Appendix C: Economic Conditions Analysis Methods and Results

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A. INTRODUCTION

This appendix provides supplemental detail on the assumptions, calculation steps, and resulting inputs used to generate the Direct Highway System User Cost Savings and Direct Freight Shipper and Receiver Cost Savings inputs to the REMI Model. The REMI Model will ultimately be used to estimate economic impacts from operations of the Build Alternatives in Tier II.

B. CALCULATION OF REMI INPUTS

REMI INPUT: DIRECT HIGHWAY SYSTEM USER COST SAVINGS

The diversion of freight from truck to rail or waterborne modes leads to congestion relief and other benefits on specific segments of the region's highway system. The region's two travel demand models—NYMTC's Best Practice Model (BPM) and NJTPA's Regional Transportation Model Enhanced (RTME)—were used to generate estimates of travel time savings by users, in the form of reduced Vehicle Hours of Travel (VHT). **Table C-1** shows the estimated VHT savings by alternative, according to the travel demand model analysis.

The Enhanced Railcar Float Alternative with service between New Jersey and Brooklyn is the only Waterborne Alternative that was modeled. Shipper/receiver cost savings presented in Chapter 6.2-2, "Economic Conditions and Effects," for the Enhanced Railcar Float-New Jersey to Bronx, Truck Float/Truck Ferry, and Roll On-Roll Off (RORO)/Lift On-Lift Off (LOLO) Container Barge Alternatives were estimated by determining the volume of freight diverted from truck to a less expensive mode (i.e., rail, barge, or float); the diverted ton-miles were multiplied with the cost savings per diverted ton-mile that the modeled results for the Enhanced Railcar Float showed. Because the Truck Float/Ferry Alternatives do not result in a shift from truck to an alternative mode (a float/ferry functions as a link on which the truck travels), there is no measurable shipper cost savings associated with that alternative. Because the Container Barge Alternatives with service to New England do not provide direct benefits to shippers and receivers in the 23-county regional study area, no shipper/receiver cost savings were assigned. The RORO/LOLO Container Barge Alternatives with service to Brooklyn offer cost savings only to shippers and receivers in New York City.

Table C-1
Change in Daily Weekday Vehicle Hours of Travel (VHT), 2035

Alternative Class	Alternative		Non-Truck Business Related VHT Savings				Truck-Related VHT Savings			
			New York County	Rest of New York City	Study Area Counties in NY State	Study Area Counties in NJ	New York County	Rest of New York City	Study Area Counties in NY State	Study Area Counties in NJ
Water-borne	Enhanced Railcar Float	New Jersey to Brooklyn	(6,337)	(14,126)	(3,542)	3,309	(34)	(265)	(114)	(407)
Rail Tunnel	Rail Tunnel	Seamless	(6,488)	(14,022)	(3,416)	(8,999)	(96)	(603)	(637)	(1,265)
		Base	(6,481)	(14,098)	(3,420)	(8,591)	(70)	(598)	(531)	(1,118)
		Limited	(6,477)	(14,145)	(3,422)	(8,337)	(54)	(595)	(465)	(1,027)
	Rail Tunnel with Chunnel Service		(6,481)	(13,873)	(3,385)	(4,633)	(150)	(447)	(720)	(955)
	Rail Tunnel with Shuttle Service		(6,511)	(14,162)	(3,123)	(5,550)	(130)	(613)	(662)	(1,443)
	Rail Tunnel with Automated Guided Vehicle (AGV) Technology		(6,484)	(14,158)	(3,446)	(9,562)	(118)	(463)	(681)	(965)
	Rail Tunnel with Truck Access		(6,571)	(13,226)	(3,684)	3,089	(173)	100	(1,136)	136

Sources: Cambridge Systematics analysis, using Best Practices Model and Regional Travel Model-Enhanced.

These savings, in turn, were monetized using values of user time published by the U.S. Department of Transportation (USDOT) as part of the guidance for the Transportation Investments Generating Economic Recovery (TIGER) program. All truck trips were assumed to be work-related; 6 percent of auto trips were assumed to be business-related and the remainder were assumed to be commute or leisure-related. The value of time for non-truck related business trips is $12.00 per hour, and the value of time for truck-related trips is $23.70. Daily VHT savings were converted to annual cost savings by multiplying daily VHT savings by 295 weekdays to achieve annual savings, which in turn were multiplied by the TIGER value of time factors. The result for 2035 is shown in **Table C-2**.

<div align="right">Table C-2</div>

Annual Value of Highway User Time Savings, 2035 (Thousands of 2012$)

Alternative Class	Alternative		Non-Truck Business Related VHT Savings				Truck-Related VHT Savings			
			New York County	Rest of New York City	Study Area Counties in NY State	Study Area Counties in NJ	New York County	Rest of New York City	Study Area Counties in NY State	Study Area Counties in NJ
Water-borne	Enhanced Railcar Float	New Jersey to Brooklyn	$517	$2,294	$3,387	$6,706	$5	$30	$45	$115
Rail Tunnel	Rail Tunnel	Seamless	$22,966	$49,639	$12,094	$31,858	$672	$4,213	$4,454	$8,844
		Base	$22,943	$49,907	$12,105	$30,413	$491	$4,182	$3,715	$7,820
		Limited	$22,929	$50,074	$12,112	$29,514	$379	$4,163	$3,254	$7,182
	Rail Tunnel with Chunnel Service		$22,943	$49,112	$11,984	$16,400	$1,051	$3,123	$5,032	$6,677
	Rail Tunnel with Shuttle Service		$23,050	$50,133	$11,055	$19,646	$912	$4,288	$4,626	$10,088
	Rail Tunnel with Automated Guided Vehicle (AGV) Technology		$22,954	$50,119	$12,198	$33,849	$823	$3,235	$4,764	$6,744
	Rail Tunnel with Truck Access		$23,262	$46,818	$13,042	($10,936)	$1,209	($701)	$7,941	($951)
Sources: Cambridge Systematics analysis, using Best Practices Model, Regional Travel Model-Enhanced, and USDOT TIGER Value of Time Factors										

REMI Input: Direct Freight Shipper and Receiver Cost Savings

Direct freight shipper and receiver cost savings were estimated by multiplying the Avoided Truck VMT for each mode times the expected cost savings associated with each mode. The national average trucking cost per VMT published in USDOT's TIGER Benefit-Cost Analysis guidance, $2.038 per truck VMT, was used as a baseline. The Build Alternatives were assumed to offer a 10 percent discount ($0.2038 per VMT) on each truck VMT avoided as a result of shifting freight to non-truck modes.

Table C-3 shows the estimated total equivalent cost savings by east-of-Hudson market. This calculation was developed by multiplying the cost savings ($0.2038) times avoided truck VMT.

Table C-3
Total Equivalent Cost Savings by Market Origin-Destination, 2035 (Millions of 2012$)

Alternative Class	Alternative		Kings County	Queens County	Nassau County	Suffolk County	Bronx County	Other East-of-Hudson Study Area Counties	New England	Total East-of-Hudson Savings
Waterborne	Enhanced Railcar Float	New Jersey to Brooklyn	2.8	0.7	0.8	1.8	0.8	2.9	None	9.7
		New Jersey to Bronx	1.0	0.2	0.3	0.6	0.8	1.0	None	3.9
	Truck Float/Truck Ferry	New Jersey to Brooklyn	None	None	None	None	None	None	None	None
		New Jersey to Bronx	None	None	None	None	None	None	None	None
	RORO/ LOLO Container Barge	New Jersey to Brooklyn	0.02	0.02	None	None	None	None	None	0.04
		New Jersey to New England	None	None	None	None	None	None	0.9	0.9
Rail Tunnel	Rail Tunnel	Seamless	16.8	2.9	4.4	5.4	5.0	7.7	39.3	79.7
		Base	15.1	2.9	4.4	5.4	3.6	7.3	26.0	64.8
		Limited	14.8	2.9	4.4	5.1	3.2	7.2	18.5	56.0
	Rail Tunnel with Chunnel Service		15.3	3.0	4.5	5.5	3.6	7.3	26.0	65.2
	Rail Tunnel with Shuttle Service		15.1	2.9	4.4	5.4	3.6	7.3	26.0	64.8
	Rail Tunnel with Automated Guided Vehicle (AGV) Technology		15.2	2.9	4.4	5.5	3.6	7.3	26.0	64.9
	Rail Tunnel with Truck Access		15.1	2.9	4.4	5.4	3.6	7.3	26.0	64.8

Sources: Cambridge Systematics analysis, using Best Practices Model, Regional Travel Model-Enhanced, and USDOT trucking cost factors.

Table C-4 shows net shipper and receiver cost savings by market, with the assumption that 50 percent of the savings are accrued at each end of the trip. Due to the significant share of traffic for the chunnel being intraregional, benefits are shown for New Jersey counties in addition to east-of-Hudson markets.

<div align="right">**Table C-4**</div>

Net Shipper/Receiver Cost Savings by Market, 2035 (Millions of 2012$)

Alternative Class	Alternative		Kings County	Queens County	Nassau County	Suffolk County	Bronx County	Rockland West-chester Putnam Counties	Hudson County	Essex County	Rest of North-ern New Jersey Count-ies	Total Study Area Savings
Waterborne	Enhanced Railcar Float	New Jersey to Brooklyn	1.4	0.3	0.4	0.9	1.4	0.1	0.0	0.0	0.0	4.6
		New Jersey to Bronx	0.5	0.1	0.4	0.9	1.4	0.1	0.0	0.0	0.0	3.4
	Truck Float/Truck Ferry	New Jersey to Brooklyn	None	None	None	None	None	None	None	None	None	None
		New Jersey to Bronx	None	None	None	None	None	None	None	None	None	None
	RORO/ LOLO Container Barge	New Jersey to Brooklyn	0.01	0.01	None	None	None	None	None	None	None	0.02
		New Jersey to New England	None	None	None	None	None	None	None	None	None	None
Rail Tunnel	Rail Tunnel	Seamless	7.5	1.5	2.2	2.7	3.9	0.4	0.0	0.0	0.0	18.1
		Base	7.6	1.5	2.2	2.7	3.7	0.4	0.0	0.0	0.0	18.0
		Limited	7.4	1.5	2.2	2.6	3.6	0.4	0.0	0.0	0.0	17.5
	Rail Tunnel with Chunnel Service		7.6	1.5	2.2	2.7	3.7	0.4	0.02	0.02	0.85	18.3
	Rail Tunnel with Shuttle Service		7.6	1.5	2.2	2.7	3.7	0.4	0.0	0.0	0.0	18.0
	Rail Tunnel with Automated Guided Vehicle (AGV) Technology		7.6	1.5	2.2	2.7	3.7	0.4	0.0	0.0	0.0	18.0
	Rail Tunnel with Truck Access		7.6	1.5	2.2	2.7	3.7	0.4	0.0	0.0	0.0	18.0

Sources: Cambridge Systematics analysis, using Best Practices Model, Regional Travel Model-Enhanced, and USDOT trucking cost factors.

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