-facto park.

Equity. Making sure to use the concept of Universal Design to ensure all users have access to the new overpass and its amenities.

INITIAL COSTS:

Planning/Design = $500,000
Right-of-way = $1,100,000
Construction Engineering = $500,000
Construction = $6,800,000

CONTINUING COSTS:

For the proposed project, the increase in maintenance of the bridge would be the only different continuing costs (if the overcrossing wasn't built, the County would still maintain the road and ditch network). Therefore the estimated operation and maintenance for this section was limited to approximately $25,000.

Measuring the Cost Effectiveness of the Overcrossing:

Using a BCA tool from Cal-Trans, the County input the project costs and information, past accident rates in the corridor, ADT for base and the 20 year projection, and any other required information. The County also modified the parameters based upon the *Benefit-Cost Analysis (BCA) Resource Guide* for the TIGER and FASTLANE Grants.

As anticipated, the model shows that the proposed overcrossing will dramatically help reduce accidents along the corridor. Also, since the existing underpass slows traffic down, the proposed improvements will also reduce the number of hours traveling in a vehicle. With a 7% public sector discount rate, the benefit/cost ratio is 2.6 and the project pays for itself in five years. Below is a summary of those results. Copies of the project information and major model inputs are attached to this report. A copy of the spreadsheet can be found on our website at: https://www.co.benton.or.us/publicworks

County: Benton OR

PROJECT: SW 53rd St Railroad Overpass

EA:
PPNO:

(3)

INVESTMENT ANALYSIS

SUMMARY RESULTS

Life-Cycle Costs (mil. $)	$7.9
Life-Cycle Benefits (mil. $)	$20.5
Net Present Value (mil. $)	$12.6
Benefit / Cost Ratio:	2.6
Rate of Return on Investment:	20.6%
Payback Period:	5 years

ITEMIZED BENEFITS (mil. $)	Average Annual	Total Over 20 Years
Travel Time Savings	$0.2	$3.4
Veh. Op. Cost Savings	-$0.0	-$0.0
Accident Cost Savings	$0.9	$17.1
Emission Cost Savings	$0.0	$0.0
TOTAL BENEFITS	$1.0	$20.5
Person-Hours of Time Saved	23,974	479,477
CO_2 Emissions Saved (tons)	80	1,591
CO_2 Emissions Saved (mil. $)	$0.0	$0.0

County: Benton OR

PROJECT: SW 53rd St Railroad Overcrossing

EA:
PPNO:

1A PROJECT DATA

Type of Project		
Select project type from list	General Highway	
Project Location (enter 1 for So. Cal., 2 for No. Cal., or 3 for rural)	3	
Length of Construction Period	2	years
One- or Two-Way Data		enter 1 or 2
	Current	
Length of Peak Period(s) (up to 24 hrs)	4	hours

1B HIGHWAY DESIGN AND TRAFFIC DATA

Highway Design		No Build	Build
Roadway Type (Fwy, Exp, Conv Hwy)		F	F
Number of General Traffic Lanes		2	2
Number of HOV/HOT Lanes		0	0
HOV Restriction (2 or 3)			
Exclusive ROW for Buses (y/n)		N	
Highway Free-Flow Speed		35	45
Ramp Design Speed (if aux. lane/off-ramp proj.)		35	35
Length (in miles)	Highway Segment	0.7	0.7
	Impacted Length	0.7	0.7

Average Daily Traffic			
	Current	11,518	
		No Build	Build
	Base (Year 1)	11,762	11,762
	Forecast (Year 20)	14,076	14,076
Average Hourly HOV/HOT Lane Traffic			0
Percent of Induced Trips in HOV (if HOT or 2-to-3 conv.)			100%
Percent Traffic in Weave			0.0%
Percent Trucks (include RVs, if applicable)		9%	9%
Truck Speed			

On-Ramp Volume	Peak	Non-Peak
Hourly Ramp Volume (if aux. lane/on-ramp proj.)	0	0
Metering Strategy (1, 2, 3, or D, if on-ramp proj.)		

Queue Formation (if queuing or grade crossing project)	Year 1	Year 20
Arrival Rate (in vehicles per hour)	0	0
Departure Rate (in vehicles per hour)	0	0

Pavement Condition (if pavement project)		No Build	Build
IRI (inches/mile)	Base (Year 1)	362	450
	Forecast (Year 20)		

Average Vehicle Occupancy (AVO)		No Build	Build
General Traffic	Non-Peak	1.30	1.30
	Peak	1.15	1.15
High Occupancy Vehicle (if HOV/HOT lanes)		2.15	2.15

1C HIGHWAY ACCIDENT DATA

Actual 3-Year Accident Data (from Table B)	Count (No.)	Rate
Total Accidents (Tot)	5	0.59
Fatal Accidents (Fat)	0	0.000
Injury Accidents (Inj)	1	0.12
Property Damage Only (PDO) Accidents	4	0.47

Statewide Basic Average Accident Rate	No Build	Build
Rate Group		
Accident Rate (per million vehicle-miles)	1.18	1.18
Percent Fatal Accidents (Pct Fat)	0.6%	0.6%
Percent Injury Accidents (Pct Inj)	48.0%	48.0%

1D RAIL AND TRANSIT DATA

Annual Person-Trips	No Build	Build
Base (Year 1)		
Forecast (Year 20)		
Percent Trips during Peak Period		
Percent New Trips from Parallel Highway		100%

Annual Vehicle-Miles	No Build	Build
Base (Year 1)		
Forecast (Year 20)		
Average Vehicles/Train (if rail project)		

Reduction in Transit Accidents	
Percent Reduction (if safety project)	

Average Transit Travel Time		No Build	Build
In-Vehicle	Non-Peak (in minutes)		0.0
	Peak (in minutes)		0.0
Out-of-Vehicle	Non-Peak (in minutes)	0.0	0.0
	Peak (in minutes)	0.0	0.0

Highway Grade Crossing	Current	Year 1	Year 20
Annual Number of Trains		0	
Avg. Gate Down Time (in min.)		0.0	

Transit Agency Costs (if TMS project)	No Build	Build
Annual Capital Expenditure		$0
Annual Ops. and Maintenance Expenditure		$0

Model should be run for both roads for intersection or bypass highway projects, and may be run twice for connectors. Press button below to prepare model to enter data for second road. After data are entered, results reflect total project benefits.

Prepare Model for Second Road

Enter all project costs (in today's dollars) in columns 1 to 7. Costs during construction should be entered in the first eight rows.
Project costs (including maintenance and operating costs) should be net of costs without project.

1E

PROJECT COSTS (enter costs in thousands of dollars)

Col. no.	(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Year	DIRECT PROJECT COSTS						Transit Agency Cost Savings	TOTAL COSTS (in dollars)	
	INITIAL COSTS			SUBSEQUENT COSTS					
	Project Support	R / W	Construction	Maint./ Op.	Rehab.	Mitigation		Constant Dollars	Present Value
Construction Period									
1	$1	$1,100	$6,400	<-- Must enter a cost -->		400		$7,900,500	$7,900,500
2								0	0
3								0	0
4								0	0
5								0	0
6								0	0
7								0	0
8								0	0
Project Open									
1				$12	$10	$1		$22,500	$19,652
2								0	0
3								0	0
4								0	0
5								0	0
6								0	0
7								0	0
8								0	0
9								0	0
10								0	0
11								0	0
12								0	0
13								0	0
14								0	0
15								0	0
16								0	0
17								0	0
18								0	0
19								0	0
20								0	0
Total	$1	$1,100	$6,400	$12	$10	$401	$0	$7,923,000	$7,920,152

Present Value = Future Value (in Constant Dollars) / (1 + Real Discount Rate) ^ Year

2A

HIGHWAY SPEED AND VOLUME INPUTS

	Calculated by Model	Changed by User	Used for Proj. Eval.	Reason for Change
No Build				
Year 1				
Peak Period				
HOV Volume	0		0	
Non-HOV Volume	3,650		3,650	
Weaving Volume	0		0	
Truck Volume	361	235	235	less trucks since limited clearance
HOV Speed	55.0		55.0	
Non-HOV Speed	35.0		35.0	
Weaving Speed	55.0		55.0	
Truck Speed	35.0		35.0	
Non-Peak Period				
Non-HOV Volume	7,053		7,053	
Weaving Volume	0		0	
Truck Volume	698	455	455	less trucks since limited clearance
Non-HOV Speed	35.0		35.0	
Weaving Speed	55.0		55.0	
Truck Speed	35.0		35.0	
Year 20				
Peak Period				
HOV Volume	0		0	
Non-HOV Volume	4,368		4,368	
Weaving Volume	0		0	
Truck Volume	432	282	282	less trucks since limited clearance
HOV Speed	55.0		55.0	
Non-HOV Speed	35.0		35.0	
Weaving Speed	55.0		55.0	
Truck Speed	35.0		35.0	
Non-Peak Period				
Non-HOV Volume	8,441		8,441	
Weaving Volume	0		0	
Truck Volume	835	545	545	less trucks since limited clearance
Non-HOV Speed	35.0		35.0	
Weaving Speed	55.0		55.0	
Truck Speed	35.0		35.0	
Build				
Year 1				
Peak Period				
HOV Volume	0		0	
Non-HOV Volume	3,650		3,650	
Weaving Volume	0		0	
Truck Volume	361	292	292	8% first year
HOV Speed	55.0		55.0	
Non-HOV Speed	45.0		45.0	
Weaving Speed	55.0		55.0	
Truck Speed	45.0		45.0	
Non-Peak Period				
Non-HOV Volume	7,053		7,053	
Weaving Volume	0		0	
Truck Volume	698	564	564	8% first year
Non-HOV Speed	45.0		45.0	
Weaving Speed	55.0		55.0	
Truck Speed	45.0		45.0	
Year 20				
Peak Period				
HOV Volume	0		0	
Non-HOV Volume	4,368		4,368	
Weaving Volume	0		0	
Truck Volume	432		432	
HOV Speed	55.0		55.0	
Non-HOV Speed	45.0		45.0	
Weaving Speed	55.0		55.0	
Truck Speed	45.0		45.0	
Non-Peak Period				
Non-HOV Volume	8,441		8,441	
Weaving Volume	0		0	
Truck Volume	835		835	
Non-HOV Speed	45.0		45.0	
Weaving Speed	55.0		55.0	
Truck Speed	45.0		45.0	

Model speed estimates based on Highway Capacity Manual, pavement research, and research on weaving impacts

2B

HIGHWAY ACCIDENT RATES

	Calculated by Model	Changed by User	Used for Proj. Eval.	Reason for Change
No Build				
Fatal Accidents	0.000	0.050	0.050	Trestle has high accident potential
Injury Accidents	0.12		0.12	
PDO Accidents	0.47		0.47	
Total Accidents	0.590			

Hwy Safety or Weaving Improvement 0% collision reduction factor (per HSIP Guidelines)

Adjustment Factor (Actual/Statewide Avg. Existing)				
Fatal Accidents	7.0621		7.0621	
Injury Accidents	0.2119		0.2119	
PDO Accidents	0.7749		0.7749	
Build				
Fatal Accidents	0.000	0.001	0.001	
Injury Accidents	0.12	0.09	0.09	Remove trestle
PDO Accidents	0.47	0.37	0.37	Remove trestle
Total Accidents	0.640			

2C

RAMP AND ARTERIAL INPUTS

(if detailed information is available for a TMS or an arterial signal management project)

Detailed Information Available? (y/n) N

Aggregate Segment Length (estimate as VMT/total volume)

All Ramps		miles
Arterials		miles

	Entered by User	Used for Proj. Eval.	Source/Notes
No Build (Peak Period Only)			
Year 1			
Aggregate Ramp Volume		0	
Aggregate Arterial Volume		0	
Average Ramp Speed		5.0	
Average Arterial Speed		5.0	
Year 20			
Aggregate Ramp Volume		0	
Aggregate Arterial Volume		0	
Average Ramp Speed		5.0	
Average Arterial Speed		5.0	
Build (Peak Period Only)			
Year 1			
Aggregate Ramp Volume		0	
Aggregate Arterial Volume		0	
Average Ramp Speed		5.0	
Average Arterial Speed		5.0	
Year 20			
Aggregate Ramp Volume		0	
Aggregate Arterial Volume		0	
Average Ramp Speed		5.0	
Average Arterial Speed		5.0	

2D

ANNUAL PERSON-TRIPS

(for HOV and HOT lane projects that affect average vehicle occupancy)

	No Build	Build	Induced
Year 1			
Peak Period			
HOV Trips	0	0	
Non-HOV Trips	1,531,982	1,531,982	0
Truck Trips	131,752	131,752	0
Non-Peak Period			
Non-HOV Trips	3,346,803	3,346,803	0
Truck Trips	254,617	254,617	0
Total Trips	5,265,154	5,265,154	0
Year 20			
Peak Period			
HOV Trips	0	0	
Non-HOV Trips	1,833,436	1,833,436	0
Truck Trips	157,677	157,677	0
Non-Peak Period			
Non-HOV Trips	4,005,367	4,005,367	0
Truck Trips	304,719	304,719	0
Total Trips	6,301,199	6,301,199	0