

**I-70 Mountain Corridor Sketch-Level Opinion of Probable Costs for ITS
Alternative 1, Options 1 and 2: 2 Tolled Reversible Lanes
February 7, 2014**

Disclaimer: This is a preliminary, sketch-level opinion of probable costs that is intended for comparative purposes of the various alternatives during the planning phase. Items, quantities, and costs are subject to change and are not meant to be exhaustive or all inclusive. These are preliminary costs and an unallocated contingency should be included in the total project costs. Additionally, no capital costs are included for maintenance equipment.

ITS EQUIPMENT					
Item	Units	Unit Cost	Quantity	Total Cost	Assumptions
Closed Circuit Television (CCTV)	EACH	\$7,700	82	\$631,400	Device only. Assumes replacing 71 existing CCTV on corridor (excluding those within the EJT), plus 11 new CCTV in new EJT bore.
Travel Time Indicator (TTI)	EACH	\$10,000	89	\$890,000	Device only. Assumes replacing 48 existing TTI on corridor, plus 1 new TTI in Tunnel, plus 20 TTI in each direction in ML (either between each ML access point or at a maximum spacing of 3 miles)
Microwave Vehicle Radar Detector (MVRD)/RTMS	EACH	\$12,700	66	\$838,200	Device only, assumes mounting on existing pole. Replace 43 existing MVRD on corridor, plus 23 new MVRD in ML (at existing MVRD locations)
Automatic Traffic Data Recorder (ATR)	EACH	\$12,100	8	\$96,800	Replace 5 existing ATR devices in corridor, and add ATR devices to the ML at the three existing ATRs in the corridor (EJT, Twin Tunnels, Evergreen)
Overhead Variable Message Sign (VMS)	EACH	\$300,000	32	\$9,600,000	Replace 19 existing full, overhead VMS along corridor and convert EB Hidden Valley VMS to full overhead, install 12 new overhead VMS (one each between all tolling points in ML). Cost includes electronic sign, structure, foundation.
EJT Overhead Variable Message Sign (VMS)	EACH	\$41,700	11	\$458,700	Install overhead VMS in new EJT bore at same spacing as signage in existing tunnels.
Blank Out Signs	EACH	\$11,000	16	\$176,000	Assumes existing blank out signs along the corridor will need to be relocated and replaced. Includes footing and sign.
Flashing Beacons	EACH	\$5,000	2	\$10,000	Assumes existing flashing beacon signs along the corridor will need to be relocated and replaced. Includes footing and sign.
Lane Control Signs (LUS)	EACH	\$30,000	44	\$1,320,000	64x64 matrix; includes LUS sign, controller. Assumes 1 sign over each managed lane through new EJT tunnel bore at same spacing as signage in existing tunnels
Ramp Metering	EACH	\$35,000	8	\$280,000	Assumes existing ramp meters along the corridor will need to be relocated and replaced. Includes foundations and device.
Downieville Weigh-In-Motion Station (WIM)	LS	\$500,000	1	\$500,000	Assumes existing weigh-in-motion station at Downieville will need to be relocated and replaced.
Weigh-In-Motion (WIM)	EACH	\$78,600	3	\$235,800	Assumes other weigh-in-motion devices along the corridor will need to be relocated and replaced. Includes foundations and device.
Weather Station	EACH	\$80,000	10	\$800,000	Assumes existing weather stations along the corridor will need to be relocated and replaced. Includes foundations, fencing, tower and device.
Variable Speed Limit (VSL) signs	EACH	\$11,000	10	\$110,000	Assumes existing VSL signs along the corridor will need to be relocated and replaced. Includes foundations and device.
Cabinets	EACH	\$7,000	209	\$1,463,000	Assumes new cabinets at 154 existing locations plus 55 new locations in ML (20 TTI, 23 MVRD, 12 VMS)
Monotube overhead sign cantilever and foundation	EACH	\$50,000		\$0	sign
Install new fiber	LF	\$5	338,000	\$1,690,000	Assumes pulling fiber through new conduit, laterals, splicing, testing, connections
Conduit and handholes	LF	\$60	338,000	\$20,280,000	Assumes an array of 4 2-inch conduit is installed along the corridor, plus new conduit to all new ITS & Tolling devices (750 LF per new device).
Light Standard Steel (40 Foot)	EACH	\$5,000	154	\$770,000	Includes pole, foundation, and communication device. Assumes one pole at each existing power location for CCTV, TTI, MVRD
Power	EACH	\$50,000	209	\$10,450,000	Includes power service pedestal and limited conduit to 154 existing device locations, plus 55 new locations in ML (20 TTI, 23 MVRD, 12 VMS); does not include setting transformers or bringing power from Xcel to pedestal.
Communications	EACH	\$7,500	209	\$1,567,500	Includes field ethernet switches and transceivers
Temporary ITS	LS	\$2,500,000	1	\$2,500,000	Keeping ITS comm and field devices operational during construction, including replacement equipment and resets.
Spare parts	LS	\$400,000	1	\$400,000	Spare VMS LED modules, controllers, etc.
SUBTOTAL				\$55,067,400	
CAPITAL REPLACEMENT				\$2,319,160.00	Sum of all line items except conduit, divided by 15 (assuming a 15 year life for ITS equipment)
OPERATIONS				\$4,405,392.00	8% of subtotal

**I-70 Mountain Corridor Sketch-Level Opinion of Probable Costs for ITS
Alternative 2, Options 1 - 3: 3 Tolled Reversible Lanes
February 7, 2014**

Disclaimer: This is a preliminary, sketch-level opinion of probable costs that is intended for comparative purposes of the various alternatives during the planning phase. Items, quantities, and costs are subject to change and are not meant to be exhaustive or all inclusive. These are preliminary costs and an unallocated contingency should be included in the total project costs. Additionally, no capital costs are included for maintenance equipment.

ITS EQUIPMENT					
Item	Units	Unit Cost	Quantity	Total Cost	Assumptions
Closed Circuit Television (CCTV)	EACH	\$7,700	82	\$631,400	Device only. Assumes replacing 71 existing CCTV on corridor (excluding those within the EJT), plus 11 new CCTV in new EJT bore.
Travel Time Indicator (TTI)	EACH	\$10,000	89	\$890,000	Device only. Assumes replacing 48 existing TTI on corridor, plus 1 new TTI in Tunnel, plus 20 TTI in each direction in ML (either between each ML access point or at a maximum spacing of 3 miles)
Microwave Vehicle Radar Detector (MVRD)/RTMS	EACH	\$12,700	66	\$838,200	Device only, assumes mounting on existing pole. Replace 43 existing MVRD on corridor, plus 23 new MVRD in ML (at existing MVRD locations)
Automatic Traffic Data Recorder (ATR)	EACH	\$12,100	8	\$96,800	Replace 5 existing ATR devices in corridor, and add ATR devices to the ML at the three existing ATRs in the corridor (EJT, Twin Tunnels, Evergreen)
Overhead Variable Message Sign (VMS)	EACH	\$300,000	32	\$9,600,000	Replace 19 existing full, overhead VMS along corridor and convert EB Hidden Valley VMS to full overhead, install 12 new overhead VMS (one each between all tolling points in ML). Cost includes electronic sign, structure, foundation.
EJT Overhead Variable Message Sign (VMS)	EACH	\$41,700	11	\$458,700	Install overhead VMS in new EJT bore at same spacing as signage in existing tunnels.
Blank Out Signs	EACH	\$11,000	16	\$176,000	Assumes existing blank out signs along the corridor will need to be relocated and replaced. Includes footing and sign.
Flashing Beacons	EACH	\$5,000	2	\$10,000	Assumes existing flashing beacon signs along the corridor will need to be relocated and replaced. Includes footing and sign.
Lane Control Signs (LUS)	EACH	\$30,000	66	\$1,980,000	64x64 matrix; includes LUS sign, controller. Assumes 1 sign over each managed lane through new EJT tunnel bore at same spacing as signage in existing tunnels
Ramp Metering	EACH	\$35,000	8	\$280,000	Assumes existing ramp meters along the corridor will need to be relocated and replaced. Includes foundations and device.
Downieville Weigh-In-Motion Station (WIM)	LS	\$500,000	1	\$500,000	Assumes existing weigh-in-motion station at Downieville will need to be relocated and replaced.
Weigh-In-Motion (WIM)	EACH	\$78,600	3	\$235,800	Assumes other weigh-in-motion devices along the corridor will need to be relocated and replaced. Includes foundations and device.
Weather Station	EACH	\$80,000	10	\$800,000	Assumes existing weather stations along the corridor will need to be relocated and replaced. Includes foundations, fencing, tower and device.
Variable Speed Limit (VSL) signs	EACH	\$11,000	10	\$110,000	Assumes existing VSL signs along the corridor will need to be relocated and replaced. Includes foundations and device.
Cabinets	EACH	\$7,000	209	\$1,463,000	Assumes new cabinets at 154 existing locations plus 55 new locations in ML (20 TTI, 23 MVRD, 12 VMS)
Monotube overhead sign cantilever and foundation	EACH	\$50,000		\$0	
Install new fiber	LF	\$5	338,000	\$1,690,000	Assumes pulling fiber through new conduit, laterals, splicing, testing, connections
Conduit and handholes	LF	\$60	338,000	\$20,280,000	Assumes an array of 4 2-inch conduit is installed along the corridor, plus new conduit to all new ITS & Tolling devices (750 LF per new device).
Light Standard Steel (40 Foot)	EACH	\$5,000	154	\$770,000	Includes pole, foundation, and communication device. Assumes one pole at each existing power location for CCTV, TTI, MVRD
Power	EACH	\$50,000	209	\$10,450,000	Includes power service pedestal and limited conduit to 154 existing device locations, plus 55 new locations in ML (20 TTI, 23 MVRD, 12 VMS); does not include setting transformers or bringing power from Xcel to pedestal.
Communications	EACH	\$7,500	209	\$1,567,500	Includes field ethernet switches and transceivers
Temporary ITS	LS	\$2,500,000	1	\$2,500,000	Keeping ITS comm and field devices operational during construction, including replacement equipment and resets.
Spare parts	LS	\$400,000	1	\$400,000	Spare VMS LED modules, controllers, etc.
SUBTOTAL				\$55,727,400	
CAPITAL REPLACEMENT				\$2,363,160.00	Sum of all line items except conduit, divided by 15 (assuming a 15 year life for ITS equipment)
OPERATIONS				\$4,458,192.00	8% of subtotal

**I-70 Mountain Corridor Sketch-Level Opinion of Probable Costs for ITS
Alternative 3, Options 1 and 2: Minimum Program per PEIS with 3rd EJT Bore
February 7, 2014**

Disclaimer: This is a preliminary, sketch-level opinion of probable costs that is intended for comparative purposes of the various alternatives during the planning phase. Items, quantities, and costs are subject to change and are not meant to be exhaustive or all inclusive. These are preliminary costs and an unallocated contingency should be included in the total project costs. Additionally, no capital costs are included for maintenance equipment.

ITS EQUIPMENT					
Item	Units	Unit Cost	Quantity	Total Cost	Assumptions
Closed Circuit Television (CCTV)	EACH	\$7,700	76	\$585,200	Device only. Assumes replacing 65 existing CCTV e/o EJT, plus 11 new CCTV in new EJT bore.
Travel Time Indicator (TTI)	EACH	\$10,000	30	\$300,000	Device only. Assumes replacing 29 existing TTI e/o EJT plus 1 new TTI in Tunnel
Microwave Vehicle Radar Detector (MVRD)/RTMS	EACH	\$12,700	29	\$368,300	Device only, assumes mounting on existing pole. Replace 29 existing MVRD e/o EJT
Automatic Traffic Data Recorder (ATR)	EACH	\$12,100	3	\$36,300	Replace 3 existing ATR devices e/o EJT.
Overhead Variable Message Sign (VMS)	EACH	\$300,000	18	\$5,400,000	Replace 17 existing full, overhead VMS e/o EJT and convert EB Hidden Valley VMS to full overhead. Cost includes electronic sign, structure, foundation.
EJT Overhead Variable Message Sign (VMS)	EACH	\$41,700	11	\$458,700	Install overhead VMS in new EJT bore at same spacing as signage in existing tunnels.
Blank Out Signs	EACH	\$11,000	13	\$143,000	Assumes existing blank out signs along the corridor will need to be relocated and replaced. Includes footing and sign.
Flashing Beacons	EACH	\$5,000	2	\$10,000	Assumes existing flashing beacon signs along the corridor will need to be relocated and replaced. Includes footing and sign.
Lane Control Signs (LUS)	EACH	\$30,000	44	\$1,320,000	64x64 matrix; includes LUS sign, controller. Assumes 1 sign over each managed lane through new EJT tunnel bore at same spacing as signage in existing tunnels
Ramp Metering	EACH	\$35,000	8	\$280,000	Assumes existing ramp meters along the corridor will need to be relocated and replaced. Includes foundations and device.
Downieville Weigh-In-Motion Station (WIM)	LS	\$500,000	1	\$500,000	Assumes existing weigh-in-motion station at Downieville will need to be relocated and replaced.
Weigh-In-Motion (WIM)	EACH	\$78,600	3	\$235,800	Assumes other weigh-in-motion devices e/o EJT will need to be relocated and replaced. Includes foundations and device.
Weather Station	EACH	\$80,000	7	\$560,000	Assumes existing weather stations e/o EJT will need to be relocated and replaced. Includes foundations, fencing, tower and device.
Variable Speed Limit (VSL) signs	EACH	\$11,000	10	\$110,000	Assumes existing VSL signs e/o EJT will need to be relocated and replaced. Includes foundations and device.
Cabinets	EACH	\$7,000	133	\$931,000	Assumes new cabinets at 133 existing locations e/o EJT.
Monotube overhead sign cantilever and foundation	EACH	\$50,000		\$0	
Install new fiber	LF	\$5	243,000	\$1,215,000	Assumes pulling fiber through core conduit, laterals, splicing, testing, connections, from C-470 to EJT.
Conduit and handholes	LF	\$60	128,400	\$7,704,000	Assumes 2-inch conduit is installed along each auxiliary lane segment and through the new EJMT bore.
Light Standard Steel (40 Foot)	EACH	\$5,000	133	\$665,000	Includes pole, foundation, and communication device. Assumes one pole at each existing power location e/o EJT for CCTV, TTI, MVRD.
Power	EACH	\$50,000	133	\$6,650,000	Includes power service pedestal and limited conduit to 133 existing device locations e/o EJT; does not include setting transformers or bringing power from Xcel to pedestal.
Communications	EACH	\$7,500	133	\$997,500	Includes field ethernet switches and transceivers
Temporary ITS	LS	\$2,000,000	1	\$2,000,000	Keeping ITS comm and field devices operational during construction, including replacement equipment and resets.
Spare parts	LS	\$250,000	1	\$250,000	Spare VMS LED modules, controllers, etc.
SUBTOTAL				\$30,719,800	
CAPITAL REPLACEMENT				\$1,534,386.67	Sum of all line items except conduit, divided by 15 (assuming a 15 year life for ITS equipment)
OPERATIONS				\$2,457,584.00	8% of subtotal

**I-70 Mountain Corridor Sketch-Level Opinion of Probable Costs for ITS
Alternative 3, Options 3 and 4: Minimum Program per PEIS without 3rd EJT Bore
February 7, 2014**

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ITS EQUIPMENT					
Item	Units	Unit Cost	Quantity	Total Cost	Assumptions
Closed Circuit Television (CCTV)	EACH	\$7,700	65	\$500,500	Device only. Assumes replacing 65 existing CCTV e/o EJT
Travel Time Indicator (TTI)	EACH	\$10,000	29	\$290,000	Device only. Assumes replacing 29 existing TTI e/o EJT
Microwave Vehicle Radar Detector (MVRD)/RTMS	EACH	\$12,700	29	\$368,300	Device only, assumes mounting on existing pole. Replace 29 existing MVRD e/o EJT
Automatic Traffic Data Recorder (ATR)	EACH	\$12,100	3	\$36,300	Replace 3 existing ATR devices in corridor.
Overhead Variable Message Sign (VMS)	EACH	\$300,000	18	\$5,400,000	Replace 17 existing full, overhead VMS e/o EJT and convert EB Hidden Valley VMS to full overhead. Cost includes electronic sign, structure, foundation.
EJT Overhead Variable Message Sign (VMS)	EACH	\$41,700		\$0	Install overhead VMS in new EJT bore at same spacing as signage in existing tunnels.
Blank Out Signs	EACH	\$11,000	13	\$143,000	Assumes existing blank out signs along the corridor will need to be relocated and replaced. Includes footing and sign.
Flashing Beacons	EACH	\$5,000	2	\$10,000	Assumes existing flashing beacon signs along the corridor will need to be relocated and replaced. Includes footing and sign.
Lane Control Signs (LUS)	EACH	\$30,000		\$0	64x64 matrix; includes LUS sign, controller. Assumes 1 sign over each managed lane through new EJT tunnel bore at same spacing as signage in existing tunnels
Ramp Metering	EACH	\$35,000	8	\$280,000	Assumes existing ramp meters along the corridor will need to be relocated and replaced. Includes foundations and device.
Downieville Weigh-In-Motion Station (WIM)	LS	\$500,000	1	\$500,000	Assumes existing weigh-in-motion station at Downieville will need to be relocated and replaced.
Weigh-In-Motion (WIM)	EACH	\$78,600	3	\$235,800	Assumes other weigh-in-motion devices e/o EJT will need to be relocated and replaced. Includes foundations and device.
Weather Station	EACH	\$80,000	7	\$560,000	Assumes existing weather stations e/o EJT will need to be relocated and replaced. Includes foundations, fencing, tower and device.
Variable Speed Limit (VSL) signs	EACH	\$11,000	10	\$110,000	Assumes existing VSL signs e/o EJT will need to be relocated and replaced. Includes foundations and device.
Cabinets	EACH	\$7,000	133	\$931,000	Assumes new cabinets at 133 existing locations e/o EJT.
Monotube overhead sign cantilever and foundation	EACH	\$50,000		\$0	
Install new fiber	LF	\$5	243,000	\$1,215,000	Assumes pulling fiber through core conduit, laterals, splicing, testing, connections, from C-470 to EJT.
Conduit and handholes	LF	\$60	119,400	\$7,164,000	Assumes 2-inch conduit is installed along each auxiliary lane segment.
Light Standard Steel (40 Foot)	EACH	\$5,000	133	\$665,000	Includes pole, foundation, and communication device. Assumes one pole at each existing power location e/o EJT for CCTV, TTI, MVRD.
Power	EACH	\$50,000	133	\$6,650,000	Includes power service pedestal and limited conduit to 133 existing device locations e/o EJT; does not include setting transformers or bringing power from Xcel to pedestal.
Communications	EACH	\$7,500	133	\$997,500	Includes field ethernet switches and transceivers
Temporary ITS	LS	\$2,000,000	1	\$2,000,000	Keeping ITS comm and field devices operational during construction, including replacement equipment and resets.
Spare parts	LS	\$250,000	1	\$250,000	Spare VMS LED modules, controllers, etc.
SUBTOTAL				\$28,306,400	
CAPITAL REPLACEMENT				\$1,409,493.33	Sum of all line items except conduit, divided by 15 (assuming a 15 year life for ITS equipment)
OPERATIONS				\$2,264,512.00	8% of subtotal

**I-70 Mountain Corridor Sketch-Level Opinion of Probable Costs for ITS
Alternative 4, Options 1 and 2: Maximum Program per PEIS
February 7, 2014**

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ITS EQUIPMENT					
Item	Units	Unit Cost	Quantity	Total Cost	Assumptions
Closed Circuit Television (CCTV)	EACH	\$7,700	76	\$585,200	Device only. Assumes replacing 65 existing CCTV e/o EJT, plus 11 new CCTV in new EJT bore.
Travel Time Indicator (TTI)	EACH	\$10,000	70	\$700,000	Device only. Assumes replacing 29 existing TTI e/o EJT plus 1 new TTI in Tunnel, plus 20 new TTI in each direction for toll lane
Microwave Vehicle Radar Detector (MVRD)/RTMS	EACH	\$12,700	29	\$368,300	Device only, assumes mounting on existing pole. Replace 29 existing MVRD e/o EJT
Automatic Traffic Data Recorder (ATR)	EACH	\$12,100	3	\$36,300	Replace 3 existing ATR devices e/o EJT.
Overhead Variable Message Sign (VMS)	EACH	\$300,000	18	\$5,400,000	Replace 17 existing full, overhead VMS e/o EJT and convert EB Hidden Valley VMS to full overhead. Cost includes electronic sign, structure, foundation.
EJT Overhead Variable Message Sign (VMS)	EACH	\$41,700	11	\$458,700	Install overhead VMS in new EJT bore at same spacing as signage in existing tunnels.
Blank Out Signs	EACH	\$11,000	20	\$220,000	Assumes existing blank out signs along the corridor will need to be relocated and replaced. Includes footing and sign.
Flashing Beacons	EACH	\$5,000	2	\$10,000	Assumes existing flashing beacon signs along the corridor will need to be relocated and replaced. Includes footing and sign.
Lane Control Signs (LUS)	EACH	\$30,000		\$0	64x64 matrix; includes LUS sign, controller. Assumes 1 sign over each managed lane through new EJT tunnel bore at same spacing as signage in existing tunnels.
Ramp Metering	EACH	\$35,000	8	\$280,000	Assumes existing ramp meters along the corridor will need to be relocated and replaced. Includes foundations and device.
Downieville Weigh-In-Motion Station (WIM)	LS	\$500,000	1	\$500,000	Assumes existing weigh-in-motion station at Downieville will need to be relocated and replaced.
Weigh-In-Motion (WIM)	EACH	\$78,600	3	\$235,800	Assumes other weigh-in-motion devices e/o EJT will need to be relocated and replaced. Includes foundations and device.
Weather Station	EACH	\$80,000	7	\$560,000	Assumes existing weather stations e/o EJT will need to be relocated and replaced. Includes foundations, fencing, tower and device.
Variable Speed Limit (VSL) signs	EACH	\$11,000	10	\$110,000	Assumes existing VSL signs e/o EJT will need to be relocated and replaced. Includes foundations and device.
Cabinets	EACH	\$7,000	153	\$1,071,000	Assumes new cabinets at 133 existing locations e/o EJT plus 20 new TTI locations for toll lane.
Monotube overhead sign cantilever and foundation	EACH	\$50,000		\$0	
Install new fiber	LF	\$5	258,000	\$1,290,000	Assumes pulling fiber through new conduit, laterals, splicing, testing, connections, from C-470 to EJT
Conduit and handholes	LF	\$60	258,000	\$15,480,000	Assumes an array of 4 2-inch conduit, plus new conduit to all new ITS & Tolling devices, is installed from C-470 to EJT.
Light Standard Steel (40 Foot)	EACH	\$5,000	153	\$765,000	Includes pole, foundation, and communication device. Assumes one pole at each existing power location e/o EJT. Plus 20 new TTI locations for toll lane.
Power	EACH	\$50,000	153	\$7,650,000	Includes power service pedestal and limited conduit to 133 existing device locations e/o EJT, plus 20 new TTI locations for toll lane; does not include setting transformers or bringing power from Xcel to pedestal.
Communications	EACH	\$7,500	153	\$1,147,500	Includes field ethernet switches and transceivers
Temporary ITS	LS	\$2,500,000	1	\$2,500,000	Keeping ITS comm and field devices operational during construction, including replacement equipment and resets.
Spare parts	LS	\$400,000	1	\$400,000	Spare VMS LED modules, controllers, etc.
SUBTOTAL				\$39,767,800	
CAPITAL REPLACEMENT				\$1,619,186.67	Sum of all line items except conduit, divided by 15 (assuming a 15 year life for ITS equipment)
OPERATIONS				\$3,181,424.00	8% of subtotal

**I-70 Mountain Corridor Sketch-Level Opinion of Probable Costs for ITS
Alternative 5, Option 1: Permanent Peak Period Shoulder Lane
February 7, 2014**

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ITS EQUIPMENT					
Item	Units	Unit Cost	Quantity	Total Cost	Assumptions
Closed Circuit Television (CCTV)	EACH	\$7,700	46	\$354,200	Device only. Assumes replacing 18 existing CCTV between EJMT and Floyd Hill
Travel Time Indicator (TTI)	EACH	\$10,000	50	\$500,000	Device only. Assumes replacing 22 existing TTI between EJMT and Floyd Hill, plus 14 TTI in each direction of the PPSL (either between each ML access point or at a maximum spacing of 3 miles)
Microwave Vehicle Radar Detector (MVRD)/RTMS	EACH	\$12,700	25	\$317,500	Device only, assumes mounting on existing pole. Replace 25 existing MVRD between EJMT and Floyd Hill
Automatic Traffic Data Recorder (ATR)	EACH	\$12,100	4	\$48,400	Replace existing ATR devices between EJMT and Floyd Hill
Overhead Variable Message Sign (VMS)	EACH	\$300,000	14	\$4,200,000	Replace 13 existing full, overhead VMS between EJMT and Floyd Hill and convert EB Hidden Valley VMS to full overhead. Cost includes electronic sign, structure, foundation.
EJT Overhead Variable Message Sign (VMS)	EACH	\$41,700	2	\$83,400	Replace 2 existing EJMT VMS outside of east portal of tunnel
Blank Out Signs	EACH	\$11,000	10	\$110,000	Assumes existing blank out signs between EJMT and Floyd Hill will need to be relocated and replaced. Includes footing and sign.
Flashing Beacons	EACH	\$5,000	2	\$10,000	Assumes existing flashing beacon signs between EJMT and Floyd Hill will need to be relocated and replaced. Includes footing and sign.
Lane Control Signs (LUS)	EACH	\$30,000	124	\$3,720,000	64x64 matrix; includes LUS sign, controller. Assumes 1 sign every 1/2 mile in each direction to maintain sign visibility
Ramp Metering	EACH	\$35,000	6	\$210,000	Assumes existing ramp meters between EJMT and Floyd Hill will need to be relocated and replaced. Includes foundations and device.
Downieville Weigh-In-Motion Station (WIM)	LS	\$500,000	1	\$500,000	Assumes existing weigh-in-motion station at Downieville will need to be relocated and replaced.
Weigh-In-Motion (WIM)	EACH	\$78,600	3	\$235,800	Assumes other weigh-in-motion devices between EJMT and Floyd Hill will need to be relocated and replaced. Includes foundations and device.
Weather Station	EACH	\$80,000	4	\$320,000	Assumes existing weather stations between EJMT and Floyd Hill will need to be relocated and replaced. Includes foundations, fencing, tower and device.
Variable Speed Limit (VSL) signs	EACH	\$11,000	54	\$594,000	Assumes 2 new VSL signs will be installed (one in the median and one on the outside shoulder) after each on ramp at each interchange between EJMT and Floyd Hill. Includes foundations and device.
Cabinets	EACH	\$7,000	157	\$1,099,000	Assumes new cabinets at 101 existing locations between EJMT and Floyd Hill, plus 28 additional for LUS signs, plus 27 additional for VSL signs.
Monotube overhead sign cantilever and foundation	EACH	\$50,000	178	\$8,900,000	Assumes new cantilever overhead sign structures for each LUS and VSL sign
Install new fiber	LF	\$5	261,000	\$1,305,000	Assumes pulling fiber through new conduit, laterals, splicing, testing, connections, from C-470 to EJMT
Conduit and handholes	LF	\$60	261,000	\$15,660,000	Assumes an array of 4 2-inch conduit, plus new conduit to all new ITS & Tolling devices, is installed from C-470 to EJMT.
Light Standard Steel (40 Foot)	EACH	\$5,000	101	\$505,000	Includes pole, foundation, and communication device. Assumes one pole at each existing power location for CCTV, TTI, MVRD.
Power	EACH	\$50,000	157	\$7,850,000	Includes power service pedestal and limited conduit to 101 existing device locations between EJMT and Floyd Hill, plus 28 additional locations for LUS signs, plus 27 locations for VSL signs; does not include setting transformers or bringing power from Xcel to pedestal.
Communications	EACH	\$7,500	157	\$1,177,500	Includes field ethernet switches and transceivers
Temporary ITS	LS	\$2,000,000	1	\$2,000,000	Keeping ITS comm and field devices operational during construction, including replacement equipment and resets.
Spare parts	LS	\$250,000	1	\$250,000	Spare VMS LED modules, controllers, etc.
SUBTOTAL				\$49,949,800	
CAPITAL REPLACEMENT				\$2,285,986.67	Sum of all line items except conduit, divided by 15 (assuming a 15 year life for ITS equipment)
OPERATIONS				\$3,995,984.00	8% of subtotal

I-70 Mountain Corridor Sketch-Level Opinion of Probable Costs for ITS
Alternative 6, Option 1: Temporary Peak Period Shoulder Lane, Empire to Floyd Hill
February 7, 2014

Disclaimer: This is a preliminary, sketch-level opinion of probable costs that is intended for comparative purposes of the various alternatives during the planning phase. Items, quantities, and costs are subject to change and are not meant to be exhaustive or all inclusive. These are preliminary costs and an unallocated contingency should be included in the total project costs. Additionally, no capital costs are included for maintenance equipment.

ITS EQUIPMENT					
Item	Units	Unit Cost	Quantity	Total Cost	Assumptions
Closed Circuit Television (CCTV)	EACH	\$7,700	18	\$138,600	Device only. Assumes replacing 18 existing CCTV between Empire and Floyd Hill
Travel Time Indicator (TTI)	EACH	\$10,000	7	\$70,000	Device only. Assumes replacing 7 existing WB TTI between Empire and Floyd Hill, plus 3 new TTI in WB PPSL lane
Microwave Vehicle Radar Detector (MVRD)/RTMS	EACH	\$12,700	6	\$76,200	Device only, assumes mounting on existing pole. Replace 6 existing WB MVRD between Empire and Floyd Hill
Automatic Traffic Data Recorder (ATR)	EACH	\$12,100	1	\$12,100	Replace existing ATR devices at twin tunnels
Overhead Variable Message Sign (VMS)	EACH	\$300,000	9	\$2,700,000	Replace 3 existing full, overhead WB VMS between Empire and Floyd Hill, plus 6 new signs for PPSL VSL signs, one at PPSL entrance and one after each WB on-ramp except Downieville. Cost includes electronic sign, structure, foundation.
EJT Overhead Variable Message Sign (VMS)	EACH	\$41,700	0	\$0	
Blank Out Signs	EACH	\$11,000	3	\$33,000	Assumes existing WB blank out signs between Empire and Floyd Hill will need to be relocated and replaced. Includes footing and sign.
Flashing Beacons	EACH	\$5,000	1	\$5,000	Assumes existing flashing beacon sign between Empire and Floyd Hill will need to be relocated and replaced. Includes footing and sign.
Lane Control Signs (LUS)	EACH	\$30,000	24	\$720,000	64x64 matrix; includes LUS sign, controller. Assumes 1 sign every 1/2 mile in WB direction to maintain sign visibility
Ramp Metering	EACH	\$35,000	0	\$0	
Downieville Weigh-In-Motion Station (WIM)	LS	\$500,000	1	\$500,000	Assumes existing weigh-in-motion station at Downieville will need to be relocated and replaced.
Weigh-In-Motion (WIM)	EACH	\$78,600	0	\$0	
Weather Station	EACH	\$80,000	0	\$0	
Variable Speed Limit (VSL) signs	EACH	\$11,000	12	\$132,000	Assumes 12 new VSL signs would be installed through the PPSL section, one every mile
Cabinets	EACH	\$7,000	41	\$287,000	Assumes new cabinets at 28 existing WB locations between Empire and Floyd Hill, plus 13 additional for LUS signs.
Monotube overhead sign cantilever and foundation	EACH	\$50,000	36	\$1,800,000	Assumes new cantilever overhead sign structures for each LUS and VSL sign.
Install new fiber	LF	\$5	154,000	\$770,000	Assumes pulling fiber through new conduit, laterals, splicing, testing, connections, from C-470 to Empire Junction
Conduit and handholes	LF	\$60	0	\$0	
Light Standard Steel (40 Foot)	EACH	\$5,000	41	\$205,000	Includes pole, foundation, and communication device. Assumes one pole at each existing power location for CCTV, TTI, MVRD.
Power	EACH	\$50,000	41	\$2,050,000	Includes power service pedestal and limited conduit to 28 existing device locations between Empire and Floyd Hill, plus 13 additional locations for LUS signs; does not include setting transformers or bringing power from Xcel to pedestal.
Communications	EACH	\$7,500	41	\$307,500	Includes field ethernet switches and transceivers
Temporary ITS	LS	\$2,000,000	1	\$2,000,000	Keeping ITS comm and field devices operational during construction, including replacement equipment and resets.
Spare parts	LS	\$250,000	1	\$250,000	Spare VMS LED modules, controllers, etc.
SUBTOTAL				\$12,056,400	
CAPITAL REPLACEMENT				\$803,760.00	Sum of all line items except conduit, divided by 15 (assuming a 15 year life for ITS equipment)
OPERATIONS				\$964,512.00	8% of subtotal

I-70 Mountain Corridor Sketch-Level Opinion of Probable Costs for ITS
Alternative 6, Option 2: Temporary Peak Period Shoulder Lane, Empire to the West Side of the Twin Tunnels
February 20, 2014

Disclaimer: This is a preliminary, sketch-level opinion of probable costs that is intended for comparative purposes of the various alternatives during the planning phase. Items, quantities, and costs are subject to change and are not meant to be exhaustive or all inclusive. These are preliminary costs and an unallocated contingency should be included in the total project costs. Additionally, no capital costs are included for maintenance equipment.

ITS EQUIPMENT					
Item	Units	Unit Cost	Quantity	Total Cost	Assumptions
Closed Circuit Television (CCTV)	EACH	\$7,700	14	\$107,800	Device only. Assumes replacing 14 existing CCTV between Empire and Twin Tunnels
Travel Time Indicator (TTI)	EACH	\$10,000	5	\$50,000	Device only. Assumes replacing 3 existing WB TTI between Empire and Twin Tunnels, plus 2 new TTI in WB PPSL lane
Microwave Vehicle Radar Detector (MVRD)/RTMS	EACH	\$12,700	4	\$50,800	Device only, assumes mounting on existing pole. Replace 4 existing WB MVRD between Empire and Twin Tunnels
Automatic Traffic Data Recorder (ATR)	EACH	\$12,100	1	\$12,100	Replace existing ATR devices at twin tunnels
Overhead Variable Message Sign (VMS)	EACH	\$300,000	6	\$1,800,000	Replace 2 existing full, overhead WB VMS between Empire and Twin Tunnels, plus 4 new signs for PPSL VSL signs, one at entrance and one after each WB on-ramp except Downieville. Cost includes electronic sign, structure, foundation.
EJT Overhead Variable Message Sign (VMS)	EACH	\$41,700	0	\$0	
Blank Out Signs	EACH	\$11,000	3	\$33,000	Assumes existing WB blank out signs between Empire and Twin Tunnels will need to be relocated and replaced. Includes footing and sign.
Flashing Beacons	EACH	\$5,000	1	\$5,000	Assumes existing flashing beacon sign between Empire and Twin Tunnels will need to be relocated and replaced. Includes footing and sign.
Lane Control Signs (LUS)	EACH	\$30,000	18	\$540,000	64x64 matrix; includes LUS sign, controller. Assumes 1 sign every 1/2 mile in WB direction to maintain sign visibility
Ramp Metering	EACH	\$35,000	0	\$0	
Downieville Weigh-In-Motion Station (WIM)	LS	\$500,000	1	\$500,000	Assumes existing weigh-in-motion station at Downieville will need to be relocated and replaced.
Weigh-In-Motion (WIM)	EACH	\$78,600	0	\$0	
Weather Station	EACH	\$80,000	0	\$0	
Variable Speed Limit (VSL) signs	EACH	\$11,000	9	\$99,000	Assumes 9 new VSL signs would be installed through the PPSL section, one every mile
Cabinets	EACH	\$7,000	27	\$189,000	Assumes new cabinets at 19 existing WB locations between Empire and Floyd Hill, plus 8 additional for LUS signs.
Monotube overhead sign cantilever and foundation	EACH	\$50,000	27	\$1,350,000	Assumes new cantilever overhead sign structures for each LUS and VSL sign.
Install new fiber	LF	\$5	154,000	\$770,000	Assumes pulling fiber through new conduit, laterals, splicing, testing, connections, from C-470 to Empire Junction
Conduit and handholes	LF	\$60	0	\$0	
Light Standard Steel (40 Foot)	EACH	\$5,000	27	\$135,000	Includes pole, foundation, and communication device. Assumes one pole at each existing power location for CCTV, TTI, MVRD.
Power	EACH	\$50,000	27	\$1,350,000	Includes power service pedestal and limited conduit to 28 existing device locations between Empire and Floyd Hill, plus 13 additional locations for LUS signs; does not include setting transformers or bringing power from Xcel to pedestal.
Communications	EACH	\$7,500	27	\$202,500	Includes field ethernet switches and transceivers
Temporary ITS	LS	\$2,000,000	1	\$2,000,000	Keeping ITS comm and field devices operational during construction, including replacement equipment and resets.
Spare parts	LS	\$250,000	1	\$250,000	Spare VMS LED modules, controllers, etc.
SUBTOTAL				\$9,444,200	
CAPITAL REPLACEMENT				\$629,613.33	Sum of all line items except conduit, divided by 15 (assuming a 15 year life for ITS equipment)
OPERATIONS				\$755,536.00	8% of subtotal

I-70 Mountain Corridor Sketch-Level Opinion of Probable Costs for ITS
Alternative 6, Option 2: Temporary Peak Period Shoulder Lane, Empire to the West Side of the Twin Tunnels
February 20, 2014

Disclaimer: This is a preliminary, sketch-level opinion of probable costs that is intended for comparative purposes of the various alternatives during the planning phase. Items, quantities, and costs are subject to change and are not meant to be exhaustive or all inclusive. These are preliminary costs and an unallocated contingency should be included in the total project costs. Additionally, no capital costs are included for maintenance equipment.

ITS EQUIPMENT					
Item	Units	Unit Cost	Quantity	Total Cost	Assumptions
Closed Circuit Television (CCTV)	EACH	\$7,700	14	\$107,800	Device only. Assumes replacing 14 existing CCTV between Empire and Twin Tunnels
Travel Time Indicator (TTI)	EACH	\$10,000	5	\$50,000	Device only. Assumes replacing 3 existing WB TTI between Empire and Twin Tunnels, plus 2 new TTI in WB PPSL lane
Microwave Vehicle Radar Detector (MVRD)/RTMS	EACH	\$12,700	4	\$50,800	Device only, assumes mounting on existing pole. Replace 4 existing WB MVRD between Empire and Twin Tunnels
Automatic Traffic Data Recorder (ATR)	EACH	\$12,100	1	\$12,100	Replace existing ATR devices at twin tunnels
Overhead Variable Message Sign (VMS)	EACH	\$300,000	6	\$1,800,000	Replace 2 existing full, overhead WB VMS between Empire and Twin Tunnels, plus 4 new signs for PPSL VSL signs, one at entrance and one after each WB on-ramp except Downieville. Cost includes electronic sign, structure, foundation.
EJT Overhead Variable Message Sign (VMS)	EACH	\$41,700	0	\$0	
Blank Out Signs	EACH	\$11,000	3	\$33,000	Assumes existing WB blank out signs between Empire and Twin Tunnels will need to be relocated and replaced. Includes footing and sign.
Flashing Beacons	EACH	\$5,000	1	\$5,000	Assumes existing flashing beacon sign between Empire and Twin Tunnels will need to be relocated and replaced. Includes footing and sign.
Lane Control Signs (LUS)	EACH	\$30,000	18	\$540,000	64x64 matrix; includes LUS sign, controller. Assumes 1 sign every 1/2 mile in WB direction to maintain sign visibility
Ramp Metering	EACH	\$35,000	0	\$0	
Downieville Weigh-In-Motion Station (WIM)	LS	\$500,000	1	\$500,000	Assumes existing weigh-in-motion station at Downieville will need to be relocated and replaced.
Weigh-In-Motion (WIM)	EACH	\$78,600	0	\$0	
Weather Station	EACH	\$80,000	0	\$0	
Variable Speed Limit (VSL) signs	EACH	\$11,000	9	\$99,000	Assumes 9 new VSL signs would be installed through the PPSL section, one every mile
Cabinets	EACH	\$7,000	27	\$189,000	Assumes new cabinets at 19 existing WB locations between Empire and Floyd Hill, plus 8 additional for LUS signs.
Monotube overhead sign cantilever and foundation	EACH	\$50,000	27	\$1,350,000	Assumes new cantilever overhead sign structures for each LUS and VSL sign.
Install new fiber	LF	\$5	154,000	\$770,000	Assumes pulling fiber through new conduit, laterals, splicing, testing, connections, from C-470 to Empire Junction
Conduit and handholes	LF	\$60	0	\$0	
Light Standard Steel (40 Foot)	EACH	\$5,000	27	\$135,000	Includes pole, foundation, and communication device. Assumes one pole at each existing power location for CCTV, TTI, MVRD.
Power	EACH	\$50,000	27	\$1,350,000	Includes power service pedestal and limited conduit to 28 existing device locations between Empire and Floyd Hill, plus 13 additional locations for LUS signs; does not include setting transformers or bringing power from Xcel to pedestal.
Communications	EACH	\$7,500	27	\$202,500	Includes field ethernet switches and transceivers
Temporary ITS	LS	\$2,000,000	1	\$2,000,000	Keeping ITS comm and field devices operational during construction, including replacement equipment and resets.
Spare parts	LS	\$250,000	1	\$250,000	Spare VMS LED modules, controllers, etc.
SUBTOTAL				\$9,444,200	
CAPITAL REPLACEMENT				\$629,613.33	Sum of all line items except conduit, divided by 15 (assuming a 15 year life for ITS equipment)
OPERATIONS				\$755,536.00	8% of subtotal

21 power locations west of EJT (assumed devices within 0.05 miles (250 ft) could be powered from one location)

133 power locations east of EJT (assumed devices within 0.05 miles (250 ft) could be powered from one location)

101 power locations between EJM and Floyd Hill (assumed devices within 0.05 miles (250 ft) could be powered from one location)

Location	MM	Power w/in 0.05 MI?	
E-470 Interchange	260.00	Y	1
	259.50	N	0
	259.00	N	0
	258.50	Y	1
	258.00	N	0
	257.50	N	0
	257.00	Y	1
	256.50	N	0
	256.00	Y	1
	255.50	N	0
	255.00	Y	1
	254.50	N	0
	254.00	Y	1
	253.50	N	0
	253.00	N	0
	252.50	N	0
	252.00	Y	1
	251.50	N	0
	251.00	Y	1
	250.50	N	0
	250.00	N	0
	249.50	N	0
	249.00	Y	1
	248.50	N	0
	248.00	Y	1
	247.50	N	0
	247.00	Y	1
246.50	Y	1	
Floyd Hill	246.00	Y	1

	245.50	N	0		
	245.00	Y	1		
	244.50	N	0		
	244.00	Y	1		
	243.50	Y	1		
	243.00	Y	1		
	242.50	Y	1		
Twin Tunnels	242.00	Y	1		
	241.50	N	0		
	241.00	Y	1		
	240.50	N	0		
	240.00	Y	1		
	239.50	N	0		
	239.00	Y	1		
	238.50	N	0		
	238.00	Y	1		
	237.50	N	0		
	237.00	Y	1		
	236.50	Y	1		
	236.00	Y	1		
	235.50	N	0		
	235.00	Y	1		
	234.50	N	0		
	234.00	Y	1		
	233.50	N	0		
	233.00	Y	1	Empire to Floyd Hill	Empire to Twin Tunnels
Empire Junction	232.50	Y	1	18 Power	12 Power
	232.00	Y	1	10 No Power	8 No Power
	231.50	N	0		
	231.00	Y	1		
	230.50	N	0		
	230.00	N	0		
	229.50	Y	1		
	229.00	N	0		

	228.50	Y	1			
	228.00	Y	1			
	227.50	N	0			
	227.00	N	0			
	226.50	Y	1			
	226.00	Y	1			
	225.50	N	0			
	225.00	N	0			
	224.50	Y	1			
	224.00	Y	1			
	223.50	N	0			
	223.00	Y	1			
	222.50	N	0			
	222.00	Y	1			
	221.50	N	0			
	221.00	N	0			
	220.50	Y	1			
	220.00	N	0			
	219.50	N	0			
	219.00	Y	1			
	218.50	N	0			
	218.00	N	0			
	217.50	N	0			
	217.00	Y	1			
	216.50	Y	1			
	216.00	N	0	EJMT to C470	EJMT to Floyd Hill	
EJT East Portal	215.50	Y	1		46 Power	34 Power
EJT West Portal	215.35		0		44 No Power	28 No Power
	213.65		0			
	213.50	Y	1			
	213.00	N	0			
	212.50	N	0			
	212.00	N	0			
	211.50	N	0			

	211.00	N	0	
	210.50	N	0	
	210.00	N	0	
	209.50	N	0	
	209.00	Y	1	
	208.50	N	0	
	208.00	Y	1	
	207.50	N	0	
	207.00	Y	1	
	206.50	N	0	
	206.00	N	0	
	205.50	N	0	
Silverthorne Interchange	205.00	Y	1	5

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	Costs verified from I-25 Managed Lane bid
	Costs taken from I-70 PPSL 30 Percent Design
	Costs verified from Statewide CCTV and RWIS Installation bids
	Costs verified from I-70 West ITS Devices bids

**2 Tolled Reversible Managed Lanes (Alt01_Opt01, Alt01_Opt02)
February 10, 2014**

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TOLLING, GATES, & CONTROLS					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and LC software	EA	60	\$24,520	\$1,471,200	Assume one per lane in each direction
5204 Reader	EA	30	\$6,548	\$196,429	Assume one in each direction
22 Degree Antennas	EA	120	\$900	\$108,000	Assume two per lane in each direction
3M High Definition ALPR Camera (P382) - 50 foot	EA	120	\$13,230	\$1,587,600	Assume two per lane in each direction
3M Termination Box	EA	120	\$450	\$54,000	Assume one for each camera
3M AVC system including licenses and axles	EA	30	\$14,350	\$430,500	Assume one in each direction
Main and Axle Loop Installation (2 main & 4 axle loops per tolling direction)	EA	60	\$3,500	\$210,000	Assume one per lane in each direction
VTMS Signs	EA	108	\$35,000	\$3,780,000	Assume 2 per sign, and 2 signs per ingress
Static VTMS Signs	SF	20,736	\$25	\$518,400	This is the static portion of VTMS signs; assumed other static signage will be accounted for elsewhere. Assumed size of signs from I-25 project with 2 destination points per sign (192" X 288").
Static Signs	SF	16,740	\$25	\$418,500	This is the other static signing for accesses to the managed lanes; assuming four 14' X 10' signs with 6' X 2.5' plaque for each ingress.
Full Color VMS Signs	EA	27	\$160,000	\$4,320,000	Assuming full color; assuming one per access point.
Drilled Caisson (48 inch)	LF	2,775	\$360	\$999,000	Assume 25 LF per cantilever or gantry foundation
Monotube Overhead Sign Cantilever (24 inch diameter)	EA	81	\$46,000	\$3,726,000	Assume 1 per VMS, 1 per VTMS
Overhead Sign Gantry	EA	15	\$280,000	\$4,200,000	Assume 1 per toll point
2 Inch Electrical Conduit (bored)	LF	72,000	\$45	\$3,240,000	Assume 750 LF per VTMS, VMS, and toll point
Pull Box (24"X36"X24")	EA	576	\$450	\$259,200	Assume 6 new pull box per VTMS, VMS, and toll point
Wiring	LS	1	\$375,000	\$375,000	Assume \$25k per toll point
Communications Cabinet	EA	96	\$4,000	\$384,000	Assume one for each VTMS, VMS, and toll point
Uninterrupted Power Supply	EA	96	\$5,000	\$480,000	Assume one for each VTMS, VMS, and toll point
Fiber Optic Termination Panel	EA	96	\$800	\$76,800	Assume one per communications cabinet
Ethernet Switch	EA	96	\$5,000	\$480,000	Assume one for each VTMS, VMS, and toll point
HOV Gate Controller Cabinet	EA	27	\$12,400	\$334,800	CDOT 2013 cost data book has HOV Gate Controller Cabinet for \$12.4K each.
HOV Gate	EA	135	\$35,500	\$4,792,500	CDOT 2013 cost data book has HOV Gate for \$35.5K each.
Spare Equipment & Parts	LS	1	\$1,050,000	\$1,050,000	Based on per VTMS cost from PPSL project; will likely be lower for this project.
SUBTOTAL				\$33,491,929	

2 Tolled Reversible Managed Lanes (Alt01_Opt01, Alt01_Opt02)

February 10, 2014

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TOLLING, GATES, & CONTROLS SPARES					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and...	EA	6	\$24,520	\$147,120	
5204 Reader	EA	3	\$6,548	\$19,643	
22 Degree Antennas	EA	12	\$700	\$8,400	
7' Cable S3114-020	EA	12	\$180	\$2,160	
3M High Definition ALPR Camera (P382) - 50 foot	EA	12	\$13,230	\$158,760	
3M Termination Box	EA	12	\$450	\$5,400	
Beacon & Associated Hardware	EA	0	\$200	\$0	Assuming this is not required if HOVs will still have to pay toll.
HOV Gate	EA	20	\$35,500	\$710,000	
SUBTOTAL				\$1,051,483	

Operations	\$2,679,354.29	8% of Subtotal
Capital Replacement	\$1,946,795	Sum of all line items except conduit and spare parts, divided by 15 (assuming a 15 year life for ITS equipment)

3 Tolled Reversible Managed Lanes (Alt02_Opt01, Alt02_Opt02, Alt02_Opt03)

February 10, 2014

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TOLLING, GATES, & CONTROLS					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and LC software	EA	90	\$24,520	\$2,206,800	Assume one per lane in each direction
5204 Reader	EA	30	\$6,548	\$196,429	Assume one in each direction
22 Degree Antennas	EA	180	\$900	\$162,000	Assume two per lane in each direction
3M High Definition ALPR Camera (P382) - 50 foot	EA	180	\$13,230	\$2,381,400	Assume two per lane in each direction
3M Termination Box	EA	180	\$450	\$81,000	Assume one for each camera
3M AVC system including licenses and axles	EA	30	\$14,350	\$430,500	Assume one in each direction
Main and Axle Loop Installation (2 main & 4 axle loops per tolling direction)	EA	90	\$3,500	\$315,000	Assume one per lane in each direction
VTMS Signs	EA	108	\$35,000	\$3,780,000	Assume 2 per sign, and 2 signs per ingress
Static VTMS Signs	SF	20,736	\$25	\$518,400	This is the static portion of VTMS signs; assumed other static signage will be accounted for elsewhere. Assumed size of signs from I-25 project with 2 destination points per sign (192" X 288").
Static Signs	SF	16,740	\$25	\$418,500	This is the other static signing for accesses to the managed lanes; assuming four 14' X 10' signs with 6' X 2.5' plaque for each ingress.
Full Color VMS Signs	EA	28	\$160,000	\$4,480,000	Assuming full color; assuming one per access point.
Drilled Caisson (48 inch)	LF	2,800	\$360	\$1,008,000	Assume 25 LF per cantilever or gantry foundation
Monotube Overhead Sign Cantilever (24 inch diameter)	EA	82	\$46,000	\$3,772,000	Assume 1 per VMS, 1 per VTMS
Overhead Sign Gantry	EA	15	\$320,000	\$4,800,000	Assume 1 per toll point
2 Inch Electrical Conduit (bored)	LF	72,750	\$45	\$3,273,750	Assume 750 LF per VTMS, VMS, and toll point
Pull Box (24"X36"X24")	EA	582	\$450	\$261,900	Assume 6 new pull box per VTMS, VMS, and toll point
Wiring	LS	1	\$375,000	\$375,000	Assume \$25k per toll point
Communications Cabinet	EA	97	\$4,000	\$388,000	Assume one for each VTMS, VMS, and toll point
Uninterrupted Power Supply	EA	97	\$5,000	\$485,000	Assume one for each VTMS, VMS, and toll point
Fiber Optic Termination Panel	EA	97	\$800	\$77,600	Assume one per communications cabinet
Ethernet Switch	EA	97	\$5,000	\$485,000	Assume one for each VTMS, VMS, and toll point
HOV Gate Controller Cabinet	EA	27	\$12,400	\$334,800	CDOT 2013 cost data book has HOV Gate Controller Cabinet for \$12.4K each.
HOV Gate	EA	135	\$35,500	\$4,792,500	CDOT 2013 cost data book has HOV Gate for \$35.5K each.
Spare Equipment & Parts	LS	1	\$1,250,000	\$1,250,000	Based on per VTMS cost from PPSL project; will likely be lower for this project.
TOTAL				\$36,273,579	

3 Tolled Reversible Managed Lanes (Alt02_Opt01, Alt02_Opt02, Alt02_Opt03)

February 10, 2014

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TOLLING, GATES, & CONTROLS SPARES					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and...	EA	9	\$24,520	\$220,680	
5204 Reader	EA	6	\$6,548	\$39,286	
22 Degree Antennas	EA	18	\$700	\$12,600	
7' Cable S3114-020	EA	18	\$180	\$3,240	
3M High Definition ALPR Camera (P382) - 50 foot	EA	18	\$13,230	\$238,140	
3M Termination Box	EA	18	\$450	\$8,100	
Beacon & Associated Hardware	EA	0	\$200	\$0	Assuming this is not required if HOVs will still have to pay toll.
HOV Gate	EA	20	\$35,500	\$710,000	
SUBTOTAL				\$1,232,046	

Operations	\$2,901,886.29	8% of Subtotal
Capital Replacement	\$2,116,655	Sum of all line items except conduit and spare parts, divided by 15 (assuming a 15 year life for ITS equipment)

**Minimum Program with EJMT 3rd Bore and Twin Tunnels Widening Tolled (Alt03_Opt01, Alt03_Opt02)
February 10, 2014**

Disclaimer: This is a preliminary, sketch-level opinion of probable costs that is intended for comparative purposes of the various alternatives during the planning phase. Items, quantities, and costs are subject to change and are not meant to be exhaustive or all inclusive. These are preliminary costs and an unallocated contingency should be included in the total project costs. Additionally, no capital costs are included for maintenance equipment.

TOLLING, GATES, & CONTROLS					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and LC software	EA	4	\$24,520	\$98,080	Assume one per lane in each direction
5204 Reader	EA	4	\$6,548	\$26,190	Assume one in each direction
22 Degree Antennas	EA	8	\$900	\$7,200	Assume two per lane in each direction
3M High Definition ALPR Camera (P382) - 50 foot	EA	8	\$13,230	\$105,840	Assume two per lane in each direction
3M Termination Box	EA	8	\$450	\$3,600	Assume one for each camera
3M AVC system including licenses and axles	EA	4	\$14,350	\$57,400	Assume one in each direction
Main and Axle Loop Installation (2 main & 4 axle loops per tolling direction)	EA	4	\$3,500	\$14,000	Assume one per lane in each direction
VTMS Signs	EA	8	\$35,000	\$280,000	Assume 2 signs per toll point
Static VTMS Signs	SF	1,536	\$25	\$38,400	This is the static portion of VTMS signs; assumed other static signage will be accounted for elsewhere. Assumed size of signs from I-25 project with 2 destination points per sign (192" X 288").
Static Signs	SF	3,072	\$25	\$76,800	This is the other static signing for accesses to the managed lanes; assuming two 14' X 10' signs with 6' X 2.5' plaque for each toll point.
Full Color VMS Signs	EA	4	\$120,000	\$480,000	Assuming full color; assuming one per access point.
Drilled Caisson (48 inch)	LF	600	\$360	\$216,000	Assume 25 LF per cantilever or gantry foundation
Monotube Overhead Sign Cantilever (24 inch diameter)	EA	24	\$46,000	\$1,104,000	Assume 1 per VMS, 1 per VTMS, and 3 per toll point
Overhead Sign Gantry	EA	0	\$280,000	\$0	Assume none for this alternative.
2 Inch Electrical Conduit (bored)	LF	12,000	\$45	\$540,000	Assume 750 LF per VTMS, VMS, and toll point
Pull Box (24"X36"X24")	EA	96	\$450	\$43,200	Assume 6 new pull box per VTMS, VMS, and toll point
Wiring	LS	1	\$100,000	\$100,000	Assume \$25k per toll point
Communications Cabinet	EA	16	\$4,000	\$64,000	Assume one for each VTMS, VMS, and toll point
Uninterrupted Power Supply	EA	16	\$5,000	\$80,000	Assume one for each VTMS, VMS, and toll point
Fiber Optic Termination Panel	EA	16	\$800	\$12,800	Assume one per communications cabinet
Ethernet Switch	EA	16	\$2,500	\$40,000	Assume one for each VTMS, VMS, and toll point
HOV Gate Controller Cabinet	EA	0	\$12,400	\$0	CDOT 2013 cost data book has HOV Gate Controller Cabinet for \$12.4K each.
HOV Gate	EA	0	\$35,500	\$0	CDOT 2013 cost data book has HOV Gate for \$35.5K each.
Spare Equipment & Parts	LS	1	\$50,000	\$50,000	Based on per VTMS cost from PPSL project; will likely be lower for this project.
SUBTOTAL				\$3,437,510	

**Minimum Program with EJMT 3rd Bore and Twin Tunnels Widening Tolloed (Alt03_Opt01, Alt03_Opt02)
February 10, 2014**

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TOLLING, GATES, & CONTROLS SPARES					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and...	EA	1	\$24,520	\$24,520	
5204 Reader	EA	1	\$6,548	\$6,548	
22 Degree Antennas	EA	2	\$700	\$1,400	
7' Cable S3114-020	EA	2	\$180	\$360	
3M High Definition ALPR Camera (P382) - 50 foot	EA	1	\$13,230	\$13,230	
3M Termination Box	EA	1	\$450	\$450	
Beacon & Associated Hardware	EA	0	\$200	\$0	Assuming this is not required if HOVs will still have to pay toll.
HOV Gate	EA	0	\$35,500	\$0	
SUBTOTAL				\$46,508	
Operations				\$275,000.84	8% of Subtotal
Capital Replacement				\$189,834	Sum of all line items except conduit and spare parts, divided by 15 (assuming a 15 year life for ITS equipment)

**Minimum Program with Twin Tunnels Widening Tolled (Alt03_Opt03, Alt03_Opt04)
February 10, 2014**

Disclaimer: This is a preliminary, sketch-level opinion of probable costs that is intended for comparative purposes of the various alternatives during the planning phase. Items, quantities, and costs are subject to change and are not meant to be exhaustive or all inclusive. These are preliminary costs and an unallocated contingency should be included in the total project costs. Additionally, no capital costs are included for maintenance equipment.

TOLLING, GATES, & CONTROLS					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and LC software	EA	2	\$24,520	\$49,040	Assume one per lane in each direction
5204 Reader	EA	2	\$6,548	\$13,095	Assume one in each direction
22 Degree Antennas	EA	4	\$900	\$3,600	Assume two per lane in each direction
3M High Definition ALPR Camera (P382) - 50 foot	EA	4	\$13,230	\$52,920	Assume two per lane in each direction
3M Termination Box	EA	4	\$450	\$1,800	Assume one for each camera
3M AVC system including licenses and axles	EA	2	\$14,350	\$28,700	Assume one in each direction
Main and Axle Loop Installation (2 main & 4 axle loops per tolling direction)	EA	2	\$3,500	\$7,000	Assume one per lane in each direction
VTMS Signs	EA	4	\$35,000	\$140,000	Assume 2 signs per toll point
Static VTMS Signs	SF	768	\$25	\$19,200	This is the static portion of VTMS signs; assumed other static signage will be accounted for elsewhere. Assumed size of signs from I-25 project with 2 destination points per sign (192" X 288").
Static Signs	SF	1,536	\$25	\$38,400	This is the other static signing for accesses to the managed lanes; assuming two 14' X 10' signs with 6' X 2.5' plaque for each toll point.
Full Color VMS Signs	EA	2	\$120,000	\$240,000	Assuming full color; assuming one per access point.
Drilled Caisson (48 inch)	LF	300	\$360	\$108,000	Assume 25 LF per cantilever or gantry foundation
Monotube Overhead Sign Cantilever (24 inch diameter)	EA	12	\$46,000	\$552,000	Assume 1 per VMS, 1 per VTMS, and 3 per toll point
Overhead Sign Gantry	EA	0	\$280,000	\$0	Assume none for this alternative.
2 Inch Electrical Conduit (bored)	LF	6,000	\$45	\$270,000	Assume 750 LF per VTMS, VMS, and toll point
Pull Box (24"X36"X24")	EA	48	\$450	\$21,600	Assume 6 new pull box per VTMS, VMS, and toll point
Wiring	LS	1	\$100,000	\$100,000	Assume \$25k per toll point
Communications Cabinet	EA	10	\$4,000	\$40,000	Assume one for each VTMS, VMS, and toll point
Uninterrupted Power Supply	EA	10	\$5,000	\$50,000	Assume one for each VTMS, VMS, and toll point
Fiber Optic Termination Panel	EA	10	\$800	\$8,000	Assume one per communications cabinet
Ethernet Switch	EA	10	\$2,500	\$25,000	Assume one for each VTMS, VMS, and toll point
HOV Gate Controller Cabinet	EA	0	\$12,400	\$0	CDOT 2013 cost data book has HOV Gate Controller Cabinet for \$12.4K each.
HOV Gate	EA	0	\$35,500	\$0	CDOT 2013 cost data book has HOV Gate for \$35.5K each.
Spare Equipment & Parts	LS	1	\$50,000	\$50,000	Based on per VTMS cost from PPSL project; will likely be lower for this project.
SUBTOTAL				\$1,818,355	

**Minimum Program with Twin Tunnels Widening Tolled (Alt03_Opt03, Alt03_Opt04)
February 10, 2014**

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TOLLING, GATES, & CONTROLS SPARES					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and...	EA	1	\$24,520	\$24,520	
5204 Reader	EA	1	\$6,548	\$6,548	
22 Degree Antennas	EA	2	\$700	\$1,400	
7' Cable S3114-020	EA	2	\$180	\$360	
3M High Definition ALPR Camera (P382) - 50 foot	EA	1	\$13,230	\$13,230	
3M Termination Box	EA	1	\$450	\$450	
Beacon & Associated Hardware	EA	0	\$200	\$0	Assuming this is not required if HOVs will still have to pay toll.
HOV Gate	EA	0	\$35,500	\$0	
SUBTOTAL				\$46,508	
Operations				\$145,468.42	8% of Subtotal
Capital Replacement				\$99,890	Sum of all line items except conduit and spare parts, divided by 15 (assuming a 15 year life for ITS equipment)

**Maximum Program & Permanent Peak Period Shoulder Lane (Alt04_Opt01, Alt04_Opt02, Alt 05_Opt01)
February 10, 2014**

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TOLLING, GATES, & CONTROLS					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and LC software	EA	22	\$24,520	\$539,440	Assume one per lane in each direction
5204 Reader	EA	22	\$6,548	\$144,048	Assume one in each direction
22 Degree Antennas	EA	44	\$900	\$39,600	Assume two per lane in each direction
3M High Definition ALPR Camera (P382) - 50 foot	EA	44	\$13,230	\$582,120	Assume two per lane in each direction
3M Termination Box	EA	44	\$450	\$19,800	Assume one for each camera
3M AVC system including licenses and axes	EA	22	\$14,350	\$315,700	Assume one in each direction
Main and Axle Loop Installation (2 main & 4 axle loops per tolling direction)	EA	22	\$3,500	\$77,000	Assume one per lane in each direction
VTMS Signs	EA	60	\$35,000	\$2,100,000	Assume 2 per sign, and 2 signs per ingress
Static VTMS Signs	SF	11,520	\$25	\$288,000	This is the static portion of VTMS signs; assumed other static signage will be accounted for elsewhere. Assumed size of signs from I-25 project with 2 destination points per sign (192" X 288").
Static Signs	SF	9,300	\$25	\$232,500	This is the other static signing for accesses to the managed lanes; assuming four 14' X 10' signs with 6' X 2.5' plaque for each ingress.
Full Color VMS Signs	EA	15	\$120,000	\$1,800,000	Assuming full color; assuming one per access point.
Drilled Caisson (48 inch)	LF	1,950	\$360	\$702,000	Assume 25 LF per cantilever or gantry foundation
Monotube Overhead Sign Cantilever (24 inch diameter)	EA	78	\$46,000	\$3,588,000	Assume 1 per VMS, 1 per VTMS, and 3 per toll point
Overhead Sign Gantry	EA	0	\$280,000	\$0	Assume none for this alternative.
2 Inch Electrical Conduit (bored)	LF	42,000	\$45	\$1,890,000	Assume 750 LF per VTMS, VMS, and toll point
Pull Box (24"X36"X24")	EA	336	\$450	\$151,200	Assume 6 new pull box per VTMS, VMS, and toll point
Wiring	LS	1	\$275,000	\$275,000	Assume \$25k per toll point
Communications Cabinet	EA	56	\$4,000	\$224,000	Assume one for each VTMS, VMS, and toll point
Uninterrupted Power Supply	EA	56	\$5,000	\$280,000	Assume one for each VTMS, VMS, and toll point
Fiber Optic Termination Panel	EA	56	\$800	\$44,800	Assume one per communications cabinet
Ethernet Switch	EA	56	\$2,500	\$140,000	Assume one for each VTMS, VMS, and toll point
HOV Gate Controller Cabinet	EA	0	\$12,400	\$0	CDOT 2013 cost data book has HOV Gate Controller Cabinet for \$12.4K each.
HOV Gate	EA	0	\$35,500	\$0	CDOT 2013 cost data book has HOV Gate for \$35.5K each.
Spare Equipment & Parts	LS	1	\$120,000	\$120,000	Based on per VTMS cost from PPSL project; will likely be lower for this project.
SUBTOTAL				\$13,553,208	

**Maximum Program & Permanent Peak Period Shoulder Lane (Alt04_Opt01, Alt04_Opt02, Alt 05_Opt01)
February 10, 2014**

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TOLLING, GATES, & CONTROLS SPARES					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and...	EA	2	\$24,520	\$49,040	
5204 Reader	EA	2	\$6,548	\$13,095	
22 Degree Antennas	EA	4	\$700	\$2,800	
7' Cable S3114-020	EA	4	\$180	\$720	
3M High Definition ALPR Camera (P382) - 50 foot	EA	4	\$13,230	\$52,920	
3M Termination Box	EA	4	\$450	\$1,800	
Beacon & Associated Hardware	EA	0	\$200	\$0	Assuming this is not required if HOVs will still have to pay toll.
HOV Gate	EA	0	\$35,500	\$0	
			SUBTOTAL	\$120,375	

Operations	\$1,084,256.61	8% of Subtotal
Capital Replacement	\$769,547	Sum of all line items except conduit and spare parts, divided by 15 (assuming a 15 year life for ITS equipment)

Temporary Peak Period Shoulder Lane (Alt06_Opt02)
February 18, 2014

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TOLLING, GATES, & CONTROLS					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and LC software	EA	4	\$24,520	\$98,080	Assume one per lane in each direction
5204 Reader	EA	4	\$6,548	\$26,190	Assume one in each direction
22 Degree Antennas	EA	8	\$900	\$7,200	Assume two per lane in each direction
3M High Definition ALPR Camera (P382) - 50 foot	EA	8	\$13,230	\$105,840	Assume two per lane in each direction
3M Termination Box	EA	8	\$450	\$3,600	Assume one for each camera
3M AVC system including licenses and axles	EA	4	\$14,350	\$57,400	Assume one in each direction
Main and Axle Loop Installation (2 main & 4 axle loops per tolling direction)	EA	4	\$3,500	\$14,000	Assume one per lane in each direction
VTMS Signs	EA	16	\$35,000	\$560,000	Assume 2 per sign, and 2 signs per ingress
Static VTMS Signs	SF	3,072	\$25	\$76,800	This is the static portion of VTMS signs; assumed other static signage will be accounted for elsewhere. Assumed size of signs from I-25 project with 2 destination points per sign (192" X 288").
Static Signs	SF	2,480	\$25	\$62,000	This is the other static signing for accesses to the managed lanes; assuming four 14' X 10' signs with 6' X 2.5' plaque for each ingress.
Full Color VMS Signs	EA	4	\$120,000	\$480,000	Assuming full color; assuming one per access point.
Drilled Caisson (48 inch)	LF	600	\$360	\$216,000	Assume 25 LF per cantilever or gantry foundation
Monotube Overhead Sign Cantilever (24 inch diameter)	EA	24	\$46,000	\$1,104,000	Assume 1 per VMS, 1 per VTMS, and 3 per toll point
Overhead Sign Gantry	EA	0	\$280,000	\$0	Assume none for this alternative.
2 Inch Electrical Conduit (bored)	LF	18,000	\$45	\$810,000	Assume 750 LF per VTMS, VMS, and toll point
Pull Box (24"X36"X24")	EA	144	\$450	\$64,800	Assume 6 new pull box per VTMS, VMS, and toll point
Wiring	LS	1	\$100,000	\$100,000	Assume \$25k per toll point
Communications Cabinet	EA	16	\$4,000	\$64,000	Assume one for each VTMS, VMS, and toll point
Uninterrupted Power Supply	EA	16	\$5,000	\$80,000	Assume one for each VTMS, VMS, and toll point
Fiber Optic Termination Panel	EA	16	\$800	\$12,800	Assume one per communications cabinet
Ethernet Switch	EA	16	\$2,500	\$40,000	Assume one for each VTMS, VMS, and toll point
HOV Gate Controller Cabinet	EA	0	\$12,400	\$0	CDOT 2013 cost data book has HOV Gate Controller Cabinet for \$12.4K each.
HOV Gate	EA	0	\$35,500	\$0	CDOT 2013 cost data book has HOV Gate for \$35.5K each.
Spare Equipment & Parts	LS	1	\$48,000	\$48,000	Based on per VTMS cost from PPSL project; will likely be lower for this project.
SUBTOTAL				\$4,030,710	

Temporary Peak Period Shoulder Lane (Alt06_Opt02)
February 18, 2014

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TOLLING, GATES, & CONTROLS SPARES					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and...	EA	1	\$24,520	\$24,520	
5204 Reader	EA	1	\$6,548	\$6,548	
22 Degree Antennas	EA	2	\$700	\$1,400	
7' Cable S3114-020	EA	2	\$180	\$360	
3M High Definition ALPR Camera (P382) - 50 foot	EA	2	\$13,230	\$26,460	
3M Termination Box	EA	2	\$450	\$900	
Beacon & Associated Hardware	EA	0	\$200	\$0	Assuming this is not required if HOVs will still have to pay toll.
HOV Gate	EA	0	\$35,500	\$0	
SUBTOTAL				\$60,188	

Operations	\$322,456.84	8% of Subtotal
Capital Replacement	\$211,514	Sum of all line items except conduit and spare parts, divided by 15 (assuming a 15 year life for ITS equipment)

Temporary Peak Period Shoulder Lane (Alt06_Opt01)
February 10, 2014

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TOLLING, GATES, & CONTROLS					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and LC software	EA	5	\$24,520	\$122,600	Assume one per lane in each direction
5204 Reader	EA	5	\$6,548	\$32,738	Assume one in each direction
22 Degree Antennas	EA	10	\$900	\$9,000	Assume two per lane in each direction
3M High Definition ALPR Camera (P382) - 50 foot	EA	10	\$13,230	\$132,300	Assume two per lane in each direction
3M Termination Box	EA	10	\$450	\$4,500	Assume one for each camera
3M AVC system including licenses and axles	EA	5	\$14,350	\$71,750	Assume one in each direction
Main and Axle Loop Installation (2 main & 4 axle loops per tolling direction)	EA	5	\$3,500	\$17,500	Assume one per lane in each direction
VTMS Signs	EA	20	\$35,000	\$700,000	Assume 2 per sign, and 2 signs per ingress
Static VTMS Signs	SF	3,840	\$25	\$96,000	This is the static portion of VTMS signs; assumed other static signage will be accounted for elsewhere. Assumed size of signs from I-25 project with 2 destination points per sign (192" X 288").
Static Signs	SF	3,100	\$25	\$77,500	This is the other static signing for accesses to the managed lanes; assuming four 14' X 10' signs with 6' X 2.5' plaque for each ingress.
Full Color VMS Signs	EA	5	\$120,000	\$600,000	Assuming full color; assuming one per access point.
Drilled Caisson (48 inch)	LF	750	\$360	\$270,000	Assume 25 LF per cantilever or gantry foundation
Monotube Overhead Sign Cantilever (24 inch diameter)	EA	30	\$46,000	\$1,380,000	Assume 1 per VMS, 1 per VTMS, and 3 per toll point
Overhead Sign Gantry	EA	0	\$280,000	\$0	Assume none for this alternative.
2 Inch Electrical Conduit (bored)	LF	22,500	\$45	\$1,012,500	Assume 750 LF per VTMS, VMS, and toll point
Pull Box (24"X36"X24")	EA	180	\$450	\$81,000	Assume 6 new pull box per VTMS, VMS, and toll point
Wiring	LS	1	\$125,000	\$125,000	Assume \$25k per toll point
Communications Cabinet	EA	20	\$4,000	\$80,000	Assume one for each VTMS, VMS, and toll point
Uninterrupted Power Supply	EA	20	\$5,000	\$100,000	Assume one for each VTMS, VMS, and toll point
Fiber Optic Termination Panel	EA	20	\$800	\$16,000	Assume one per communications cabinet
Ethernet Switch	EA	20	\$2,500	\$50,000	Assume one for each VTMS, VMS, and toll point
HOV Gate Controller Cabinet	EA	0	\$12,400	\$0	CDOT 2013 cost data book has HOV Gate Controller Cabinet for \$12.4K each.
HOV Gate	EA	0	\$35,500	\$0	CDOT 2013 cost data book has HOV Gate for \$35.5K each.
Spare Equipment & Parts	LS	1	\$60,000	\$60,000	Based on per VTMS cost from PPSL project; will likely be lower for this project.
SUBTOTAL				\$5,038,388	

Temporary Peak Period Shoulder Lane (Alt06_Opt01)
February 10, 2014

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TOLLING, GATES, & CONTROLS SPARES					
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST	NOTES
Lane ARM Controller including two loop detectors, 16Gb Micro-SD, 64Gb SD and...	EA	1	\$24,520	\$24,520	
5204 Reader	EA	1	\$6,548	\$6,548	
22 Degree Antennas	EA	2	\$700	\$1,400	
7' Cable S3114-020	EA	2	\$180	\$360	
3M High Definition ALPR Camera (P382) - 50 foot	EA	2	\$13,230	\$26,460	
3M Termination Box	EA	2	\$450	\$900	
Beacon & Associated Hardware	EA	0	\$200	\$0	Assuming this is not required if HOVs will still have to pay toll.
HOV Gate	EA	0	\$35,500	\$0	
SUBTOTAL				\$60,188	

Operations	\$403,071.05	8% of Subtotal
Capital Replacement	\$264,393	Sum of all line items except conduit and spare parts, divided by 15 (assuming a 15 year life for ITS equipment)