

Appendix A – Detailed Costs

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Existing Bridge Rehabilitation

Year of Estimate: 2013

Construction Year: 2017

Inflation Rate: . %

Structure Costs	Structure Width		36.5 FT	
	Structure Length		2529 FT	
	Deck Area		92,309 SF	
	Estimated \$\$/SF - Substructure Rehab		\$ 200/SF	
	Steel Surface Area		500,000 SF	
	Estimated \$\$/SF - Super Painting		\$ 20/SF	
	Misc. Superstructure Repair		\$ 50/SF	
	Total Estimated Structure Cost		\$ 33,080,000	
Rail Costs	Trackwork			
	Bridge Rail, Timbers, Tie Plates, Spikes		\$2,000,000	5,000 feet @ \$400 per foot
	Approaches Rail, Ties, Ballast, Earthwork		\$3,016,000	10,400 feet @ \$290 per foot
	Signals			
	Remove, Protect, Reconnect Existing Equipment		\$500,000	
			\$ 5,516,000	
Other Costs	Underwater Inspection		\$ 80,000	
	In-depth Inspection		\$ 250,000	
	Remaining Fatigue Life Analysis		\$ 72,000	
	Update Load Rating		\$ 96,000	
	Mobilization		\$ 2,700,000	Assume 7% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost		\$ 41,794,000	
	Base Cost Including Inflation		\$ 41,790,000	
	Contingency		\$ 14,630,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency		\$ 56,420,000	
	Design		\$ 6,210,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection		\$ 5,640,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST		\$ 68,270,000	

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Alternative 2: Reconstruct Existing 2-Track Bridge*

(2013 Dollars)

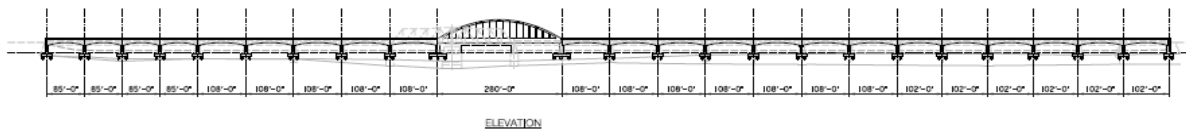
Structure Type	Structure Cost		Rail Cost	Other Costs		Anticipated Total Cost for New Structure
	Low	High		Low	High	
1. Steel Tied Arch	\$62,520,000	\$93,250,000	\$5,516,000	\$68,707,750	\$98,429,300	\$137 – \$197 M
2. Steel Through Arch	\$69,780,000	\$103,440,000	\$5,516,000	\$75,447,750	\$107,879,300	\$151 – \$217 M
3. Extradosed	\$142,660,000	\$194,980,000	\$5,516,000	\$143,027,750	\$192,779,300	\$291 – \$393 M
3a. Partial Extradosed	\$97,720,000	\$141,060,000	\$5,516,000	\$101,367,750	\$142,759,300	\$205 – \$289 M
4. Concrete Deck Arch	\$74,830,000	\$107,580,000	\$5,516,000	\$80,117,750	\$111,719,300	\$160 – \$225 M
4a. Standard Girder Structure with Concrete Arch Façade Elements	\$71,610,000	\$99,720,000	\$5,516,000	\$77,137,750	\$104,439,300	\$154 – \$210 M

**These costs and the bridge and tunnel types discussed herein are conceptual in nature, and therefore evaluations of cost at this stage of the project development must be considered to be very preliminary, and should not be used for funding or programming purposes. None of the alternatives described in this report have been sufficiently engineered to determine costs based on estimated structural quantities, anticipated erection methods, right-of way implications, expected schedule durations, and potential effects of inflation based on the anticipated timing of the beginning of construction. At this stage of development, only preliminary level of cost evaluation can be made that differentiates the alternatives on the basis of anticipated construction cost. A 35% contingency is included in the cost of bridge or tunnel options.*

Alternative 2: Steel Tied Arch

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

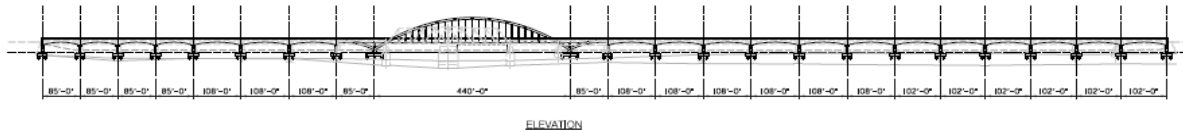
		Low	High	
Structure Costs	Structure Width	38.5 FT	38.5 FT	
	Structure Length - Tied Arch	280 FT	280 FT	
	Deck Area - Tied Arch Span	10,780 SF	10,780 SF	
	Estimated \$\$/SF - Tied Arch Span	\$ 500/SF	\$ 700/SF	
	Structure Length - Approaches	7,420 FT	7,420 FT	Const Length = 7700 FT
	Deck Area - Approaches	285,670 SF	285,670 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF		
	Total Estimated Structure Cost	\$ 62,520,000	\$ 93,250,000	
Rail Costs	Trackwork			
	Bridge Rail, Timbers, Tie Plates, Spikes	\$2,000,000	\$2,000,000	5,000 feet @ \$400 per foot
	Approaches Rail, Ties, Ballast, Earthwork	\$3,016,000	\$3,016,000	10,400 feet @ \$290 per foot
	Signals			
	Remove, Protect, Reconnect Existing Equipment	\$500,000	\$500,000	
		Total Estimated RR Cost	\$ 5,516,000	\$ 5,516,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 3,130,000	\$ 4,660,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$	\$	
	Maintenance & Protection of Traffic	\$ 2,720,000	\$ 3,950,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 4,760,000	\$ 6,910,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 1,360,000	\$ 1,980,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 83,713,750	\$ 120,715,300	
	Base Cost Including Inflation	\$ 83,710,000	\$ 120,720,000	
	Contingency	\$ 29,300,000	\$ 42,250,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 113,010,000	\$ 162,970,000	
	Design	\$ 12,430,000	\$ 17,930,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 11,300,000	\$ 16,300,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 136,740,000	\$ 197,200,000	



Alternative 2: Steel Through Arch

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

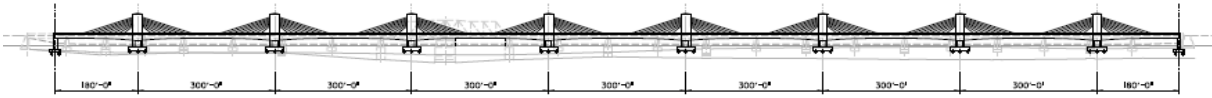
		Low	High	
Structure Costs	Structure Width	40.5 FT	40.5 FT	
	Structure Length - Through Arch	610 FT	610 FT	
	Deck Area - Through Arch Span	24,705 SF	24,705 SF	
	Estimated \$\$/SF - Through Arch Span	\$ 500/SF	\$ 700/SF	
	Structure Length - Approaches	7,090 FT	7,090 FT	Const Length = 7700 FT
	Deck Area - Approaches	287,145 SF	287,145 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 69,780,000	\$ 103,440,000	
Rail Costs	Trackwork			
	Bridge Rail, Timbers, Tie Plates, Spikes	\$2,000,000	\$2,000,000	5,000 feet @ \$400 per foot
	Approaches Rail, Ties, Ballast, Earthwork	\$3,016,000	\$3,016,000	10,400 feet @ \$290 per foot
	Signals			
	Remove, Protect, Reconnect Existing Equipment	\$500,000	\$500,000	
		Total Estimated RR Cost	\$ 5,516,000	\$ 5,516,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 3,490,000	\$ 5,170,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$	\$	
	Maintenance & Protection of Traffic	\$ 3,010,000	\$ 4,360,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 5,270,000	\$ 7,630,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 1,510,000	\$ 2,180,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 92,283,750	\$ 132,745,300	
	Base Cost Including Inflation	\$ 92,280,000	\$ 132,750,000	
	Contingency	\$ 32,300,000	\$ 46,460,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 124,580,000	\$ 179,210,000	
	Design	\$ 13,700,000	\$ 19,710,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 12,460,000	\$ 17,920,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
		TOTAL ESTIMATED COST	\$ 150,740,000	\$ 216,840,000



Alternative 2: Full Extradosed

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

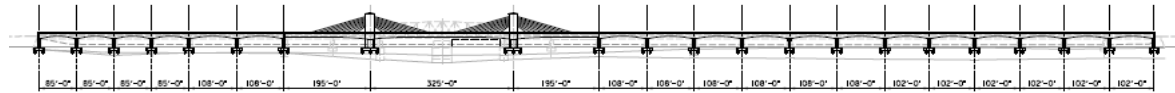
		Low	High	
Structure Costs	Structure Width	51.5 FT	51.5 FT	
	Structure Length - Extradosed	2460 FT	2460 FT	
	Deck Area - Extradosed Spans	126,690 SF	126,690 SF	
	Estimated \$\$/SF - Extradosed Spans	\$ 700/SF	\$ 900/SF	
	Structure Length - Approaches	5,240 FT	5,240 FT	Const Length = 7700 FT
	Deck Area - Approaches	269,860 SF	269,860 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 142,660,000	\$ 194,980,000	
Rail Costs	Trackwork			
	Bridge Rail, Timbers, Tie Plates, Spikes	\$2,000,000	\$2,000,000	5,000 feet @ \$400 per foot
	Approaches Rail, Ties, Ballast, Earthwork	\$3,016,000	\$3,016,000	10,400 feet @ \$290 per foot
	Signals			
	Remove, Protect, Reconnect Existing Equipment	\$500,000	\$500,000	
		Total Estimated RR Cost	\$ 5,516,000	\$ 5,516,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 7,130,000	\$ 9,750,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$	\$	
	Maintenance & Protection of Traffic	\$ 5,930,000	\$ 8,020,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 10,370,000	\$ 14,030,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 2,960,000	\$ 4,010,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 178,273,750	\$ 240,755,300	
	Base Cost Including Inflation	\$ 178,270,000	\$ 240,760,000	
	Contingency	\$ 62,390,000	\$ 84,270,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 240,660,000	\$ 325,030,000	
	Design	\$ 26,470,000	\$ 35,750,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 24,070,000	\$ 32,500,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 291,200,000	\$ 393,280,000	



Alternative 2: Partial Extradosed

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

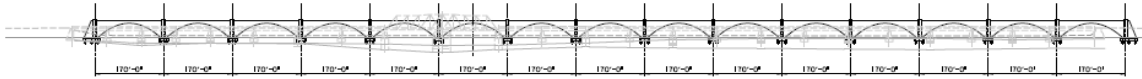
		Low	High	
Structure Costs	Structure Width	51.5 FT	51.5 FT	
	Structure Length - Extradosed	715 FT	715 FT	
	Deck Area - Extradosed Spans	36,823 SF	36,823 SF	
	Estimated \$\$/SF - Extradosed Spans	\$ 700/SF	\$ 900/SF	
	Structure Length - Approaches	6,985 FT	6,985 FT	Const Length = 7700 FT
	Deck Area - Approaches	359,728 SF	359,728 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 97,720,000	\$ 141,060,000	
Rail Costs	Trackwork			
	Bridge Rail, Timbers, Tie Plates, Spikes	\$2,000,000	\$2,000,000	5,000 feet @ \$400 per foot
	Approaches Rail, Ties, Ballast, Earthwork	\$3,016,000	\$3,016,000	10,400 feet @ \$290 per foot
	Signals			
	Remove, Protect, Reconnect Existing Equipment	\$500,000	\$500,000	
		Total Estimated RR Cost	\$ 5,516,000	\$ 5,516,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 4,890,000	\$ 7,050,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$	\$	
	Maintenance & Protection of Traffic	\$ 4,130,000	\$ 5,860,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 7,230,000	\$ 10,260,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 2,060,000	\$ 2,930,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 125,253,750	\$ 177,125,300	
	Base Cost Including Inflation	\$ 125,250,000	\$ 177,130,000	
	Contingency	\$ 43,840,000	\$ 62,000,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 169,090,000	\$ 239,130,000	
	Design	\$ 18,600,000	\$ 26,300,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 16,910,000	\$ 23,910,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
		TOTAL ESTIMATED COST	\$ 204,600,000	\$ 289,340,000



Alternative 2: Deck Arch

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

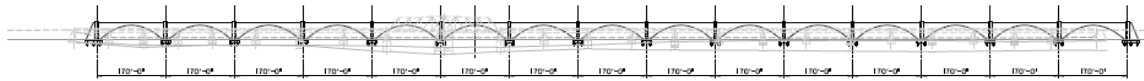
		Low	High	
Structure Costs	Structure Width	36.5 FT	36.5 FT	
	Structure Length - Deck Arch	2550 FT	2550 FT	
	Deck Area - Deck Arch Spans	93,075 SF	93,075 SF	
	Estimated \$\$/SF - Deck Arch Spans	\$ 400/SF	\$ 550/SF	
	Structure Length - Approaches	5,150 FT	5,150 FT	Const Length = 7700 FT
	Deck Area - Approaches	187,975 SF	187,975 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 74,830,000	\$ 107,580,000	
Rail Costs	Trackwork			
	Bridge Rail, Timbers, Tie Plates, Spikes	\$2,000,000	\$2,000,000	5,000 feet @ \$400 per foot
	Approaches Rail, Ties, Ballast, Earthwork	\$3,016,000	\$3,016,000	10,400 feet @ \$290 per foot
	Signals			
	Remove, Protect, Reconnect Existing Equipment	\$500,000	\$500,000	
		Total Estimated RR Cost	\$ 5,516,000	\$ 5,516,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 3,740,000	\$ 5,380,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$	\$	
	Maintenance & Protection of Traffic	\$ 3,210,000	\$ 4,520,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 5,620,000	\$ 7,920,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 1,610,000	\$ 2,260,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 98,233,750	\$ 137,625,300	
	Base Cost Including Inflation	\$ 98,230,000	\$ 137,630,000	
	Contingency	\$ 34,380,000	\$ 48,170,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 132,610,000	\$ 185,800,000	
	Design	\$ 14,590,000	\$ 20,440,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 13,260,000	\$ 18,580,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
		TOTAL ESTIMATED COST	\$ 160,460,000	\$ 224,820,000



Alternative 2: Multi-Girder with Arch Façade

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

		Low	High	
Structure Costs	Structure Width	36.5 FT	36.5 FT	
	Structure Length - Deck Arch	00 FT	00 FT	
	Deck Area - Deck Arch Spans	SF	SF	
	Estimated \$\$/SF - Deck Arch Spans	\$ 000/SF	\$ 000/SF	
	Structure Length - Approaches	7,700 FT	7,700 FT	Const Length = 7700 FT
	Deck Area - Approaches	281,050 SF	281,050 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Precast Arch Facades	15400 LF	15400 LF	
Estimated \$/LF - Arch Facades	\$ 1,000 /LF	\$ 1,000 /LF	Includes fabrication, erection, post-tensioning	
Total Estimated Structure Cost		\$ 71,610,000	\$ 99,720,000	
Rail Costs	Trackwork			
	Bridge Rail, Timbers, Tie Plates, Spikes	\$2,000,000	\$2,000,000	5,000 feet @ \$400 per foot
	Approaches Rail, Ties, Ballast, Earthwork	\$3,016,000	\$3,016,000	10,400 feet @ \$290 per foot
	Signals			
	Remove, Protect, Reconnect Existing Equipment	\$500,000	\$500,000	
Total Estimated RR Cost		\$ 5,516,000	\$ 5,516,000	
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 3,580,000	\$ 4,990,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$	\$	
	Maintenance & Protection of Traffic	\$ 3,090,000	\$ 4,210,000	Assume 4% of (Structure Plus Rail) Cost
	Mobilization	\$ 5,400,000	\$ 7,370,000	Assume 7% of (Structure Plus Rail) Cost
	Construction Staking/Survey	\$ 1,540,000	\$ 2,100,000	Assume 2% of (Structure Plus Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 94,443,750	\$ 128,355,300	
	Base Cost Including Inflation	\$ 94,440,000	\$ 128,360,000	
	Contingency	\$ 33,050,000	\$ 44,930,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 127,490,000	\$ 173,290,000	
	Design	\$ 14,020,000	\$ 19,060,000	Assume 11% of (Base Cost Plus Inflation Plus Contingency)
	Construction Management / Inspection	\$ 12,750,000	\$ 17,330,000	Assume 10% of (Base Cost Plus Inflation Plus Contingency)
TOTAL ESTIMATED COST		\$ 154,260,000	\$ 209,680,000	



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Alternative 3: 4-Track Rail Bridge*

(2013 Dollars)

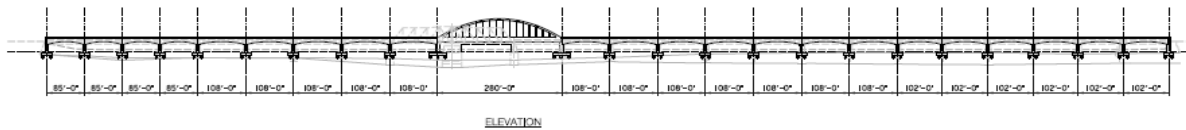
Structure Type	Structure Cost		Rail Cost	Other Costs		Anticipated Total Cost for New Structure
	Low	High		Low	High	
1. Steel Tied Arch	\$113,680,000	\$169,540,000	\$68,775,000	\$172,577,750	\$225,599,300	\$355 – \$464 M
2. Steel Through Arch	\$124,060,000	\$183,890,000	\$68,775,000	\$185,117,750	\$241,819,300	\$378 – \$494 M
3. Extradosed	\$229,910,000	\$314,240,000	\$68,775,000	\$299,287,750	\$378,709,300	\$598 – \$762 M
3a. Partial Extradosed	\$157,490,000	\$227,340,000	\$68,775,000	\$232,107,750	\$298,109,300	\$458 – \$594 M
4. Concrete Deck Arch	\$139,400,000	\$200,430,000	\$68,775,000	\$193,527,750	\$251,329,300	\$402 – \$521 M
4a. Standard Girder Structure with Concrete Arch Façade Elements	\$120,120,000	\$172,480,000	\$68,775,000	\$175,657,750	\$225,419,300	\$365 – \$467 M

**These costs and the bridge and tunnel types discussed herein are conceptual in nature, and therefore evaluations of cost at this stage of the project development must be considered to be very preliminary, and should not be used for funding or programming purposes. None of the alternatives described in this report have been sufficiently engineered to determine costs based on estimated structural quantities, anticipated erection methods, right-of way implications, expected schedule durations, and potential effects of inflation based on the anticipated timing of the beginning of construction. At this stage of development, only preliminary level of cost evaluation can be made that differentiates the alternatives on the basis of anticipated construction cost. A 35% contingency is included in the cost of bridge or tunnel options.*

Alternative 3: Steel Tied Arch

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

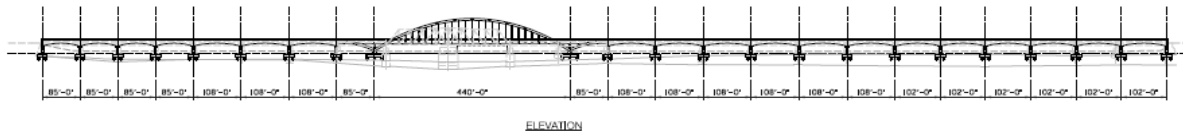
		Low	High	
Structure Costs	Structure Width	70 FT	70 FT	
	Structure Length - Tied Arch	280 FT	280 FT	
	Deck Area - Tied Arch Span	19,600 SF	19,600 SF	
	Estimated \$\$/SF - Tied Arch Span	\$ 500/SF	\$ 700/SF	
	Structure Length - Approaches	7,420 FT	7,420 FT	Const Length = 7700 FT
	Deck Area - Approaches	519,400 SF	519,400 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 113,680,000	\$ 169,540,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 5,680,000	\$ 8,480,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 1,780,000	\$ 1,780,000	Assume Width excluding Rail expansion
	Maintenance & Protection of Traffic	\$ 7,300,000	\$ 9,530,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 12,770,000	\$ 16,680,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 3,650,000	\$ 4,770,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 217,342,750	\$ 284,004,300	
	Base Cost Including Inflation	\$ 217,340,000	\$ 284,000,000	
	Contingency	\$ 76,070,000	\$ 99,400,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 293,410,000	\$ 383,400,000	
	Design	\$ 32,280,000	\$ 42,170,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 29,340,000	\$ 38,340,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 355,030,000	\$ 463,910,000	



Alternative 3: Steel Through Arch

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

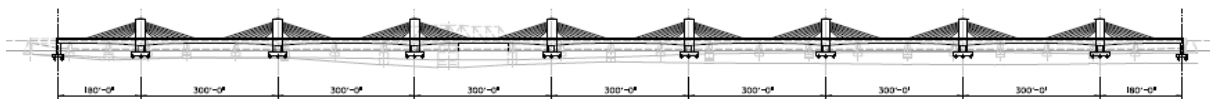
		Low	High	
Structure Costs	Structure Width	72 FT	72 FT	
	Structure Length - Through Arch	610 FT	610 FT	
	Deck Area - Through Arch Span	43,920 SF	43,920 SF	
	Estimated \$\$/SF - Through Arch Span	\$ 500/SF	\$ 700/SF	
	Structure Length - Approaches	7,090 FT	7,090 FT	Const Length = 7700 FT
	Deck Area - Approaches	510,480 SF	510,480 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
Total Estimated Structure Cost	\$ 124,060,000	\$ 183,890,000		
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
	Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000	
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 6,200,000	\$ 9,190,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 3,560,000	\$ 3,560,000	Assume Width excluding Rail expansion
	Maintenance & Protection of Traffic	\$ 7,710,000	\$ 10,110,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 13,500,000	\$ 17,690,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 3,860,000	\$ 5,050,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 231,372,750	\$ 302,714,300	
	Base Cost Including Inflation	\$ 231,370,000	\$ 302,710,000	
	Contingency	\$ 80,980,000	\$ 105,950,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 312,350,000	\$ 408,660,000	
	Design	\$ 34,360,000	\$ 44,950,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 31,240,000	\$ 40,870,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
TOTAL ESTIMATED COST	\$ 377,950,000	\$ 494,480,000		



Alternative 3: Full Extradosed

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

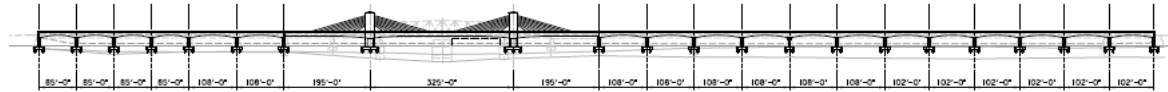
		Low	High	
Structure Costs	Structure Width	83 FT	83 FT	
	Structure Length - Extradosed	2460 FT	2460 FT	
	Deck Area - Extradosed Spans	204,180 SF	204,180 SF	
	Estimated \$\$/SF - Extradosed Spans	\$ 700/SF	\$ 900/SF	
	Structure Length - Approaches	5,240 FT	5,240 FT	Const Length = 7700 FT
	Deck Area - Approaches	434,920 SF	434,920 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 229,910,000	\$ 314,240,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 11,500,000	\$ 15,710,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 13,350,000	\$ 13,350,000	Assume Width excluding Rail expansion
	Maintenance & Protection of Traffic	\$ 11,950,000	\$ 15,320,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 20,910,000	\$ 26,810,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 5,970,000	\$ 7,660,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 366,072,750	\$ 466,314,300	
	Base Cost Including Inflation	\$ 366,070,000	\$ 466,310,000	
	Contingency	\$ 128,120,000	\$ 163,210,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 494,190,000	\$ 629,520,000	
	Design	\$ 54,360,000	\$ 69,250,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 49,420,000	\$ 62,950,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 597,970,000	\$ 761,720,000	



Alternative 3: Partial Extradosed

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

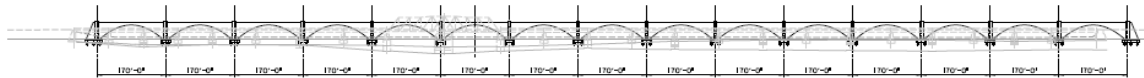
		Low	High	
Structure Costs	Structure Width	83 FT	83 FT	
	Structure Length - Extradosed	715 FT	715 FT	
	Deck Area - Extradosed Spans	59,345 SF	59,345 SF	
	Estimated \$\$/SF - Extradosed Spans	\$ 700/SF	\$ 900/SF	
	Structure Length - Approaches	6,985 FT	6,985 FT	Const Length = 7700 FT
	Deck Area - Approaches	579,755 SF	579,755 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 157,490,000	\$ 227,340,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 7,870,000	\$ 11,370,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 13,350,000	\$ 13,350,000	Assume Width excluding Rail expansion
	Maintenance & Protection of Traffic	\$ 9,050,000	\$ 11,840,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 15,840,000	\$ 20,730,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 4,530,000	\$ 5,920,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 280,612,750	\$ 363,774,300	
	Base Cost Including Inflation	\$ 280,610,000	\$ 363,770,000	
	Contingency	\$ 98,210,000	\$ 127,320,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 378,820,000	\$ 491,090,000	
	Design	\$ 41,670,000	\$ 54,020,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 37,880,000	\$ 49,110,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 458,370,000	\$ 594,220,000	



Alternative 3: Deck Arch

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

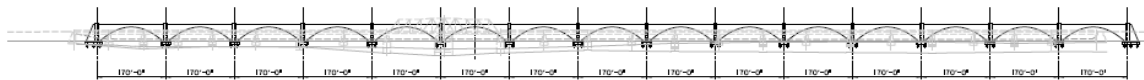
		Low	High	
Structure Costs	Structure Width	68 FT	68 FT	
	Structure Length - Deck Arch	2550 FT	2550 FT	
	Deck Area - Deck Arch Spans	173,400 SF	173,400 SF	
	Estimated \$\$/SF - Deck Arch Spans	\$ 400/SF	\$ 550/SF	
	Structure Length - Approaches	5,150 FT	5,150 FT	Const Length = 7700 FT
	Deck Area - Approaches	350,200 SF	350,200 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 139,400,000	\$ 200,430,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 6,970,000	\$ 10,020,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$	\$	Assume Width excluding Rail expansion
	Maintenance & Protection of Traffic	\$ 8,330,000	\$ 10,770,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 14,570,000	\$ 18,840,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 4,160,000	\$ 5,380,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 245,912,750	\$ 318,664,300	
	Base Cost Including Inflation	\$ 245,910,000	\$ 318,660,000	
	Contingency	\$ 86,070,000	\$ 111,530,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 331,980,000	\$ 430,190,000	
	Design	\$ 36,520,000	\$ 47,320,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 33,200,000	\$ 43,020,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 401,700,000	\$ 520,530,000	



Alternative 3: Multi-Girder with Arch Façade

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

		Low	High	
Structure Costs	Structure Width	68 FT	68 FT	
	Structure Length - Deck Arch	00 FT	00 FT	
	Deck Area - Deck Arch Spans	SF	SF	
	Estimated \$\$/SF - Deck Arch Spans	\$ 000/SF	\$ 000/SF	
	Structure Length - Approaches	7,700 FT	7,700 FT	Const Length = 7700 FT
	Deck Area - Approaches	523,600 SF	523,600 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Precast Arch Facades	15400 LF	15400 LF	
Estimated \$/LF - Arch Facades	\$ 1,000 /LF	\$ 1,000 /LF	Includes fabrication, erection, post-tensioning	
Total Estimated Structure Cost		\$ 120,120,000	\$ 172,480,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @\$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
	Total Estimated RR Cost		\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 6,010,000	\$ 8,620,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$	\$	Assume Width excluding Rail expansion
	Maintenance & Protection of Traffic	\$ 7,560,000	\$ 9,650,000	Assume 4% of (Structure Plus Rail) Cost
	Mobilization	\$ 13,220,000	\$ 16,890,000	Assume 7% of (Structure Plus Rail) Cost
Construction Staking/Survey	\$ 3,780,000	\$ 4,830,000	Assume 2% of (Structure Plus Rail) Cost	
Total Cost Summary	Base Construction Cost	\$ 223,172,750	\$ 285,694,300	
	Base Cost Including Inflation	\$ 223,170,000	\$ 285,690,000	
	Contingency	\$ 78,110,000	\$ 99,990,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 301,280,000	\$ 385,680,000	
	Design	\$ 33,140,000	\$ 42,420,000	Assume 11% of (Base Cost Plus Inflation Plus Contingency)
	Construction Management / Inspection	\$ 30,130,000	\$ 38,570,000	Assume 10% of (Base Cost Plus Inflation Plus Contingency)
TOTAL ESTIMATED COST		\$ 364,550,000	\$ 466,670,000	



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**Alternative 4: A - Shallow Bore Jacked Tunnel
B - Shallow Submersed Tunnel
C - Deep Bore Tunnel**

Year of Estimate 2013
Construction Year 2017
Inflation Rate 0%

		ALTERNATE 4 A: Tunnel Approach with Shallow Bore Jacked Tunnel Segments Under the River	ALTERNATE 4 B: Tunnel Approach with Submersed Tunnel Segments Under the River	ALTERNATE 4 C: Tunnel Approach with EPBM Tunnel Deep Bore with Segmental Lining Below Top of Rock		
Structure Costs	Structure Width		88	88	88	2 tunnels - 44' diameter each
	Structure Length - Tunnel Approaches		41,000	41,000	41,000	Passenger Tunnel = 14,225' tunnel, 1 portal in VA - 1000' portal to grade Freight Tunnel = 25,950' tunnel, 2 portals one in VA one in DC, 2000' portal to grade
	Tunnel Approaches		\$2,665,000,000	\$2,665,000,000	\$2,255,000,000	Assumes EPBM or TBM excavation & lining - no open cut in crowded urban area
	Estimated \$/LF - Approaches		\$65,000	\$65,000	\$55,000	Cost presumes learning curve with about 8 miles of tunneling - better production after time
	Estimated Retaining Walls		-	-	-	
	Estimated \$/SF - Retaining Walls		-	-	-	
	Assembly Chamber/Jacking Pit		\$10,000,000	\$15,000,000	\$15,000,000	Slurry wall chambers required for jacking tunnel segments or TBM assembly/disassembly
	Disassembly Chamber/Receiving Pit		\$10,000,000	\$15,000,000	\$15,000,000	
	Jet Grout River Bed	59,259	\$88,888,500			Jacking tunnel segments will require ground improvement to stand-up the face of excavation
	Estimated \$/CY - Jet Grout/Ground Freeze	1,500	1500			
	Fire Protection, Vent Plants & Equipment		\$100,000,000	\$100,000,000	\$260,000,000	
Total Estimated Structure Cost		\$2,785,000,000	\$2,795,000,000	\$2,545,000,000		
Rail Costs	Trackwork/Earthwork/Ballast					
	Construct Track		\$24,400,000	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)		\$1,600,000	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)		\$6,400,000	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout		\$25,000	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover		\$200,000	\$200,000	\$200,000	4 @ \$50K each
	Signals					
	Virginia & L'Enfant Interlockings		\$12,000,000	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings		\$16,000,000	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings		\$5,000,000	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)		\$2,900,000	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs		\$ 250,000	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
	Total Estimated RR Cost		\$ 68,775,000	\$ 68,775,000	\$ 68,775,000	
Underground Station	Support of Earth		\$15,000,000	\$15,000,000	\$15,000,000	Soldier Pile/Lagging to top of rock then shotcrete & rock bolts down to invert
	Decking		\$3,500,000	\$3,500,000	\$3,500,000	
	Structural Excavation		\$10,000,000	\$10,000,000	\$10,000,000	Low rock PSI would permit rapid excavation by road header/excavator
	Structural Concrete		\$40,000,000	\$40,000,000	\$40,000,000	
	Structural Steel		\$25,000,000	\$25,000,000	\$25,000,000	
	Architectural Works & Finishes		\$50,000,000	\$50,000,000	\$50,000,000	
	Fire Protection, Vent (MEP)		\$35,000,000	\$35,000,000	\$35,000,000	
	Passage Ways		\$10,000,000	\$10,000,000	\$10,000,000	NATM excavation methods or mole
Total Estimated Underground Station Costs		\$188,500,000	\$188,500,000	\$188,500,000		
Other Costs	Drainage, Signing, Landscaping etc		\$142,688,750	\$143,188,750	\$130,688,750	Assume 5% of Structure & Rail Cost
	Utility Relocation		\$228,302,000	\$229,102,000	\$209,102,000	Assume 8% of Structure & Rail Cost
	Right of Way Acquisition		\$25,000,000	\$25,000,000	\$25,000,000	In VA ROW - Cost for Egress in DC
	Maintenance & Protection of Traffic		\$114,151,000	\$114,551,000	\$104,551,000	Assume 4% of Structure & Rail Cost
	Mobilization		\$199,764,250	\$200,464,250	\$182,964,250	Assume 7% of Structure & Rail Cost
	Construction Staking/Survey		\$57,075,500	\$57,275,500	\$52,275,500	Assume 2% of Structure & Rail Cost
Total Cost Summary	Base Construction Cost		\$3,809,256,500	\$3,821,856,500	\$3,506,856,500	
	Base Cost Including Inflation		\$3,809,256,500	\$3,821,856,500	\$3,506,856,500	
	Contingency		\$1,333,239,775	\$1,337,649,775	\$1,227,399,775	Assume 35% of Base Cost
	Base Cost including Inflation and Contingency		\$5,142,496,275	\$5,159,506,275	\$4,734,256,275	
	Design		\$565,674,590	\$567,545,690	\$520,768,190	Assume 11% of Base Cost
	Construction Management/Inspection		\$514,249,628	\$515,950,628	\$473,425,628	Assume 10% of Base Cost
	Total Estimated Cost		\$6,222,420,493	\$6,243,002,593	\$5,728,450,093	

**These costs and the bridge and tunnel types discussed herein are conceptual in nature, and therefore evaluations of cost at this stage of the project development must be considered to be very preliminary, and should not be used for funding or programming purposes. None of the alternatives described in this report have been sufficiently engineered to determine costs based on estimated structural quantities, anticipated erection methods, right-of-way implications, expected schedule durations, and potential effects of inflation based on the anticipated timing of the beginning of construction. At this stage of development, only preliminary level of cost evaluation can be made that differentiates the alternatives on the basis of anticipated construction cost. A 35% contingency is included in the cost of bridge or tunnel options.*

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Alternative 5: 4-Track Rail Bridge with Pedestrian /Bicycle Path*

(2013 Dollars)

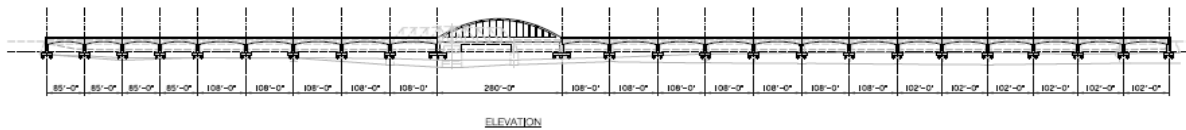
Structure Type	Structure Cost		Rail Cost	Other Costs		Anticipated Total Cost for New Structure
	Low	High		Low	High	
1. Steel Tied Arch	\$138,040,000	\$205,870,000	\$68,775,000	\$216,977,750	\$281,109,300	\$424 – \$556 M
2. Steel Through Arch	\$149,900,000	\$222,200,000	\$68,775,000	\$230,907,750	\$299,159,300	\$450 – \$590 M
3. Extradosed	\$271,460,000	\$371,030,000	\$68,775,000	\$359,617,750	\$453,199,300	\$700 – \$893 M
3a. Partial Extradosed	\$185,960,000	\$268,420,000	\$68,775,000	\$280,317,750	\$358,019,300	\$535 – \$695 M
4. Concrete Deck Arch	\$170,150,000	\$244,640,000	\$68,775,000	\$243,857,750	\$314,169,300	\$483 – \$628 M
4a. Standard Girder Structure with Concrete Arch Façade Elements	\$143,220,000	\$207,130,000	\$68,775,000	\$218,877,750	\$279,379,300	\$431 – \$555 M

**These costs and the bridge and tunnel types discussed herein are conceptual in nature, and therefore evaluations of cost at this stage of the project development must be considered to be very preliminary, and should not be used for funding or programming purposes. None of the alternatives described in this report have been sufficiently engineered to determine costs based on estimated structural quantities, anticipated erection methods, right-of way implications, expected schedule durations, and potential effects of inflation based on the anticipated timing of the beginning of construction. At this stage of development, only preliminary level of cost evaluation can be made that differentiates the alternatives on the basis of anticipated construction cost. A 35% contingency is included in the cost of bridge or tunnel options.*

Alternative 5: Steel Tied Arch

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

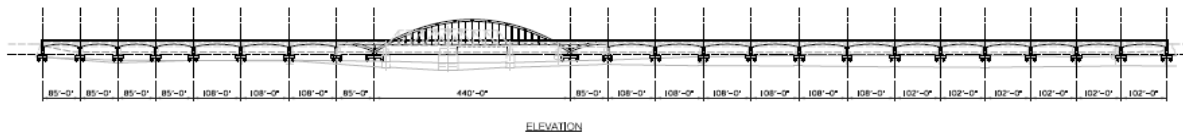
		Low	High	
Structure Costs	Structure Width	85 FT	85 FT	
	Structure Length - Tied Arch	280 FT	280 FT	
	Deck Area - Tied Arch Span	23,800 SF	23,800 SF	
	Estimated \$\$/SF - Tied Arch Span	\$ 500/SF	\$ 700/SF	
	Structure Length - Approaches	7,420 FT	7,420 FT	Const Length = 7700 FT
	Deck Area - Approaches	630,700 SF	630,700 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF		
Total Estimated Structure Cost	\$ 138,040,000	\$ 205,870,000		
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
	Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000	
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 6,900,000	\$ 10,290,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 15,130,000	\$ 15,130,000	Assume Width excluding Rail expansion
	Maintenance & Protection of Traffic	\$ 8,270,000	\$ 10,990,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 14,480,000	\$ 19,230,000	Assume 7% of (Structure + Rail) Cost
Construction Staking/Survey	\$ 4,140,000	\$ 5,490,000	Assume 2% of (Structure + Rail) Cost	
Total Cost Summary	Base Construction Cost	\$ 259,442,750	\$ 340,224,300	
	Base Cost Including Inflation	\$ 259,440,000	\$ 340,220,000	
	Contingency	\$ 90,800,000	\$ 119,080,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 350,240,000	\$ 459,300,000	
	Design	\$ 38,530,000	\$ 50,520,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 35,020,000	\$ 45,930,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 423,790,000	\$ 555,750,000	



Alternative 5: Steel Through Arch

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

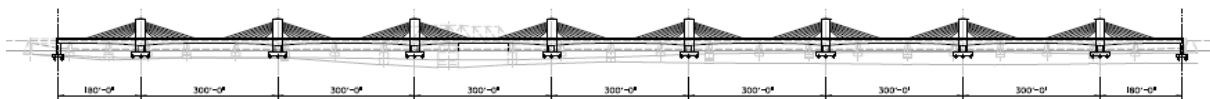
		Low	High	
Structure Costs	Structure Width	87 FT	87 FT	
	Structure Length - Through Arch	610 FT	610 FT	
	Deck Area - Through Arch Span	53,070 SF	53,070 SF	
	Estimated \$\$/SF - Through Arch Span	\$ 500/SF	\$ 700/SF	
	Structure Length - Approaches	7,090 FT	7,090 FT	Const Length = 7700 FT
	Deck Area - Approaches	616,830 SF	616,830 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
Total Estimated Structure Cost	\$ 149,900,000	\$ 222,200,000		
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
	Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000	
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 7,500,000	\$ 11,110,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 16,910,000	\$ 16,910,000	Assume Width excluding Rail expansion
	Maintenance & Protection of Traffic	\$ 8,750,000	\$ 11,640,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 15,310,000	\$ 20,370,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 4,370,000	\$ 5,820,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 275,222,750	\$ 361,274,300	
	Base Cost Including Inflation	\$ 275,220,000	\$ 361,270,000	
	Contingency	\$ 96,330,000	\$ 126,440,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 371,550,000	\$ 487,710,000	
	Design	\$ 40,870,000	\$ 53,650,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 37,160,000	\$ 48,770,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
TOTAL ESTIMATED COST	\$ 449,580,000	\$ 590,130,000		



Alternative 5: Full Extradosed

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

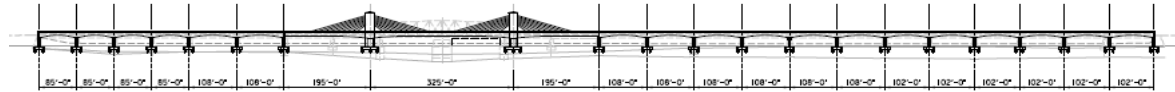
		Low	High		
Structure Costs	Structure Width	98 FT	98 FT		
	Structure Length - Extradosed	2460 FT	2460 FT		
	Deck Area - Extradosed Spans	241,080 SF	241,080 SF		
	Estimated \$\$/SF - Extradosed Spans	\$ 700/SF	\$ 900/SF		
	Structure Length - Approaches	5,240 FT	5,240 FT	Const Length = 7700 FT	
	Deck Area - Approaches	513,520 SF	513,520 SF		
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF		
	Estimated Retaining Walls	SF	SF		
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF		
	Total Estimated Structure Cost	\$ 271,460,000	\$ 371,030,000		
Rail Costs	Trackwork/Earthwork/Ballast				
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile	
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each	
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each	
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K	
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each	
	Signals				
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each	
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each	
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each	
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each	
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.	
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000	
	Other Costs	Drainage, Signing, Landscaping, etc.	\$ 13,570,000	\$ 18,550,000	Assume 5% of Structure Cost
Utility Relocation		\$ 3,707,750	\$ 4,449,300	Surface Utility Survey	
Right of Way Acquisition		\$ 26,700,000	\$ 26,700,000	Assume Width excluding Rail expansion	
Maintenance & Protection of Traffic		\$ 13,610,000	\$ 17,590,000	Assume 4% of (Structure + Rail) Cost	
Mobilization		\$ 23,820,000	\$ 30,790,000	Assume 7% of (Structure + Rail) Cost	
Construction Staking/Survey		\$ 6,800,000	\$ 8,800,000	Assume 2% of (Structure + Rail) Cost	
Total Cost Summary	Base Construction Cost	\$ 428,442,750	\$ 546,684,300		
	Base Cost Including Inflation	\$ 428,440,000	\$ 546,680,000		
	Contingency	\$ 149,950,000	\$ 191,340,000	Assume 35% of Base Cost Plus Inflation	
	Base Cost Including Inflation and Contingency	\$ 578,390,000	\$ 738,020,000		
	Design	\$ 63,620,000	\$ 81,180,000	Assume 11% of Base Cost Plus Inflation Plus Contingency	
	Construction Management / Inspection	\$ 57,840,000	\$ 73,800,000	Assume 10% of Base Cost Plus Inflation Plus Contingency	
		TOTAL ESTIMATED COST	\$ 699,850,000	\$ 893,000,000	



Alternative 5: Partial Extradosed

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

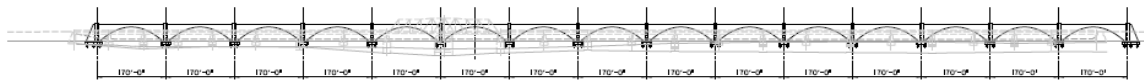
		Low	High	
Structure Costs	Structure Width	98 FT	98 FT	
	Structure Length - Extradosed	715 FT	715 FT	
	Deck Area - Extradosed Spans	70,070 SF	70,070 SF	
	Estimated \$\$/SF - Extradosed Spans	\$ 700/SF	\$ 900/SF	
	Structure Length - Approaches	6,985 FT	6,985 FT	Const Length = 7700 FT
	Deck Area - Approaches	684,530 SF	684,530 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 185,960,000	\$ 268,420,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 9,300,000	\$ 13,420,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 26,700,000	\$ 26,700,000	Assume Width excluding Rail expansion
	Maintenance & Protection of Traffic	\$ 10,190,000	\$ 13,490,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 17,830,000	\$ 23,600,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 5,090,000	\$ 6,740,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 327,552,750	\$ 425,594,300	
	Base Cost Including Inflation	\$ 327,550,000	\$ 425,590,000	
	Contingency	\$ 114,640,000	\$ 148,960,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 442,190,000	\$ 574,550,000	
	Design	\$ 48,640,000	\$ 63,200,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 44,220,000	\$ 57,460,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 535,050,000	\$ 695,210,000	



Alternative 5: Multi-Girder with Arch Façade

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

		Low	High	
Structure Costs	Structure Width	83 FT	83 FT	
	Structure Length - Deck Arch	00 FT	00 FT	
	Deck Area - Deck Arch Spans	SF	SF	
	Estimated \$\$/SF - Deck Arch Spans	\$ 000/SF	\$ 000/SF	
	Structure Length - Approaches	7,700 FT	7,700 FT	Const Length = 7700 FT
	Deck Area - Approaches	639,100 SF	639,100 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Precast Arch Façades	15400 LF	15400 LF	
Estimated \$/LF - Arch Façades	\$ 1,000 /LF	\$ 1,000 /LF	Includes fabrication, erection, post-tensioning	
Total Estimated Structure Cost		\$ 143,220,000	\$ 207,130,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @\$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
	Total Estimated RR Cost		\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 7,160,000	\$ 10,360,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 13,350,000	\$ 13,350,000	Assume Width excluding Rail expansion
	Maintenance & Protection of Traffic	\$ 8,480,000	\$ 11,040,000	Assume 4% of (Structure Plus Rail) Cost
	Mobilization	\$ 14,840,000	\$ 19,310,000	Assume 7% of (Structure Plus Rail) Cost
Construction Staking/Survey	\$ 4,240,000	\$ 5,520,000	Assume 2% of (Structure Plus Rail) Cost	
Total Cost Summary	Base Construction Cost	\$ 263,772,750	\$ 339,934,300	
	Base Cost Including Inflation	\$ 263,770,000	\$ 339,930,000	
	Contingency	\$ 92,320,000	\$ 118,980,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 356,090,000	\$ 458,910,000	
	Design	\$ 39,170,000	\$ 50,480,000	Assume 11% of (Base Cost Plus Inflation Plus Contingency)
	Construction Management / Inspection	\$ 35,610,000	\$ 45,890,000	Assume 10% of (Base Cost Plus Inflation Plus Contingency)
TOTAL ESTIMATED COST		\$ 430,870,000	\$ 555,280,000	



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Alternative 6: 4-Track Rail Bridge with Pedestrian /Bicycle Path and Streetcar*

(2013 Dollars)

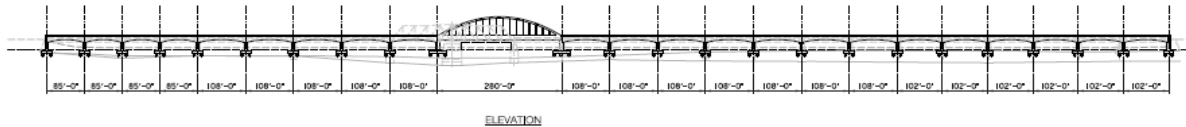
Structure Type	Structure Cost		Rail Cost	Other Costs		Anticipated Total Cost for New Structure
	Low	High		Low	High	
1. Steel Tied Arch	\$188,380,000	\$280,950,000	\$68,775,000	\$349,417,750	\$444,619,300	\$607 _ \$794 M
2. Steel Through Arch	\$203,310,000	\$301,370,000	\$68,775,000	\$366,177,750	\$466,479,300	\$638 _ \$837 M
3. Extradosed	\$343,480,000	\$469,460,000	\$68,775,000	\$504,907,750	\$631,089,300	\$917 _ \$1,169 M
3a. Partial Extradosed	\$235,290,000	\$339,640,000	\$68,775,000	\$404,537,750	\$510,689,300	\$709 _ \$919 M
4. Concrete Deck Arch	\$223,450,000	\$321,280,000	\$68,775,000	\$371,767,750	\$471,829,300	\$664 _ \$862 M
4a. Standard Girder Structure with Concrete Arch Façade Elements	\$183,260,000	\$267,190,000	\$68,775,000	\$334,477,750	\$421,699,300	\$587 _ \$758 M

**These costs and the bridge and tunnel types discussed herein are conceptual in nature, and therefore evaluations of cost at this stage of the project development must be considered to be very preliminary, and should not be used for funding or programming purposes. None of the alternatives described in this report have been sufficiently engineered to determine costs based on estimated structural quantities, anticipated erection methods, right-of way implications, expected schedule durations, and potential effects of inflation based on the anticipated timing of the beginning of construction. At this stage of development, only preliminary level of cost evaluation can be made that differentiates the alternatives on the basis of anticipated construction cost. A 35% contingency is included in the cost of bridge or tunnel options.*

Alternative 6: Steel Tied Arch

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

		Low	High	
Structure Costs	Structure Width	116 FT	116 FT	
	Structure Length - Tied Arch	280 FT	280 FT	
	Deck Area - Tied Arch Span	32,480 SF	32,480 SF	
	Estimated \$\$/SF - Tied Arch Span	\$ 500/SF	\$ 700/SF	
	Structure Length - Approaches	7,420 FT	7,420 FT	Const Length = 7700 FT
	Deck Area - Approaches	860,720 SF	860,720 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 188,380,000	\$ 280,950,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 9,420,000	\$ 14,050,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 42,720,000	\$ 42,720,000	Assume Width excluding Rail expansion
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary
	Maintenance & Protection of Traffic	\$ 10,290,000	\$ 13,990,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 18,000,000	\$ 24,480,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 5,140,000	\$ 6,990,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 371,332,750	\$ 486,284,300	
	Base Cost Including Inflation	\$ 371,330,000	\$ 486,280,000	
	Contingency	\$ 129,970,000	\$ 170,200,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 501,300,000	\$ 656,480,000	
	Design	\$ 55,140,000	\$ 72,210,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 50,130,000	\$ 65,650,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
		TOTAL ESTIMATED COST	\$ 606,570,000	\$ 794,340,000



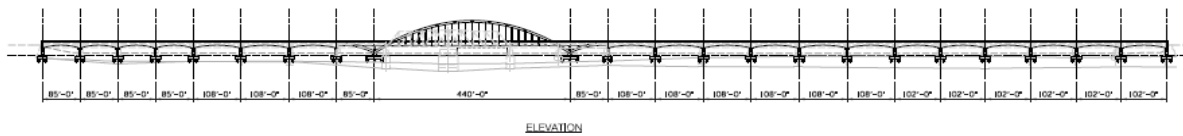
Alternative 6: Steel Through Arch

Year of Estimate: 2013

Construction Year: 2017

Inflation Rate: . %

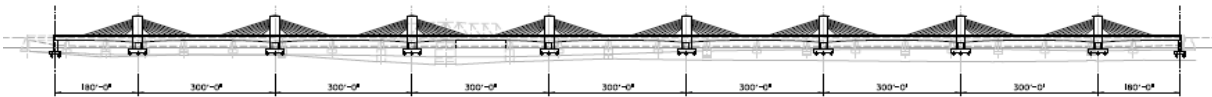
		Low	High	
Structure Costs	Structure Width	118 FT	118 FT	
	Structure Length - Through Arch	610 FT	610 FT	
	Deck Area - Through Arch Span	71,980 SF	71,980 SF	
	Estimated \$\$/SF - Through Arch Span	\$ 500/SF	\$ 700/SF	
	Structure Length - Approaches	7,090 FT	7,090 FT	Const Length = 7700 FT
	Deck Area - Approaches	836,620 SF	836,620 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 203,310,000	\$ 301,370,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 10,170,000	\$ 15,070,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 44,500,000	\$ 44,500,000	Assume Width excluding Rail expansion
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary
	Maintenance & Protection of Traffic	\$ 10,880,000	\$ 14,810,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 19,050,000	\$ 25,910,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 5,440,000	\$ 7,400,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 390,732,750	\$ 512,164,300	
	Base Cost Including Inflation	\$ 390,730,000	\$ 512,160,000	
	Contingency	\$ 136,760,000	\$ 179,260,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 527,490,000	\$ 691,420,000	
	Design	\$ 58,020,000	\$ 76,060,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 52,750,000	\$ 69,140,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 638,260,000	\$ 836,620,000	



Alternative 6: Full Extradosed

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

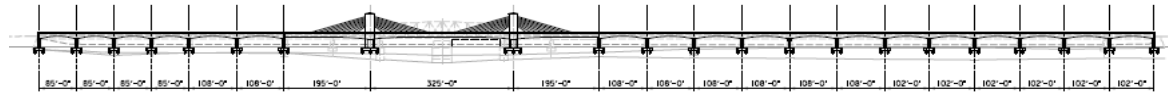
		Low	High	
Structure Costs	Structure Width	124 FT	124 FT	
	Structure Length - Extradosed	2460 FT	2460 FT	
	Deck Area - Extradosed Spans	305,040 SF	305,040 SF	
	Estimated \$\$/SF - Extradosed Spans	\$ 700/SF	\$ 900/SF	
	Structure Length - Approaches	5,240 FT	5,240 FT	Const Length = 7700 FT
	Deck Area - Approaches	649,760 SF	649,760 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF		
	Total Estimated Structure Cost	\$ 343,480,000	\$ 469,460,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 17,170,000	\$ 23,470,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 49,840,000	\$ 49,840,000	Assume Width excluding Rail expansion
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary
	Maintenance & Protection of Traffic	\$ 16,490,000	\$ 21,530,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 28,860,000	\$ 37,680,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 8,250,000	\$ 10,760,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 561,472,750	\$ 715,844,300	
	Base Cost Including Inflation	\$ 561,470,000	\$ 715,840,000	
	Contingency	\$ 196,510,000	\$ 250,540,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 757,980,000	\$ 966,380,000	
	Design	\$ 83,380,000	\$ 106,300,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 75,800,000	\$ 96,640,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 917,160,000	\$ 1,169,320,000	



Alternative 6: Partial Extradosed

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

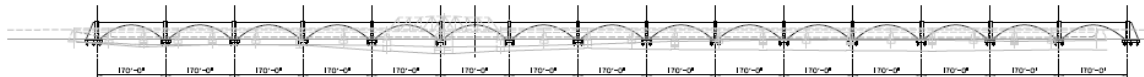
		Low	High	
Structure Costs	Structure Width	124 FT	124 FT	
	Structure Length - Extradosed	715 FT	715 FT	
	Deck Area - Extradosed Spans	88,660 SF	88,660 SF	
	Estimated \$\$/SF - Extradosed Spans	\$ 700/SF	\$ 900/SF	
	Structure Length - Approaches	6,985 FT	6,985 FT	Const Length = 7700 FT
	Deck Area - Approaches	866,140 SF	866,140 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 235,290,000	\$ 339,640,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 11,760,000	\$ 16,980,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 49,840,000	\$ 49,840,000	Assume Width excluding Rail expansion
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary
	Maintenance & Protection of Traffic	\$ 12,160,000	\$ 16,340,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 21,280,000	\$ 28,590,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 6,080,000	\$ 8,170,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 433,792,750	\$ 562,664,300	
	Base Cost Including Inflation	\$ 433,790,000	\$ 562,660,000	
	Contingency	\$ 151,830,000	\$ 196,930,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 585,620,000	\$ 759,590,000	
	Design	\$ 64,420,000	\$ 83,550,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 58,560,000	\$ 75,960,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 708,600,000	\$ 919,100,000	



Alternative 6: Multi-Girder with Arch Façade

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

		Low	High	
Structure Costs	Structure Width	109 FT	109 FT	
	Structure Length - Deck Arch	00 FT	00 FT	
	Deck Area - Deck Arch Spans	SF	SF	
	Estimated \$\$/SF - Deck Arch Spans	\$ 000/SF	\$ 000/SF	
	Structure Length - Approaches	7,700 FT	7,700 FT	Const Length = 7700 FT
	Deck Area - Approaches	839,300 SF	839,300 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Precast Arch Façades	15400 LF	15400 LF	
Estimated \$/LF - Arch Façades	\$ 1,000 /LF	\$ 1,000 /LF	Includes fabrication, erection, post-tensioning	
Total Estimated Structure Cost	\$ 183,260,000	\$ 267,190,000		
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
	Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000	
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 9,160,000	\$ 13,360,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 36,490,000	\$ 36,490,000	Assume Width excluding Rail expansion
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary
	Maintenance & Protection of Traffic	\$ 10,080,000	\$ 13,440,000	Assume 4% of (Structure Plus Rail) Cost
	Mobilization	\$ 17,640,000	\$ 23,520,000	Assume 7% of (Structure Plus Rail) Cost
	Construction Staking/Survey	\$ 5,040,000	\$ 6,720,000	Assume 2% of (Structure Plus Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 359,052,750	\$ 463,824,300	
	Base Cost Including Inflation	\$ 359,050,000	\$ 463,820,000	
	Contingency	\$ 125,670,000	\$ 162,340,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 484,720,000	\$ 626,160,000	
	Design	\$ 53,320,000	\$ 68,880,000	Assume 11% of (Base Cost Plus Inflation Plus Contingency)
	Construction Management / Inspection	\$ 48,470,000	\$ 62,620,000	Assume 10% of (Base Cost Plus Inflation Plus Contingency)
TOTAL ESTIMATED COST	\$ 586,510,000	\$ 757,660,000		



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Alternative 7: 4-Track Rail Bridge with Pedestrian /Bicycle Path and Shared Streetcar/Auto Lanes*

(2013 Dollars)

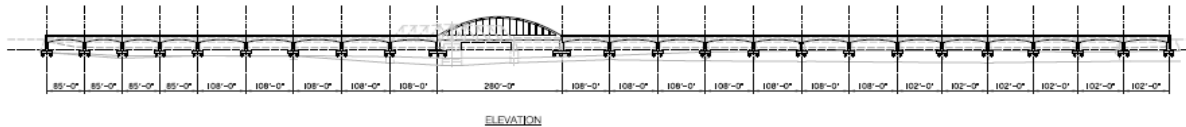
Structure Type	Structure Cost		Rail Cost	Other Costs		Anticipated Total Cost for New Structure
	Low	High		Low	High	
1. Steel Tied Arch	\$194,070,000	\$289,430,000	\$68,775,000	\$359,782,750	\$457,564,300	\$623 _ \$816 M
2. Steel Through Arch	\$209,340,000	\$310,310,000	\$68,775,000	\$376,852,750	\$479,864,300	\$655 _ \$859 M
3. Extradosed	\$353,170,000	\$482,710,000	\$68,775,000	\$518,992,750	\$648,484,300	\$941 _ \$1,200 M
3a. Partial Extradosed	\$241,930,000	\$349,220,000	\$68,775,000	\$415,812,750	\$524,674,300	\$727 _ \$943 M
4. Concrete Deck Arch	\$231,650,000	\$333,070,000	\$68,775,000	\$385,187,750	\$488,599,300	\$686 _ \$890 M
4a. Standard Girder Structure with Concrete Arch Façade Elements	\$189,420,000	\$276,430,000	\$68,775,000	\$346,007,750	\$436,049,300	\$604 _ \$781 M

**These costs and the bridge and tunnel types discussed herein are conceptual in nature, and therefore evaluations of cost at this stage of the project development must be considered to be very preliminary, and should not be used for funding or programming purposes. None of the alternatives described in this report have been sufficiently engineered to determine costs based on estimated structural quantities, anticipated erection methods, right-of way implications, expected schedule durations, and potential effects of inflation based on the anticipated timing of the beginning of construction. At this stage of development, only preliminary level of cost evaluation can be made that differentiates the alternatives on the basis of anticipated construction cost. A 35% contingency is included in the cost of bridge or tunnel options.*

Alternative 7: Steel Tied Arch

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

		Low	High	
Structure Costs	Structure Width	120 FT	120 FT	
	Structure Length - Tied Arch	280 FT	280 FT	
	Deck Area - Tied Arch Span	33,460 SF	33,460 SF	
	Estimated \$\$/SF - Tied Arch Span	\$ 500/SF	\$ 700/SF	
	Structure Length - Approaches	7,420 FT	7,420 FT	Const Length = 7700 FT
	Deck Area - Approaches	886,690 SF	886,690 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 194,070,000	\$ 289,430,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 9,700,000	\$ 14,470,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 45,835,000	\$ 45,835,000	Assume Width excluding Rail expansion
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary
	Maintenance & Protection of Traffic	\$ 10,510,000	\$ 14,330,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 18,400,000	\$ 25,070,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 5,260,000	\$ 7,160,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 381,157,750	\$ 499,399,300	
	Base Cost Including Inflation	\$ 381,160,000	\$ 499,400,000	
	Contingency	\$ 133,410,000	\$ 174,790,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 514,570,000	\$ 674,190,000	
	Design	\$ 56,600,000	\$ 74,160,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 51,460,000	\$ 67,420,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
		TOTAL ESTIMATED COST	\$ 622,630,000	\$ 815,770,000



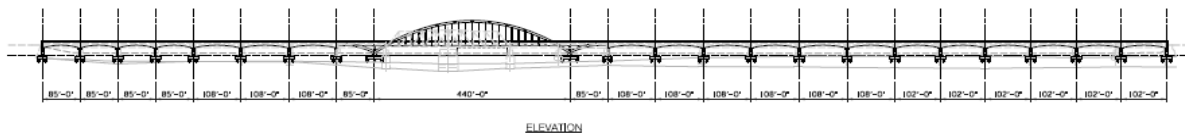
Alternative 7: Steel Through Arch

Year of Estimate: 2013

Construction Year: 2017

Inflation Rate: . %

		Low	High	
Structure Costs	Structure Width	122 FT	122 FT	
	Structure Length - Through Arch	610 FT	610 FT	
	Deck Area - Through Arch Span	74,115 SF	74,115 SF	
	Estimated \$\$/SF - Through Arch Span	\$ 500/SF	\$ 700/SF	
	Structure Length - Approaches	7,090 FT	7,090 FT	Const Length = 7700 FT
	Deck Area - Approaches	861,435 SF	861,435 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 209,340,000	\$ 310,310,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 10,470,000	\$ 15,520,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 47,615,000	\$ 47,615,000	Assume Width excluding Rail expansion
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary
	Maintenance & Protection of Traffic	\$ 11,120,000	\$ 15,160,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 19,470,000	\$ 26,540,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 5,560,000	\$ 7,580,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 400,957,750	\$ 525,829,300	
	Base Cost Including Inflation	\$ 400,960,000	\$ 525,830,000	
	Contingency	\$ 140,340,000	\$ 184,040,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 541,300,000	\$ 709,870,000	
	Design	\$ 59,540,000	\$ 78,090,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 54,130,000	\$ 70,990,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 654,970,000	\$ 858,950,000	



Alternative 7: Full Extradosed

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

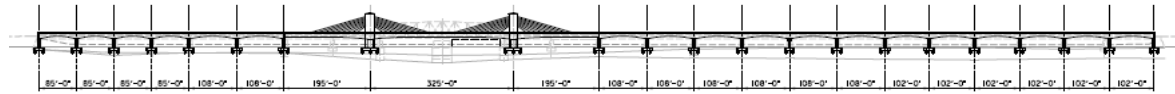
		Low	High		
Structure Costs	Structure Width	128 FT	128 FT		
	Structure Length - Extradosed	2460 FT	2460 FT		
	Deck Area - Extradosed Spans	313,650 SF	313,650 SF		
	Estimated \$\$/SF - Extradosed Spans	\$ 700/SF	\$ 900/SF		
	Structure Length - Approaches	5,240 FT	5,240 FT	Const Length = 7700 FT	
	Deck Area - Approaches	668,100 SF	668,100 SF		
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF		
	Estimated Retaining Walls	SF	SF		
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF		
	Total Estimated Structure Cost	\$ 353,170,000	\$ 482,710,000		
Rail Costs	Trackwork/Earthwork/Ballast				
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile	
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each	
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each	
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K	
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each	
	Signals				
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each	
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each	
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each	
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each	
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.	
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000	
	Other Costs	Drainage, Signing, Landscaping, etc.	\$ 17,660,000	\$ 24,140,000	Assume 5% of Structure Cost
Utility Relocation		\$ 3,707,750	\$ 4,449,300	Surface Utility Survey	
Right of Way Acquisition		\$ 52,955,000	\$ 52,955,000	Assume Width excluding Rail expansion	
Light Rail Trackwork and Catenary		\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary	
Maintenance & Protection of Traffic		\$ 16,880,000	\$ 22,060,000	Assume 4% of (Structure + Rail) Cost	
Mobilization		\$ 29,540,000	\$ 38,600,000	Assume 7% of (Structure + Rail) Cost	
	Construction Staking/Survey	\$ 8,440,000	\$ 11,030,000	Assume 2% of (Structure + Rail) Cost	
Total Cost Summary	Base Construction Cost	\$ 576,027,750	\$ 734,599,300		
	Base Cost Including Inflation	\$ 576,030,000	\$ 734,600,000		
	Contingency	\$ 201,610,000	\$ 257,110,000	Assume 35% of Base Cost Plus Inflation	
	Base Cost Including Inflation and Contingency	\$ 777,640,000	\$ 991,710,000		
	Design	\$ 85,540,000	\$ 109,090,000	Assume 11% of Base Cost Plus Inflation Plus Contingency	
	Construction Management / Inspection	\$ 77,760,000	\$ 99,170,000	Assume 10% of Base Cost Plus Inflation Plus Contingency	
	TOTAL ESTIMATED COST	\$ 940,940,000	\$ 1,199,970,000		



Alternative 7: Partial Extradosed

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

		Low	High	
Structure Costs	Structure Width	128 FT	128 FT	
	Structure Length - Extradosed	715 FT	715 FT	
	Deck Area - Extradosed Spans	91,163 SF	91,163 SF	
	Estimated \$\$/SF - Extradosed Spans	\$ 700/SF	\$ 900/SF	
	Structure Length - Approaches	6,985 FT	6,985 FT	Const Length = 7700 FT
	Deck Area - Approaches	890,588 SF	890,588 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 241,930,000	\$ 349,220,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 12,100,000	\$ 17,460,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 52,955,000	\$ 52,955,000	Assume Width excluding Rail expansion
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary
	Maintenance & Protection of Traffic	\$ 12,430,000	\$ 16,720,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 21,750,000	\$ 29,260,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 6,210,000	\$ 8,360,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 444,757,750	\$ 577,079,300	
	Base Cost Including Inflation	\$ 444,760,000	\$ 577,080,000	
	Contingency	\$ 155,670,000	\$ 201,980,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 600,430,000	\$ 779,060,000	
	Design	\$ 66,050,000	\$ 85,700,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 60,040,000	\$ 77,910,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 726,520,000	\$ 942,670,000	



Alternative 7: Deck Arch

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

		Low	High		
Structure Costs	Structure Width		113 FT	113 FT	
	Structure Length - Deck Arch		2550 FT	2550 FT	
	Deck Area - Deck Arch Spans		288,150 SF	288,150 SF	
	Estimated \$\$/SF - Deck Arch Spans		\$ 400/SF	\$ 550/SF	
	Structure Length - Shared Use Bridge		5,150 FT	5,150 FT	Const Length = 7700 FT
	Deck Area - Approaches		581,950 SF	581,950 SF	
	Estimated \$\$/SF - Shared Use Path		\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls		SF	SF	
	Estimated \$\$/SF - Retaining Walls		\$ 140/SF	\$ 140/SF	
Total Estimated Structure Cost		\$ 231,650,000	\$ 333,070,000		
Rail Costs	Trackwork/Earthwork/Ballast				
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile	
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each	
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each	
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K	
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each	
	Signals				
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each	
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each	
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each	
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each	
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.	
	Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000		
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 11,580,000	\$ 16,650,000	Assume 5% of Structure Cost	
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey	
	Right of Way Acquisition	\$ 40,050,000	\$ 40,050,000	Assume Width excluding Rail expansion	
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary	
	Maintenance & Protection of Traffic	\$ 12,020,000	\$ 16,070,000	Assume 4% of (Structure + Rail) Cost	
	Mobilization	\$ 21,030,000	\$ 28,130,000	Assume 7% of (Structure + Rail) Cost	
	Construction Staking/Survey	\$ 6,010,000	\$ 8,040,000	Assume 2% of (Structure + Rail) Cost	
Total Cost Summary	Base Construction Cost	\$ 419,722,750	\$ 545,114,300		
	Base Cost Including Inflation	\$ 419,720,000	\$ 545,110,000		
	Contingency	\$ 146,900,000	\$ 190,790,000	Assume 35% of Base Cost Plus Inflation	
	Base Cost Including Inflation and Contingency	\$ 566,620,000	\$ 735,900,000		
	Design	\$ 62,330,000	\$ 80,950,000	Assume 11% of Base Cost Plus Inflation Plus Contingency	
	Construction Management / Inspection	\$ 56,660,000	\$ 73,590,000	Assume 10% of Base Cost Plus Inflation Plus Contingency	
TOTAL ESTIMATED COST		\$ 685,610,000	\$ 890,440,000		



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Alternative 8: 4-Track Rail Bridge with Pedestrian /Bicycle Path, Shared Streetcar/Auto Lanes and General Purpose Lanes*

(2013 Dollars)

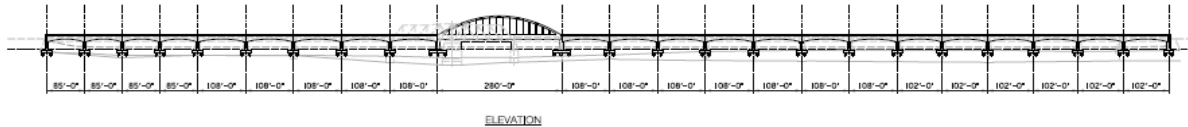
Structure Type	Structure Cost		Rail Cost	Other Costs		Anticipated Total Cost for New Structure
	Low	High		Low	High	
1. Steel Tied Arch	\$233,040,000	\$347,560,000	\$68,775,000	\$430,822,750	\$546,384,300	\$733 _ \$963 M
2. Steel Through Arch	\$250,700,000	\$371,610,000	\$68,775,000	\$450,112,750	\$571,624,300	\$770 _ \$1,012 M
3. Extradosed	\$419,660,000	\$573,580,000	\$68,775,000	\$615,542,750	\$767,644,300	\$1,104 _ \$1,410 M
3a. Partial Extradosed	\$287,470,000	\$414,960,000	\$68,775,000	\$492,932,750	\$620,524,300	\$849 _ \$1,104 M
4. Concrete Deck Arch	\$280,850,000	\$403,810,000	\$68,775,000	\$465,707,750	\$589,099,300	\$815 _ \$1,062 M
4a. Standard Girder Structure with Concrete Arch Façade Elements	\$226,380,000	\$331,870,000	\$68,775,000	\$415,197,750	\$522,379,300	\$710 _ \$923 M

**These costs and the bridge and tunnel types discussed herein are conceptual in nature, and therefore evaluations of cost at this stage of the project development must be considered to be very preliminary, and should not be used for funding or programming purposes. None of the alternatives described in this report have been sufficiently engineered to determine costs based on estimated structural quantities, anticipated erection methods, right-of way implications, expected schedule durations, and potential effects of inflation based on the anticipated timing of the beginning of construction. At this stage of development, only preliminary level of cost evaluation can be made that differentiates the alternatives on the basis of anticipated construction cost. A 35% contingency is included in the cost of bridge or tunnel options.*

Alternative 8: Steel Tied Arch

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

		Low	High	
Structure Costs	Structure Width	144 FT	144 FT	
	Structure Length - Tied Arch	280 FT	280 FT	
	Deck Area - Tied Arch Span	40,180 SF	40,180 SF	
	Estimated \$\$/SF - Tied Arch Span	\$ 500/SF	\$ 700/SF	
	Structure Length - Approaches	7,420 FT	7,420 FT	Const Length = 7700 FT
	Deck Area - Approaches	1,064,770 SF	1,064,770 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
Total Estimated Structure Cost	\$ 233,040,000	\$ 347,560,000		
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
	Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000	
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 11,650,000	\$ 17,380,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 67,195,000	\$ 67,195,000	Assume Width excluding Rail expansion
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary
	Maintenance & Protection of Traffic	\$ 12,070,000	\$ 16,650,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 21,130,000	\$ 29,140,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 6,040,000	\$ 8,330,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 448,507,750	\$ 589,359,300	
	Base Cost Including Inflation	\$ 448,510,000	\$ 589,360,000	
	Contingency	\$ 156,980,000	\$ 206,280,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 605,490,000	\$ 795,640,000	
	Design	\$ 66,600,000	\$ 87,520,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 60,550,000	\$ 79,560,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 732,640,000	\$ 962,720,000	



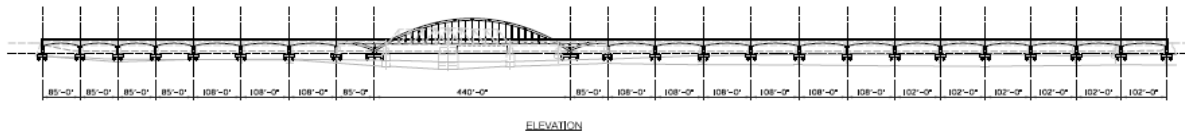
Alternative 8: Steel Through Arch

Year of Estimate: 2013

Construction Year: 2017

Inflation Rate: . %

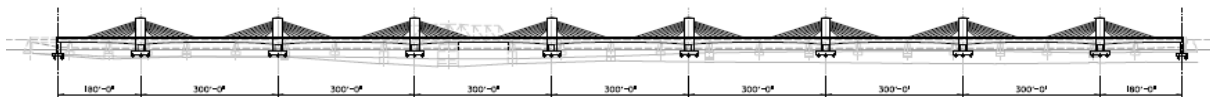
		Low	High	
Structure Costs	Structure Width	146 FT	146 FT	
	Structure Length - Through Arch	610 FT	610 FT	
	Deck Area - Through Arch Span	88,755 SF	88,755 SF	
	Estimated \$\$/SF - Through Arch Span	\$ 500/SF	\$ 700/SF	
	Structure Length - Approaches	7,090 FT	7,090 FT	Const Length = 7700 FT
	Deck Area - Approaches	1,031,595 SF	1,031,595 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 250,700,000	\$ 371,610,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 12,540,000	\$ 18,580,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 68,975,000	\$ 68,975,000	Assume Width excluding Rail expansion
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary
	Maintenance & Protection of Traffic	\$ 12,780,000	\$ 17,620,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 22,360,000	\$ 30,830,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 6,390,000	\$ 8,810,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 471,127,750	\$ 619,529,300	
	Base Cost Including Inflation	\$ 471,130,000	\$ 619,530,000	
	Contingency	\$ 164,900,000	\$ 216,840,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 636,030,000	\$ 836,370,000	
	Design	\$ 69,960,000	\$ 92,000,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 63,600,000	\$ 83,640,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 769,590,000	\$ 1,012,010,000	



Alternative 8: Full Extradosed

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

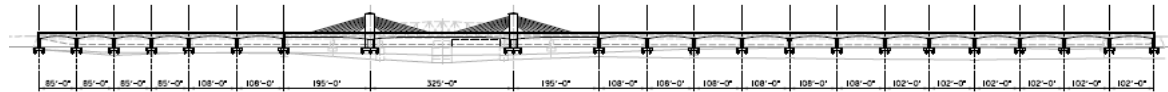
		Low	High	
Structure Costs	Structure Width	152 FT	152 FT	
	Structure Length - Extradosed	2460 FT	2460 FT	
	Deck Area - Extradosed Spans	372,690 SF	372,690 SF	
	Estimated \$\$/SF - Extradosed Spans	\$ 700/SF	\$ 900/SF	
	Structure Length - Approaches	5,240 FT	5,240 FT	Const Length = 7700 FT
	Deck Area - Approaches	793,860 SF	793,860 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF		
	Total Estimated Structure Cost	\$ 419,660,000	\$ 573,580,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 20,980,000	\$ 28,680,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 74,315,000	\$ 74,315,000	Assume Width excluding Rail expansion
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary
	Maintenance & Protection of Traffic	\$ 19,540,000	\$ 25,690,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 34,190,000	\$ 44,960,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 9,770,000	\$ 12,850,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 675,837,750	\$ 863,179,300	
	Base Cost Including Inflation	\$ 675,840,000	\$ 863,180,000	
	Contingency	\$ 236,540,000	\$ 302,110,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 912,380,000	\$ 1,165,290,000	
	Design	\$ 100,360,000	\$ 128,180,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 91,240,000	\$ 116,530,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
		TOTAL ESTIMATED COST	\$ 1,103,980,000	\$ 1,410,000,000



Alternative 8: Partial Extradosed

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

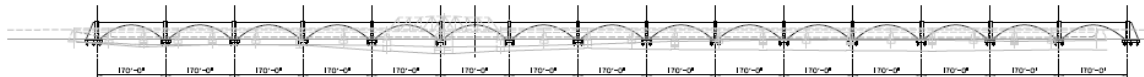
		Low	High	
Structure Costs	Structure Width	152 FT	152 FT	
	Structure Length - Extradosed	715 FT	715 FT	
	Deck Area - Extradosed Spans	108,323 SF	108,323 SF	
	Estimated \$\$/SF - Extradosed Spans	\$ 700/SF	\$ 900/SF	
	Structure Length - Approaches	6,985 FT	6,985 FT	Const Length = 7700 FT
	Deck Area - Approaches	1,058,228 SF	1,058,228 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Total Estimated Structure Cost	\$ 287,470,000	\$ 414,960,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
		Total Estimated RR Cost	\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 14,370,000	\$ 20,750,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 74,315,000	\$ 74,315,000	Assume Width excluding Rail expansion
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary
	Maintenance & Protection of Traffic	\$ 14,250,000	\$ 19,350,000	Assume 4% of (Structure + Rail) Cost
	Mobilization	\$ 24,940,000	\$ 33,860,000	Assume 7% of (Structure + Rail) Cost
	Construction Staking/Survey	\$ 7,120,000	\$ 9,670,000	Assume 2% of (Structure + Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 519,847,750	\$ 676,009,300	
	Base Cost Including Inflation	\$ 519,850,000	\$ 676,010,000	
	Contingency	\$ 181,950,000	\$ 236,600,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 701,800,000	\$ 912,610,000	
	Design	\$ 77,200,000	\$ 100,390,000	Assume 11% of Base Cost Plus Inflation Plus Contingency
	Construction Management / Inspection	\$ 70,180,000	\$ 91,260,000	Assume 10% of Base Cost Plus Inflation Plus Contingency
	TOTAL ESTIMATED COST	\$ 849,180,000	\$ 1,104,260,000	



Alternative 8: Multi-Girder with Arch Façade

Year of Estimate: 2013
 Construction Year: 2017
 Inflation Rate: . %

		Low	High	
Structure Costs	Structure Width	137 FT	137 FT	
	Structure Length - Deck Arch	00 FT	00 FT	
	Deck Area - Deck Arch Spans	SF	SF	
	Estimated \$\$/SF - Deck Arch Spans	\$ 000/SF	\$ 000/SF	
	Structure Length - Approaches	7,700 FT	7,700 FT	Const Length = 7700 FT
	Deck Area - Approaches	1,054,900 SF	1,054,900 SF	
	Estimated \$\$/SF - Approaches	\$ 200/SF	\$ 300/SF	
	Estimated Retaining Walls	SF	SF	
	Estimated \$\$/SF - Retaining Walls	\$ 140/SF	\$ 140/SF	
	Precast Arch Facades	15400 LF	15400 LF	
	Estimated \$/LF - Arch Facades	\$ 1,000 /LF	\$ 1,000 /LF	Includes fabrication, erection, post-tensioning
Total Estimated Structure Cost		\$ 226,380,000	\$ 331,870,000	
Rail Costs	Trackwork/Earthwork/Ballast			
	Construct Track	\$24,400,000	\$24,400,000	15.7 miles @ \$1.55M per mile
	Turnout (#20)	\$1,600,000	\$1,600,000	4 @ \$400K each
	Crossover (#20)	\$6,400,000	\$6,400,000	8 @ \$800K each
	Remove Turnout	\$25,000	\$25,000	1 @ \$25K
	Remove Crossover	\$200,000	\$200,000	4 @ \$50K each
	Signals			
	Virginia & L'Enfant Interlockings	\$12,000,000	\$12,000,000	2 @ \$6M each
	RO & AF Interlockings	\$16,000,000	\$16,000,000	2 @ \$8M each
	Slaters Lane & Franconia Interlockings	\$5,000,000	\$5,000,000	2 @ \$2.5m each
	Cut Section (Code Change)	\$2,900,000	\$2,900,000	23 @ \$125K each
	Miscellaneous RR Costs	\$ 250,000	\$ 250,000	Flagging, Agreements, etc.
	Total Estimated RR Cost		\$ 68,775,000	\$ 68,775,000
Other Costs	Drainage, Signing, Landscaping, etc.	\$ 11,320,000	\$ 16,590,000	Assume 5% of Structure Cost
	Utility Relocation	\$ 3,707,750	\$ 4,449,300	Surface Utility Survey
	Right of Way Acquisition	\$ 61,410,000	\$ 61,410,000	Assume Width excluding Rail expansion
	Light Rail Trackwork and Catenary	\$ 24,900,000	\$ 29,880,000	3.1 miles @ \$2.5M per mile track, \$1.5M per mile catenary
	Maintenance & Protection of Traffic	\$ 11,810,000	\$ 16,030,000	Assume 4% of (Structure Plus Rail) Cost
	Mobilization	\$ 20,660,000	\$ 28,050,000	Assume 7% of (Structure Plus Rail) Cost
	Construction Staking/Survey	\$ 5,900,000	\$ 8,010,000	Assume 2% of (Structure Plus Rail) Cost
Total Cost Summary	Base Construction Cost	\$ 434,862,750	\$ 565,064,300	
	Base Cost Including Inflation	\$ 434,860,000	\$ 565,060,000	
	Contingency	\$ 152,200,000	\$ 197,770,000	Assume 35% of Base Cost Plus Inflation
	Base Cost Including Inflation and Contingency	\$ 587,060,000	\$ 762,830,000	
	Design	\$ 64,580,000	\$ 83,910,000	Assume 11% of (Base Cost Plus Inflation Plus Contingency)
	Construction Management / Inspection	\$ 58,710,000	\$ 76,280,000	Assume 10% of (Base Cost Plus Inflation Plus Contingency)
TOTAL ESTIMATED COST		\$ 710,350,000	\$ 923,020,000	



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Preliminary Estimates of Long Bridge Utilities in ROW

		Unit Cost	Total Cost
Gas Line Marker/Valve	1	5000	\$5,000
Fire hydrant	2	5000	\$10,000
Traffic Signal Poles	6	25000	\$150,000
Electric Hand Holes	1	10000	\$10,000
Communications Box	1	25000	\$25,000
Electric MH	9	10000	\$90,000
Fiber Optic Marker	2	500	\$1,000
Light Pole	55	10000	\$550,000
Utility Pole	60	15000	\$900,000
Telephone MH	7	10000	\$70,000
GPS Pts / Posts	25	1000	\$25,000
Water Valves	27	4000	\$108,000
Water MH	2	10000	\$20,000
Misc Railroad Equipment	5	10000	\$50,000

	FT	Cost per FT	
Overhead Electric	4965	150	\$744,750
Underground Electric	505	1300	\$656,500
Underground Gas	65	4500	\$292,500
Water Lines	0		\$0
Underground Communicator	0		\$0

\$3,707,750

Included in Other Costs - Drainage, Signing, Landscaping, etc.

Signs	14
Catch Basin	9
Drainage MH	26

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LONG BRIDGE STUDY

Bridge and Tunnel Concept Report

This material is based upon work supported by the Federal Railroad Administration under the Long Bridge Study American Recovery and Reinvestment Act of 2009 Grant dated December 9, 2011. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the Federal Railroad Administration and/or the U.S. Department of Transportation.



District Department
of Transportation



Federal Railroad
Administration