

I-70 Traffic & Revenue Study

LEVEL 1 SUMMARY COST ESTIMATES

Draft 2/17/2014

Prepared by Parsons Transportation Group

Background

The I-70 Traffic and Revenue Study Team has completed schematic designs and Level 1 cost estimates for all alternatives and options developed by the Project Leadership Team (PLT). This report, **Level 1 Summary Cost Estimates** contains summaries of costs for those alternatives. A second report, entitled **Level 1 Base Cost Estimates** includes detailed, itemized cost breakdowns of all options.

Cost Estimating Methodology

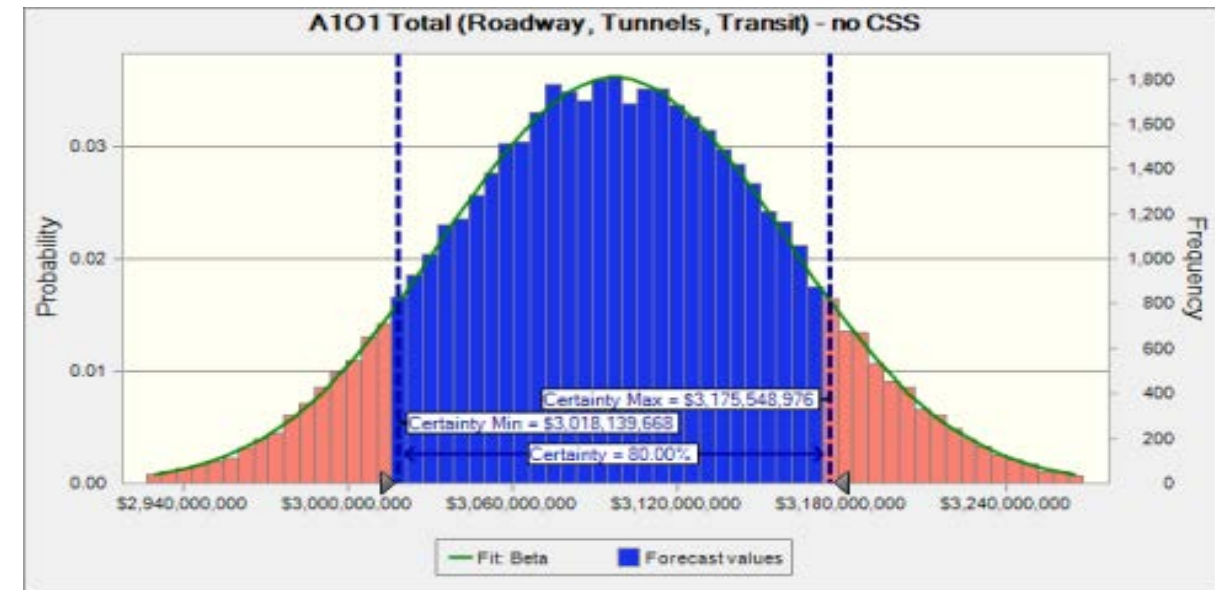
All alternatives and options developed by the PLT were carried to a schematic design level by the project team. Estimating included known and quantifiable costs, known but not quantifiable costs, and unknown costs. At this level of study, the ultimate cost of project alternatives cannot be predicted with 100% certainty, because a number of variables can affect plans and estimates. These variables include:

- Technical issues (design unknowns such as uncertainty over foundation conditions)
- Regulatory, political, and policy issues (such as changes in regulations & CDOT/FHWA policy during the design process)
- Stakeholder concerns (such as roadway width, roadside treatments, and access to communities)
- Limited design information (at this time designs are at a 5% or less level).

To assess these circumstances, the project team used the **Transportation Risk and Uncertainty Estimating (TRUE)** cost estimating process. The TRUE process provides a method for quantifying uncertainties, risks, and opportunities in costs through a systematic analysis.

The first step of the process is to generate **base costs** through the engineering estimating application of 2014 unit prices and quantity takeoffs. Unit costs and quantities do not include any contingencies to cover risks, opportunities, and uncertainties.

The next step is to review the base costs in a **Cost/Risk Workshop**. In the Cost/Risk workshop, a collaborative team of subject matter experts assesses each item, assigning both minimum and maximum costs and probabilities for achieving the minimum, base, and maximum cost. This information is input into a statistical model. This model is developed using software called Crystal Ball™. This software is a predictive analysis tool that uses a “Monte Carlo Simulation”. A Monte Carlo Simulation is a computerized mathematical technique that relies on repeated calculations of tens of thousands of scenarios to obtain possible cost outcomes and the probabilities the costs will occur for any choice of action.



The scenarios are plotted on a cost distribution curve. This curve develops the possible range of costs, based on the risks and opportunities assigned to the base cost items. An example curve is shown below. Cost distribution curves have been generated for each alternative & option, as well as each capital cost line item. For each alternative & option, the **Cost Ranges** are reported in the summary spreadsheets.

For the Level 1 cost estimates, CDOT picked an 80% confidence level for the estimates. That means that we are 80% confident that the reported range of costs for each alternative will be attained. There is only a 20% confidence that the total cost for each alternative will fall outside that range.

All cost elements were taken through this Cost/Risk analysis except for:

- AGS Capital & Operating & Maintenance (O&M) costs (applied directly from the 2014 AGS study).
- Roadway, Structures, Tunnels & Bus Rapid Transit (BRT) O&M (directly from individual O&M cost worksheets).
- Design and Construction Engineering Costs are calculated as percentages of the Capital Cost range.
- Context Sensitive Solutions Factors are applied directly to Capital Cost (15%) and Design Costs (19%).

This package includes the summary of cost ranges based on the cost/risk workshop and the original base cost estimates for each alternative.

I-70 Traffic & Revenue Study Level 1 Summary of Alternatives & Options

Summary of Costs

DRAFT 2/17/2014

Alternative Number	Alternative Description	Total Capital Costs		Total Design & Construction Engineering Costs		Total Costs without AGS		Total Costs with AGS	
		Cost Range		Cost Range		Cost Range		Cost Range	
Alt01_Opt01	2 tolled reversible managed lanes designed at 65 mph. The reversible managed lanes are on a separate viaduct structure from East Idaho Springs to Floyd Hill in order to maintain 65 mph design speed. General Purpose lanes designed at 55 mph except from East Idaho Springs to Floyd Hill, where existing design speeds and lanes will remain. Bus Rapid Transit.	\$ 3,470,870,000	\$ 3,651,890,000	\$ 644,290,000	\$ 677,890,000	\$ 4,116,000,000	\$ 4,330,000,000	\$ 4,116,000,000	\$ 4,330,000,000
Alt01_Opt02	2 tolled reversible managed lanes and I-70 designed at 65 mph. This option matches Alt01_Opt01 except from East Idaho Springs to Floyd Hill, where the reversible managed lanes and I-70 will be reconstructed to meet a 65 mph design speed. Bus Rapid Transit.	\$ 3,789,740,000	\$ 3,991,490,000	\$ 703,480,000	\$ 740,930,000	\$ 4,494,000,000	\$ 4,733,000,000	\$ 4,494,000,000	\$ 4,733,000,000
Alt02_Opt01	3 tolled reversible managed lanes designed at 65 mph. The reversible managed lanes are on a separate viaduct from East Idaho Springs to Floyd Hill in order to maintain 65 mph design speed. General Purpose lanes designed at 55 mph except from East Idaho Springs to Floyd Hill, where existing design speeds and lanes will remain. Bus Rapid Transit.	\$ 4,287,970,000	\$ 4,512,750,000	\$ 795,960,000	\$ 837,690,000	\$ 5,084,000,000	\$ 5,351,000,000	\$ 5,084,000,000	\$ 5,351,000,000
Alt02_Opt02	3 tolled reversible managed lanes designed at 65 mph. This option matches Alt02_Opt01 except from East Idaho Springs to Floyd Hill, where the reversible managed lanes and I-70 General Purpose lanes will be reconstructed to meet a 65 mph design speed. Bus Rapid Transit.	\$ 4,503,030,000	\$ 4,742,410,000	\$ 835,880,000	\$ 880,320,000	\$ 5,339,000,000	\$ 5,623,000,000	\$ 5,339,000,000	\$ 5,623,000,000
Alt02_Opt03	3 tolled reversible managed lanes designed at 65 mph. The reversible managed lanes are on a viaduct structure from West Idaho Springs to Floyd Hill to minimize impacts. General Purpose lanes designed at 65 mph except from West Idaho Springs to Floyd Hill where existing design speeds & lanes will remain. This option matches Alt02_Opt01 except viaduct extends to West Idaho Springs. Bus Rapid Transit.	\$ 4,347,980,000	\$ 4,569,190,000	\$ 807,100,000	\$ 848,160,000	\$ 5,156,000,000	\$ 5,418,000,000	\$ 5,156,000,000	\$ 5,418,000,000
Alt03_Opt01	Minimum program per PEIS with 55 mph design speed including a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements. AGS.	\$ 7,482,310,000	\$ 7,608,600,000	\$ 1,267,370,000	\$ 1,288,390,000	\$ 1,948,000,000	\$ 2,096,000,000	\$ 8,750,000,000	\$ 8,897,000,000
Alt03_Opt02	Minimum program per PEIS with 65 mph design speed including a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements. AGS.	\$ 7,784,100,000	\$ 7,919,310,000	\$ 1,317,610,000	\$ 1,340,110,000	\$ 2,300,000,000	\$ 2,458,000,000	\$ 9,102,000,000	\$ 9,260,000,000
Alt03_Opt03	Minimum program per PEIS with 55 mph design speed without a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements. Option is similar to Alt03_Opt01 without 3rd bore at EJMT. AGS.	\$ 6,262,900,000	\$ 6,294,990,000	\$ 1,064,390,000	\$ 1,069,730,000	\$ 526,000,000	\$ 563,000,000	\$ 7,328,000,000	\$ 7,365,000,000
Alt03_Opt04	Minimum program per PEIS with 65 mph design speed without a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements. Option is similar to Alt03_Opt02 without 3rd bore at EJMT. AGS.	\$ 6,571,860,000	\$ 6,620,560,000	\$ 1,115,820,000	\$ 1,123,920,000	\$ 886,000,000	\$ 943,000,000	\$ 7,688,000,000	\$ 7,745,000,000
Alt04_Opt01	Maximum program per PEIS with 55 mph design speed including a 3rd bore at EJMT. Maximum program includes one additional non-reversible tolled lane (EB & WB) between EJMT and Floyd Hill. AGS.	\$ 8,062,790,000	\$ 8,212,060,000	\$ 1,364,000,000	\$ 1,388,850,000	\$ 2,625,000,000	\$ 2,800,000,000	\$ 9,427,000,000	\$ 9,601,000,000
Alt04_Opt02	Maximum program per PEIS with 65 mph design speed including a 3rd bore at EJMT. Maximum program includes one additional non-reversible tolled lane (EB & WB) between EJMT and Floyd Hill. AGS.	\$ 8,408,290,000	\$ 8,570,890,000	\$ 1,421,510,000	\$ 1,448,580,000	\$ 3,028,000,000	\$ 3,218,000,000	\$ 9,830,000,000	\$ 10,020,000,000
Alt05_Opt01	Permanent Peak Period Shoulder Lane EB and WB. Widen the existing roadway to accommodate one additional left side managed lane (EB & WB) for use during peak times; during non-peak times operates as a standard shoulder. Provide full width shoulder on right side. AGS.	\$ 7,472,750,000	\$ 7,573,010,000	\$ 1,265,780,000	\$ 1,282,470,000	\$ 1,937,000,000	\$ 2,054,000,000	\$ 8,739,000,000	\$ 8,856,000,000
Alt06_Opt01	Temporary Peak Period Shoulder Lane. Using the existing roadway, accommodate one additional WB left side managed lane for use during peak times; during non-peak times operates as a standard shoulder. No 12 foot wide shoulders are available during peak periods. Construction of WB peak period lane is from Empire to Floyd Hill only. (Assumes EB peak period lane from Empire to Floyd Hill is constructed.) AGS.	\$ 5,898,080,000	\$ 5,904,610,000	\$ 1,003,660,000	\$ 1,004,750,000	\$ 100,000,000	\$ 108,000,000	\$ 6,902,000,000	\$ 6,910,000,000

I-70 Traffic & Revenue Study Level 1 Summary of Alternatives & Options

Capital Costs

DRAFT 2/17/2014

Alternative Number	Alternative Description	Capital Costs			Capital Costs CSS Factor (15%)		Capital Costs plus CSS Factor		AGS Capital Costs	Total Capital Costs	
		Estimated Base Cost	Cost Range		Cost Range		Cost Range			Cost Range	
Alt01_Opt01	2 tolled reversible managed lanes designed at 65 mph. The reversible managed lanes are on a separate viaduct structure from East Idaho Springs to Floyd Hill in order to maintain 65 mph design speed. General Purpose lanes designed at 55 mph except from East Idaho Springs to Floyd Hill, where existing design speeds and lanes will remain. Bus Rapid Transit.	\$ 2,937,026,269	\$ 3,018,139,668	\$ 3,175,548,976	\$ 452,720,950	\$ 476,332,346	\$ 3,470,860,618	\$ 3,651,881,322	Not included in Alternative	\$ 3,470,870,000	\$ 3,651,890,000
Alt01_Opt02	2 tolled reversible managed lanes and I-70 designed at 65 mph. This option matches Alt01_Opt01 except from East Idaho Springs to Floyd Hill, where the reversible managed lanes and I-70 will be reconstructed to meet a 65 mph design speed. Bus Rapid Transit.	\$ 3,195,652,172	\$ 3,295,419,959	\$ 3,470,860,103	\$ 494,312,994	\$ 520,629,015	\$ 3,789,732,953	\$ 3,991,489,118	Not included in Alternative	\$ 3,789,740,000	\$ 3,991,490,000
Alt02_Opt01	3 tolled reversible managed lanes designed at 65 mph. The reversible managed lanes are on a separate viaduct from East Idaho Springs to Floyd Hill in order to maintain 65 mph design speed. General Purpose lanes designed at 55 mph except from East Idaho Springs to Floyd Hill, where existing design speeds and lanes will remain. Bus Rapid Transit.	\$ 3,634,648,890	\$ 3,728,664,222	\$ 3,924,123,041	\$ 559,299,633	\$ 588,618,456	\$ 4,287,963,855	\$ 4,512,741,497	Not included in Alternative	\$ 4,287,970,000	\$ 4,512,750,000
Alt02_Opt02	3 tolled reversible managed lanes designed at 65 mph. This option matches Alt02_Opt01 except from East Idaho Springs to Floyd Hill, where the reversible managed lanes and I-70 General Purpose lanes will be reconstructed to meet a 65 mph design speed. Bus Rapid Transit.	\$ 3,847,973,416	\$ 3,915,670,892	\$ 4,123,831,490	\$ 587,350,634	\$ 618,574,724	\$ 4,503,021,526	\$ 4,742,406,214	Not included in Alternative	\$ 4,503,030,000	\$ 4,742,410,000
Alt02_Opt03	3 tolled reversible managed lanes designed at 65 mph. The reversible managed lanes are on a viaduct structure from West Idaho Springs to Floyd Hill to minimize impacts. General Purpose lanes designed at 65 mph except from West Idaho Springs to Floyd Hill where existing design speeds & lanes will remain. This option matches Alt02_Opt01 except viaduct extends to West Idaho Springs. Bus Rapid Transit.	\$ 3,677,755,753	\$ 3,780,847,836	\$ 3,973,202,712	\$ 567,127,175	\$ 595,980,407	\$ 4,347,975,011	\$ 4,569,183,119	Not included in Alternative	\$ 4,347,980,000	\$ 4,569,190,000
Alt03_Opt01	Minimum program per PEIS with 55 mph design speed including a 3rd bore at EJMT. Minimum program is generally localized auxillary lane improvements. AGS.	\$ 1,442,300,478	\$ 1,452,058,238	\$ 1,561,874,004	\$ 217,808,736	\$ 234,281,101	\$ 1,669,866,974	\$ 1,796,155,105	\$ 5,812,440,000	\$ 7,482,310,000	\$ 7,608,600,000
Alt03_Opt02	Minimum program per PEIS with 65 mph design speed including a 3rd bore at EJMT. Minimum program is generally localized auxillary lane improvements. AGS.	\$ 1,716,951,849	\$ 1,714,483,236	\$ 1,832,053,399	\$ 257,172,485	\$ 274,808,010	\$ 1,971,655,721	\$ 2,106,861,409	\$ 5,812,440,000	\$ 7,784,100,000	\$ 7,919,310,000
Alt03_Opt03	Minimum program per PEIS with 55 mph design speed without a 3rd bore at EJMT. Minimum program is generally localized auxillary lane improvements. Option is similar to Alt03_Opt01 without 3rd bore at EJMT. AGS.	\$ 386,591,506	\$ 391,698,459	\$ 419,605,088	\$ 58,754,769	\$ 62,940,763	\$ 450,453,228	\$ 482,545,851	\$ 5,812,440,000	\$ 6,262,900,000	\$ 6,294,990,000
Alt03_Opt04	Minimum program per PEIS with 65 mph design speed without a 3rd bore at EJMT. Minimum program is generally localized auxillary lane improvements. Option is similar to Alt03_Opt02 without 3rd bore at EJMT. AGS.	\$ 672,583,261	\$ 660,362,773	\$ 702,709,473	\$ 99,054,416	\$ 105,406,421	\$ 759,417,189	\$ 808,115,894	\$ 5,812,440,000	\$ 6,571,860,000	\$ 6,620,560,000
Alt04_Opt01	Maximum program per PEIS with 55 mph design speed including a 3rd bore at EJMT. Maximum program includes one additional non-reversible tolled lane (EB & WB) between EJMT and Floyd Hill. AGS.	\$ 1,942,279,735	\$ 1,956,825,211	\$ 2,086,620,036	\$ 293,523,782	\$ 312,993,005	\$ 2,250,348,993	\$ 2,399,613,041	\$ 5,812,440,000	\$ 8,062,790,000	\$ 8,212,060,000
Alt04_Opt02	Maximum program per PEIS with 65 mph design speed including a 3rd bore at EJMT. Maximum program includes one additional non-reversible tolled lane (EB & WB) between EJMT and Floyd Hill. AGS.	\$ 2,257,579,186	\$ 2,257,259,885	\$ 2,398,649,426	\$ 338,588,983	\$ 359,797,414	\$ 2,595,848,868	\$ 2,758,446,840	\$ 5,812,440,000	\$ 8,408,290,000	\$ 8,570,890,000
Alt05_Opt01	Permanent Peak Period Shoulder Lane EB and WB. Widen the existing roadway to accommodate one additional left side managed lane (EB & WB) for use during peak times; during non-peak times operates as a standard shoulder. Provide full width shoulder on right side. AGS.	\$ 1,398,549,467	\$ 1,443,745,710	\$ 1,530,924,043	\$ 216,561,857	\$ 229,638,606	\$ 1,660,307,567	\$ 1,760,562,649	\$ 5,812,440,000	\$ 7,472,750,000	\$ 7,573,010,000
Alt06_Opt01	Temporary Peak Period Shoulder Lane. Using the existing roadway, accommodate one additional WB left side managed lane for use during peak times; during non-peak times operates as a standard shoulder. No 12 foot wide shoulders are available during peak periods. Construction of WB peak period lane is from Empire to Floyd Hill only. (Assumes EB peak period lane from Empire to Floyd Hill is constructed.) AGS.	\$ 66,326,953	\$ 74,464,610	\$ 80,139,620	\$ 11,169,692	\$ 12,020,943	\$ 85,634,302	\$ 92,160,563	\$ 5,812,440,000	\$ 5,898,080,000	\$ 5,904,610,000

I-70 Traffic & Revenue Study Level 1 Summary of Alternatives & Options

Design & Construction Engineering Costs

DRAFT 2/17/2014

Alternative Number	Alternative Description	Design Costs		Design Cost CSS Factor (19%)		AGS Design Cost	Total Design Costs plus CSS Factor		Construction Engineering Costs		AGS Construction Engineering Cost	Total Design & Construction Engineering Costs	
		Cost Range		Cost Range			Cost Range		Cost Range			Cost Range	
Alt01_Opt01	2 tolled reversible managed lanes designed at 65 mph. The reversible managed lanes are on a separate viaduct structure from East Idaho Springs to Floyd Hill in order to maintain 65 mph design speed. General Purpose lanes designed at 55 mph except from East Idaho Springs to Floyd Hill, where existing design speeds and lanes will remain. Bus Rapid Transit.	\$ 341,049,782	\$ 358,837,034	\$ 64,799,459	\$ 68,179,037	Not included in Alternative	\$ 405,849,241	\$ 427,016,071	\$ 238,433,034	\$ 250,868,369	Not included in Alternative	\$ 644,290,000	\$ 677,890,000
Alt01_Opt02	2 tolled reversible managed lanes and I-70 designed at 65 mph. This option matches Alt01_Opt01 except from East Idaho Springs to Floyd Hill, where the reversible managed lanes and I-70 will be reconstructed to meet a 65 mph design speed. Bus Rapid Transit.	\$ 372,382,455	\$ 392,207,192	\$ 70,752,667	\$ 74,519,366	Not included in Alternative	\$ 443,135,122	\$ 466,726,558	\$ 260,338,177	\$ 274,197,948	Not included in Alternative	\$ 703,480,000	\$ 740,930,000
Alt02_Opt01	3 tolled reversible managed lanes designed at 65 mph. The reversible managed lanes are on a separate viaduct from East Idaho Springs to Floyd Hill in order to maintain 65 mph design speed. General Purpose lanes designed at 55 mph except from East Idaho Springs to Floyd Hill, where existing design speeds and lanes will remain. Bus Rapid Transit.	\$ 421,339,057	\$ 443,425,904	\$ 80,054,421	\$ 84,250,922	Not included in Alternative	\$ 501,393,478	\$ 527,676,825	\$ 294,564,474	\$ 310,005,720	Not included in Alternative	\$ 795,960,000	\$ 837,690,000
Alt02_Opt02	3 tolled reversible managed lanes designed at 65 mph. This option matches Alt02_Opt01 except from East Idaho Springs to Floyd Hill, where the reversible managed lanes and I-70 General Purpose lanes will be reconstructed to meet a 65 mph design speed. Bus Rapid Transit.	\$ 442,470,811	\$ 465,992,958	\$ 84,069,454	\$ 88,538,662	Not included in Alternative	\$ 526,540,265	\$ 554,531,620	\$ 309,338,000	\$ 325,782,688	Not included in Alternative	\$ 835,880,000	\$ 880,320,000
Alt02_Opt03	3 tolled reversible managed lanes designed at 65 mph. The reversible managed lanes are on a viaduct structure from West Idaho Springs to Floyd Hill to minimize impacts. General Purpose lanes designed at 65 mph except from West Idaho Springs to Floyd Hill where existing design speeds & lanes will remain. This option matches Alt02_Opt01 except viaduct extends to West Idaho Springs. Bus Rapid Transit.	\$ 427,235,805	\$ 448,971,906	\$ 81,174,803	\$ 85,304,662	Not included in Alternative	\$ 508,410,609	\$ 534,276,569	\$ 298,686,979	\$ 313,883,014	Not included in Alternative	\$ 807,100,000	\$ 848,160,000
Alt03_Opt01	Minimum program per PEIS with 55 mph design speed including a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements. AGS.	\$ 140,849,649	\$ 151,501,778	\$ 26,761,433	\$ 28,785,338	\$ 552,181,800	\$ 719,792,882	\$ 732,468,916	\$ 110,356,426	\$ 118,702,424	\$ 437,218,200	\$ 1,267,370,000	\$ 1,288,390,000
Alt03_Opt02	Minimum program per PEIS with 65 mph design speed including a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements. AGS.	\$ 166,304,874	\$ 177,709,180	\$ 31,597,926	\$ 33,764,744	\$ 552,181,800	\$ 750,084,600	\$ 763,655,724	\$ 130,300,726	\$ 139,236,058	\$ 437,218,200	\$ 1,317,610,000	\$ 1,340,110,000
Alt03_Opt03	Minimum program per PEIS with 55 mph design speed without a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements. Option is similar to Alt03_Opt01 without 3rd bore at EJMT. AGS.	\$ 37,994,751	\$ 40,701,694	\$ 7,219,003	\$ 7,733,322	\$ 552,181,800	\$ 597,395,553	\$ 600,616,815	\$ 29,769,083	\$ 31,889,987	\$ 437,218,200	\$ 1,064,390,000	\$ 1,069,730,000
Alt03_Opt04	Minimum program per PEIS with 65 mph design speed without a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements. Option is similar to Alt03_Opt02 without 3rd bore at EJMT. AGS.	\$ 64,055,189	\$ 68,162,819	\$ 12,170,486	\$ 12,950,936	\$ 552,181,800	\$ 628,407,475	\$ 633,295,554	\$ 50,187,571	\$ 53,405,920	\$ 437,218,200	\$ 1,115,820,000	\$ 1,123,920,000
Alt04_Opt01	Maximum program per PEIS with 55 mph design speed including a 3rd bore at EJMT. Maximum program includes one additional non-reversible tolled lane (EB & WB) between EJMT and Floyd Hill. AGS.	\$ 189,812,045	\$ 202,402,143	\$ 36,064,289	\$ 38,456,407	\$ 552,181,800	\$ 778,058,134	\$ 793,040,351	\$ 148,718,716	\$ 158,583,123	\$ 437,218,200	\$ 1,364,000,000	\$ 1,388,850,000
Alt04_Opt02	Maximum program per PEIS with 65 mph design speed including a 3rd bore at EJMT. Maximum program includes one additional non-reversible tolled lane (EB & WB) between EJMT and Floyd Hill. AGS.	\$ 218,954,209	\$ 232,668,994	\$ 41,601,300	\$ 44,207,109	\$ 552,181,800	\$ 812,737,309	\$ 829,057,903	\$ 171,551,751	\$ 182,297,356	\$ 437,218,200	\$ 1,421,510,000	\$ 1,448,580,000
Alt05_Opt01	Permanent Peak Period Shoulder Lane EB and WB. Widen the existing roadway to accommodate one additional left side managed lane (EB & WB) for use during peak times; during non-peak times operates as a standard shoulder. Provide full width shoulder on right side. AGS.	\$ 140,043,334	\$ 148,499,632	\$ 26,608,233	\$ 28,214,930	\$ 552,181,800	\$ 718,833,367	\$ 728,896,362	\$ 109,724,674	\$ 116,350,227	\$ 437,218,200	\$ 1,265,780,000	\$ 1,282,470,000
Alt06_Opt01	Temporary Peak Period Shoulder Lane. Using the existing roadway, accommodate one additional WB left side managed lane for use during peak times; during non-peak times operates as a standard shoulder. No 12 foot wide shoulders are available during peak periods. Construction of WB peak period lane is from Empire to Floyd Hill only. (Assumes EB peak period lane from Empire to Floyd Hill is constructed.) AGS.	\$ 7,223,067	\$ 7,773,543	\$ 1,372,383	\$ 1,476,973	\$ 552,181,800	\$ 560,777,250	\$ 561,432,316	\$ 5,659,310	\$ 6,090,611	\$ 437,218,200	\$ 1,003,660,000	\$ 1,004,750,000

I-70 Traffic & Revenue Study Level 1 Summary of Alternatives & Options

Operating & Maintenance Costs

DRAFT 2/17/2014

Alternative Number	Alternative Description	Roadway & Structures	Tunnels	Bus Rapid Transit	Advanced Guideway System	Total Operating & Maintenance Costs per Year
Alt01_Opt01	2 tolled reversible managed lanes designed at 65 mph. The reversible managed lanes are on a separate viaduct structure from East Idaho Springs to Floyd Hill in order to maintain 65 mph design speed. General Purpose lanes designed at 55 mph except from East Idaho Springs to Floyd Hill, where existing design speeds and lanes will remain.	\$ 16,516,343	\$ 3,209,941	\$ 29,921,470	Not included in Alternative	\$ 49,650,000
Alt01_Opt02	2 tolled reversible managed lanes and I-70 designed at 65 mph. This option matches Alt01_Opt01 except from East Idaho Springs to Floyd Hill, where the reversible managed lanes and I-70 will be reconstructed to meet a 65 mph design speed.	\$ 16,639,434	\$ 3,209,941	\$ 29,921,470	Not included in Alternative	\$ 49,780,000
Alt02_Opt01	3 tolled reversible managed lanes designed at 65 mph. The reversible managed lanes are on a separate viaduct from East Idaho Springs to Floyd Hill in order to maintain 65 mph design speed. General Purpose lanes designed at 55 mph except from East Idaho Springs to Floyd Hill, where existing design speeds and lanes will remain.	\$ 19,099,298	\$ 4,841,044	\$ 29,921,470	Not included in Alternative	\$ 53,870,000
Alt02_Opt02	3 tolled reversible managed lanes designed at 65 mph. This option matches Alt02_Opt01 except from East Idaho Springs to Floyd Hill, where the reversible managed lanes and I-70 General Purpose lanes will be reconstructed to meet a 65 mph design speed.	\$ 19,370,647	\$ 4,841,044	\$ 29,921,470	Not included in Alternative	\$ 54,140,000
Alt02_Opt03	3 tolled reversible managed lanes designed at 65 mph. The reversible managed lanes are on a separate viaduct structure from West Idaho Springs to Floyd Hill to minimize impacts. General Purpose lanes designed at 65 mph except from West Idaho Springs to Floyd Hill where existing design speeds and lanes will remain. This option matches Alt02_Opt01 except viaduct extends to West Idaho Springs.	\$ 19,307,581	\$ 4,841,044	\$ 29,921,470	Not included in Alternative	\$ 54,080,000
Alt03_Opt01	Minimum program per PEIS with 55 mph design speed including a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements.	\$ 5,977,871	\$ 4,739,127	Not included in Alternative	\$ 59,245,212	\$ 69,970,000
Alt03_Opt02	Minimum program per PEIS with 65 mph design speed including a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements.	\$ 5,977,871	\$ 4,972,640	Not included in Alternative	\$ 59,245,212	\$ 70,200,000
Alt03_Opt03	Minimum program per PEIS with 55 mph design speed without a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements. Option is similar to Alt03_Opt01 without 3rd bore at EJMT.	\$ 5,450,691	Not included in Alternative	Not included in Alternative	\$ 59,245,212	\$ 64,700,000
Alt03_Opt04	Minimum program per PEIS with 65 mph design speed without a 3rd bore at EJMT. Minimum program is generally localized auxiliary lane improvements. Option is similar to Alt03_Opt02 without 3rd bore at EJMT.	\$ 5,459,132	\$ 232,399	Not included in Alternative	\$ 59,245,212	\$ 64,940,000
Alt04_Opt01	Maximum program per PEIS with 55 mph design speed including a 3rd bore at EJMT. Maximum program includes one additional non-reversible tolled lane (EB & WB) between EJMT and Floyd Hill.	\$ 9,497,232	\$ 4,739,127	Not included in Alternative	\$ 59,245,212	\$ 73,490,000
Alt04_Opt02	Maximum program per PEIS with 65 mph design speed including a 3rd bore at EJMT. Maximum program includes one additional non-reversible tolled lane (EB & WB) between EJMT and Floyd Hill.	\$ 9,500,000	\$ 4,972,640	Not included in Alternative	\$ 59,245,212	\$ 73,720,000
Alt05_Opt01	Permanent Peak Period Shoulder Lane EB and WB. Widen the existing roadway to accommodate one additional left side managed lane (EB & WB) for use during peak times; during non-peak times operates as a standard shoulder. Provide full width shoulder on right side.	\$ 10,651,029	\$ 3,159,418	Not included in Alternative	\$ 59,245,212	\$ 73,060,000
Alt06_Opt01	Temporary Peak Period Shoulder Lane. Using the existing roadway, accommodate one additional WB left side managed lane for use during peak times; during non-peak times operates as a standard shoulder. No twelve foot wide shoulders are available during peak periods. Construction of WB peak period lane is from Empire to Floyd Hill only. (Assumes EB peak period lane from Empire to Floyd Hill is constructed.)	\$ 3,463,832	Not included in Alternative	Not included in Alternative	\$ 59,245,212	\$ 62,710,000