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Comments upon Metrics and Minimum Standards for Intercity Passenger Rail Service

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Virgil G. Payne, PE

Personal Work

Greetings:

Introduction

I am a licensed professional engineer who has had a part in recent Interstate Highway planning, design, and construction who now supports high-volume manufacturing after a period of designing infill buildings and sites and briefly working in utility and railroad operations. Perhaps a broader consideration of transportation financing is needed to address the rulemaking.

An amicable path forward is available to address questions of operational reliability and efficiency on the General Railway System that the proposed Metrics and Minimum Standards seek to address should federal policy be reversed to move toward a market economy. While performance based metrics can play some part in ordering goals for the public good they should not be developed using existing assumptions when competitive modes are financed under differing methods and cost recovery rates. The FRA and the USDOT could guide the metrics and minimum standards by considering the differences between infrastructure and operations in greater detail relative to other surface transportation programs.

The Financial Assumptions behind the 1973 3R Act Infrastructure Consolidation are not Durable

Discussion:

With the benefit of hindsight, it can be seen that the drastic reduction in system infrastructure route reliability that was the hallmark of various plans to reduce overall capacity in the eastern General Railway System to meet a lower marketplace demand under past observed conditions was predicated on an incorrect financial model of infrastructure investment. The United States Department of Transportation (USDOT) at its 1967 founding as an agency inherited a concept of infrastructure financing from the Department of Commerce, Bureau of Public Roads that does not actually advocate for incremental user funding of highway infrastructure, but instead promotes a little understood concept of leveraging highways as a public investment. This leveraging arises when excise taxes collected during the use of the much broader locally financed road network are devoted at the federal level through the fuel (gas) tax to intercity highways, significantly funding this type of infrastructure with minimal incremental cost recovery.

While many focus on the \$141 Billion transferred to the Highway Trust Fund (HTF) from general funds¹ by the last authorizing legislation the much larger incremental funding gap is actually this leveraging atop locally financed road assets. Governments ultimately survive on some form of excise taxation warranted for public good projects, yet marketplace distortions occur when only one mode is beneficially funded in a long-term program of consistent formulaic investment.

Net Present Value studies that I have conducted, using historic corporate bond interest rates though with no equity load nor property tax burden, show that the nationwide Interstate Highway system has only recovered around 1/8th of its direct financial long-run average costs over the last six-decades from incremental fuel taxes and fees prorated by mileage and only 1/16th for newer projects similar to those I helped organize at MDOT. The basic charts are enclosed with this comment.

Certainly, this incremental highway funding gap could be corrected by a fuel tax increase, targeted by perhaps creating a new class of chemically marked diesel fuel. However, this is politically unlikely leaving few solutions to establish a competitive infrastructure basis outside of urban areas where toll lanes could be expanded to throttle congestion.

While the USDOT as a whole should look to reform their methodologies for project justification perhaps the only option to restore the marketplace that is available solely to the Federal Railroad Administration (FRA) is to research this topic and publish data that supports a form of assignable Tax Credit for mainline General Railway System infrastructure equal to the highway leveraging per person-mile and/or intermodal freight highway container/trailer-mile converted to a train-mile basis², claimable only with operation of consumer beneficial transportation (both passenger and highway competitive intermodal freight routes) to balance the funding of intercity infrastructure. The FRA could thus advocated for a Shadow Toll of this amount.

Ultimately, it must be acknowledged that the only real solution to many of the on-time and financial metrics is for the nation to encourage the shareholder owned railroads to provide for resilient mainline infrastructure in a manner that is beneficial to their owners though there is some residual duty that such railroads have to provide for common carrier service in their partially deregulated state. While this is somewhat out of the scope of the rulemaking the FRA must ask itself how will more reliable infrastructure be funded and what can they do to through basic research to advance concepts that would serve as the foundation for legislation such as an infrastructure Tax Credit.

Proposed Addition to Rule Section II. Background – Modal Equity Rationale Statement:

Overall, incremental changes to the Amtrak route level performance and goal achievement should be evaluated using a Metric of \$17.2 per train-mile as an acceptable level of Public Good Below-the-Rail Infrastructure Investment that is not covered by incremental consumer revenue which shall be subtracted from existing costs. This investment is roughly equivalent to the gap between the incremental consumer fuel taxes and prorated fees and the long-run average financial cost of the last six-decades of nationwide Interstate Highway spending. An additional fixed amount for the Northeast Corridor infrastructure will exist in such an analysis that is justified at the federal level as the most efficient method to provide for intercity transportation capacity where no room remains for economical highway expansion.

¹ Government Accountability Office, "Funding the Nation's Surface Transportation System—High Risk Issue 2017," https://www.gao.gov/key_issues/funding_nations_surface_transportation_system/issue_summary

² Virgil G. Payne, "<u>Tax Credit Policy Summary</u>" 2020, https://www.scribd.com/document/442430149/Policy-Summary-National-Railway-Infrastructure-Plan

Financial Efficiency Metrics must be Open, Consistent, and Encourage Competition

Discussion:

The metrics proposed in <u>Section 273.9 Financial</u> - state that "Adding frequency variable and route variable costs to calculate avoidable operating costs (ed. as proposed by the rule) does not make any distinction between short- and long-term avoidable costs, but results in a single avoidable cost figure for a single route at a future time. This approach represents a maximum saving, or cost avoided, and may be lower depending on the specific context of each individual route".

As such the proposed avoidable cost metric is deficient to the original legislative intent to report avoidable loss/cost as it is not actually the avoidable cost as Congress requested in Section 207 "Such metrics, at a minimum, shall include the percentage of avoidable and fully allocated operating costs covered by passenger revenues <u>on each route</u>..."³ and lacks transparency. Further Congress has clarified elsewhere they desire to see reports including loss/cost that are on the "short-term avoidable" basis that have yet to be provided as required.⁴

Combining frequency variable and route variable costs together cannot work for this purpose as many physical rail lines have many routes, some even with differing state or federal sponsorship, such that the data is not parsed for determining this result. It appears that the FRA is simply using the recently developed Amtrak methods as a way to meet the statutory requirements to report these costs without performing detailed oversight of the grant to Amtrak even though the FRA previously determined that both short and long-term avoidable loss/costs were needed under the metrics determination and proceeded to report they did not have this data for a decade every quarter⁵. I take this position after filing detailed Freedom of Information Act requests with both Volpe and the FRA⁶ for any underlying data that they had developed under the original PRIIA financial metrics study funded almost a decade ago by federal spending but yet was told that neither group had such data.

At the very least the FRA should provide some discussion and analysis

I have included my own breakdown of a US private operator's information from Security and Exchange Commission (SEC) filings to show the distinctions between Above-the-rail and Below-the-rail costs in the Appendix to demonstrate why a consumer service agency must be guided by such business metrics as well as why the public good is served by such a division. Congress clearly wanted additional information similar to this analysis as many are business oriented. At the very least the FRA should require reporting much more information, including the cost recovery as both a percentage of the frequency variable cost and as a percentage of the frequency and route variable cost if no additional data analysis is budgeted.

However, a much more sensible way that the rule should adopt is to compare the revenue to the costs of only above-the-rail operations as a refined type of long-term avoidable cost as this would first be consistent with other United States modes such as highway and aviation and secondly is the path

³ <u>49 USC Subtitle V, Part C (Ch. 241, §24101 - Section 207)</u>

⁴ <u>49 USC Subtitle V, Part C (Ch. 241, §24315)</u> Reports and audits (a) Amtrak Annual Operations Report...(1) <u>for each</u> <u>route</u> on which Amtrak provided intercity rail passenger transportation during the prior fiscal year, includes information on- (A) ridership; (B) passenger-miles; (C) the <u>short-term avoidable profit or loss for each passenger-mile</u>; (D) the revenue-to-cost ratio; (E) revenues; (F) the United States Government subsidy; (G) the subsidy not provided by the United States Government; and (H) on-time performance.

⁵ <u>FRA quarterly Metrics Statement - 2010</u>, https://cms8.fra.dot.gov/elibrary/rail-service-metrics-and-performancequarter-ended-december-31-2010-first-quarter-fiscal

⁶ FRA FOIA Request 2020-102

increasingly taken by other western democracies as their competitive railway deregulation schemes mature and they see that infrastructure is a core government function.

This is important as Section 208 required FRA to consider "(4) the methodologies of Amtrak and major intercity rail passenger transportation service providers in other countries for determining intercity passenger rail routes and service"⁷

In these countries the highway fuel tax is around ten times that in North America, so the effects of undercharging highway users are not as pronounced as here, however the European democracies are starting to consider infrastructure funding – and not just limited to capital - to support services instead of a mixed bag of general subsidies as they are extending the funding to the track usage fee that they previously tried to recover from fares for certain intra-state connectivity services. Track usage fees are Capital Leases or in other words the long-run average costs of infrastructure (below-the-rail).

Investing in infrastructure only - though the average cost of both capital and operations - appears to be a much preferred way to accomplish governmental investment as the operator them becomes competitive in their service provisions toward the customer⁸, who then is free to provide immediate feedback through purchases and as such the Customer Service metrics proposed in this rulemaking will require less agency oversight.

In the United States highway infrastructure has such a low cost recovery rate (around 1/8th of the longterm average cost where even capital is variable with respect to use) that the division of costs between above-the-rail operations and below-the-rail infrastructure when combined with the assignable Tax Credit for infrastructure per operated train-mile would allow for beneficial modal neutrality to accomplish the USDOT's efficiency goal below the point where commercial aviation becomes efficient which is a much longer trip than is commonly assumed when considering connecting at airports relative to overnight rail services when considering the Base Airfare to Trip Length chart in the Appendix.

I have included an analysis of Amtrak's cost centers for existing train operations indicating that the true revenue gap is already being spent on below-the-rail infrastructure facilities such as mainline leases, terminal yards, platforms, and risk protection. Incremental additions to service away from the congested corridor regions is already equivalent to the gap seen in highway funding due to leveraging on a person-mile metrics.

Thus an amicable path forward is to expand passenger capacity and volume per train-mile by running at least two round trips a day per route, utilizing the declining cost curve with respect to volume, so that all operational costs for a quality service are accounted for above-the-rail including ultimately equipment lease/ depreciation costs – everything that the average customer sees. Notably, this distance based metric could become a refundable or assignable federal tax credit, nimbly bringing the funds forward for reconstructing the shareholder owned general railway system mainlines and publicly held commuter lines and terminals as worked out in more detail for both freight and passenger rail operations in a recent paper⁹. One can see that this method is both easily understood and can be rather easily defined by parsing the financial metrics in this rule.

⁷ <u>49 USC Subtitle V, Part C (Ch. 241, §24101 - Section 208)</u>

⁸ David Burroughs, "Subsidies could harm overnight train revival, AllRail warns," July 18, 2019,

https://www.railjournal.com/regions/europe/subsidies-could-harm-overnight-train-revival-allrail-warns/ ⁹ Virgil G. Payne, "<u>National Railway Infrastructure Plan for Shareholder and Publicly Held Railways</u>," 2020, https://www.scribd.com/document/443778048/National-Infrastructure-Plan-for-Shareholder-and-Publicly-Held-Railways

Proposed Section 273.9 Financial Rule Revision:

Define the Financial Metrics Thus:

Short-Term Avoidable Cost = Amtrak's Frequency Variable Cost Definition

Long-Term Avoidable Cost = Above-the-Rail Operations * + Off-book Equipment Lease/Depreciation

Long-Term Infrastructure Average Cost = Below-the-Rail Infrastructure Investment*

Common System Fixed Cost = Amtrak's Common System Fixed Cost Definition

* Breakdown defined by FY2018 Amtrak Performance Tracking Cost Centers in Appendix

Operational On-Time-Percentage Metrics for Monitoring Need Simple Enforcement Boundaries

Discussion:

Preference as exists in current law perhaps might not need to be mediated through the performance based metrics proposed in <u>Section 273.5</u> On-Time Performance and Train Delays - as it is rather complicated to assign corrective infrastructure or operations action. While I take no issue with the all Customer OTP metric proposed in the metrics for monitoring, perhaps the FRA should work to define in very realistic terms what minimum boundary actions exhibit preference in the current operating environment, thus would be investigative targets for enforcement should the monitoring metrics fall out of bounds. The FRA could do so by publishing a paper of best practices.

The first example might be that auto-routing of dispatching decisions authorizing train movements must be coded to create a plan of the next 90 minutes for train movements that provides a clear path assuming all goes well, continually reset against where the train is now compared to a table of pure running plus dwell time between upcoming control points. Should a train be unable to move, the established dispatching path might only be kept open for 15 minutes unless earlier consent to end it is given by the operating conductor by means of an update. Once movement is again possible the clear path decision tree test is again reinstated but it would only apply for the next future 90 minutes, staring just then. This test would not penalize a host railroad should their equipment function incorrectly or should there be interference at grade crossings but would penalize them for deficiencies in infrastructure configuration and maintenance timeliness.

The second example might be that there needs to be some type of industry wide dispatching data transfer standard to hand off this 90 minute future look countdown clock at interchanges between railroads so that each dispatching plan provides for these movements.

At some level the FRA is likely going to have to coordinate such data transfer and investigative methodology within the rule. These approaches could be easily auditable and could generate easily understood and assignable corrective action items at particular infrastructure points. The clear path could also vary, such that a railroad that meet the metrics consistently could see the 90 minutes drop to 60, while one that didn't would see the 90 minutes increase.

Proposed Section 273.5 On-Time Performance and Train Delays Addition:

Include a statement of best practices in dispatching software code in the final rule.

Appendix Charts Follow

Analysis of Original Interstate Highway Long-run Average Construction and Rebuilding Costs relative to Fuel Taxes and Fees Collected for Use of System

						-			<u> </u>	HVUT, Trailer	-													1000		
										& Truck tire				Interstate Federal-												
			Interstate					State A	verage Fee	fees (estimated)	Interstate Federal Capital Expenditure	Interstate Federal	State Capital (Millions) 10%	State Maintenance (Millions) None							User					
	nterstate		Combo &						Gallon	prorated to	. ,			Assumed Prior to							Federal &					
	otal VMT Villions)		Single Truck VMT						MF-205 o-rated by	VMT Table FE-101	204 & FA-3 1956 Reimbursement of		Prior to 1981 Table SF-212A 1981-1995			Resulting Federal-State user capital repayment for			User Federal Incremental	User State Incremental	State Taxes per	Aaa Corporate				
	able VM-		(Millions)	Miles pe	r Gallon	Federa	l Fee per		antity)	1956-1985						each year based on VMT,			Taxes per	Taxes per		Bond Rate	1-Yr			
)2, 203 & VM-1		VM-201& VM-1	VN Gasoline			allon e Diesel		7-1995 e Diesel	Estimates 1986-Current	per Sec. 1014 of	& FA-3 to		2008 Table SF-12/A 2009-2015	VMT, Federal tax, and MPG	Federal tax, MPG, and Fee Test Ratio	Inflation Factor	Capital Cost (\$2018) CPI Inde		Automobile		(Est. prior	Treasury r Rate	NPV Aaa Corporate Bond Rate	NPV 1-YR Treasury + 1% Rate	NPV Investor WACC Rate
	Rural	Urban	VIVI-1	Gasoline	Diesei	Gasonne	Diesei	Gasoiin	e Diesei	1980-Current	ISTEA 1991	2011	12/A 2009-2015	2009-2013		Test Natio	Factor		x vivii (\$2018)	vivii (32018)	(\$2018)	to 1976) Yea	Nate	bond kate	1% Rate	Nate
1956	2.242	2 5 6 2		14.3	5.0	¢0.020	<u> </u>	40.0FC	40.05C	<u> </u>	\$4,967		\$4,967		640 00C 000	\$4,967,000,000	9.2463	\$45,926,216,418 26.		60.005	£0.400		.956	<u> </u>	<u> </u>	65 225 05 4 700
	3,243 6,264	3,563 6,658		14.3 14.3	5.0 5.0	\$0.030 \$0.030				\$0.004 \$0.004	\$400 \$1,700		\$444 \$1,889		\$40,836,000 \$78,164,545	\$403,608,444 \$1,810,724,343	8.9783 8.6643	\$3,990,338,164 27. \$16,365,967,366 28.		\$0.035 \$0.034			.957 3.11% .958 1.57%	\$5,245,648,700 \$5,879,181,910	\$5,171,143,700 \$5,718,023,275	\$5,335,054,700 \$6,075,522,671
1959	9,775	10,222		14.3	5.0	\$0.030	\$0.030	\$0.059	\$0.059	\$0.004	\$2,200		\$2,444		\$123,897,497	\$2,320,546,948	8.5448	\$20,887,356,322 29.	0 \$0.018	\$0.035	\$0.187	5.81% 1	.959 3.31%	\$8,136,689,807	\$7,853,236,640	\$8,486,390,412
	10,514 13,091	13,365 16,952		14.3 14.3	5.0 5.0	\$0.040 \$0.040				\$0.004 \$0.004	\$2,487 \$1,782		\$2,763 \$1,980		\$165,984,098 \$211,981,727	\$2,597,349,235 \$1,768,018,273	8.4573 8.3154	\$23,370,443,686 29.3 \$16,464,563,758 29.3		\$0.035 \$0.035			.960 3.21% .961 1.95%	\$11,054,344,974 \$14,259,194,601	\$10,602,099,877 \$13,588,832,862	\$11,618,538,356 \$15,104,380,566
	22,001	22,180		14.3	5.0	\$0.040	\$0.040			\$0.004	\$2,178		\$2,420		\$314,519,287	\$2,105,480,713	8.2600	\$19,989,200,000 30.		\$0.036			.962 3.10%	\$16,924,736,795	\$15,986,482,031	\$18,120,956,353
	27,536	27,674		14.3 14.3	5.0	\$0.040				\$0.004 \$0.004	\$2,370 \$2,567		\$2,633		\$394,577,762	\$2,238,755,571 \$2,366,080,488	8.1513	\$21,465,131,579 30.		\$0.035			.963 3.36%	\$20,145,388,254	\$18,880,772,320	\$21,775,782,145
	33,595 40,310	33,833 40,380		14.3 14.5	5.0 5.0	\$0.040 \$0.040	\$0.040 \$0.040			\$0.004 \$0.005	\$2,652		\$2,852 \$2,947		\$486,141,734 \$579,298,552	\$2,366,080,488 \$2,367,368,115	8.0194 7.9423	\$22,873,160,734 30.1 \$23,403,333,333 31.1		\$0.035 \$0.035			.964 3.85% .965 4.15%	\$23,805,536,958 \$27,912,030,006	\$22,143,824,994 \$25,772,165,614	\$25,971,722,540 \$30,732,347,384
	48,900	50,414	8,918	14.5	5.0	\$0.040		-		\$0.005	\$2,765		\$3,072		\$876,663,512	\$2,195,558,710	7.7925	\$23,940,146,751 31.		\$0.035			.966 5.20%	\$32,610,911,777	\$29,884,184,820	\$36,244,188,471
	54,847 62,300	56,317 63,973	9,887 10,597	14.5 14.5	5.0 5.0	\$0.040 \$0.040				\$0.005 \$0.005	\$2,955 \$3,362		\$3,283 \$3,736		\$983,797,041 \$1,124,815,155	\$2,299,536,293 \$2,610,740,400	7.5319 7.2669	\$24,729,787,234 32. \$27,145,767,351 34.		\$0.034 \$0.033			.967 4.88% .968 5.69%	\$37,375,188,009 \$42,924,084,221	\$33,966,032,449 \$38,691,735,291	\$41,968,515,972 \$48,690,430,686
	71,821	73,195	11,268	14.5	5.0	\$0.040				\$0.005	\$3,752		\$4,169		\$1,302,460,509	\$2,866,428,380	6.9607	\$29,018,277,154 35.		\$0.033			.969 7.12%	\$49,915,274,750	\$44,656,236,717	\$57,159,764,825
	79,516	81,532	12,035	13.5	5.5	\$0.040				\$0.005	\$3,940		\$4,378		\$1,522,306,231	\$2,855,471,546	6.5556	\$28,698,765,432 37.		\$0.034			.970 6.90%	\$57,743,183,224	\$51,276,955,639	\$66,749,126,843
	89,542 99,024	90,117 100,556	13,600 15,668	13.5 13.5	5.5 5.5	\$0.040 \$0.040				\$0.006 \$0.006	\$3,920 \$3,964		\$4,356 \$4,404		\$1,717,021,300 \$1,958,183,410	\$2,638,534,256 \$2,446,261,034	6.2261 6.0292	\$27,118,257,956 39. \$26,555,263,585 41.		\$0.033 \$0.033			.971 4.89% .972 4.95%	\$65,076,895,358 \$72,760,229,120	\$57,320,827,147 \$63,526,943,406	\$76,001,260,982 \$85,913,976,297
1973 1	107,085	108,462	18,354	13.5	5.5	\$0.040		\$0.075	\$0.075	\$0.006	\$3,964		\$4,404		\$2,182,553,767	\$2,221,890,678	5.8169	\$25,620,219,092 42.	6 \$0.017	\$0.032	\$0.158	9.82% 1	.973 7.32%	\$82,591,767,487	\$71,462,175,050	\$98,627,696,909
	104,621 111,980	109,304 118,232	19,205 20,347	13.5 13.9	5.5 5.5	\$0.040 \$0.040				\$0.007 \$0.008	\$2,543 \$2,965		\$2,826 \$3,294		\$2,202,869,047 \$2,343,964,050	\$622,686,508 \$950,480,394	5.3176 4.7562	\$15,025,164,521 46. \$15,669,161,868 52.		\$0.030 \$0.026			.974 8.20% .975 6.78%	\$93,888,719,589 \$103,282,064,582	\$80,462,999,774 \$87,394,152,675	\$113,455,786,035 \$126,718,367,300
	117,885	132,698	20,347	13.9	5.5	\$0.040 \$0.040				\$0.008 \$0.008	\$3,235		\$3,594		\$2,586,971,895	\$1,007,472,549	4.4568	\$16,019,844,125 55.		\$0.025			.976 5.88%	\$113,019,348,518	\$94,422,743,825	\$140,703,837,044
	126,149	141,639	25,231	13.9	5.5	\$0.040		-		\$0.009	\$3,112		\$3,458		\$2,812,708,328	\$645,069,450	4.2359	\$14,646,792,023 58.		\$0.024			.977 6.08%	\$123,171,772,117	\$102,186,675,694	\$155,944,793,529
	136,125 133,597	156,793 159,452	28,145 29,230	13.9 13.9	5.5 5.5	\$0.040 \$0.040	\$0.040 \$0.040			\$0.009 \$0.010	\$3,263 \$3,280		\$3,626 \$3,644		\$3,114,405,673 \$3,207,841,703	\$511,149,883 \$436,602,741	3.9648 3.6281	\$14,374,602,667 62. \$13,222,449,976 68.		\$0.022 \$0.021			.978 8.34% .979 10.65%	\$134,626,051,836 \$148,150,914,245	\$112,436,230,140 \$126,105,749,796	\$174,400,393,995 \$197,366,687,881
	135,084	161,242	30,651	15.9	5.7	\$0.040				\$0.011	\$3,261	\$170	\$4,992		\$3,049,892,751	\$1,942,315,249	3.1851	\$15,900,631,650 77.		\$0.017			.980 12.00%	\$166,328,866,514	\$142,992,858,367	\$227,006,968,450
	139,304	166,479	32,539	15.9	5.7	\$0.040	\$0.040			\$0.013	\$3,519	\$170	\$4,496		\$3,426,444,788	\$1,069,491,212	2.8483	\$12,805,665,986 87.		\$0.016			.981 14.80%	\$192,115,208,219	\$167,834,931,047	\$268,378,929,337
	142,546 145,250	175,879 192,470	33,705 35,241	15.9 15.9	5.7 5.7	\$0.040 \$0.090				\$0.014 \$0.014	\$3,519 \$3,162	\$268 \$780	\$4,198 \$4,586		\$3,607,648,216 \$5,259,174,048	\$590,152,784 \$672,856,048	2.6278 2.5337	\$11,030,912,914 94. \$11,620,548,061 97.		\$0.015 \$0.016			.982 12.27% .983 9.58%	\$219,824,869,483 \$246,952,990,948	\$191,318,039,093 \$212,212,078,578	\$312,511,667,121 \$356,485,208,072
	149,139	204,304	37,118	15.9	5.7	\$0.090				\$0.015	\$3,599	\$1,901	\$5,959		\$6,162,819,512	\$203,341,512	2.4318	\$14,492,234,037 101.		\$0.016			.984 10.91%	\$277,582,340,046	\$236,733,543,933	\$408,436,998,888
	154,357 159,498	216,188 232,017	37,252 38,863	17.4 17.4	5.7 5.7	\$0.090 \$0.090				\$0.015 \$0.016	\$3,640 \$3,483	\$2,758 \$2,930	\$7,386 \$7,391		\$6,157,081,609 \$6,677,491,375	\$1,229,180,391 \$713,082,625	2.3488 2.2609	\$17,348,964,205 105. \$16,709,710,193 109.		\$0.015 \$0.015			.985 8.42% .986 6.45%	\$308,916,990,668 \$338,121,355,688	\$258,811,347,490 \$279,413,547,208	\$461,263,209,470 \$512,404,568,575
	170,493	244,836	41,245	17.4	5.7	\$0.091	\$0.151			\$0.016	\$2,623	\$2,541	\$7,564		\$7,421,901,097	\$141,671,903	2.2284	\$16,854,796,667 111.		\$0.016			.987 6.77%	\$370,617,108,627	\$301,892,468,971	\$570,258,432,837
	181,315	258,695	42,871	17.4	5.7	\$0.091				\$0.017	\$2,771	\$2,543	\$7,344		\$8,047,905,421	\$703,835,421	2.1417	\$15,729,131,772 115.		\$0.017			.988 7.65%	\$406,759,458,119	\$328,160,094,060	\$637,057,060,980
	191,085 200,173	270,735 278,901	44,719 46,123	17.4 20.2	5.7 5.9	\$0.091 \$0.091	\$0.151 \$0.151			\$0.018 \$0.019	\$2,421 \$2,733	\$2,543 \$2,508	\$8,149 \$8,707		\$8,712,476,042 \$8,551,206,582	\$563,939,042 \$156,282,418	2.0462 1.9451	\$16,673,884,960 121. \$16,936,544,538 127.		\$0.017 \$0.015			.989 8.53% .990 7.89%	\$443,656,373,360 \$484,388,649,197	\$358,662,840,087 \$389,933,893,348	\$711,239,273,143 \$792,744,121,683
1991 2	205,011	285,325	47,369	21.1	5.9	\$0.141	\$0.201	\$0.176	\$0.176	\$0.020	\$2,754	\$2,528	\$8,331		\$10,600,975,072	\$2,270,463,072	1.8410	\$15,336,559,239 134.	6 \$0.012	\$0.015	\$0.154	8.77% 1	.991 5.86%	\$527,039,522,118	\$416,850,361,824	\$875,409,620,152
	205,557 208,308	303,265 317,399	48,857 49,009	21.0 20.5	5.9 5.9	\$0.141 \$0.141	\$0.201 \$0.201			\$0.020 \$0.021	\$1,630 \$1,218	\$2,339 \$2,795	\$9,363 \$8,931		\$11,190,614,959 \$11,775,281,051	\$1,827,356,959 \$2,844,025,051	1.7944 1.7377	\$16,800,979,959 138. \$15,520,092,825 142.		\$0.015 \$0.016			.992 3.89% .993 3.43%	\$567,485,260,452 \$606,498,404,124	\$434,852,855,800 \$452,208,528,440	\$953,817,215,194 \$1,032,947,075,779
	215,568	330,577	51,618	20.7	5.9	\$0.141 \$0.184	\$0.244			\$0.021	\$1,061	\$2,782	\$9,651	\$1,373	\$13,705,299,950	\$2,681,299,950	1.6949	\$16,357,850,889 146.		\$0.015			.994 5.32%	\$651,765,633,085	\$477,764,340,002	\$1,130,126,056,953
	223,382	341,528	55,136	21.1	5.9	\$0.184	\$0.244			\$0.022	\$1,329	\$2,775	\$9,949	\$1,377	\$14,173,055,421	\$2,846,861,421	1.6487	\$16,402,716,244 150.		\$0.014			.995 5.94%	\$698,349,834,021	\$508,053,803,032	\$1,237,145,131,860
	232,565 240,255	351,579 361,433	58,710 62,283	21.1 21.1	5.9 5.9	\$0.183 \$0.183	\$0.243 \$0.243			\$0.022 \$0.023	\$1,000 \$1,082	\$2,427 \$2,404	\$10,522 \$11,007	\$1,474 \$1,329	\$14,787,839,706 \$15,417,397,742	\$2,792,422,706 \$3,081,070,742	1.6049 1.5575	\$16,886,258,778 154. \$17,143,509,552 159.		\$0.014 \$0.014			.996 5.52% .997 5.63%	\$746,761,541,681 \$798,055,673,924	\$538,146,434,205 \$570,847,982,461	\$1,350,692,597,341 \$1,474,791,497,076
1998 2	251,520	374,622	64,000	21.1	5.9	\$0.183				\$0.023	\$595	\$2,490	\$10,924	\$1,334	\$16,103,486,023	\$3,846,209,023	1.5334	\$16,750,504,092 161.	6 \$0.013	\$0.014	\$0.150		.998 5.05%	\$846,886,444,770	\$602,116,809,878	\$1,600,308,483,387
	260,166	383,259	66,000	21.1	5.9	\$0.183			\$0.202	\$0.024	\$329	\$3,199	\$12,953	\$1,479	\$16,769,299,195	\$2,337,021,195	1.5082	\$19,536,542,951 164.		\$0.014			.999 5.08%	\$902,474,572,367	\$634,645,453,387	\$1,741,133,685,667
2000 2 2001 2	208,180	393,465 399,890	67,849 68,685	21.1 21.1	5.9 5.9	\$0.183 \$0.183				\$0.025 \$0.025	\$217 \$158	\$3,597 \$3,793	\$14,112 \$14,263	\$1,724 \$1,725	\$17,521,141,665 \$17,730,055,871	\$1,685,001,665 \$1,742,891,871	1.4680 1.4152	\$20,716,424,982 168. \$20,184,255,348 175.		\$0.014 \$0.013			.000 6.11% .001 3.49%	\$968,728,032,571 \$1,035,509,677,495	\$677,265,561,721 \$705,914,127,203	\$1,909,476,945,056 \$2,068,885,895,091
	279,962	408,618	69,520	21.1	5.9	\$0.183				\$0.026	\$128	\$4,414	\$15,320	\$1,806	\$18,263,941,819	\$1,137,309,819	1.3992	\$21,436,370,656 177.	1 \$0.012	\$0.013			.002 2.00%	\$1,100,858,250,011	\$725,296,372,392	\$2,222,054,699,882
	269,945 266,996	432,633 454,385	79,427 89,334	21.1 22.5	5.9 5.9	\$0.183 \$0.183			\$0.200 \$0.194	\$0.026 \$0.027	\$79 \$117	\$3,893 \$3,822	\$15,093 \$13,685	\$1,900 \$1,658	\$19,097,379,193 \$19,533,770,082	\$2,103,881,193 \$4,190,243,082	1.3638 1.3380	\$20,584,196,394 181. \$18,310,830,441 185.		\$0.012 \$0.011			.003 1.24% .004 1.89%	\$1,161,965,145,406 \$1,225,161,453,389	\$740,380,225,574 \$759,612,530,734	\$2,369,541,181,806 \$2,531,595,403,037
2005 2		469,070	91,771	22.9	5.9	\$0.183			\$0.200	\$0.028	\$20	\$4,082	\$15,063	\$2,213	\$19,863,778,218	\$2,587,774,218	1.2994	\$19,572,796,811 190.		\$0.011			.005 3.62%	\$1,284,828,004,606	\$790,322,797,342	\$2,714,079,305,070
2006 2		477,287	90,322	22.5	5.9	\$0.183				\$0.029	\$6	\$4,373	\$16,752	\$2,281	\$20,519,607,354	\$1,486,617,354	1.2496	\$20,934,130,254 198.		\$0.011			4.94%	\$1,353,917,459,266	\$834,526,483,497	\$2,931,935,792,310
2007 2 2008 2		483,315 476,114	119,778 114,358	22.9 23.7	6.0 6.0	\$0.183 \$0.183			\$0.205 \$0.208	\$0.029 \$0.031	\$4 \$3	\$4,000 \$4,901	\$19,375 \$20,010	\$2,104 \$2,505	\$22,634,079,501 \$21,996,877,623	\$1,155,759,501 \$517,777,377	1.2243 1.1740	\$23,720,721,113 202. \$23,490,749,710 211.		\$0.010 \$0.010			.007 4.53% .008 1.83%	\$1,427,625,996,722 \$1,506,780,511,577	\$879,106,970,740 \$902,797,230,517	\$3,163,361,275,381 \$3,380,713,917,027
2009 2	242,178	474,798	105,758	23.5	6.0	\$0.183	\$0.243	\$0.208	\$0.214	\$0.032	\$46	\$4,622	\$14,782	\$4,118	\$21,600,390,360	\$2,700,565,360	1.1736	\$17,348,248,641 211.	1 \$0.009	\$0.010	\$0.127	5.31% 2	0.47%	\$1,587,335,828,098	\$916,593,738,511	\$3,589,988,939,217
2010 2 2011 2		477,693 476,704	110,626 105,052	23.3 23.1	5.9 5.8	\$0.183 \$0.183			\$0.224 \$0.224	\$0.032 \$0.032	\$10 \$14	\$5,000 \$5,000	\$14,228 \$14,228	\$5,971 \$5,971	\$22,839,112,450 \$22,381,177,540	\$2,639,420,450 \$2,181,485,540	1.1436 1.1252	\$16,271,439,516 216. \$16,010,177,931 220.		\$0.011 \$0.010			010 0.32% 011 0.17%	\$1,662,916,244,717 \$1,737,313,668,913	\$925,956,563,036 \$934,119,953,155	\$3,798,651,404,844 \$4,010,562,581,753
2011 2		476,704 484,548	105,052	23.1	5.8 5.8	\$0.183 \$0.183			\$0.224 \$0.219	\$0.032 \$0.032	414	90,000	\$14,228 \$20,492	\$3,533	\$22,746,713,755	\$2,181,485,540 \$1,278,852,245	1.1252	\$22,399,758,029 226.		\$0.010 \$0.010		4.64% 2 3.64% 2		\$1,798,290,994,848	\$942,842,147,686	\$4,010,562,581,753 \$4,210,884,509,193
2013 2	234,303	505,309	112,248	23.4	5.8	\$0.183	\$0.243	\$0.219	\$0.223	\$0.032			\$21,208	\$3,668	\$23,388,312,067	\$1,487,687,933	1.0760	\$22,819,550,152 230.	3 \$0.008	\$0.010	\$0.121	4.27% 2	013 0.13%	\$1,876,411,479,564	\$954,789,567,231	\$4,440,209,885,827
2014 2 2015 2		519,843 541,186	113,413 115,858	23.4 23.4	5.8 5.8	\$0.183 \$0.183			\$0.238 \$0.237	\$0.032 \$0.032			\$25,305 \$24,389	\$3,843 \$3,324	\$24,165,766,686 \$25,548,069,842	\$4,982,233,314 \$2,164,930,158	1.0626 1.0603	\$26,889,275,300 233. \$25,860,480,103 233.		\$0.010 \$0.011		4.25% 2 4.19% 2	014 0.11% 015 0.30%	\$1,957,709,882,116 \$2,044,928,915,067	\$966,891,932,696 \$984,508,530,169	\$4,681,282,740,889 \$4,940,916,612,902
2015 2		558,388	120,881	23.4	5.8	\$0.183 \$0.183			\$0.257	\$0.032			\$24,000	\$3,200	\$26,825,840,876	\$374,159,124	1.0460	\$25,104,263,402 236.		\$0.011			016 0.60%	\$2,118,742,129,808	\$1,002,460,235,692	\$5,197,155,934,373
2017 2	252,550	567,210	124,118	23.4	5.8	\$0.183			\$0.250	\$0.032			\$24,000	\$3,200	\$27,416,260,513	\$216,260,513	1.0206	\$24,494,233,937 242.		\$0.011			017 1.17%	\$2,197,099,768,365		\$5,482,146,841,417
2018 2 Current 10		570,000 16,238,701	130,000 3,105,740	23.4	5.8	ŞU.183	şu.243	şu.251	\$0.250	\$0.032			\$24,000 2006, 2016-2018 Not	\$3,200 Found, Estimated	\$28,185,422,930	\$985,422,930	1.0000	\$24,000,000,000 247. \$1,243,506,153,327	8 \$0.008 \$0.014	\$0.011 \$0.020	\$0.117 \$0.149	3.96% 2	.018 2.25%	\$2,283,880,094,763	\$1,057,671,978,993	\$5,815,012,683,000
10		.,	-,,3											,						,						

Total Urban & Rural VMT 29,478,198

Note: NHS category now used for major Interstate Capital and STP for bond financed new Interstate routes, Capital costs after 1998 don't reflect this as the data is not broken out by FHWA, several values extended 2016-2018 due to lack of FHWA reports
 Total Route Miles
 46,876

 1956 Incorporated Toll Route Miles
 2,300

 Federal-State \$2018 per Total Route M
 \$26,527,565

	NPV AAA Corporate Bond Rate	NPV 1-YR Treasury + 1% Rate	NPV Investor WACC Rate
Fee Gap per Total VMT	\$0.087	\$0.036	\$0.197
% Fuel Tax Rate	293%	121%	668%
Gap per Route Mile	\$35,274,130	\$23,503,822	\$129,222,504
Test Ratio for Historical Fees	1.00		

Truck (N-1) Prorate		Additional funds per VMT to ma	ake up Gap - add to exist	ing fuel fees
Total Cost Ratio Automobile Class 8 Truck	100% 400%		\$0.024 \$0.095	\$0.093 \$0.370
Rural-Urban Cost A	ssignment	\$2018 Adjusted Route Gap by Ov	wnership Method (No Cost-VI	VT elasticity)
Rural Urban	170% 56%		\$0.040 \$0.013	\$0.157 \$0.052

VMT VMT <th></th> <th></th> <th><u>Analysis o</u></th> <th>of Recei</th> <th>ntly Co</th> <th>onstruct</th> <th>ted Inters</th> <th><u>state High</u></th> <th>way Long-I</th> <th><u>Run Avera</u></th> <th><u>ge Constru</u></th> <th>iction and Rebuil</th> <th>ding Cos</th> <th><u>sts relative to</u></th> <th>o Fue</th> <th>l Taxes</th> <th>and Fe</th> <th>es Coll</th>			<u>Analysis o</u>	of Recei	ntly Co	onstruct	ted Inters	<u>state High</u>	way Long-I	<u>Run Avera</u>	<u>ge Constru</u>	iction and Rebuil	ding Cos	<u>sts relative to</u>	o Fue	l Taxes	and Fe	es Coll
Image Simple Simple Simple Simple Restrict or point oppoint oppoin			Interstate															
Image Simple Simple Simple Simple Restrict or point oppoint oppoin			Combo &					HVUT, Trailer			Resulting							
Internate Turk Federal aprel Milterator Martial								& Truck tire	At 90%-10%	Interstate	-	Resulting Federal user						
VMT VMT <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>fees</td> <td>Split Interstate</td> <td></td> <td>fees for each</td> <td>-</td> <td></td> <td></td> <td></td> <td>AAA</td> <td></td> <td></td>								fees	Split Interstate		fees for each	-				AAA		
Interstare Total VMT (Millions) Mullicons, for solution Federal lay, MP, Federal Tay, MP, Gand Inflation Capability Perture lay, MP, Gand Pe									•							Corporat		1-Yr
ch/Millions/Estimated Est Gatoline Dised Avail VMT (Millions) tax, and MPG Feater Pater 212 Delart Pater Rurd Urban 22.9 5.9 50.33 <		Interstate Total V		Miles nei	Gallon	Federal Fe	e ner Gallon						Inflation	Canital Cost in		e Bond		reasury
Ruril Urban 22.9 5.9 50.183 50.243 50.005 50 50 50 50 50.0000 50.0000 50.000 <td>~</td> <td></td> <td>. ,</td> <td>•</td> <td></td> <td></td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Rate</td> <td></td> <td>Rate</td>	~		. ,	•			•	•	•	•						Rate		Rate
5 22.9 5.9 50.183 50.243 50.032 50.000 50.000 50.000 57.000				Gasonine	DICSCI	Gasonine	Dieser	VIVII	(winnoris)	(1411110113)			Tactor	2012 Donars		Nate		Nate
5 22.5 5.9 \$0.133 \$0.024 \$0.005 \$0.005 \$0.000 \$5.000 \$0.005 \$5 2 2.29 6.0 \$0.133 \$0.024 \$0.032 \$6.683 \$0.005 \$56,683.000 \$1000 \$54,681.000 \$0005 \$56,683.000 \$10005 \$56,755.000 \$111,600 \$10005 \$56,755.000 \$111,600 \$56,755.000 \$101,620 \$56,755.000 \$10005 \$56,755.000 \$101,620 \$0005 \$56,755.000 \$101,620 \$0005 \$56,755.000 \$101,620 \$0005 \$56,755.000 \$101,620 \$0005 \$56,755.000 \$101,620 \$0005 \$56,755.000 \$101,620 \$0005 \$510,620.000 <td>5</td> <td></td> <td>ball</td> <td>22.9</td> <td>5.9</td> <td>\$0,183</td> <td>\$0.243</td> <td>\$0.032</td> <td></td> <td></td> <td>\$0</td> <td>ŚŊ</td> <td>1.0000</td> <td>\$0</td> <td>2005</td> <td>5.23%</td> <td>2005</td> <td>3.62%</td>	5		ball	22.9	5.9	\$0,183	\$0.243	\$0.032			\$0	ŚŊ	1.0000	\$0	2005	5.23%	2005	3.62%
7 22.9 6.0 50.133 50.243 50.032 6.783 50 5783.000 1.0000 5783.000 2007 5783.000 2007 5783.000 2.000 5783.000 2.000 5783.000 2.000 5783.000 2.000 544.116.000 1.0000 554.683.000 2.000 544.116.000 1.0000 544.575.000 2.010 4 2.6.7 6.3 50.183 50.243 50.023 34.122.2 50 54.07.000 1.0000 544.575.000 2.010 4 2.6.7 6.7 50.183 50.243 50.032 34.023.2 50 54.07.000 1.0000 584.450.00 2.010 4 4 2.6.7 6.7 50.183 50.243 50.032 54.091.00 1.0000 563.44.000 2.015 4 4 50 553.43.000 1.0000 563.44.000 2.017 3 111 13 2.6.7 6.7 50.183 50.243 50.032 2.2.8.56.2.837 553.64.50.73 1.0000	5								\$0.006		\$0	\$6,000				5.59%	2006	4.94%
3 2.3.7 6.0.0 50.128 50.243 50.032 4.1.16 50.0 5.6.83.000 1.0000 55.6.83.000 2000 55 1 2.5.7 6.2 50.183 50.243 50.032 26.77 50 52.57.000 1.0000 55.4.75.000 210.000 55.4.75.000 210.000 55.4.75.000 210.000 55.4.75.000 210.000 55.4.75.000 210.000 55.4.75.000 210.000 55.4.07.5.000 1.0000 55.4.07.5.000 210.000 51.4.0.66.000 1.0000 51.4.0.66.000 210.000 51.4.0.66.000 1.0000 51.4.0.66.000 1.0000 55.4.07.1000 210.8 50.07 50.07 50.07 50.07 50.07 50.07 50.07 55.07 50.07 5	7															5.56%	2007	4.53%
0 25.7 6.2 50.183 50.243 50.032 24.577 50 55.000 1.000 566.755.000 2010 4 2 26.7 6.3 50.183 50.243 50.032 24.577 50 534.577.00 1.0000 534.577.00 2012 34 2 26.7 6.7 50.183 50.243 50.032 184.66 50 51.04.696.00 1.0000 534.677.00 2012 3 2 26.7 6.7 50.183 50.243 50.032 83.888 50 586.898.00 1.0000 534.497.00 1.000 534.977.00 2013 4 3 104 13 26.7 6.7 50.183 50.433 50.032 28.497.00 1.0000 534.971.00 2013 4 111 13 26.7 6.7 50.183 50.433 50.032 27.457.073 537.557.073 1.0000 50 2014 4 122 16 26.7 6.7 50.18	3			23.7	6.0	\$0.183	\$0.243								2008	5.63%	2008	1.83%
1 26.7 6.3 50.183 50.423 50.032 24.577 50 524,577,000 10000 524,577,000 2011 4 26.7 6.4 50.183 50.043 50.032 34.023 50 5314,056,00 10000 5344,023.00 210.02 34 3 26.7 6.7 50.183 50.043 50.032 140.696 50 5141,056,00 10000 584,898,000 2015 4 4 26.7 6.7 50.183 50.243 50.032 56.34,340 10000 58.498,000 2011 3 3 104 13 26.7 6.7 50.183 50.043 50.032 56.34,340 10000 55.44,51.00 2011 4 1111 13 26.7 6.7 50.183 50.043 50.032 57.45,57,073 1.0000 53.44,51.00 2011 4 1131 15 26.7 6.7 50.183 50.043 50.032 57.45,57,073 1.0000 50 2021 4 1144 26.7 6.7 50.183 <td>9</td> <td></td> <td>\$14,116,000</td> <td></td> <td></td> <td></td> <td>5.31%</td> <td>2009</td> <td>0.47%</td>	9											\$14,116,000				5.31%	2009	0.47%
2 26.7 6.4 50.183 50.023 34.023 50 534,023,000 1.0000 \$54,023,000 2013 23 4 26.7 6.5 50.183 \$0.024 \$0.032 110.622 \$0 \$101,622,000 1.000 \$101,620,000 2014 4 5 26.7 6.7 \$0.183 \$0.024 \$0.032 \$88,898 \$0 \$588,890,000 1.0000 \$584,990,000 2016 3 6 26.7 6.7 \$0.183 \$0.0243 \$0.032 \$64.911,000 \$54,971,000 1.000 \$54,971,000 2018 3 104 13 26.7 6.7 \$0.183 \$0.0243 \$0.032 \$27,855,073 \$27,855,073 1.0000 \$54,971,000 \$000 2021 4 112 14 26.7 6.7 \$0.183 \$0.043 \$0.032 \$23,847,010 \$30,89,545 \$30,89,545 \$30,89,545 \$30,89,545 \$30,89,545 \$30,89,545 \$30,89,545 \$30,89,545 \$30,89,545 \$30,89,545 \$30,89,545 \$30,89,545 \$30,89,545 \$30,89,545 \$30,89,545 <td>)</td> <td></td> <td>4.94%</td> <td>2010</td> <td>0.32%</td>)															4.94%	2010	0.32%
3 - - 5.0 50.183 50.243 50.032 10.1622 5.0 51.06.62.000 51.0.62.000 51.0.62.000 51.0.62.000 51.0.62.000 51.0.62.000 51.0.62.000 51.0.62.000 51.0.62.000 51.0.62.000 51.0.62.000 51.0.62.000 51.0.62.000 51.0.62.000 51.0.62.000 51.0.62.000 51.0.62.000 55.0.91.000 55.0.91.000 55.0.91.000 55.0.91.000 55.0.91.000 55.0.91.000 55.0.91.000 50.0.91.000 <td< td=""><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>4.64%</td><td>2011</td><td>0.17%</td></td<>	1															4.64%	2011	0.17%
1	2															3.64%	2012	0.17%
5 5	3															4.27%	2013	0.13%
j j	+															4.25% 4.19%	2014 2015	0.11% 0.30%
2 26.7 6.7 50.183 50.243 50.032 54.091 50 55.091,000 10.000 53.64.500 20.17 3 3 111 13 26.7 6.7 50.183 50.243 50.032 36.451 52.63.62.837 1.000 53.64.510 201 4 1 13 26.7 6.7 50.183 50.043 50.032 52.785.073 52.785.073 1.000 50 2021 4 1 123 15 26.7 6.7 50.183 50.043 50.032 53.0839.545 1.000 50 2021 4 1 142 1.7 26.7 50.183 50.043 50.032 53.516.253 53.81.253 1.000 50 2024 4 1 144 18 26.7 6.7 50.183 50.043 50.032 53.516.253 53.81.023 1.000 50 2024 4 1 126 6.7 50.183 50.043	5															3.50%	2013	0.50%
a) 104 13 26.7 6.7 \$0.183 \$0.012 36.451 \$24,870,601 \$11,800,399 1.000 \$54,641,000 \$2019 4 a) 117 14 26.7 6.7 \$0.183 \$0.043 \$0.032 \$27,855,073 \$27,855,073 \$1,000 \$50 2020 4 a) 16 26.7 6.7 \$0.183 \$0.043 \$0.032 \$29,347,309 \$23,947,309 \$20,947,318 \$20,491,309 \$20,947,318 \$20,491,310 \$20,947,318 \$20,491,310 \$20,947,318 \$20,491,310 \$20,947,318 \$20,491,310 \$20,947,318 \$20,491,310 \$20,947,318 \$20,491,309 \$20,947,318 \$20,491,400 \$20,491,400 \$2	7															3.68%	2010	1.17%
9 111 13 26.7 6.7 \$0.183 \$0.0243 \$0.032 \$26,362,837 \$1.000 \$0 2019 4 1 123 15 26.7 6.7 \$0.183 \$0.243 \$0.032 \$27,855,073 \$27,855,073 \$1.0000 \$0 2020 4 1 123 15 26.7 6.7 \$0.183 \$0.243 \$0.032 \$30.839,545 \$1.0000 \$0 2021 4 1 142 17 26.7 6.7 \$0.183 \$0.243 \$0.032 \$33.834,017 \$33.824,017 \$1.0000 \$0 2025 4 1 14 19 26.7 6.7 \$0.183 \$0.243 \$0.032 \$35.316,253 \$35.316,253 \$1.0000 \$0 2025 4 1 154 19 26.7 6.7 \$0.183 \$0.243 \$0.032 \$38.30,0725 \$38.30,0725 \$1.0000 \$0 2026 4 1 161 19 26.7 6.7 \$0.183 \$0.243 \$0.032 7.600 \$41,007,480 \$34	3	104	13													3.96%	2018	2.25%
117 14 26.7 6.7 \$0.183 \$0.202 \$27,855,073 \$27,855,073 \$1.0000 \$0 \$202 4 1 123 16 26.7 6.7 \$0.183 \$0.243 \$0.032 \$29,347,309 \$1.0000 \$0 2021 4 2 129 16 26.7 6.7 \$0.183 \$0.243 \$0.032 \$33,824,017 \$33,824,017 \$1.0000 \$0 2024 4 142 17 26.7 6.7 \$0.183 \$0.043 \$0.032 \$33,824,017 \$33,824,017 \$1.0000 \$0 2026 4 5 148 18 26.7 6.7 \$0.183 \$0.043 \$0.032 \$33,824,017 \$33,824,017 \$1.0000 \$0 2026 4 6 167 20 6.7 \$0.183 \$0.043 \$0.032 \$33,824,017 \$33,824,017 \$1.0000 \$0 \$0 2027 4 4 \$0 \$0 \$0.032 \$38,700,725 \$1.0000 \$0 \$0.030 \$0.032 \$0.032 \$0.032 \$0.032 \$0.032	9															4.00%	2019	2.00%
1 123 15 26.7 6.7 50.183 50.243 \$0.032 \$29.347.309 \$29.347.309 1.0000 50 2022 4 3 136 16 26.7 6.7 \$0.183 \$0.243 \$0.032 \$30.839.545 \$1.0000 50 2022 4 4 142 17 26.7 6.7 \$0.183 \$0.243 \$0.032 \$33.81,253 \$35.316,253 \$35.316,253 \$35.316,253 \$30.839,754 1.0000 \$0 2025 4 5 154 19 26.7 6.7 \$0.183 \$0.243 \$0.032 \$36,800,489 \$36,808,489 1.0000 \$0 2026 4 6 157 20 26.7 6.7 \$0.183 \$0.243 \$0.032 \$36,800,725 \$1.0000 \$0 2028 4 0 17 10 10 \$0 \$0.22 \$0.322 \$0.322 \$36,800,725 \$1.0000 \$7.600,000 \$02.203 4 \$0.32 \$36,800,725 \$1.0000 \$57.600,000 \$02.304 \$0 \$1.157 \$1.2 26.7)				6.7	\$0.183	\$0.243								2020	4.00%	2020	2.00%
3 136 16 26.7 6.7 \$0.183 \$0.243 \$0.032 \$32,331,781 \$32,31,781 1.000 \$0 2023 4 5 148 18 26.7 6.7 \$0.183 \$0.243 \$0.032 \$33,824,017 \$33,824,017 1.0000 \$0 2025 4 5 148 19 26.7 6.7 \$0.183 \$0.243 \$0.032 \$35,810,253 \$35,916,253 1.0000 \$0 2026 4 7 161 19 26.7 6.7 \$0.183 \$0.243 \$0.032 \$38,800,725 \$38,707,785 \$10000 \$0 2028 4 9 171 21 26.7 6.7 \$0.183 \$0.243 \$0.032 \$40,787,785 \$40,787,785 1.0000 \$7,600,000 2014 4 1 180 22 26.7 6.7 \$0.183 \$0.243 \$0.032 7.600 \$42,82,667 \$35,25,67 1.0000 \$7,600,000 2014 4 4 14 23 26.7 6.7 \$0.183 \$0.243 \$0.032	1	123	15	26.7	6.7	\$0.183	\$0.243	\$0.032			\$29,347,309			\$0	2021	4.00%	2021	2.00%
1 142 17 26.7 6.7 \$0.183 \$0.024 \$0.032 \$33,824,017 \$33,824,017 \$33,824,017 \$1000 \$0 2024 4 5 148 18 26.7 6.7 \$0.183 \$0.043 \$0.032 \$35,316,253 \$35,316,253 \$10000 \$0 2026 4 5 154 19 26.7 6.7 \$0.183 \$0.243 \$0.032 \$38,300,725 \$33,90,725 \$10000 \$0 2027 4 6 171 21 26.7 6.7 \$0.183 \$0.243 \$0.032 \$40,787,785 \$40,787,785 \$10000 \$7,600,000 203 4 1 180 22 26.7 6.7 \$0.183 \$0.243 \$0.032 7.600 \$43,827,480 1.0000 \$7,600,000 203 4 1 180 22 26.7 6.7 \$0.183 \$0.243 \$0.032 7.600 \$43,827,480 1.0000 \$7,600,000 203 4 1 180 22 26.7 6.7 \$0.183 \$0.243	2															4.00%	2022	2.00%
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9 171 21 26.7 6.7 \$0.183 \$0.032 \$40,787,785 \$40,787,785 1.000 \$7,600,00 2029 4 0 175 21 26.7 6.7 \$0.183 \$0.243 \$0.032 7.600 \$41,807,480 \$34,207,480 1.0000 \$7,600,000 2031 4 1 180 22 26.7 6.7 \$0.183 \$0.243 \$0.032 7.600 \$43,923,984 \$36,323,984 1.0000 \$7,600,000 2031 4 1 194 23 26.7 6.7 \$0.183 \$0.243 \$0.032 \$46,147,635 \$46,147,635 1.0000 \$0 2033 4 4 194 23 26.7 6.7 \$0.183 \$0.243 \$0.032 \$46,147,635 \$46,147,635 1.0000 \$0 2036 4 5 299 24 26.7 6.7 \$0.183 \$0.243 \$0.032 \$48,483,859 \$48,483,859 1.0000 \$0 2036 4 6 219 26 26.7 6.7 \$0.183 \$0.2	, 2															4.00%	2027	2.00%
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۱ 0,454 //2 كال.007 كال.030 كو22 كو689,164,000	ן ו			26.7	6.7			\$0.032	ćcoo		\$68,506,424	\$68,506,424	1.0000		2050	4.00%	2050	2.00%
	1	0,454	112			ŞU.UU7	ŞU.USD		203Z					2009,104,000				

Year

2006 2007

Total

Analysis of Recently Constructed Interstate Highway Long-Run Average Construction and Rebuilding Costs relative to Fuel Taxes and Fees Collected for Use of System

Constructed Route Miles

28.6

\$24,096,643

\$2012 per Constructed Route Mile

Rou Test Ratio for Fees

Truck (N-1) Prorate	
Total Cost Ratio	Total Cost Rati
Automobile	100%
Class 8 Truck	400%
Computed Cost Respon	nsibility per Class at
Automobile	65%
Class 8 Truck	35%

6 6 /	0.0447	\$94,045,504 \$122,940,363 \$162,665,608	\$89,801,079 \$115,716,302	\$95,261,482 \$125,892,722
% %	0.0414 0.0414	\$163,665,698 \$276,562,426	\$151,431,356 \$255,862,248	\$168,573,559 \$284,769,908
% %	0.0389 0.029	\$434,741,554 \$541,966,938	\$401,713,506 \$498,461,290	\$448,585,725 \$565,110,389
%	0.0251	\$627,585,344	\$573,995,443	\$662,867,496
6	0.0171	\$708,670,727	\$648,499,252	\$760,520,894
6	0.02	\$749,061,171	\$679,882,041	\$818,427,371
% %	0.02 0.02	\$751,606,268 \$752,701,243	\$673,124,780 \$664,627,799	\$839,588,406 \$860,437,333
%	0.02	\$752,288,091	\$654,338,904	\$880,955,426
6	0.02	\$750,306,488	\$642,204,340	\$901,122,834
6	0.02	\$746,693,695	\$628,168,736	\$920,918,516
6	0.02	\$741,384,465	\$612,175,060	\$940,320,169
% %	0.02 0.02	\$734,310,940 \$725,402,549	\$594,164,571 \$574,076,765	\$959,304,151 \$977,845,401
6	0.02	\$714,585,897	\$551,849,320	\$995,917,356
6	0.02	\$701,784,653	\$527,418,050	\$1,013,491,859
6	0.02	\$687,436,742	\$501,229,173	\$1,031,066,318
% %	0.02 0.02	\$679,358,433 \$669,869,997	\$481,032,343 \$459,153,067	\$1,056,670,368 \$1,082,702,763
6	0.02	\$658,887,854	\$435,513,956	\$1,109,161,506
6	0.02	\$638,420,401	\$402,206,629	\$1,127,987,789
6	0.02	\$615,963,677	\$366,740,763	\$1,146,750,562
6	0.02 0.02	\$591,408,844 \$564,641,984	\$329,022,620 \$288,954,923	\$1,165,416,190 \$1,183,948,271
% %	0.02	\$535,543,870	\$246,436,737	\$1,202,307,454
6	0.02	\$503,989,736	\$201,363,333	\$1,220,451,245
6	0.02	\$469,849,039	\$153,626,065	\$1,238,333,798
6	0.02	\$432,985,207	\$103,112,225	\$1,255,905,690
% %	0.02 0.02	\$393,255,377 \$362,407,723	\$49,704,904 \$5,066,046	\$1,273,113,693 \$1,302,026,917
6	0.02	\$328,864,276	\$42,359,807	\$1,331,184,935
6	0.02	\$292,480,658	\$92,692,463	\$1,360,565,183
6	0.02	\$241,208,200	\$157,839,424	\$1,378,016,416
6	0.02	\$186,310,551	\$226,499,949 \$298,818,423	\$1,394,910,156
% %	0.02 0.02	\$127,603,347 \$64,893,864	\$374,944,538	\$1,411,172,839 \$1,426,725,484
6	0.02	\$2,019,338	\$455,033,476	\$1,441,483,346
	\$/Total			
	VMT	\$0.000	\$0.063	\$0.200
	Deficit per			
	Route Mile	\$70,606	\$15,910,261	\$50,401,516
>		16.75		
		Additional funds per VMT t	o make up capital deficit	- add to existing fuel fees
	Ratio	¢0.000	¢0.053	¢0.405
% %		\$0.000 \$0.001	\$0.052 \$0.208	\$0.165 \$0.659
as	s at VMT			
6				



APT Average Costs FY2018 Dollars (Millions) -Responsibility for Infrastructure and Operations parsed per Highway and Aviation Divisions

	d Costs by Subfamily, P vides the allocated costs	· ·	Millions)	
		Democrat		

Family	Family Name	Subfamily Number	Subfamily Name	Operating Costs (Millions)	Percent of Amtrak Fully Allocated Costs	Operating and Capital Costs (Millions)	% of Operating and Capital
		FM_101	Central Div MoW	\$19.90	0.5%	\$26.30	0.5%
		FM_102	MidAtlantic Div MoW	\$93.20	2.2%	\$150.30	2.7%
		FM_103	New England Div MoW	\$59.10	1.4%	\$85.30	1.5%
FM_MOW	Maintenance of Way	FM_104	New York Div MoW	\$110.10	2.6%	\$140.10	2.5%
		FM_105	MoW Support	\$113.80	2.7%	\$572.60	10.4%
		FM_106	System Gangs	\$8.60	0.2%	\$114.00	2.1%
		FM_107	West Div MoW	\$11.10	0.3%	\$11.20	0.2%
		FM_108	Empire District	\$10.70	0.3%	\$14.70	0.3%
		FM_109	Michigan Line	\$10.30	0.2%	\$10.40	0.2%
		FM_201	MoE Turnaround	\$163.00	3.9%	\$163.30	3.0%
		FM_202	MoE Loco Maintenance	\$88.30	2.1%	\$88.50	1.6%
		FM_203	MoE Car Maintenance	\$38.00	0.9%	\$38.00	0.7%
FM MOE	Maintenance of	FM_204	MoE Support	\$39.10	0.9%	\$44.00	0.8%
	Equipment	FM_205	MoE Multiple	\$186.60	4.4%	\$344.00	6.2%
		FM_206	MoE HSR Maintenance	\$57.60	1.4%	\$58.20	1.1%
		FM_207	MoE Back Shop	\$18.00	0.4%	\$79.10	1.4%
		FM_208	MoE Material Control	\$10.60	0.3%	\$10.60	0.2%
		FM_301	On Board Services (OBS)	\$262.70	6.2%	\$262.70	4.8%
		FM_302	T&E	\$438.40	10.4%	\$438.40	7.9%
FM_OPS_ TRANS	Ops - Transportation	FM_303	Yard	\$71.00	1.7%	\$71.20	1.3%
INANS	Tansportation	FM_304	Fuel	\$128.10	3.0%	\$128.10	2.3%
		FM_305	Transportation - Multiple	\$11.50	0.3%	\$11.50	0.2%
		FM_306	Train Movement	\$86.70	2.0%	\$86.80	1.6%
		FM_307	Train Movement - Host RR	\$152.30	3.6%	\$160.10	2.9%
FM_OPS_ TRANS	Ops - Transportation	FM_308	Transportation Support	\$77.60	1.8%	\$149.80	2.7%
		FM_309	Power - Electric Traction	\$81.10	1.9%	\$81.10	1.5%
		FM_310	Stations	\$196.90	4.7%	\$196.90	3.6%
FM_SALES	Sales and	FM_401	Sales	\$10.30	0.2%	\$10.30	0.2%
_MKTG	Marketing	FM_402	Information & Reservations	\$73.00	1.7%	\$73.00	1.3%
		FM_403	Marketing	\$54.90	1.3%	\$77.40	1.4%
		FM_404	Station and On- Board Technology	\$5.00	0.1%	\$5.00	0.1%
		FM_601	Corporate Administration	\$144.10	3.4%	\$190.30	3.4%
	General and	FM_602	Centralized Services	\$237.20	5.6%	\$296.40	5.4%
FM_G_A	Administrative	FM_603	Qualified Mgmt	\$971.50	23.0%	\$1,015.60	18.4%
		FM_604	Direct Customer (Non- NTS)	\$49.40	1.2%	\$154.10	2.8%
		FM_605	Subsidiary	\$39.20	0.9%	\$39.20	0.7%
FM_UTILI TIES	Utilities	FM_801	Utilities	\$5.80	0.1%	\$5.80	0.1%
	Police,	FM_901	Police	\$58.90	1.4%	\$60.90	1.1%
FM_POLIC E SAFETY	Environmental & Safety	FM_902	Emergency Mgmt & Corp Security	\$28.40	0.7%	\$34.40	0.6%
E_SAFETY		FM_903	Environmental & Safety	\$7.40	0.2%	\$22.30	0.4%
	Gra	nd Total		\$4,229.10	100%	\$5,521.60	100%

Infrastruct Mostly Fix	v-the-Rail ure Investment ed with Respect Movements)					
Х	\$26.30					
Х	\$150.30					
Х	\$85.30					
X	\$140.10					
л	\$140.10					
Х	\$572.60					
Х	\$114.00					
Х	\$11.20					
Х	\$14.70					
Х	\$10.40					
		Х	\$163.30			
		Х	\$88.50			
		Х	\$38.00			
		Х	\$44.00			
		Х	\$344.00			
		Х	\$58.20			
		Х	\$79.10			
		Х	\$10.60			
		Х	\$262.70			
		Х	\$438.40			
Х	\$71.20					
		Х	\$128.10			
		Х	\$11.50			
Х	\$86.80					
Х	\$160.10					
Х	\$149.80					
		Х	\$81.10			
Х	\$196.90					
		Х	\$10.30			
		Х	\$73.00			
		Х	\$77.40			
		Х	\$5.00			
		Х	\$190.30			
		Х	\$296.40			
		Х	\$1,015.60			
		X	\$154.10			
Х	\$39.20					
X	\$5.80					
Х	\$60.90					
	\$00.90	Х	\$34.40			
Х	\$22.30					
	\$1,917.90		\$3,604.00			

Reconcilliation of APT Formula to Actual FY2018 Costs and Revenues

FY2018 Federal Government Investment after FRA witholding ¹			\$1,924.90	
Below-the-Rail Infrastrucutre Remaining to be Covered by Operations			(\$7.00)	\$7.00
Actual FY2018 Total Operating, Capital, Interest, Pensions, Tax, and Net Change in Cash ¹	\$5,063.70			
APT Formulaic Cost Above Actual FY2018 Costs	\$457.90	9.0%		\$ (457.90)
Total Above-the-Rail Operations Cost + Remaining Infrastructure Cost				\$ 3,153.10
Actual FY2018 Total Revenues (Tickets, State Contributions, Ancillary, and Other Core) ¹				\$ 3,386.70

1. Consolidated Financial Statements National Railroad Passenger Corporation and Subsidiaries (Amtrak) for FY2018

AAF/Brightline/Virgin SEC Data (Made Parametric)	Parametric	Benchmark
Miami to Orlando One-way Route (Miles)	235	235
Average Schedule Speed (MPH)	74.4	74.4
Utilization Miles per Hour - Full Schedule Cycle	58.9	58.9
Est. Cycles per Day	1.5	1.5
Trip Time (Hours)	3.16	3.16
Departure Terminal Dwell (Hours)	1.08	1.08
Turning Terminal Dwell (Hours)	0.58	0.58
Total Round Trip Cycle Time	8.0	8.0
Miles per Day	942	942
Train-Miles (Millions)	2.747	2.747
Train-Hours	23,329	23,329
Seats per Train-Mile	622	348
Seat-Miles (Millions)	1,708.435	955.845
Car-Miles (Millions)	32.960	19.227
Equipment Sets	10	10
Annual Train-miles per Set (Millions)	0.275	0.275
Locomotives per Set	2	2
First Class Coaches per Set	5	2
Seats per Car	50	50
Business Class Coaches per Set	6	4
Seats per Car	62	62
Café Cars per Set	1	1
Total Car per Set	12	7
Stated Total Operating Labor		\$45.9
Corporate, Station, and Parking Garage Operating Expense		
Est. Station and Parking Garage Operating Labor Portion	\$14.0	\$14.0
Est. Corporate Operating Labor Portion	\$10.6	\$10.6
Marketing & Advertising	\$2.2	\$2.2
Station Expense	\$3.6	\$3.6
Information Technology	\$7.9	\$7.9
Parking Garage	\$5.6	\$5.6
Other G & A	\$2.8	\$2.8
Total	\$46.7	\$46.7
Above-the-Rail Operating and Maintenance Expense		
Est. Rail Operations Labor	\$21.3	\$21.3
Maintenance of Equipment	\$16.4	\$11.3
Fuel	\$22.3	\$16.4
Maintenance Facility	\$3.5	\$3.5
Est. Equipment Development & Testing	\$172.5	
Est. Equipment Cost Variable wrt Pieces	\$521.5	
Est. Total Equipment Cost	\$694.0	\$549.0
Est. Equipment Lease Payment/ Depreciation / Parts	\$55.52	\$43.9
VMA - Heavy Maintenance and Parts Contract	\$24.0	\$14.0
Total	\$143.1	\$110.4
Sales and Consumables Expense		
Credit Card Fees	\$27.2	\$15.2
Passenger Meal Costs	\$21.4	\$12.0

Above-the-Rail and Below-the-Rail Financial Analysis

Complimentary Meal Costs	\$9.1	\$5.1
Total	\$57.7	\$32.3
	·	
Below-the-Rail Infrastructure Maintenance Expense	¢10.5	¢10.5
Maintenance of Way	\$18.5	\$18.5
Insurance (Risk on Infrastructure Use)	\$7.7	\$7.7
Total	\$26.2	\$26.2
Below-the-Rail Infrastructure Capital Depreciation		
Railway Track and Signal Depreciation	\$128.4	\$128.4
Land Lease - Right of Way	\$8.3	\$8.3
Total	\$136.7	\$136.7
Above-the-Rail and Common Operating Analysis (Long-run A	Average Cost)	
Above-the-Rail Train Operating and Equipment Expense (Train-mile)	\$52.08	\$40.20
Above-the-Rail per Car-Mile	\$4.34	\$5.74
Above-the-Rail per Seat-Mile	\$0.084	\$0.116
Above-the-Rail Sales and Consumables Expense (Train-mile)	\$21.02	\$11.76
Common - Parking, Station, and Corporate Expense (Train-mile)	\$17.00	\$17.00
Total Operating (Millions Annually)	\$247.50	\$189.42
Total Operating (Train-mile)	\$90.11	\$68.96
Total Operating (Seat-mile)	\$0.145	\$0.198
Total Operating per Person-Mile at 60% Occupancy	\$0.241	\$0.330
Below-the-Rail Infrastructure Investment Analysis (Long-run	Average Cost)	
Below-the-Rail Infrastructure Maintenance (Train-mile)	\$9.54	\$9.54
Below-the-Rail Infrastructure Capital Depreciation (Train-mile)	\$49.75	\$49.75
Total Infrastructure Investment per Person-mile at 60% Occupancy	\$0.159	\$0.284
Proposed Below-the-Rail Tax Credits for Infrastructure Investment Equiv		
Proposed Tax Credit per Passenger Train-Mile	\$17.20	\$17.20
Proposed Tax Credit per Intermodal Freight Train-Mile	\$21.00	\$21.00
Damaining Delaw the mill Infractory to a control by Direct Consumous Day		N
Remaining Below-the-rail Infrastructure covered by Direct Consumer Rev	<u>enue after Tax C</u> \$21.09	<u>realt</u> \$21.09
Below-the-Rail Infrastructure Investment Remaining (Train-mile)		
Total Infrastructure Investment per Person-mile at 60% Occupancy	\$0.057	\$0.101