Port of Grays Harbor Terminal 4 Expansion & Redevelopment Project:



Discretionary Grant Program Benefit-Cost Analysis

May 2022



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Section I. BCA SUMMARY

I.A. OVERVIEW

This memo provides detailed documentation of the Benefit-Cost Analysis (BCA) performed to evaluate the public benefits generated by the Port of Grays Harbor's (Port) Terminal 4 Expansion & Redevelopment Project. The BCA demonstrates the cost effectiveness of the project for which the project sponsor is seeking Federal support, measured in terms of a benefit-cost ratio (BCR) and net present value (NPV). The IRCE has independent utility with benefits exceeding cost.

The BCA methodology used in this analysis is consistent with the U.S. Department of Transportation, *Benefit-Cost Analysis Guidance for Discretionary Grant Programs*, March 2022- Revised. The detailed cost and benefit assumptions are provided in this BCA Appendix, and have been prepared by an independent professional accountant and economist. Exhibit.1.1 describes the Current Status (Baseline), the anticipated changes to the baseline (the Build Scenario), types impacts, Population Affects, anticipated Societal benefits and references to where the details can be found both in this technical memo as well as to which Tab the calculations can be found in the Excel Spreadsheet.

Exhibit I-1: Benefit-Cost Analysis Overview Matrix

	Project Matrix for POGH T4 Expansion and Redevelopment Project											
Current Status/ Base line (No Build) & Problem to be Addressed	Change to Baseline/ Alternatives	Type of Impacts	Population Affected by Impacts	Societal Benefit	Summary of Results (Mill \$ 2020)	Tab in Spreadsheet						
		Improved efficiency in freight modal choice by switching freight to rail vs. truck	Agricultural / Grain Shippers utilizing the Port of Grays Harbor	Monetized value of reduced operational costs to shippers	Estimated \$807 million operational costs savings to shippers	Op. Cost Savings						
	The implementation of the T4	Reduced VMT on highways and roadways	Truck drivers/ Rail Engineers	Monetized value of differential in truck vs. rail miles generating operator time value savings	Estimate \$127 million in Travel Time Savings	Time Value Savings						
Constraints in Rail Capacity for the Port of Grays Harbor customers cause inefficient use of Trucks to	The implementation of the 14 Redevelopment Project will provide the Port and its customers with rail capacity to move cargo by rail versus by truck between the Port and the inland destinations/ origins. This analysis uses 10% of the Port's Cargo projections of the AGP Soybean Export Terminal Expansion to evaluate the Build scenario in this analysis.	Reduced road maintenance cost due to the reduction of VMT on highways	Government	Monetized value of reduced road maintenance costs to due to reduced Road VMT	Estimated \$24 million of Road maintenance savings to states and regions	Road Maintenance						
transfer cargo between Port and Inland Origins.		Reduced potential fatalities on highways	General public	Monetized value of the reduction of potential fatalities on roadways to due to reduced VMT	Estimated \$28 million of prevented fatalities and injuries from reduction of Vehicle Miles Traveled on Poads	Collision Savings						
		Reduced pollutant emissions	Local, state, region and national populations	Monetized value of emission reductions due to reduced trucking	Estimated Emissions on 24 million gallons of fuel saved	Emission Savings						

I.A.1. NO-BUILD SCENARIO

Under the no-build scenario, Port rail volume will be constrained to the current level, and additional cargo movements will be restricted to move by Truck as rail activity onto Port Facilities is nearing the throughput capacity of their current rail yard. Delays will continue for motor vehicles passing through the Port of Grays Harbor's industrial area. It is expected to worsen over time along with delays in rail freight movements which will limit overall cargo capacity at the Port. The rail support tracks to store arrival and departing trains at the Port of Grays Harbor will likely preclude significant private investment, additional Port cargo and limit future permanent job creation. The Port is working with a AGP soymeal bulk customer who requires the ability to bring in full unit train to the Port. At this time, the Port cannot provide customers with efficient train service due to limited rail capacity.

I.A.2. BUILD SCENARIO

The completion of this project, scheduled for 2026, will create significant increases in Economic Competitiveness Benefits, as measured by operating costs saved by shipper using rail versus truck and Travel time saved by cargo vehicle transportation operators; State of Good Repair Benefits from savings in road maintenance and preservation costs; Safety Benefits from the prevention of fatalities and injuries resulting in reduced vehicle miles traveled on the roadways; and Emission savings from the reduced fuel usage. The BCA recognizes life-cycle costs of the project as well as the useful life of the assets of the transportation capital improvements remaining at the end of the 25-year analysis. To be conservative, this analysis assumes that 10% of the Port's soybean meal volume can be shifted from road to rail and is assigned to this project's BCA.

I.A.3. BCA Model Development

An Excel spreadsheet-based BCA model was developed for the purpose of this analysis. The model utilizes available data provided by the Port, project specific data elements, and nationally accepted parameters. Many of the national parameters were provided by the United States Department of Transportation (USDOT) specifically for the purposes of Discretionary Grant applications such as INFRA, RAISE and PIDP.

I.A.4. Components of the Project

USDOT Guidance recommends that a Project Sponsor prepare a BCA for each component of the Project that has independent utility. For this project, the Port does not considers the smaller components to have independent utility in respect to the ability to export soymeal through T4.

The Port of Grays Harbor is expanding rail and shipping capacity at marine terminal 4 to accommodate growth of dry bulk, breakbulk and roll-on/roll-off cargoes. AG Processing Inc a cooperative (AGP) is an existing tenant of the Port, and the leading soybean meal exporter in the US, has announced their intention to invest \$150 million in ship loading infrastructure at Terminal 4 contingent upon the Port's ability to provide the rail and other on-site infrastructure to accommodate their expansion.

The expansion of the rail yard is the primary component that currently limits the Port's ability expand its cargo mix to include the exportation of Soymeal by ship. The Port recently receive notice from AGP, that it would like to use the Port of Grays Harbor as its export terminal to support the exportation of soymeal that will be produced in their new facility in David City, NE. The Port is working with AGP to ensure the Port is ready for this new cargo and can move the product through the Port and T4 as efficiently as possible. In addition to Port investments primarily in rail, AGP plans a \$ million private investment which will include adding a ship loader to T4 which will use rail to directly load out the Soymeal from rail to ship. Small components such as security gates and



Exhibit I-2: T4 Expansion and Redevelopment



Exhibit I-3: Schematic of New Export Facility (T4B) and relocation of current cargo Yard (T4A)

Exhibit I-4 Existing Facilities and T4 Expansion and Redevelopment



As can be seen in the exhibits above, the expansion of rail at T4 will require the relocation of the uses that are currently within the new rail footprint. Thus, the Project Sponsor believe that this project should be considered a one Project that has smaller components, that would not need to be relocated "but for" the expansion of the rail. With the rail yard expanding to take over most of the area shown in Exhibit I-3 in green, activities that can be seen in Exhibit I-4 must be relocated primarily to Terminal 4A as noted in the pink area of Exhibit I-3. Thus, the Project Sponsor is submitting one BCA for the Project. The Port of Grays Harbor respectfully requests that MARAD consider this a one project will independent utility versus a set of components that are interlinked. If AGP was not requesting improved Rail services, the other components would not be constructed at this time.

Providing the transportation link between thousands of US soybean farmers and international markets, the Grays Harbor Terminal 4 Expansion and Redevelopment Project (T4 project) constructs rail, terminal improvements, dock and fendering system upgrades, expanded upland cargo laydown area and associated site improvements at the US's most western mainland port. This critical public infrastructure will support port resiliency with the private development of a second ship loader, equipped with dual loading spouts, resulting in increased loading efficiency and movement of goods through the Port. Expansion and redevelopment designs have considered all users of the Port and improve efficiency across all terminals.

PROJECT COMPONENTS OF THIS MULTIMODAL PORT IMPROVEMENT INCLUDE:

- Rail Upgrades—New rail will be constructed to move soymeal unit trains to and through the new dump pits for unloading, and new storage tracks will be constructed for parking hopper cars. The rail upgrades will include:
 - New Lead Track Through Terminal—A new Port-owned rail lead track will be built with connections to the Puget Sound & Pacific Railroad. The new lead track will split into two tracks through the new dump pits.
 - New Storage Tracks—Four new storage tracks will be constructed with connections to Port-owned lead tracks and the Puget Sound & Pacific Railroad.
 - Modification of Existing Storage Tracks—Six existing storage tracks will be extended and aligned with the four new storage tracks, with connections to both Port-owned lead tracks and the Puget Sound & Pacific Railroad.
 - Work items will include:
 - 50,245 lineal feet of new, 136-pound continuous welded rail with concrete ties and associated switch gear
 - New bridge over Fry Creek
 - Extension of existing culvert at East Terminal Way ditch
 - Road-rail crossing signal upgrades
- Site, Access & Security Improvements
- Terminal 4 Dock Fender System Replacement & Upgrade
- Terminal 4A Cargo Yard Expansion- to enable the relocation of current bulk, roll-on/ roll-off cargos currently in the footprint of and that will be use for the rail expansion.

I.A.5. Organization of the BCA Memorandum

Section II describes the inputs and results of each of the Benefit components of the BCA model. The project specific inputs include items such as freight forecasts, project capital and operating costs, lifecycle costs, annual benefits, residual value of the project's assets at the end of this analysis. National modeling parameters include emission rates, crash rates, unit operating costs, values of time, average trip lengths, fuel efficiency and monetization factors for all classes of benefits. This section also displays the results of each benefit and cost category.

Section III describes the capital cost components of the BCA model.

Section IV summaries the results of the BCA and the resulting BCA ratio.

I.B. BCA SUMMARY

The results of the BCA analysis indicate a positive Benefit-Cost Ratio. As shown in **Exhibit I.2**, the BCA ratio at a 7% discount rate for non CO_2 benefits and costs /3% discount rate for CO_2 benefits is 11:1.

Exhibit I-5: BCA Results (20-year analysis)

Benefit Cost Analysis of Port of Grays Harbor T4 Expansion and Redevelopment Project

Project Benefit and Cost Analysis Summary (20-year analysis) using 10% of Port's Projected increased volume

					n-CO ₂ Benefits	CO ₂ Benefits	Combined	
				Di	iscount Rate	Discount Rate		
Category	Metric	Zero Discount Rate*		@7%		@3%	Discount Rate	
Project Benefits								
Improved Safety	2 lives saved by reducing VMT on Roads	\$	27,923,674	\$	9,855,994		\$	9,855,994
Emission Savings	244,350 MT of CO ₂ Saved	\$	28,563,158	\$	4,179,622	\$ 10,247,278	\$	14,426,901
Improved Economic Competition	Savings to Shipper by using Rail vs. Truck	\$	807,552,520	\$	285,035,313		\$	285,035,313
Improved Mobility	Truck Time Savings Offset by Rail Engineer Time Increase	\$	127,298,194	\$	44,931,419		\$	44,931,419
Improved State of Good Repair on Roads	Reduction of 204 million VMT off road network	\$	24,485,757	\$	8,642,541		\$	8,642,541
Total Societal Benefits		\$	1,015,823,303	\$	352,644,889	\$ 10,247,278	\$	362,892,167
Life-Cycle Costs		\$	(7,617,385)	\$	(2,688,647)		\$	(2,688,647)
Residual Value of Capital Improvements in Year 20		\$	17,351,242	\$	2,987,806		\$	2,987,806
Total Benefits		\$	1,025,557,160	\$	352,944,047	\$ 10,247,278	\$	363,191,326
Project Cost	·							
Prior Incurred Cost of Design		\$	(6,039,977)	\$	(5,864,768)		\$	(5,864,768)
Cost Rail Expansion Project		\$	(36,702,550)	\$	(26,435,502)		\$	(26,435,502)
Total Cost]	\$	(42,742,527)	\$	(32,300,270)		\$	(32,300,270)
Net Present Value	•	\$	982,814,633	\$	320,643,777	\$ 10,247,278	\$	330,891,056
Benefit-Cost Ratio								
Calculated Benefit Cost Ratio			24.0					11.24
Benefit-Cost Ratio (rounded)			24					11
* These values are expressed in year 2020 dolla	ar amounts.	-		-				

I.C. ANNUAL RESULTS WITH COMPLETION OF THE BUILD SCENARIO

Exhibit I-6: Total Annual Benefits and Costs

Benefit Cos	nefit Cost Summary														
										7% NPV					
		Non-CO ₂ Benefits						7% NPV Life-		Benefits	3% NPV CO2		Costs	7% NPV	
	Calendar	before Maint and	Life-Cycle		Total Benefits			Cycle	7% Residual	before CO2	Benefits	Total Disc.	(Year of	Costs	Net Benefits
Year	Year	Residual	(O&M)	Residual	before CO ₂	CO₂ Savings	Total Benefits	(D/1.07^A))				Benefits	expenditure)		
	2016												\$ -	\$0	ş -
	2017												\$-	\$0	ş -
	2018												\$ (4,655,600)	\$ (4,655,600)	\$ (4,655,600)
	2019												\$ -	\$0	\$ -
0	2020												\$ -	\$0	\$ -
1	2021												\$-	\$0	\$ -
2	2022												\$ (1,384,377)	(\$1,209,168)	\$ (1,384,377)
3	2023												\$ (2,258,720)	(\$1,843,789)	\$ (2,258,720)
4	2024												\$ (10,333,149)	(\$7,883,110)	\$ (10,333,149)
5	2025												\$ (13,777,532)	(\$9,823,190)	\$ (13,777,532)
6	2026												\$ (10,333,149)	(\$6,885,413)	\$ (10,333,149)
7	2027	\$49,995,620	(\$380,869)		\$49,614,751	\$645,797	\$50,260,547	(\$237,186)	\$0	\$30,897,573	\$525,092	\$31,422,665		\$0	\$ 50,260,547
8	2028	\$49,937,327	(\$380,869)		\$49,556,457	\$724,807	\$50,281,264	(\$221,669)	\$0	\$28,842,309	\$572,169	\$29,414,478		\$0	\$ 50,281,264
9	2029	\$49,944,863	(\$380,869)		\$49,563,993	\$737,091	\$50,301,085	(\$207,168)	\$0	\$26,959,528	\$564,919	\$27,524,448		\$0	\$ 50,301,085
10	2030	\$49,953,326	(\$380,869)		\$49,572,456	\$749,376	\$50,321,833	(\$193,615)	\$0	\$25,200,123	\$557,606	\$25,757,729		\$0	\$ 50,321,833
11	2031	\$49,953,326	(\$380,869)		\$49,572,456	\$761,661	\$50,334,117	(\$180,948)	\$0	\$23,551,517	\$550,240	\$24,101,757		\$0	\$ 50,334,117
12	2032	\$49,953,326	(\$380,869)		\$49,572,456	\$773,946	\$50,346,402	(\$169,111)	\$0	\$22,010,763	\$542,830	\$22,553,594		\$0	\$ 50,346,402
13	2033	\$49,953,326	(\$380,869)		\$49,572,456	\$786,231	\$50,358,687	(\$158,047)	\$0	\$20,570,807	\$535,385	\$21,106,192		\$0	\$ 50,358,687
14	2034	\$49,953,326	(\$380,869)		\$49,572,456	\$810,801	\$50,383,257	(\$147,708)	\$0	\$19,225,053	\$536,035	\$19,761,088		\$0	\$ 50,383,257
15	2035	\$49,953,326	(\$380,869)		\$49,572,456	\$823,085	\$50,395,542	(\$138,045)	\$0	\$17,967,339	\$528,307	\$18,495,647		\$0	\$ 50,395,542
16	2036	\$49,953,326	(\$380,869)		\$49,572,456	\$835,370	\$50,407,827	(\$129,014)	\$0	\$16,791,906	\$520,575	\$17,312,481		\$0	\$ 50,407,827
17	2037	\$49,953,326	(\$380,869)		\$49,572,456	\$847,655	\$50,420,111	(\$120,573)	\$0	\$15,693,370	\$512,845	\$16,206,215		\$0	\$ 50,420,111
18	2038	\$49,953,326	(\$380,869)		\$49,572,456	\$859,940	\$50,432,396	(\$112,685)	\$0	\$14,666,701	\$505,124	\$15,171,825		\$0	\$ 50,432,396
19	2039	\$49,953,326	(\$380,869)		\$49,572,456	\$872,225	\$50,444,681	(\$105,314)	\$0	\$13,707,197	\$497,418	\$14,204,615		\$0	\$ 50,444,681
20	2040	\$49,953,326	(\$380,869)		\$49,572,456	\$884,510	\$50,456,966	(\$98,424)	\$0	\$12,810,465	\$489,732	\$13,300,196		\$0	\$ 50,456,966
21	2041	\$49,953.326	(\$380,869)		\$49,572.456	\$896,795	\$50,469.251	(\$91,985)	\$0	\$11,972,397	\$482,071	\$12,454,468		\$0	\$ 50,469.251
22	2042	\$49,953.326	(\$380,869)		\$49,572.456	\$921,364	\$50,493.821	(\$85,967)	\$0	\$11,189,156	\$480,853	\$11,670,009		\$0	\$ 50,493.821
23	2043	\$49,953.326	(\$380,869)		\$49,572.456	\$933,649	\$50,506,105	(\$80,343)	\$0	\$10,457,155	\$473,072	\$10,930,227		\$0	\$ 50,506.105
24	2044	\$49,953,326	(\$380,869)		\$49.572.456	\$945,934	\$50,518,390	(\$75,087)	\$0	\$9,773,042	\$465,337	\$10.238.379		\$0	\$ 50,518,390
25	2045	\$49,953,326	(\$380,869)		\$49.572.456	\$958,219	\$50,530,675	(\$70,175)	\$0	\$9,133,684	\$457,651	\$9,591,335		\$0 \$0	\$ 50,530,675
26	2046	\$49,953,326	(\$380,869)	\$17.351.242	\$66,923,699	\$970.504	\$67,894,202	(\$65,584)	\$2,987,806	\$11,523,959	\$450.017	\$11,973,977		\$0	\$ 67,894,202
Total		\$999,084,345	(\$7,617, <u>385)</u>	\$17,351 <u>,242</u>	\$1,008,818,202	\$16,738, <u>959</u>	\$1,025,557,160	(\$2,688,647)	\$2,987, <u>806</u>	\$352,944,047	\$10,247, <u>278</u>	\$363,191,3 <u>26</u> \$	60 (\$42,742 <u>,527</u>)	(\$32,300,2 <u>70)</u>	\$982,814,633

Section II. PROJECT DESCRIPTION

The Port of Grays Harbor T4 Expansion and Redevelopment project will construct 50,245 linear feet of rail to improve the movement of goods through the Port. This rail project will take advantage of the Port's position as the economic engine in the region and leverage its strategic location in Grays Harbor County on the coast of Washington to drive economic growth and pandemic-related recovery through international trade. The Project is located in a federally designed Opportunity Zone and an historically economically disadvantaged community

Exhibit II-1: Schematic of Project



Section III. PROJECT BENEFITS

This section describes the key assumptions and results of each of the anticipated project benefit category. Each Category describes the calculation of the benefit, displays the anticipated annual project benefits associated with the no-build and build scenarios.

III.A. SUMMARY OF DETAILED BENEFITS

Exhibit III-1: Detailed Benefits by year

	Detailed Benefits											
			S	avings due to incre	ased rail capacity							
Year	Calendar Year	Operating Cost Saved	Travel Time Increase differential between Truck and Rail	Highway maintenance cost savings using rail vs truck	Reduced severity of accidents due to VMT reduction	Reduced Non- CO ₂ Pollutant Emissions	Total Non-CO ₂ Benefits before Residual and Life-cycle costs	Reduced CO ₂ Pollutant Emissions	Total Benefits before Residual and Life-cycle costs			
_												
7	2027	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$744,278	\$46,913,873	\$456,279	\$47,370,151			
8	2028	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$675,695	\$46,845,290	\$512,102	\$47,357,392			
9	2029	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$684,580	\$46,854,175	\$520,782	\$47,374,957			
10	2030	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$529,461	\$47,393,566			
11	2031	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$538,141	\$47,402,245			
12	2032	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$546,821	\$47,410,925			
13	2033	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$555,500	\$47,419,605			
14	2034	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$572,860	\$47,436,964			
15	2035	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$581,540	\$47,445,644			
16	2036	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$590,219	\$47,454,323			
17	2037	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$598,899	\$47,463,003			
18	2038	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$607,579	\$47,471,683			
19	2039	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$616,258	\$47,480,363			
20	2040	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$624,938	\$47,489,042			
21	2041	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$633,618	\$47,497,722			
22	2042	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$650,977	\$47,515,081			
23	2043	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$659,657	\$47,523,761			
24	2044	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$668,336	\$47,532 <u>,441</u>			
25	2045	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$677,016	\$47,541 <u>,120</u>			
26	2046	\$35,818,371	\$7,205,400	\$1,469,733	\$1,676,091	\$694,509	\$46,864,104	\$685,696	\$47,549,800			
		\$716,367,425	\$144,107,993	\$29,394,667	\$33,521,817	\$13,911,208	\$937,303,110	\$11,826,678	\$949,129,788			

To be conservative, the Benefits summarized in Exhibit III-1 are based upon 10 percent of a potential incremental tonnage that AGP anticipates to start exporting through the Port in 2027. The Port anticipates total cargo growth starting 2027 after the completion of the Project to be 3,000,000 Metric Tons (MT). To not overstate future benefits, no increase in volumes have been assumed for this analysis. Further, the Port's engineers estimate that the 3 million MT is only about two thirds the terminal's capacity.

The Benefits of the completion of this project have been divided into five societal benefits: Economic-Operating Cost savings; Mobility-Travel Time Saved by the Mode Operator; State of Good Repair-Road Maintenance and Preservation Savings; Safety-Prevention of Fatalities and Injuries; and Emission Savings.

III.A.1. Operating Cost Savings

Operating cost savings is calculated by estimating the operating cost savings achieved by shipper when this project is completed. The assumptions below show 10 percent of the projected new volume that is expected to be converted from truck to rail. The volume is converted to Short Tons for ease of comparison. Thus, volume starts at 330,690 ST / 300,000 MT in 2027 and remains flat through for a total of incremental soymeal cargo of 6,613,800 ST for the 20-year analysis period post-construction. Seasonality was run on this assumption with volumes increase on a step function and as expected the BCR only got stronger as more volume was added. Although the Soybean meal will be coming from David City, NE, which is approximately 1717 miles by road from the Port, to be conservative in project of benefits in this analysis, it has been assumed that modal shift from truck to rail of cargo moving will be on a route that is approximately 1,000 miles east of the Port. This has been noted by USDOT as well as the Soy Transportation Coalition that the average distance that modal shift tends to occur around 1000 rail miles. Thus, using this shorter route in the analysis is a more cautious approach than to use the full route mileage.



Exhibit III-2: Map of Route

Accumations		Assumption	110:4	Course	
P	ssumptions		value	Unit	Source
					Benefit -Cost Analysis Guidance for Discretionary
					Grant Programs, Mar 2022
Value of Truck Driver Tr	avel time per hou	r (\$2020)	\$ 32.00	per hour	Table A-3: Value of Travel Time Savings
		(+====)	· · · · · ·		Benefit -Cost Analysis Guidance for Discretionary
					Grant Programs, Mar 2022
	ok		1.00		Table A-4: Average Vehicle Occupancy
Average Drivers per Truck			50	mph	
Tons per Truck			27	Short Tons	BNSE
			24	Metric Tons	Calculated
Tons per Rail Car			115	Short Tons	BNSF
			90.7	Metric Tons	BNSF
				\$2020 Cost/	
Operating cost per Bail Ton			\$0.0436	Ton Mile	USDOT National Transportation Statistics Table 2
			\$0.0100	\$2020 Cost /	21 Average Freight Revenue per Ton Mile
Operating cost per Truc	k Ton		\$0 1989	Ton Mile	Converted to \$2017 then to \$2020
	ik i oli		ψ0.1505	1 off Wile	
					Port of Grays Harbor
			000		(Estimated at 10% of estimated annual cargo
			033	Ow Thp miles	Increase)
Truck to Rail Distance F		1.2	Rail mile / Truck mile	(NCHRP) Report 388. " A Guidebook for Forecasting Freight Transportation Demand". 1997. It is assumed that this factor includes drayage distances. This factor is used to adjust truck miles to rail miles as it is assumed that truck shipping distances are generally shorter than rail shipping distances. The model assumes that for every mile of trucking	
Average Number of Mile	s per Railcar		999.6	miles	Calculated using truck miles per rail mile
Rail vs. Road Metrics					
		Rail	Road		
Short Tons Shipped			Trucks	VMT Removed	
Per Year in the		Annual Number	Removed from	per Yr using	
Analysis		of Rail Cars	Roads	Rail	
	ST	Rail Cars (ST)	Trucks (ST)		
Years 1-10	330,690	2,876	12,248	10,202,399	
Years 11-15	330,690	2,876	12,248	10,202,399	Port of Grays Harbor
Years 16-20	330,690	2,876	12,248	10,202,399	(Estimated at 10% of estimated annual cargo increase)
Total over 20 years					
post CN	6.613.800	57,511	244,956	204.047.978	

Exhibit III-3: Assumptions used in calculating operational cost savings

This Tab measures the Operating Cost Saving for the cargo being moved by Rail vs. Trucks when the construction is completed

				Operating Cos	t Savings			
			No Build			Build		
							Rail operational cost of	
	Calendar		Ton Miles Truck	Operating Cost		Ton Miles Rail	switching to Rail	Total Operations
Year	Year	Truck VMT	Only Route (ST)	Truck only	Railcar VMT	Only Route (ST)	from Truck	Cost Savings
			27	\$0.1989		115	\$0.0436	
	2026							
1	2027	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
2	2028	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
3	2029	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
4	2030	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
5	2031	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
6	2032	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
7	2033	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
8	2034	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
9	2035	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
10	2036	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
11	2037	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
12	2038	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
13	2039	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
14	2040	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
15	2041	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
16	2042	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
17	2043	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
18	2044	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
19	2045	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
20	2046	10,202,399	275,464,770	\$54,781,679	2,874,415	330,557,724	\$14,404,053	\$40,377,626
		204,047,978	5,509,295,400	1,095,633,576	57,488,300	6,611,154,480	288,081,056	807,552,520

Exhibit III-4: Results of the Operating Cost saving between the No-Build and the Build Alternatives.

The cost of moving 10 percent of the new cargo tonnage by rail versus truck is estimated to save shippers over \$807 million over the 20 years post construction. It is estimated that the cost to move cargo by truck is \$0.1989 per ST versus \$0.0436 per ST on rail. Based upon transporting over 10.3 million MT between the Port and an inland destination that is 1000 miles east of the Port by rail (833 miles by road), it is estimated the truck transport would cost \$1.1 billion compared to rail transport of \$288 million. Netting a \$807 million savings if the shippers had rail capacity available to them to ship their products.

The model calculates Vehicle miles traveled (VTM) by road, then converts the VTM into ton-miles for both road and rail routes. Once Ton-miles are determined for each mode, the model calculates the modal cost by multiplying the respective ton-mile by modal cost per ton mile.

III.A.2. Travel Time Value Savings

Travel Time Value Saving Benefit captures the net value savings to the transportation operator for transporting the goods via railroad as opposed to truckload carrier. Using 10 percent of the projected new Port's volume, total truck driver's hours are calculated and multiplied by the Hourly Truck Driver Time Value rate of \$32.00/ hour and then compared to the total number of rail engineer hours required to move the same amount of cargo. The number of train hours are then multiplied by the number of Train engineers on a train. For these trains, it is estimated that the train will have three Engineers at an hourly value of travel time rate of \$52.50 each. The model estimates that \$127 million in time value will saved in the 20-years post construction.

Assumption	Assumption Value	Unit	Source:			
Truck Driver Hourly Value of Travel Time Savings	\$ 32.00	\$/ hr	Source: USDOT BCA Guidance Table A-3			
Average Drivers per Truck	1.00		Benefit -Cost Analysis Guidance for Discretionary Grant Programs, Mar 2022 Table A-4: Average Vehicle Occupancy			
Average Speed of Truck	50	mph				
Miles per Train	1200	miles	Port of Grays Harbor			
Train Engineer Hours Value of Travel Time	\$ 52.50		Source: USDOT BCA Guidance Table A-3			
Average Engineers per Train	3.00		BNSF			
Average Speed of Train	25	mph	American Association of Railroads			

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This Tab calculates the number of Truck Driver hours saved when the cargo is moved by Rail vs. Truck

Exhibit III-6: Travel Time Value Savings

		Truc	k Driver Travel Time	Savings			Engineer Travel Time Increase								
		No Build	Build						No Build	Build					
					Truck travel Time										
	O al an dan		Truck Davida	Data and Linear	cost saved by	Total Truck		O al a se al a se	Dell Deute		Number of	F	Engineer travel Time	Total Engineer	Net Decrease in
Vaar	Calendar	Truck Pouto- VMT	Iruck Route-	Driver Hours	switching to Rail	Travel Time Cost	Veer	Calendar	Kall Route-	Traine	Trains ^ miles	Engineer Hours	Increase by switching	Travel Time	Travel Time
rear	Teal		vivii Saveu	ot 50 mph	¢ 22.00	Savings	rear	Teal	VIVII	IIdillS		at 25 mph	¢ 457.50	COSI IIICIEASE	Travel Time
	0047			at 50 mpri	ə 32.00			0047			555.0	at 25 mpn	\$ 137.30		
	2017							2017							
	2010							2010							
	2013							2013							
	2020							2020							
	2021							2021							
	2023							2023							
	2024							2024							
	2025	-	-	-				2025	-			-			
	2026	-	-					2026	-			-			
1	2027	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	1	2027	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
2	2028	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	2	2028	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
3	2029	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	3	2029	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
4	2030	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	4	2030	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
5	2031	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	5	2031	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
6	2032	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	6	2032	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
7	2033	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	7	2033	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
8	2034	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	8	2034	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
9	2035	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	9	2035	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
10	2036	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	10	2036	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
11	2037	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	11	2037	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
12	2038	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	12	2038	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
13	2039	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	13	2039	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
14	2040	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	14	2040	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
15	2041	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	15	2041	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
16	2042	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	16	2042	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
17	2043	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	17	2043	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
18	2044	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	18	2044	-	26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
19	2045	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535	19	2045		26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
20	2046	10,202,399	10,202,399	204,048	\$32.00	\$6,529,535		2046		26.14	26,131	1,045	\$157.50	\$164,626	\$6,364,910
		204,047,978	204,047,978	4,080,960		\$130,590,706			-	523		20,905		\$3,292,512	\$127,298,194

III.A.3. State of Road Good Repair

Savings on Road Maintenance and Preservation is calculated based upon the number of VMT that the Project is estimated to take off of the local roads and highways. For this analysis, it is estimated that over the 20-year period post construction that 204 million miles of VMT will not be driven on the roads and highways due to the availability to move cargo in and out of the Port by rail versus truck.

Exhibit III-7: Assumptions used to calculate Road Maintenance and Preservation Cost savings.

Assumption	Assumption Val	Unit	Source:
Pavement Maintenance Cost	\$0.12	per truck mile	WSDOT

Based upon estimates provided by Washington State Department of Transportation, savings can be estimated based upon \$0.12 per truck mile not travelled on the local roads and highways.

Exhibit III-8: Annua	I Saving in	Road N	<i>Naintenance</i>	and F	Preservation	Costs
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Decreased road maintenance due to construction of Project and use of on-dock rail											
Year	Truck Miles saved	Ma	intenance ate/ mile	Тс	Total savings						
		\$	0.12								
2020		\$	0.12	\$	-						
2021		\$	0.12	\$	-						
2022		\$	0.12	\$	-						
2023	-	\$	0.12	\$	-						
2024	-	\$	0.12	\$	-						
2025		\$	0.12	\$	-						
2026		\$	0.12	\$	-						
2027	10,202,399	\$	0.12	\$	1,224,288						
2028	10,202,399	\$	0.12	\$	1,224,288						
2029	10,202,399	\$	0.12	\$	1,224,288						
2030	10,202,399	\$	0.12	\$	1,224,288						
2031	10,202,399	\$	0.12	\$	1,224,288						
2032	10,202,399	\$	0.12	\$	1,224,288						
2033	10,202,399	\$	0.12	\$	1,224,288						
2034	10,202,399	\$	0.12	\$	1,224,288						
2035	10,202,399	\$	0.12	\$	1,224,288						
2036	10,202,399	\$	0.12	\$	1,224,288						
2037	10,202,399	\$	0.12	\$	1,224,288						
2038	10,202,399	\$	0.12	\$	1,224,288						
2039	10,202,399	\$	0.12	\$	1,224,288						
2040	10,202,399	\$	0.12	\$	1,224,288						
2041	10,202,399	\$	0.12	\$	1,224,288						
2042	10,202,399	\$	0.12	\$	1,224,288						
2043	10,202,399	\$	0.12	\$	1,224,288						
2044	10,202,399	\$	0.12	\$	1,224,288						
2045	10,202,399	\$	0.12	\$	1,224,288						
2046	10,202,399	\$	0.12	\$	1,224,288						
	204,047,978			\$	24,485,757						

This will save \$24 million in road maintenance and preservation over the 20-years post construction of the Project.

III.A.4. Prevention of Fatalities and Severe Injuries

This benefit is calculated based upon VMT removed for the local roads and highways when rail capacity is available to move cargo between the Port and inland destinations. National factors obtained for fatality and severe injuries per 100 million VMT were multiplied by the VMT removed from the roads times the value of each type of collision.

Fatality ar	Fatality and Injury Rates per 100 Million VMT													
Туре		Rate		Value	Source									
Fatality		1.11	\$	11,600,000	<u>NHTSA</u>									
Injury- Severity Unknown		3.8517	\$	210,000										

Exhibit III-10: Savings from Prevention of Fatalities and Severe Injuries on the Roads

Preventions of Collisions												
Year	Reduction of Truck VMT	Highway Fatalities Prevented	Value	Highway Injuries Prevented	Value of Injuries Prevented	Total Value of Accidents Prevented						
	in 100 Million Miles	1.11	\$ 11,600,000	3.8517	\$ 210,000							
2020		-	\$0	-	\$0	\$0						
2021			\$0	-	\$0	\$0						
2022			\$0	-	\$0	\$0						
2023			\$0	-	\$0	\$0						
2024	-	<u> </u>	\$0	-	\$0	\$0						
2025			\$0		\$0	\$0						
2026		-	\$0		\$0	\$0						
2027	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2028	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2029	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2030	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2031	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2032	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2033	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2034	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2035	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2036	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2037	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2038	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2039	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2040	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2041	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2042	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2043	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2044	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2045	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
2046	0.102	0.11	\$1,313,661	0.39	\$82,523	\$1,396,184						
Total	2.040	2.265	26,273,218	7.859	1,650,456	27,923,674						

The results indicate that removing 204 million miles off the roads and highways will prevent 2.26 fatalities and an additional 7.86 severe injuries for a total saving so \$28 million is Safety benefits.

III.A.5. Emission Savings

Emission savings were calculated based upon fuel savings of transporting cargo by rail versus road. Each pollutant was estimated and valued based upon the cost per unit of each pollutant.

Exhibit III-11: Assumptions Emission Rates for Truck and Rail Transportation

Assumption	Value	Unit								
Truck Fuel Usage	145	ton miles/ gallon								
Rail Fuel Usage	477	ton miles/ gallon								
CO2 per Gallon of Diesel	10,180	grams/ gallon	See below per BCA							
CO ₂ per Gallon	0.01018	MT/gallon	guidance							
This Tab calculates the number of Gallons of fuel saved I	by moving the	cargo by rail vs. truck.	Once gallon saved is							
calculated CO_2 is estimated at 10,180 grams per gallon.										
Gallons of d	liesel consume	ed								
In the preamble to the joint EPA/Department of Transpo	rtation rulema	king on May 7, 2010 th	at established the initial							
National Program fuel economy standards for model years 2012-2016, the agencies stated that they had agreed to use										
a common conversion factor of 10,180 grams of CO2 e	emissions per	gallon of diesel consur	med (Federal Register							

2010). For reference, to obtain the number of grams of CO2 emitted per gallon of diesel combusted, the heat content of the fuel per gallon can be multiplied by the kg CO2 per heat content of the fuel.

This value assumes that all the carbon in the diesel is converted to CO2 (IPCC 2006).

Calculation

10,180 grams of CO2/gallon of diesel = 10.180 × 10-3 metric tons CO2/gallon of diesel

Sources

Federal Register (2010). Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, page 25,330 (PDF) (407 pp, 5.7MB, About PDF). IPCC (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 2 (Energy). Intergovernmental Panel on Climate Change, Geneva, Switzerland.

Total Value i	n Dolla	irs of E	missions																		
																				Tota	Non-CO ₂
Source of		CO	2 Emissions		NOX en	nissio	ins		PM2.5 e	emis	ssions	_	VOC en	nissio	าร	-	SOX e	missio	ns	Emis	sions
Pollutant																					
	MT																				
	\$/ M1	-	\$		\$/ MT		\$		\$/ MT		\$		\$/ MT		\$		\$/ MT		\$		\$
2017																					
2018																					
2019																					
2020																					
2021																-					
2022																-					
2023														-		-					
2024																					
2025																					
2027	\$	59	\$ 645,797	\$	17.500	\$	168.953	\$	829.800	\$	463.660	\$	-	\$	-	\$	46.900	\$	-	Ś	632.613
2028	\$	59	\$ 724,807	\$	17,500	\$	153,385	\$	829,800	\$	420,935	\$	-	\$	-	\$	46,900	\$	-	\$	574,319
2029	\$	60	\$ 737,091	\$	17,700	\$	155,138	\$	841,200	\$	426,718	\$	-	\$	-	\$	47,600	\$	-	\$	581,855
2030	\$	61	\$ 749,376	\$	18,000	\$	157,767	\$	852,700	\$	432,551	\$	-	\$	-	\$	48,200	\$	-	\$	590,318
2031	\$	62	\$ 761,661	\$	18,000	\$	157,767	\$	852,700	\$	432,551	\$	-	\$	-	\$	48,200	\$	-	\$	590,318
2032	\$	63	\$ 773,946	\$	18,000	\$	157,767	\$	852,700	\$	432,551	\$	-	\$	-	\$	48,200	\$	-	\$	590,318
2033	\$	64	\$ 786,231	\$	18,000	\$	157,767	\$	852,700	\$	432,551	\$	-	\$	-	\$	48,200	\$	-	\$	590,318
2034	\$	66	\$ 810,801	\$	18,000	\$	157,767	\$	852,700	\$	432,551	\$	-	\$	-	\$	48,200	\$	-	\$	590,318
2035	\$	67	\$ 823,085	\$	18,000	\$	157,767	\$	852,700	\$	432,551	\$	-	\$	-	\$	48,200	\$	-	\$	590,318
2036	\$	68	\$ 835,370	\$	18,000	\$	157,767	\$	852,700	\$	432,551	\$	-	\$	-	\$	48,200	\$	-	\$	590,318
2037	\$	69	\$ 847,655	\$	18,000	\$	157,767	\$	852,700	\$	432,551	\$	-	\$	-	\$	48,200	\$	-	Ş	590,318
2038	\$	70	\$ 859,940	\$	18,000	\$	157,767	\$	852,700	\$	432,551	\$	-	\$	-	\$	48,200	\$	-	Ş	590,318
2039	\$	/1	\$ 8/2,225	\$	18,000	\$	157,767	\$	852,700	\$	432,551	\$	-	\$	-	\$	48,200	\$	-	Ş	590,318
2040	¢ ¢	73	φ 004,510 ¢ 806.705	ې د	18,000	ŝ	157,767	¢ ¢	002,700 852 700	¢ ¢	432,001	¢ ¢	-	¢ ¢	-	¢ ¢	40,200	¢ ¢	-	ې د	500,318
2041	φ \$	75	\$ 921 364	ş	18,000	ş	157,767	φ S	852 700	φ \$	432,001	φ \$		φ \$		φ \$	40,200	ş	-	ې د	590,318
2042	\$	76	\$ 933.649	ŝ	18 000	ş	157 767	\$	852,700	\$	432 551	Ψ \$	-	ŝ	-	ŝ	48 200	ş	-	Ś	590,318
2043	\$	77	\$ 945.934	\$	18,000	\$	157,767	\$	852,700	\$	432,551	\$	-	\$	-	\$	48,200	\$	-	Ś	590,318
2045	\$	78	\$ 958,219	\$	18,000	\$	157,767	\$	852,700	\$	432,551	\$	-	\$	-	\$	48,200	\$	-	\$	590,318
2046	\$	79	\$ 970,504	\$	18,000	\$	157,767	\$	852,700	\$	432,551	\$	-	\$	-	\$	48,200	\$	-	\$	590,318
			\$ 16,738, <u>959</u>	\$	358,70 <u>0</u>	\$3	,159,51 <u>8</u>	\$ 1	6,996,700	\$	8,664,682	\$	-	\$	-	\$	960,800	\$	-	\$	11,824,200
																To	tal Emissio	on 20	20\$	\$	28,563,158

Exhibit III-12: Emission Savings of the Project- Volume

Based upon the results displayed above, it is estimated that \$28 million in public benefit will be achieve from lower emissions by removing trucks off the roads.

Total Emissio	ons Savings				
	CO2	NOX	PM2.5	VOC	SOX
	emissions	emissions	emissions	emissions	emissions
Source		-	TTI 2017		
		ST	ST	ST	ST
		converted	converted	converted	converted
Units	MT	into MT	into MT	into MT	into MT
ST					
2017					
2018					
2019					
2020					
2021					
2022					
2023					
2024					
2025	-	-	-	-	-
2026	-	-	-	-	-
2027	10,946	9.6545	0.5588	0.8573	-
2028	12,285	8.7648	0.5073	0.7783	-
2029	12,285	8.7648	0.5073	0.7783	-
2030	12,285	8.7648	0.5073	0.7783	-
2031	12,285	8.7648	0.5073	0.7783	-
2032	12,285	8.7648	0.5073	0.7783	-
2033	12,285	8.7648	0.5073	0.7783	-
2034	12,285	8.7648	0.5073	0.7783	-
2035	12,285	8.7648	0.5073	0.7783	-
2036	12,285	8.7648	0.5073	0.7783	-
2037	12,285	8.7648	0.5073	0.7783	-
2038	12,285	8.7648	0.5073	0.7783	-
2039	12,285	8.7648	0.5073	0.7783	-
2040	12,285	8.7648	0.5073	0.7783	-
2041	12,285	8.7648	0.5073	0.7783	
2042	12,285	8.7648	0.5073	0.7783	
2043	12,285	8.7648	0.5073	0.7783	
2044	12,285	8.7648	0.5073	0.7783	-
2045	12,285	8.7648	0.5073	0.7783	
2046	12,285	8.7648	0.5073	0.7783	
	244,3 <u>5</u> 8	176.2	10.2	15.6	-

Exhibit III-13: Emission Savings of the Project- Value in Dollars

III.B. SECONDARY BENEFITS

In addition to the primary benefits that are quantified by this BCA, there would also be added benefits that have not been included in the B-C ratio at this time. Such secondary benefits include:

- Construction job creation attributed to project design and construction.
- Permanent job creation attributed to new cargo at the Port of Longview.
- T4 investment expanded rail capacity and track access T2 and T4 which in turn will bring more activity and cargo to the Port.

Section IV. PROJECT COSTS

This section identifies the basis of the capital cost estimates used in this BCA.

IV.A. CONSTRUCTION COST

The final design, and construction costs associated with the project is estimated to be \$37M (\$2020). These figures are based on the detailed construction cost estimates provided as part of the Discretionary Grant application. This does not include the \$6.0 million of pre-incurred costs.

Exhibit IV-1: Future Eligible Project Costs

Item Descriptions	To Proj	tal Future ject Funds	Total %
POGH T4 Exapnsion and Redevelopment Proje	ct		
Engineering	\$	2.26	6%
Construction	\$	34.4	94%
	\$	36.70	100%

Exhibit IV-2: Project Schedule

		2018			2019			2020			2021				2022			2023				2024				2025				2026				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2 3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	34
Property Acquisition																																		
Preliminary Engineering 30%,60%																																		
Award Announcement																																		
Permitting																																		
Federal & State Agency Review																																		
Obligation																																		
Final Engineering																																		
Construction																																		
Contract Close-Out																																		

Port of Grays Harbor T4 Expansion	and Redevelop	ment, Proje	ct Cost by Y	ear										
Year:			2018	2019	2020	2021	2022	2023	2024	2025	2026			
Project Cost			Property Acquisiton				Design/NEPA/ Permitting	Design/NEPA/ Permitting	Construction	Construction	Construction	2023-2026 Total before Prev. Incurred Costs	Prev Incurred Cost 2018-2022	Total Costs
No Discount Rate			\$4 520 000				\$1 538 197	\$2 509 689	\$11 481 277	\$15 308 369	\$11 481 277	\$40 780 611	\$6 058 197	\$46 838 808
2020\$	\$0	\$0	\$4,655,600	\$0	\$0	\$0	\$1,384,377	\$2,258,720	\$10,333,149	\$13,777,532	\$10,333,149	\$36,702,550	\$6,039,977	\$42,742,527
Disc at 7%			\$4,655,600				\$1,209,168	\$1,843,789	\$7,883,110	\$9,823,190	\$6,885,413	\$26,435,502	\$5,864,768	\$32,300,270
Cost Estimate by Year						0%	4%	6%	28%	38%	28%	100%		
Discount Factors	infla	ated to \$202	0				Di	scounted to \$202	0					
7%	1.07	1.05	1.03	1.01	1.00	1.07	1.14	1.23	1.31	1.40	1.50			
* derived from assumptions on Project S	chedule.									-				

Exhibit IV-3: Project Cost Schedule by Year

Total Future Eligible Costs for the years 2023-2026 equal \$36.7 million in 2020 dollars

IV.B. LIFE CYCLE COSTS

Life Cycle costs have been estimated at 1% per annum of the Project costs or \$380,869 per year. For a total of \$7.6 million over the analysis period.

Exhibit IV-4: Life Cycle Costs

Life-Cycle										
Voor	Annual Maint.									
rear										
2020										
2021										
2022										
2023										
2024										
2025										
2026										
2027	\$380,869									
2028	\$380,869									
2029	\$380,869									
2030	\$380,869									
2031	\$380,869									
2032	\$380,869									
2033	\$380,869									
2034	\$380,869									
2035	\$380,869									
2036	\$380,869									
2037	\$380,869									
2038	\$380,869									
2039	\$380,869									
2040	\$380,869									
2041	\$380,869									
2042	\$380,869									
2043	\$380,8 <mark>6</mark> 9									
2044	\$380,869									
2045	\$380,8 <mark>6</mark> 9									
2046	\$380,8 <mark>6</mark> 9									
Total	\$7 617 385									

IV.C. RESIDUAL AT YEAR 2042

Exhibit IV-5: Assumptions for the Calculation of Residual Value

Assumptions													
	Life of the	Analysis	Remaining Life at										
Residual	Asset	Period	2046	Cost of Asset	Residual Value of Asset Yr 2046	Disc at @7%							
Project Construction Cost	30) 20	33%	\$38,086,927	\$12,695,642								
Right of Way		20	100%	\$4,655,600	\$4,655,600								
Total				\$42,742,527	\$17,351,242	\$2,987,806							
Annual Maintenance	1.0%	Percent of Co	onstruction Cost	\$ 380,869									

It is expected that the property acquisition (ROW) investments included with this Project will have a permanent value that equates to the original purchase price. Capital investments in rail tracks and other improvements are assumed to have a 30-year lifecycle, again to be conservative. Hence, by year 20, it is assumed that the residual value of Project investments will equate to 1/3 of the capital investment plus the original ROW cost, which equates to \$42.7 M in 2020 dollars. This amount has been discounted at 7% in the BCA.

Section V. BENEFIT COST SUMMARY

A favorable Benefit- Cost Ratio is one that exceeds 1.0, indicating that the 20-year analysis of the benefits, lifecycle costs and residual value of the asset exceed the capital costs expended during that same time period. As Exhibit V-1 shows, the Project's Non-CO₂ Benefits are discounted at 7 percent, this generates \$352.6 million in societal benefits before life-cycle costs of \$2.7 million and a residual value of \$2.9 million, for a total Non-CO₂ benefits of \$320.6 million. CO₂ benefits discounted at 3 percent generate \$10.2 million in benefits. For a combined Total Benefits of \$362.9 million.

Project costs are \$32.38 million when discounted at 7 percent. The Benefit Cost Ratio is estimated to exceed 11:1 with a Net Present Value of \$330.9 million. Economic Competitiveness accounts for 79 percent of the total societal benefit with \$285.0 million in operating cost savings. Mobility Improvements are estimate at \$44.9 million or 13 percent based upon Travel Time Value savings. Savings in Emission accounting for \$14.4 million or 4 percent of the total societal benefits. State of Good Repair for Roads and Safety Benefits each account for 5 percent of the societal benefits.

Exhibit V-1: Selection Criteria Summary

Benefit Cost Analysis of Port of Grays Harbor T4 Expansion and Redevelopment Project Project Benefit and Cost Analysis Summary (20-year analysis) using 10% of Port's Projected increased volume

				Nor	n-CO ₂ Benefits	CO ₂ Benefits		Combined
				D	iscount Rate	Discount Rate	Di	scount Rate
Category	Metric	Zero	o Discount Rate*		@7%	@3%		scoulle nate
Project Benefits								
Improved Safety	2 lives saved by reducing VMT on Roads	\$	27,923,674	\$	9,855,994		\$	9,855,994
Emission Savings	244,350 MT of CO ₂ Saved	\$	28,563,158	\$	4,179,622	\$ 10,247,278	\$	14,426,901
Improved Economic Competition	Savings to Shipper by using Rail vs. Truck	\$	807,552,520	\$	285,035,313		\$	285,035,313
Improved Mobility	Truck Time Savings Offset by Rail Engineer Time Increase	\$	127,298,194	\$	44,931,419		\$	44,931,419
Improved State of Good Repair on Roads	Reduction of 204 million VMT off road network	\$	24,485,757	\$	8,642,541		\$	8,642,541
Total Societal Benefits		\$	1,015,823,303	\$	352,644,889	\$ 10,247,278	\$	362,892,167
Life-Cycle Costs		\$	(7,617,385)	\$	(2,688,647)		\$	(2,688,647)
Residual Value of Capital Improvements in Year 20		\$	17,351,242	\$	2,987,806		\$	2,987,806
Total Benefits		\$	1,025,557,160	\$	352,944,047	\$ 10,247,278	\$	363,191,326
Project Cost								
Prior Incurred Cost of Design		\$	(6,039,977)	\$	(5,864,768)		\$	(5,864,768)
Cost Rail Expansion Project		\$	(36,702,550)	\$	(26,435,502)		\$	(26,435,502)
Total Cost		\$	(42,742,527)	\$	(32,300,270)		\$	(32,300,270)
Net Present Value		\$	982,814,633	\$	320,643,777	\$ 10,247,278	\$	330,891,056
Benefit-Cost Ratio								
Calculated Benefit Cost Ratio			24.0					11.24
Benefit-Cost Ratio (rounded)			24					11
* These values are expressed in year 2020 dolla	ar amounts.							