

ALIVE Cost Estimate_DRAFT 01-20-14

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Alternative 1

ITEM #	LIZ	LIZ NAME	TARGET SPECIES	MILEPOST	FOOTPRINT	CONNECTIVITY RECOMMENDATION	8' FENCE	3' FENCE	ESCAPE RAMPS	DEER GUARDS	VMS SIGNAGE	MONITORING CAMERAS
1	K	Laskey Gulch	1" lynx, elk 2" deer, moose, bear	207.7	186'	Large bridge underpass						
2	K	Laskey Gulch	(same as above)	208.3	186'	Laskey Gulch. Extensive Bridge. Recommend bridge to replace fill (90' span x 25' high) Aquatic target species also present (GBCT) > maintain instream barrier to keep Laskey Gulch separate from Straight Creek.	18,300	21,120	6	1	1	4
1	n/a	n/a	Boreal Toad	209.5	186'	Breeding habitat in Straight Creek drainage. Incorporate connectivity for boreal toad at MP 208.3 & 211.7						
3	L	Hamilton Gulch	1" lynx, boreal toad 2" moose, bear, elk, deer Aquatic - GBCT	211.7	186'	Large bridge underpass - secondary location, although may need this location in addition to primary location to provide connectivity for boreal toad Occupied GBCT. At minimum, replace pipe with Medium Underpass and reduce culvert grade to restore aquatic connection between Hamilton Gulch tributary and						
4	L	Hamilton Gulch	1" lynx, boreal toad 2" moose, bear, elk, deer Aquatic - GBCT	212.3	186'	Large bridge underpass - primary location. Include crossing considerations for boreal toad Potential GBCT habitat. Restore aquatic connection between tributary and Straight Creek.	8,500	21,120	2	0	0	4
	n/a	n/a	Lynx, bighorn, mountain goat, wolverine, pika	EMJT	n/a	EMJT Land Bridge. Collaborate with USFS and CPW to enhance cover on land bridge (e.g., boulders), while maintain as open, high altitude crossing						
5	M	Bakerville	1" lynx 2" bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	217.4	142'	Dry Gulch. Wildlife Overpass is preferred structure - locate E of Dry Gulch. Accommodate bighorn in area population on south side. Incorporate features for boreal toad. Alternatively, Large Bridge underpass at Dry Gulch (less preferable for bighorn and elk; suitable for other target species). Maintain natural upstream barrier in Dry Gulch to keep GBCT population separate from Clear Creek.						
3	M	Bakerville	Boreal Toad	217.9	142'	Mt. Bethel. BT breeding site on north side of hwy. Occupied (surveyed 2013). Primary recommendation is to accommodate boreal toad movement at WO at MP 217.4 Natural bottomed small culvert at this location - alternative recommendation.						
4	M	Bakerville	Boreal Toad, Aquatic species	218.7	142'	Herman Gulch. Restore aquatic connection to Clear Creek. Boreal Toad breeding pond on south side - may begin using upland habitat on N side of hwy if a connection were available. Install medium underpass, restore natural stream bottom and riparian banks (alternatively, retrofit structure by adding wier plates to create drop-pool structure)						
6	M	Bakerville	1" lynx, Aquatic species 2" bighorn, bear, boreal toad, mtn lion, deer, fox, coyote, elk, moose	219.3	142'	Watrous Gulch. Aquatic target species present - restore aquatic connectivity including riparian banks (design for some terrestrial connectivity along creek banks) Preferred structure is extensive bridge for terrestrial and aquatic connectivity. Move chain station so that footprint is not directly over crossing.						
7	M	Bakerville	1" lynx 2" bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	220.5	142'	Construct wildlife overpass ~MP 220.5-220.7 (east of rock cut) Moose crossing area						
6	M	Bakerville	Boreal Toad	220.8	142'	Boreal toad breeding site. Accommodate N/S toad movement at WO at MP 220.5 and at elevated roadway section at MP 221.8	111,384	95,040	42	8	2	12
	M	Bakerville	Aquatic species	221.4	142'	Maintain natural upstream barrier. Connectivity not needed at roadway interface.						
8	M	Bakerville	1" lynx 2" bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	221.8	142'	Low fill slope. Elevated EB & WB lanes for ~1/10th mile to accommodate north-south movement for all primary and secondary target species. Clear Creek runs close to Hwy through this segment; allow to meander beneath roadway.						
9	M	Bakerville	1" lynx 2" bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	223.9	142'	East of Bridge to Nowhere. Preferred structures is wildlife overpass. (Alternatively, consider multi-use overpass on bridge to nowhere).						
10	M	Bakerville	1" lynx 2" bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose Aquatic species	225	142'	Hwy 6 bridge under I-70 + Clear Creek box culverts (under Hwy 6 & then under I-70). Q: Will Hwy 6 alignment change? Multi-use Large Bridge Underpass or Extensive Bridge (span road and Clear Creek + riparian banks).						
	M	Bakerville	Aquatic species	225	142'	Replace Hwy 6 box culvert with Large Bridge Underpass (complement I-70 mitigation above at same location) Aquatic target species presence unknown.						
11	AQU	Bakerville	Aquatic species	225.9	142'	Clear Creek. Replace box culvert with Large Bridge Underpass to reduce channel skew and reduce water velocity through culvert. Restore riparian banks to integrate terrestrial connectivity needs (e.g., bighorn sheep on north side)						
11	AQU	n/a	Aquatic species	228.2	142'	Silver Gulch. Aquatic target species presence unknown. Replace with small underpass (oversized culvert); also restore inlet, reduce channel skew at inlet and replace upstream culvert under frontage road						
12	N	Empire Junction	1" lynx 2" bighorn, bear, elk, deer	231.2	142'	Outside of LIZ, but could promote LIZ connectivity due to lack of suitable sites in LIZ. Large Bridge Underpass over Clear Creek.						
13	N	Empire Junction	Bighorn	Hwy 40	?	Wildlife Overpass for Bighorn Sheep (100' wide). Outside of I-70 alignment, but most important crossing site for bighorn. Willing landowner for conservation easement on south side.						
14	N	Empire Junction	1" lynx 2" bighorn, bear, elk, deer	232.3	142'	Preferred structure is Extensive Bridge Underpass spanning Clear Creek. Restore riparian banks and terrestrial pathways through structure. Widen structure to compensate for low height.	14,100	0	6	2	2	6
15	N	Empire Junction	1" lynx 2" bighorn, bear, elk, deer	232.5	142'	Wildlife overpass over N frontage road, I-70, Clear Creek, and S frontage road (overpass length may be shortened to end between I-70 and the S frontage road)						
12	AQU	n/a	general	234.8	142'	Mill Creek. Large Bridge Underpass needed to provide integrated terrestrial and aquatic connectivity at site (also integrate with SWEEP recommendations)						
13	AQU	n/a	general	236.3	142'	Spring Gulch. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEEP recommendations)						
14	AQU	n/a	Aquatic species	237.7	142'	Fall River. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEEP recommendations)						

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15	AQU	n/a	general	239.9	142'	Clear Creek. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways						
17	AQU	n/a	general	241.8	142'	Clear Creek. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways						
	n/a	n/a	general	242	142'	Concrete box culvert improved as part of twin tunnels project (2013) - south side entrance softened to provide better access to culvert.						
	n/a	Twin Tunnels Land Bridge	1* elk, deer 2* bighorn, lynx, mtn lion	242.5	n/a	Land Bridge. Collaborate with USFS and CPW to enhance habitat conditions for target species.						
18	AQU	n/a	Aquatic species	242.8	186'	Bridges over Clear Creek (I-70 and Central City Pkwy). Large Bridge Underpasses currently at site - maintain connectivity and dry terrestrial pathways (included in twin tunnels project - 2013)						
19	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion, preble's	243	186'	Clear Creek/CC Pkwy interchange. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways (included in twin tunnels project - 2013)						
16	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion, preble's	244.2	186'	Clear Creek Canyon Junction. Goal is to provide N/S connectivity and E/W connectivity along Clear Creek drainage. Bighorn in this area mostly moving E/W along ridge to N. Other target species moving along or into Clear Creek drainage						
17	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion	244.9	186'	Extensive Bridge underpass under I-70	21,100	0	8	6	0	4
	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion	Hwy 40	?	Crossing structure under Hwy 40 to complement mitigation at MP 244.9 (above). Alternatively, place wildlife crossing warning signs on Hwy 40.						
18	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	245.5	186'	Extensive Bridge. Secondary location - private drive and homes E of Hwy 40. Preferred location at MP 146.5, if feasible						
	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	246.5	186' + Hwy 40	Investigate opportunity to build wildlife overpass over interstate and Hwy 40 (possible to build new I-70 lanes over existing frontage/Hwy 40 to lessen overpass length?)						
19	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	~247.0	186'	E of Floyd Hill summit. Large meadow to S, Private land S & N. S side meadow recently subdivided (10-acre lots); wetland present on S side. Possible Wildlife Overpass or Landscape Bridge over I-70 and Hwy 40? Implications of homes and new homes immediately adjacent to both sides of overpass?						
20	P	Beaver Brook	Preble's jumping mouse	247.6	186'	Medium Underpass - connects diagonally under I-70 and WB off-ramp along small drainage from meadow on SW side of interchange to the NE side. Install 2 culverts - 1 under I-70 and 1 under off-ramp - and shorten each to greatest extent possible. Maintain dry riparian banks through culvert and ideally provide some rocky cover along banks through culvert. Private lands - obtain easements and/or coordinate compatible zoning with Jefferson County.	50,700	0	20	10	2	6
21	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion,	248.2	186'	Large Bridge Underpass to facilitate deer and elk passage. Alternatively, construct Wildlife Overpass immediately to west of drainage, connecting cut slopes - whichever is cheaper based on terrain. Private lands - obtain easements.						
22	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion, preble's Aquatic Species	249	186'	Soda Creek/Soda Creek Road. Aquatic target species presence unknown Multi-use Extensive Bridge spanning local access road (west side of structure) and creek (east side of structure). Restore habitat through structure.						
23	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion	250	186'	Large Bridge Underpass at fill slope						
24	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	253.2	186'	Replace existing box culvert for managing bison herd with Large Bridge Underpass to accommodate wildlife (especially elk). Will need to coordinate with Denver Mountain Parks to move bison enclosure fencing back away from structure approaches to allow wildlife access to crossing structure. Concern is that this may result in a corridor of wildlife fencing that animals must learn to navigate in order to be able to use the crossing. Resident animals may be able to learn this, but must be further investigated in L2.						
25	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	254.5	186'	Extensive bridge underpass. Separate structures under EB and WB lanes preferred over one long structure. Fence median gap. Private lands - obtain easements. If terrain dictates low height, make wider.						
26	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	255.3	186'	Extensive Bridge Underpass (preferred); Alternatively, Large Bridge Underpass. Separate structures under EB and WB lanes preferred over one long structure. Fence median gap. Private lands - obtain easements. If terrain dictates low height, make wider.	50,620	0	20	7	2	8
21	AQU	Mt Vernon Creek	Aquatic species, Preble's jumping mouse (no occupied habitat)	256	186'	Aquatic species presence unknown. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEEP recommendations)						
27	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	257	186'	Extensive Bridge Underpass under I-70; additional bridge under Hwy 6, if possible. Crossing location particularly important for bear and mountain lion, as well as resident deer. Private lands - obtain easements.						
Total Lump Sum							412,175	137,471	191	87	53	44
Miscellaneous Item Units							LF	L.F.	Each	Each	Each	Each
Miscellaneous Item Costs							\$5.50	\$2.00	\$6,250.00	\$55,000.00	\$6,000.00	\$1,000.00
SubTotals							\$2,266,963	\$274,942	\$1,193,750	\$4,785,000	\$318,000	\$44,000
Pipe Crossing Costs							\$1,813,266					
Miscellaneous Total:							\$10,695,921					

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2	K	Laskey Gulch	(same as above)	208.3	186'	Laskey Gulch. Extensive Bridge. Recommend bridge to replace fill (90'span x 25' high) Aquatic target species also present (GBCT) > maintain instream barrier to keep Laskey Gulch separate from Straight Creek.	18,300	21,120	6	1	1	4
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3	L	Hamilton Gulch	1 st lynx, boreal toad 2 nd moose, bear, elk, deer Aquatic - GBCT	211.7	186'	Large bridge underpass - secondary location, although may need this location in addition to primary location to provide connectivity for boreal toad Occupied GBCT. At minimum, replace pipe with Medium Underpass and reduce culvert grade to restore aquatic connection between Hamilton Gulch tributary and Straight Creek.						
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Miscellaneous Item Costs							\$5.50	\$2.00	\$6,250.00	\$55,000.00	\$6,000.00	\$1,000.00	
SubTotals							\$2,266,963	\$274,942	\$1,193,750	\$4,785,000	\$318,000	\$44,000	
Pipe Crossing Costs							\$1,929,330						
Miscellaneous Total:							\$10,811,985						

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Alternative 3

ITEM #	LIZ	LIZ NAME	TARGET SPECIES	MILEPOST	FOOTPRINT	CONNECTIVITY RECOMMENDATION	8' FENCE	3' FENCE	ESCAPE RAMPS	DEER GUARDS	VMS SIGNAGE	MONITORING CAMERAS
1	K	Laskey Gulch	1 st lynx, elk 2 nd deer, moose, bear	207.7	186'	Large bridge underpass						
2	K	Laskey Gulch	(same as above)	208.3	186'	Laskey Gulch. Extensive Bridge. Recommend bridge to replace fill (90' span x 25' high) Aquatic target species also present (GBCT) > maintain instream barrier to keep Laskey Gulch separate from Straight Creek.	0	0	0	0	0	0
1	n/a	n/a	Boreal Toad	209.5	186'	Breeding habitat in Straight Creek drainage. Incorporate connectivity for boreal toad at MP 208.3 & 211.7						
3	L	Hamilton Gulch	1 st lynx, boreal toad 2 nd moose, bear, elk, deer Aquatic - GBCT	211.7	186'	Large bridge underpass - secondary location, although may need this location in addition to primary location to provide connectivity for boreal toad Occupied GBCT. At minimum, replace pipe with Medium Underpass and reduce culvert grade to restore aquatic connection between Hamilton Gulch tributary and Straight Creek.						
4	L	Hamilton Gulch	1 st lynx, boreal toad 2 nd moose, bear, elk, deer Aquatic - GBCT	212.3	186'	Large bridge underpass - primary location. Include crossing considerations for boreal toad Potential GBCT habitat. Restore aquatic connection between tributary and Straight Creek.	0	0	0	0	0	0
	n/a	n/a	Lynx, bighorn, mountain goat, wolverine, pika	EMJT	n/a	EMJT Land Bridge. Collaborate with USFS and CPW to enhance cover on land bridge (e.g., boulders), while maintain as open, high altitude crossing						
5	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	217.4	142'	Dry Gulch. Wildlife Overpass is preferred structure - locate E of Dry Gulch. Accommodate bighorn in area population on south side. Incorporate features for boreal toad. Alternatively, Large Bridge underpass at Dry Gulch (less preferable for bighorn and elk; suitable for other target species). Maintain natural upstream barrier in Dry Gulch to keep GBCT population separate from Clear Creek.						
3	M	Bakerville	Boreal Toad	217.9	142'	Mt. Bethel. BT breeding site on north side of hwy. Occupied (surveyed 2013). Primary recommendation is to accommodate boreal toad movement at WO at MP 217.4 Natural bottomed small culvert at this location - alternative recommendation.						
4	M	Bakerville	Boreal Toad, Aquatic species	218.7	142'	Herman Gulch. Restore aquatic connection to Clear Creek. Boreal Toad breeding pond on south side - may begin using upland habitat on N side of hwy if a connection were available. Install medium underpass, restore natural stream bottom and riparian banks (alternatively, retrofit structure by adding wier plates to create drop-pool structure)						
6	M	Bakerville	1 st lynx, Aquatic species 2 nd bighorn, bear, boreal toad, mtn lion, deer, fox, coyote, elk, moose	219.3	142'	Watrous Gulch. Aquatic target species present - restore aquatic connectivity including riparian banks (design for some terrestrial connectivity along creek banks) Preferred structure is extensive bridge for terrestrial and aquatic connectivity. Move chain station so that footprint is not directly over crossing.						
7	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	220.5	142'	Construct wildlife overpass ~MP 220.5-220.7 (east of rock cut) Moose crossing area						
6	M	Bakerville	Boreal Toad	220.8	142'	Boreal toad breeding site. Accommodate N/S toad movement at WO at MP 220.5 and at elevated roadway section at MP 221.8	50,500	31,680	10	4	2	6
	M	Bakerville	Aquatic species	221.4	142'	Maintain natural upstream barrier. Connectivity not needed at roadway interface.						
8	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	221.8	142'	Low fill slope. Elevated EB & WB lanes for ~1/10th mile to accommodate north-south movement for all primary and secondary target species. Clear Creek runs close to Hwy through this segment; allow to meander beneath roadway.						
9	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	223.9	142'	East of Bridge to Nowhere. Preferred structures is wildlife overpass. (Alternatively, consider multi-use overpass on bridge to nowhere).						
10	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose Aquatic species	225	142'	Hwy 6 bridge under I-70 + Clear Creek box culverts (under Hwy 6 & then under I-70). Q: Will Hwy 6 alignment change? Multi-use Large Bridge Underpass or Extensive Bridge (span road and Clear Creek + riparian banks).						
	M	Bakerville	Aquatic species	225	142'	Replace Hwy 6 box culvert with Large Bridge Underpass (complement I-70 mitigation above at same location) Aquatic target species presence unknown.						
11	AQU	Bakerville	Aquatic species	225.9	142'	Clear Creek. Replace box culvert with Large Bridge Underpass to reduce channel skew and reduce water velocity through culvert. Restore riparian banks to integrate terrestrial connectivity needs (e.g., bighorn sheep on north side)						
11	AQU	n/a	Aquatic species	228.2	142'	Silver Gulch. Aquatic target species presence unknown. Replace with small underpass (oversized culvert); also restore inlet, reduce channel skew at inlet and replace upstream culvert under frontage road						
12	N	Empire Junction	1 st lynx 2 nd bighorn, bear, elk, deer	231.2	142'	Outside of LIZ, but could promote LIZ connectivity due to lack of suitable sites in LIZ. Large Bridge Underpass over Clear Creek.						
13	N	Empire Junction	Bighorn	Hwy 40	?	Wildlife Overpass for Bighorn Sheep (100' wide). Outside of I-70 alignment, but most important crossing site for bighorn. Willing landowner for conservation easement on south side.						
14	N	Empire Junction	1 st lynx 2 nd bighorn, bear, elk, deer	232.3	142'	Preferred structure is Extensive Bridge Underpass spanning Clear Creek. Restore riparian banks and terrestrial pathways through structure. Widen structure to compensate for low height.	0	0	0	0	0	0
15	N	Empire Junction	1 st lynx 2 nd bighorn, bear, elk, deer	232.5	142'	Wildlife overpass over N frontage road, I-70, Clear Creek, and S frontage road (overpass length may be shortened to end between I-70 and the S frontage road)						
12	AQU	n/a	general	234.8	142'	Mill Creek. Large Bridge Underpass needed to provide integrated terrestrial and aquatic connectivity at site (also integrate with SWEEP recommendations)						
13	AQU	n/a	general	236.3	142'	Spring Gulch. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEEP recommendations)						
14	AQU	n/a	Aquatic species	237.7	142'	Fall River. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEEP recommendations)						

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Alternative 3

ITEM #	LIZ	LIZ NAME	TARGET SPECIES	MILEPOST	FOOTPRINT	CONNECTIVITY RECOMMENDATION	8' FENCE	3' FENCE	ESCAPE RAMPS	DEER GUARDS	VMS SIGNAGE	MONITORING CAMERAS
15	AQU	n/a	general	239.9	142'	Clear Creek. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways						
17	AQU	n/a	general	241.8	142'	Clear Creek. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways						
	n/a	n/a	general	242	142'	Concrete box culvert improved as part of twin tunnels project (2013) - south side entrance softened to provide better access to culvert.						
	n/a	Twin Tunnels Land Bridge	1* elk, deer 2* bighorn, lynx, mtn lion	242.5	n/a	Land Bridge. Collaborate with USFS and CPW to enhance habitat conditions for target species.						
18	AQU	n/a	Aquatic species	242.8	186'	Bridges over Clear Creek (I-70 and Central City Pkwy). Large Bridge Underpasses currently at site - maintain connectivity and dry terrestrial pathways (included in twin tunnels project - 2013)						
19	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion, preble's	243	186'	Clear Creek/CC Pkwy interchange. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways (included in twin tunnels project - 2013)						
16	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion, preble's	244.2	186'	Clear Creek Canyon Junction. Goal is to provide N/S connectivity and E/W connectivity along Clear Creek drainage. Bighorn in this area mostly moving E/W along ridge to N. Other target species moving along or into Clear Creek drainage						
17	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion	244.9	186'	Extensive Bridge underpass under I-70	21,100	0	8	6	0	4
	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion	Hwy 40	?	Crossing structure under Hwy 40 to complement mitigation at MP 244.9 (above). Alternatively, place wildlife crossing warning signs on Hwy 40.						
18	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	245.5	186'	Extensive Bridge. Secondary location - private drive and homes E of Hwy 40. Preferred location at MP 146.5, if feasible						
	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	246.5	186' + Hwy 40	Investigate opportunity to build wildlife overpass over interstate and Hwy 40 (possible to build new I-70 lanes over existing frontage/Hwy 40 to lessen overpass length?)						
19	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	~247.0	186'	E of Floyd Hill summit. Large meadow to S. Private land S & N. S side meadow recently subdivided (10-acre lots); wetland present on S side. Possible Wildlife Overpass or Landscape Bridge over I-70 and Hwy 40? Implications of homes and new homes immediately adjacent to both sides of overpass?						
20	P	Beaver Brook	Preble's jumping mouse	247.6	186'	Medium Underpass - connects diagonally under I-70 and WB off-ramp along small drainage from meadow on SW side of interchange to the NE side. Install 2 culverts - 1 under I-70 and 1 under off-ramp - and shorten each to greatest extent possible. Maintain dry riparian banks through culvert and ideally provide some rocky cover along banks through culvert. Private lands - obtain easements and/or coordinate compatible zoning with Jefferson County.	5,280	0	2	0	0	0
21	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion,	248.2	186'	Large Bridge Underpass to facilitate deer and elk passage. Alternatively, construct Wildlife Overpass immediately to west of drainage, connecting cut slopes - whichever is cheaper based on terrain. Private lands - obtain easements.						
22	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion, preble's Aquatic Species	249	186'	Soda Creek/Soda Creek Road. Aquatic target species presence unknown Multi-use Extensive Bridge spanning local access road (west side of structure) and creek (east side of structure). Restore habitat through structure.						
23	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion	250	186'	Large Bridge Underpass at fill slope						
24	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	253.2	186'	Replace existing box culvert for managing bison herd with Large Bridge Underpass to accommodate wildlife (especially elk). Will need to coordinate with Denver Mountain Parks to move bison enclosure fencing back away from structure approaches to allow wildlife access to crossing structure. Concern is that this may result in a corridor of wildlife fencing that animals must learn to navigate in order to be able to use the crossing. Resident animals may be able to learn this, but must be further investigated in L2.						
25	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	254.5	186'	Extensive bridge underpass. Separate structures under EB and WB lanes preferred over one long structure. Fence median gap. Private lands - obtain easements. If terrain dictates low height, make wider.						
26	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	255.3	186'	Extensive Bridge Underpass (preferred); Alternatively, Large Bridge Underpass. Separate structures under EB and WB lanes preferred over one long structure. Fence median gap. Private lands - obtain easements. If terrain dictates low height, make wider.	50,620	0	20	7	2	8
21	AQU	Mt Vernon Creek	Aquatic species, Preble's jumping mouse (no occupied habitat)	256	186'	Aquatic species presence unknown. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEET recommendations)						
27	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	257	186'	Extensive Bridge Underpass under I-70; additional bridge under Hwy 6, if possible. Crossing location particularly important for bear and mountain lion, as well as resident deer. Private lands - obtain easements.						
Total Lump Sum							159,259	31,759	79	39	22	18
Miscellaneous Item Units							L.F.	L.F.	Each	Each	Each	Each
Miscellaneous Item Costs							\$5.50	\$2.00	\$6,250.00	\$55,000.00	\$6,000.00	\$1,000.00
SubTotals							\$875,925	\$63,518	\$493,750	\$2,145,000	\$132,000	\$18,000
Pipe Crossing Costs							\$956,595					
Miscellaneous Total:							\$4,684,788					

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Alternative 4

ITEM #	LIZ	LIZ NAME	TARGET SPECIES	MILEPOST	FOOTPRINT	CONNECTIVITY RECOMMENDATION	8' FENCE	3' FENCE	ESCAPE RAMPS	DEER GUARDS	VMS SIGNAGE	MONITORING CAMERAS
1	K	Laskey Gulch	1 st lynx, elk 2 nd deer, moose, bear	207.7	186'	Large bridge underpass						
2	K	Laskey Gulch	(same as above)	208.3	186'	Laskey Gulch. Extensive Bridge. Recommend bridge to replace fill (90' span x 25' high) Aquatic target species also present (GBCT) > maintain instream barrier to keep Laskey Gulch separate from Straight Creek.	0	0	0	0	0	0
1	n/a	n/a	Boreal Toad	209.5	186'	Breeding habitat in Straight Creek drainage. Incorporate connectivity for boreal toad at MP 208.3 & 211.7						
3	L	Hamilton Gulch	1 st lynx, boreal toad 2 nd moose, bear, elk, deer Aquatic - GBCT	211.7	186'	Large bridge underpass - secondary location, although may need this location in addition to primary location to provide connectivity for boreal toad Occupied GBCT. At minimum, replace pipe with Medium Underpass and reduce culvert grade to restore aquatic connection between Hamilton Gulch tributary and Straight Creek.						
4	L	Hamilton Gulch	1 st lynx, boreal toad 2 nd moose, bear, elk, deer Aquatic - GBCT	212.3	186'	Large bridge underpass - primary location. Include crossing considerations for boreal toad Potential GBCT habitat. Restore aquatic connection between tributary and Straight Creek.	0	0	0	0	0	0
	n/a	n/a	Lynx, bighorn, mountain goat, wolverine, pika	EMJT	n/a	EMJT Land Bridge. Collaborate with USFS and CPW to enhance cover on land bridge (e.g., boulders), while maintain as open, high altitude crossing						
5	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	217.4	142'	Dry Gulch. Wildlife Overpass is preferred structure - locate E of Dry Gulch. Accommodate bighorn in area population on south side. Incorporate features for boreal toad. Alternatively, Large Bridge underpass at Dry Gulch (less preferable for bighorn and elk; suitable for other target species). Maintain natural upstream barrier in Dry Gulch to keep GBCT population separate from Clear Creek.						
3	M	Bakerville	Boreal Toad	217.9	142'	Mt. Bethel. BT breeding site on north side of hwy. Occupied (surveyed 2013). Primary recommendation is to accommodate boreal toad movement at WO at MP 217.4 Natural bottomed small culvert at this location - alternative recommendation.						
4	M	Bakerville	Boreal Toad, Aquatic species	218.7	142'	Herman Gulch. Restore aquatic connection to Clear Creek. Boreal Toad breeding pond on south side - may begin using upland habitat on N side of hwy if a connection were available. Install medium underpass, restore natural stream bottom and riparian banks (alternatively, retrofit structure by adding wier plates to create drop-pool structure)						
6	M	Bakerville	1 st lynx, Aquatic species 2 nd bighorn, bear, boreal toad, mtn lion, deer, fox, coyote, elk, moose	219.3	142'	Watrous Gulch. Aquatic target species present - restore aquatic connectivity including riparian banks (design for some terrestrial connectivity along creek banks) Preferred structure is extensive bridge for terrestrial and aquatic connectivity. Move chain station so that footprint is not directly over crossing.						
7	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	220.5	142'	Construct wildlife overpass ~MP 220.5-220.7 (east of rock cut) Moose crossing area						
6	M	Bakerville	Boreal Toad	220.8	142'	Boreal toad breeding site. Accommodate N/S toad movement at WO at MP 220.5 and at elevated roadway section at MP 221.8	111,384	95,040	42	8	2	12
	M	Bakerville	Aquatic species	221.4	142'	Maintain natural upstream barrier. Connectivity not needed at roadway interface.						
8	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	221.8	142'	Low fill slope. Elevated EB & WB lanes for ~1/10th mile to accommodate north-south movement for all primary and secondary target species. Clear Creek runs close to Hwy through this segment; allow to meander beneath roadway.						
9	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	223.9	142'	East of Bridge to Nowhere. Preferred structures is wildlife overpass. (Alternatively, consider multi-use overpass on bridge to nowhere).						
10	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose Aquatic species	225	142'	Hwy 6 bridge under I-70 + Clear Creek box culverts (under Hwy 6 & then under I-70). Q: Will Hwy 6 alignment change? Multi-use Large Bridge Underpass or Extensive Bridge (span road and Clear Creek + riparian banks).						
	M	Bakerville	Aquatic species	225	142'	Replace Hwy 6 box culvert with Large Bridge Underpass (complement I-70 mitigation above at same location) Aquatic target species presence unknown.						
11	AQU	Bakerville	Aquatic species	225.9	142'	Clear Creek. Replace box culvert with Large Bridge Underpass to reduce channel skew and reduce water velocity through culvert. Restore riparian banks to integrate terrestrial connectivity needs (e.g., bighorn sheep on north side)						
11	AQU	n/a	Aquatic species	228.2	142'	Silver Gulch. Aquatic target species presence unknown. Replace with small underpass (oversized culvert); also restore inlet, reduce channel skew at inlet and replace upstream culvert under frontage road			Handled via Drainage Scope			
12	N	Empire Junction	1 st lynx 2 nd bighorn, bear, elk, deer	231.2	142'	Outside of LIZ, but could promote LIZ connectivity due to lack of suitable sites in LIZ. Large Bridge Underpass over Clear Creek.						
13	N	Empire Junction	Bighorn	Hwy 40	?	Wildlife Overpass for Bighorn Sheep (100' wide). Outside of I-70 alignment, but most important crossing site for bighorn. Willing landowner for conservation easement on south side.						
14	N	Empire Junction	1 st lynx 2 nd bighorn, bear, elk, deer	232.3	142'	Preferred structure is Extensive Bridge Underpass spanning Clear Creek. Restore riparian banks and terrestrial pathways through structure. Widen structure to compensate for low height.	14,100	0	6	2	2	6
15	N	Empire Junction	1 st lynx 2 nd bighorn, bear, elk, deer	232.5	142'	Wildlife overpass over N frontage road, I-70, Clear Creek, and S frontage road (overpass length may be shortened to end between I-70 and the S frontage road)						
12	AQU	n/a	general	234.8	142'	Mill Creek. Large Bridge Underpass needed to provide integrated terrestrial and aquatic connectivity at site (also integrate with SWEET recommendations)						
13	AQU	n/a	general	236.3	142'	Spring Gulch. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEET recommendations)						
14	AQU	n/a	Aquatic species	237.7	142'	Fall River. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEET recommendations)						

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ITEM #	LIZ	LIZ NAME	TARGET SPECIES	MILEPOST	FOOTPRINT	CONNECTIVITY RECOMMENDATION	8' FENCE	3' FENCE	ESCAPE RAMPS	DEER GUARDS	VMS SIGNAGE	MONITORING CAMERAS
15	AQU	n/a	general	239.9	142'	Clear Creek. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways						
17	AQU	n/a	general	241.8	142'	Clear Creek. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways						
	n/a	n/a	general	242	142'	Concrete box culvert improved as part of twin tunnels project (2013) - south side entrance softened to provide better access to culvert.						
	n/a	Twin Tunnels Land Bridge	1* elk, deer 2* bighorn, lynx, mtn lion	242.5	n/a	Land Bridge. Collaborate with USFS and CPW to enhance habitat conditions for target species.						
18	AQU	n/a	Aquatic species	242.8	186'	Bridges over Clear Creek (I-70 and Central City Pkwy). Large Bridge Underpasses currently at site - maintain connectivity and dry terrestrial pathways (included in twin tunnels project - 2013)						
19	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion, preble's	243	186'	Clear Creek/CC Pkwy interchange. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways (included in twin tunnels project - 2013)						
16	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion, preble's	244.2	186'	Clear Creek Canyon Junction. Goal is to provide N/S connectivity and E/W connectivity along Clear Creek drainage. Bighorn in this area mostly moving E/W along ridge to N. Other target species moving along or into Clear Creek drainage						
17	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion	244.9	186'	Extensive Bridge underpass under I-70	21,100	0	8	6	0	4
	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion	Hwy 40	?	Crossing structure under Hwy 40 to complement mitigation at MP 244.9 (above). Alternatively, place wildlife crossing warning signs on Hwy 40.						
18	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	245.5	186'	Extensive Bridge. Secondary location - private drive and homes E of Hwy 40. Preferred location at MP 146.5, if feasible						
	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	246.5	186' + Hwy 40	Investigate opportunity to build wildlife overpass over interstate and Hwy 40 (possible to build new I-70 lanes over existing frontage/Hwy 40 to lessen overpass length?)						
19	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	~247.0	186'	E of Floyd Hill summit. Large meadow to S. Private land S & N. S side meadow recently subdivided (10-acre lots); wetland present on S side. Possible Wildlife Overpass or Landscape Bridge over I-70 and Hwy 40? Implications of homes and new homes immediately adjacent to both sides of overpass?						
20	P	Beaver Brook	Preble's jumping mouse	247.6	186'	Medium Underpass - connects diagonally under I-70 and WB off-ramp along small drainage from meadow on SW side of interchange to the NE side. Install 2 culverts - 1 under I-70 and 1 under off-ramp - and shorten each to greatest extent possible. Maintain dry riparian banks through culvert and ideally provide some rocky cover along banks through culvert. Private lands - obtain easements and/or coordinate compatible zoning with Jefferson County.	5,280	0	2	0	0	0
21	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion,	248.2	186'	Large Bridge Underpass to facilitate deer and elk passage. Alternatively, construct Wildlife Overpass immediately to west of drainage, connecting cut slopes - whichever is cheaper based on terrain. Private lands - obtain easements.						
22	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion, preble's Aquatic Species	249	186'	Soda Creek/Soda Creek Road. Aquatic target species presence unknown Multi-use Extensive Bridge spanning local access road (west side of structure) and creek (east side of structure). Restore habitat through structure.						
23	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion	250	186'	Large Bridge Underpass at fill slope						
24	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	253.2	186'	Replace existing box culvert for managing bison herd with Large Bridge Underpass to accommodate wildlife (especially elk). Will need to coordinate with Denver Mountain Parks to move bison enclosure fencing back away from structure approaches to allow wildlife access to crossing structure. Concern is that this may result in a corridor of wildlife fencing that animals must learn to navigate in order to be able to use the crossing. Resident animals may be able to learn this, but must be further investigated in L2.						
25	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	254.5	186'	Extensive bridge underpass. Separate structures under EB and WB lanes preferred over one long structure. Fence median gap. Private lands - obtain easements. If terrain dictates low height, make wider.						
26	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	255.3	186'	Extensive Bridge Underpass (preferred); Alternatively, Large Bridge Underpass. Separate structures under EB and WB lanes preferred over one long structure. Fence median gap. Private lands - obtain easements. If terrain dictates low height, make wider.	50,620	0	20	7	2	8
21	AQU	Mt Vernon Creek	Aquatic species, Preble's jumping mouse (no occupied habitat)	256	186'	Aquatic species presence unknown. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEET recommendations)						
27	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	257	186'	Extensive Bridge Underpass under I-70; additional bridge under Hwy 6, if possible. Crossing location particularly important for bear and mountain lion, as well as resident deer. Private lands - obtain easements.						
Total Lump Sum							297,661	95,177	137	59	36	30
Miscellaneous Item Units							L.F.	L.F.	Each	Each	Each	Each
Miscellaneous Item Costs							\$5.50	\$2.00	\$6,250.00	\$55,000.00	\$6,000.00	\$1,000.00
SubTotals							\$1,637,136	\$190,354	\$856,250	\$3,245,000	\$216,000	\$30,000
Pipe Crossing Costs							\$1,612,201					
Miscellaneous Total:							\$7,786,941					

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Alternative 5

ITEM #	LIZ	LIZ NAME	TARGET SPECIES	MILEPOST	FOOTPRINT	CONNECTIVITY RECOMMENDATION	8' FENCE	3' FENCE	ESCAPE RAMPS	DEER GUARDS	VMS SIGNAGE	MONITORING CAMERAS
1	K	Laskey Gulch	1 st lynx, elk 2 nd deer, moose, bear	207.7	186'	Large bridge underpass						
2	K	Laskey Gulch	(same as above)	208.3	186'	Laskey Gulch. Extensive Bridge. Recommend bridge to replace fill (90' span x 25' high) Aquatic target species also present (GBCT) > maintain instream barrier to keep Laskey Gulch separate from Straight Creek.	0	0	0	0	0	0
1	n/a	n/a	Boreal Toad	209.5	186'	Breeding habitat in Straight Creek drainage. Incorporate connectivity for boreal toad at MP 208.3 & 211.7						
3	L	Hamilton Gulch	1 st lynx, boreal toad 2 nd moose, bear, elk, deer Aquatic - GBCT	211.7	186'	Large bridge underpass - secondary location, although may need this location in addition to primary location to provide connectivity for boreal toad Occupied GBCT. At minimum, replace pipe with Medium Underpass and reduce culvert grade to restore aquatic connection between Hamilton Gulch tributary and Straight Creek.						
4	L	Hamilton Gulch	1 st lynx, boreal toad 2 nd moose, bear, elk, deer Aquatic - GBCT	212.3	186'	Large bridge underpass - primary location. Include crossing considerations for boreal toad Potential GBCT habitat. Restore aquatic connection between tributary and Straight Creek.	0	0	0	0	0	0
	n/a	n/a	Lynx, bighorn, mountain goat, wolverine, pika	EMJT	n/a	EMJT Land Bridge. Collaborate with USFS and CPW to enhance cover on land bridge (e.g., boulders), while maintain as open, high altitude crossing						
5	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	217.4	142'	Dry Gulch. Wildlife Overpass is preferred structure - locate E of Dry Gulch. Accommodate bighorn in area population on south side. Incorporate features for boreal toad. Alternatively, Large Bridge underpass at Dry Gulch (less preferable for bighorn and elk; suitable for other target species). Maintain natural upstream barrier in Dry Gulch to keep GBCT population separate from Clear Creek.						
3	M	Bakerville	Boreal Toad	217.9	142'	Mt. Bethel. BT breeding site on north side of hwy. Occupied (surveyed 2013). Primary recommendation is to accommodate boreal toad movement at WO at MP 217.4 Natural bottomed small culvert at this location - alternative recommendation.						
4	M	Bakerville	Boreal Toad, Aquatic species	218.7	142'	Herman Gulch. Restore aquatic connection to Clear Creek. Boreal Toad breeding pond on south side - may begin using upland habitat on N side of hwy if a connection were available. Install medium underpass, restore natural stream bottom and riparian banks (alternatively, retrofit structure by adding wier plates to create drop-pool structure)						
6	M	Bakerville	1 st lynx, Aquatic species 2 nd bighorn, bear, boreal toad, mtn lion, deer, fox, coyote, elk, moose	219.3	142'	Watrous Gulch. Aquatic target species present - restore aquatic connectivity including riparian banks (design for some terrestrial connectivity along creek banks) Preferred structure is extensive bridge for terrestrial and aquatic connectivity. Move chain station so that footprint is not directly over crossing.						
7	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	220.5	142'	Construct wildlife overpass ~MP 220.5-220.7 (east of rock cut) Moose crossing area						
6	M	Bakerville	Boreal Toad	220.8	142'	Boreal toad breeding site. Accommodate N/S toad movement at WO at MP 220.5 and at elevated roadway section at MP 221.8	111,384	95,040	42	8	2	12
	M	Bakerville	Aquatic species	221.4	142'	Maintain natural upstream barrier. Connectivity not needed at roadway interface.						
8	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	221.8	142'	Low fill slope. Elevated EB & WB lanes for ~1/10th mile to accommodate north-south movement for all primary and secondary target species. Clear Creek runs close to Hwy through this segment; allow to meander beneath roadway.						
9	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	223.9	142'	East of Bridge to Nowhere. Preferred structures is wildlife overpass. (Alternatively, consider multi-use overpass on bridge to nowhere).						
10	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose Aquatic species	225	142'	Hwy 6 bridge under I-70 + Clear Creek box culverts (under Hwy 6 & then under I-70). Q: Will Hwy 6 alignment change? Multi-use Large Bridge Underpass or Extensive Bridge (span road and Clear Creek + riparian banks).						
	M	Bakerville	Aquatic species	225	142'	Replace Hwy 6 box culvert with Large Bridge Underpass (complement I-70 mitigation above at same location) Aquatic target species presence unknown.						
11	AQU	Bakerville	Aquatic species	225.9	142'	Clear Creek. Replace box culvert with Large Bridge Underpass to reduce channel skew and reduce water velocity through culvert. Restore riparian banks to integrate terrestrial connectivity needs (e.g., bighorn sheep on north side)						
11	AQU	n/a	Aquatic species	228.2	142'	Silver Gulch. Aquatic target species presence unknown. Replace with small underpass (oversized culvert); also restore inlet, reduce channel skew at inlet and replace upstream culvert under frontage road						
12	N	Empire Junction	1 st lynx 2 nd bighorn, bear, elk, deer	231.2	142'	Outside of LIZ, but could promote LIZ connectivity due to lack of suitable sites in LIZ. Large Bridge Underpass over Clear Creek.						
13	N	Empire Junction	Bighorn	Hwy 40	?	Wildlife Overpass for Bighorn Sheep (100' wide). Outside of I-70 alignment, but most important crossing site for bighorn. Willing landowner for conservation easement on south side.						
14	N	Empire Junction	1 st lynx 2 nd bighorn, bear, elk, deer	232.3	142'	Preferred structure is Extensive Bridge Underpass spanning Clear Creek. Restore riparian banks and terrestrial pathways through structure. Widen structure to compensate for low height.	14,100	0	6	2	2	6
15	N	Empire Junction	1 st lynx 2 nd bighorn, bear, elk, deer	232.5	142'	Wildlife overpass over N frontage road, I-70, Clear Creek, and S frontage road (overpass length may be shortened to end between I-70 and the S frontage road)						
12	AQU	n/a	general	234.8	142'	Mill Creek. Large Bridge Underpass needed to provide integrated terrestrial and aquatic connectivity at site (also integrate with SWEEP recommendations)						
13	AQU	n/a	general	236.3	142'	Spring Gulch. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEEP recommendations)						
14	AQU	n/a	Aquatic species	237.7	142'	Fall River. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEEP recommendations)						

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Alternative 5

ITEM #	LIZ	LIZ NAME	TARGET SPECIES	MILEPOST	FOOTPRINT	CONNECTIVITY RECOMMENDATION	8' FENCE	3' FENCE	ESCAPE RAMPS	DEER GUARDS	VMS SIGNAGE	MONITORING CAMERAS
15	AQU	n/a	general	239.9	142'	Clear Creek. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways						
17	AQU	n/a	general	241.8	142'	Clear Creek. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways						
	n/a	n/a	general	242	142'	Concrete box culvert improved as part of twin tunnels project (2013) - south side entrance softened to provide better access to culvert.						
	n/a	Twin Tunnels Land Bridge	1* elk, deer 2* bighorn, lynx, mtn lion	242.5	n/a	Land Bridge. Collaborate with USFS and CPW to enhance habitat conditions for target species.						
18	AQU	n/a	Aquatic species	242.8	186'	Bridges over Clear Creek (I-70 and Central City Pkwy). Large Bridge Underpasses currently at site - maintain connectivity and dry terrestrial pathways (included in twin tunnels project - 2013)						
19	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion, preble's	243	186'	Clear Creek/CC Pkwy interchange. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways (included in twin tunnels project - 2013)						
16	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion, preble's	244.2	186'	Clear Creek Canyon Junction. Goal is to provide N/S connectivity and E/W connectivity along Clear Creek drainage. Bighorn in this area mostly moving E/W along ridge to N. Other target species moving along or into Clear Creek drainage						
17	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion	244.9	186'	Extensive Bridge underpass under I-70	21,100	0	8	6	0	4
	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion	Hwy 40	?	Crossing structure under Hwy 40 to complement mitigation at MP 244.9 (above). Alternatively, place wildlife crossing warning signs on Hwy 40.						
18	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	245.5	186'	Extensive Bridge. Secondary location - private drive and homes E of Hwy 40. Preferred location at MP 146.5, if feasible						
	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	246.5	186' + Hwy 40	Investigate opportunity to build wildlife overpass over interstate and Hwy 40 (possible to build new I-70 lanes over existing frontage/Hwy 40 to lessen overpass length?)						
19	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	~247.0	186'	E of Floyd Hill summit. Large meadow to S. Private land S & N. S side meadow recently subdivided (10-acre lots); wetland present on S side. Possible Wildlife Overpass or Landscape Bridge over I-70 and Hwy 40? Implications of homes and new homes immediately adjacent to both sides of overpass?						
20	P	Beaver Brook	Preble's jumping mouse	247.6	186'	Medium Underpass - connects diagonally under I-70 and WB off-ramp along small drainage from meadow on SW side of interchange to the NE side. Install 2 culverts - 1 under I-70 and 1 under off-ramp - and shorten each to greatest extent possible. Maintain dry riparian banks through culvert and ideally provide some rocky cover along banks through culvert. Private lands - obtain easements and/or coordinate compatible zoning with Jefferson County.	12,100	0	4	2	2	0
21	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion,	248.2	186'	Large Bridge Underpass to facilitate deer and elk passage. Alternatively, construct Wildlife Overpass immediately to west of drainage, connecting cut slopes - whichever is cheaper based on terrain. Private lands - obtain easements.						
22	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion, preble's Aquatic Species	249	186'	Soda Creek/Soda Creek Road. Aquatic target species presence unknown Multi-use Extensive Bridge spanning local access road (west side of structure) and creek (east side of structure). Restore habitat through structure.						
23	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion	250	186'	Large Bridge Underpass at fill slope						
24	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	253.2	186'	Replace existing box culvert for managing bison herd with Large Bridge Underpass to accommodate wildlife (especially elk). Will need to coordinate with Denver Mountain Parks to move bison enclosure fencing back away from structure approaches to allow wildlife access to crossing structure. Concern is that this may result in a corridor of wildlife fencing that animals must learn to navigate in order to be able to use the crossing. Resident animals may be able to learn this, but must be further investigated in L2.						
25	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	254.5	186'	Extensive bridge underpass. Separate structures under EB and WB lanes preferred over one long structure. Fence median gap. Private lands - obtain easements. If terrain dictates low height, make wider.						
26	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	255.3	186'	Extensive Bridge Underpass (preferred); Alternatively, Large Bridge Underpass. Separate structures under EB and WB lanes preferred over one long structure. Fence median gap. Private lands - obtain easements. If terrain dictates low height, make wider.	0	0	0	0	0	0
21	AQU	Mt Vernon Creek	Aquatic species, Preble's jumping mouse (no occupied habitat)	256	186'	Aquatic species presence unknown. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEET recommendations)						
27	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	257	186'	Extensive Bridge Underpass under I-70; additional bridge under Hwy 6, if possible. Crossing location particularly important for bear and mountain lion, as well as resident deer. Private lands - obtain easements.						
Total Lump Sum							253,830	95,146	106	46	28	22
Miscellaneous Item Units							L.F.	L.F.	Each	Each	Each	Each
Miscellaneous Item Costs							\$5.50	\$2.00	\$6,250.00	\$55,000.00	\$6,000.00	\$1,000.00
SubTotals							\$1,396,065	\$190,292	\$662,500	\$2,530,000	\$168,000	\$22,000
Pipe Crossing Costs							\$922,350					
Miscellaneous Total:							\$5,891,207					

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Alternative 6

ITEM #	LIZ	LIZ NAME	TARGET SPECIES	MILEPOST	FOOTPRINT	CONNECTIVITY RECOMMENDATION	8' FENCE	3' FENCE	ESCAPE RAMPS	DEER GUARDS	VMS SIGNAGE	MONITORING CAMERAS
1	K	Laskey Gulch	1 st lynx, elk 2 nd deer, moose, bear	207.7	186'	Large bridge underpass						
2	K	Laskey Gulch	(same as above)	208.3	186'	Laskey Gulch. Extensive Bridge. Recommend bridge to replace fill (90' span x 25' high) Aquatic target species also present (GBCT) > maintain instream barrier to keep Laskey Gulch separate from Straight Creek.	0	0	0	0	0	0
1	n/a	n/a	Boreal Toad	209.5	186'	Breeding habitat in Straight Creek drainage. Incorporate connectivity for boreal toad at MP 208.3 & 211.7						
3	L	Hamilton Gulch	1 st lynx, boreal toad 2 nd moose, bear, elk, deer Aquatic - GBCT	211.7	186'	Large bridge underpass - secondary location, although may need this location in addition to primary location to provide connectivity for boreal toad Occupied GBCT. At minimum, replace pipe with Medium Underpass and reduce culvert grade to restore aquatic connection between Hamilton Gulch tributary and Straight Creek.						
4	L	Hamilton Gulch	1 st lynx, boreal toad 2 nd moose, bear, elk, deer Aquatic - GBCT	212.3	186'	Large bridge underpass - primary location. Include crossing considerations for boreal toad Potential GBCT habitat. Restore aquatic connection between tributary and Straight Creek.	0	0	0	0	0	0
	n/a	n/a	Lynx, bighorn, mountain goat, wolverine, pika	EMJT	n/a	EMJT Land Bridge. Collaborate with USFS and CPW to enhance cover on land bridge (e.g., boulders), while maintain as open, high altitude crossing						
5	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	217.4	142'	Dry Gulch. Wildlife Overpass is preferred structure - locate E of Dry Gulch. Accommodate bighorn in area population on south side. Incorporate features for boreal toad. Alternatively, Large Bridge underpass at Dry Gulch (less preferable for bighorn and elk; suitable for other target species). Maintain natural upstream barrier in Dry Gulch to keep GBCT population separate from Clear Creek.						
3	M	Bakerville	Boreal Toad	217.9	142'	Mt. Bethel. BT breeding site on north side of hwy. Occupied (surveyed 2013). Primary recommendation is to accommodate boreal toad movement at WO at MP 217.4 Natural bottomed small culvert at this location - alternative recommendation.						
4	M	Bakerville	Boreal Toad, Aquatic species	218.7	142'	Herman Gulch. Restore aquatic connection to Clear Creek. Boreal Toad breeding pond on south side - may begin using upland habitat on N side of hwy if a connection were available. Install medium underpass, restore natural stream bottom and riparian banks (alternatively, retrofit structure by adding wier plates to create drop-pool structure)						
6	M	Bakerville	1 st lynx, Aquatic species 2 nd bighorn, bear, boreal toad, mtn lion, deer, fox, coyote, elk, moose	219.3	142'	Watrous Gulch. Aquatic target species present - restore aquatic connectivity including riparian banks (design for some terrestrial connectivity along creek banks) Preferred structure is extensive bridge for terrestrial and aquatic connectivity. Move chain station so that footprint is not directly over crossing.						
7	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	220.5	142'	Construct wildlife overpass ~MP 220.5-220.7 (east of rock cut) Moose crossing area						
6	M	Bakerville	Boreal Toad	220.8	142'	Boreal toad breeding site. Accommodate N/S toad movement at WO at MP 220.5 and at elevated roadway section at MP 221.8	0	0	0	0	0	0
	M	Bakerville	Aquatic species	221.4	142'	Maintain natural upstream barrier. Connectivity not needed at roadway interface.						
8	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	221.8	142'	Low fill slope. Elevated EB & WB lanes for ~1/10th mile to accommodate north-south movement for all primary and secondary target species. Clear Creek runs close to Hwy through this segment; allow to meander beneath roadway.						
9	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose	223.9	142'	East of Bridge to Nowhere. Preferred structures is wildlife overpass. (Alternatively, consider multi-use overpass on bridge to nowhere).						
10	M	Bakerville	1 st lynx 2 nd bighorn, bear, boreal toad (select sites), mtn lion, deer, fox, coyote, elk, moose Aquatic species	225	142'	Hwy 6 bridge under I-70 + Clear Creek box culverts (under Hwy 6 & then under I-70). Q: Will Hwy 6 alignment change? Multi-use Large Bridge Underpass or Extensive Bridge (span road and Clear Creek + riparian banks).						
	M	Bakerville	Aquatic species	225	142'	Replace Hwy 6 box culvert with Large Bridge Underpass (complement I-70 mitigation above at same location) Aquatic target species presence unknown.						
11	AQU	Bakerville	Aquatic species	225.9	142'	Clear Creek. Replace box culvert with Large Bridge Underpass to reduce channel skew and reduce water velocity through culvert. Restore riparian banks to integrate terrestrial connectivity needs (e.g., bighorn sheep on north side)						
11	AQU	n/a	Aquatic species	228.2	142'	Silver Gulch. Aquatic target species presence unknown. Replace with small underpass (oversized culvert); also restore inlet, reduce channel skew at inlet and replace upstream culvert under frontage road						
12	N	Empire Junction	1 st lynx 2 nd bighorn, bear, elk, deer	231.2	142'	Outside of LIZ, but could promote LIZ connectivity due to lack of suitable sites in LIZ. Large Bridge Underpass over Clear Creek.						
13	N	Empire Junction	Bighorn	Hwy 40	?	Wildlife Overpass for Bighorn Sheep (100' wide). Outside of I-70 alignment, but most important crossing site for bighorn. Willing landowner for conservation easement on south side.						
14	N	Empire Junction	1 st lynx 2 nd bighorn, bear, elk, deer	232.3	142'	Preferred structure is Extensive Bridge Underpass spanning Clear Creek. Restore riparian banks and terrestrial pathways through structure. Widen structure to compensate for low height.	14,100	0	6	2	2	6
15	N	Empire Junction	1 st lynx 2 nd bighorn, bear, elk, deer	232.5	142'	Wildlife overpass over N frontage road, I-70, Clear Creek, and S frontage road (overpass length may be shortened to end between I-70 and the S frontage road)						
12	AQU	n/a	general	234.8	142'	Mill Creek. Large Bridge Underpass needed to provide integrated terrestrial and aquatic connectivity at site (also integrate with SWEET recommendations)						
13	AQU	n/a	general	236.3	142'	Spring Gulch. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEET recommendations)						
14	AQU	n/a	Aquatic species	237.7	142'	Fall River. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEET recommendations)						

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Alternative 6

ITEM #	LIZ	LIZ NAME	TARGET SPECIES	MILEPOST	FOOTPRINT	CONNECTIVITY RECOMMENDATION	8' FENCE	3' FENCE	ESCAPE RAMPS	DEER GUARDS	VMS SIGNAGE	MONITORING CAMERAS
15	AQU	n/a	general	239.9	142'	Clear Creek. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways						
17	AQU	n/a	general	241.8	142'	Clear Creek. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways						
	n/a	n/a	general	242	142'	Concrete box culvert improved as part of twin tunnels project (2013) - south side entrance softened to provide better access to culvert.						
	n/a	Twin Tunnels Land Bridge	1* elk, deer 2* bighorn, lynx, mtn lion	242.5	n/a	Land Bridge. Collaborate with USFS and CPW to enhance habitat conditions for target species.						
18	AQU	n/a	Aquatic species	242.8	186'	Bridges over Clear Creek (I-70 and Central City Pkwy). Large Bridge Underpasses currently at site - maintain connectivity and dry terrestrial pathways (included in twin tunnels project - 2013)						
19	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion, preble's	243	186'	Clear Creek/CC Pkwy interchange. Large Bridge Underpass currently at site - maintain connectivity and dry terrestrial pathways (included in twin tunnels project - 2013)						
16	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion, preble's	244.2	186'	Clear Creek Canyon Junction. Goal is to provide N/S connectivity and E/W connectivity along Clear Creek drainage. Bighorn in this area mostly moving E/W along ridge to N. Other target species moving along or into Clear Creek drainage						
17	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion	244.9	186'	Extensive Bridge underpass under I-70	21,100	0	8	6	0	4
	O	Clear Creek Junction	1* elk, deer 2* bighorn, lynx, mtn lion	Hwy 40	?	Crossing structure under Hwy 40 to complement mitigation at MP 244.9 (above). Alternatively, place wildlife crossing warning signs on Hwy 40.						
18	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	245.5	186'	Extensive Bridge. Secondary location - private drive and homes E of Hwy 40. Preferred location at MP 146.5, if feasible						
	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	246.5	186' + Hwy 40	Investigate opportunity to build wildlife overpass over interstate and Hwy 40 (possible to build new I-70 lanes over existing frontage/Hwy 40 to lessen overpass length?)						
19	P	Beaver Brook	1* elk, deer 2* bighorn, lynx, mtn lion	~247.0	186'	E of Floyd Hill summit. Large meadow to S. Private land S & N. S side meadow recently subdivided (10-acre lots); wetland present on S side. Possible Wildlife Overpass or Landscape Bridge over I-70 and Hwy 40? Implications of homes and new homes immediately adjacent to both sides of overpass?						
20	P	Beaver Brook	Preble's jumping mouse	247.6	186'	Medium Underpass - connects diagonally under I-70 and WB off-ramp along small drainage from meadow on SW side of interchange to the NE side. Install 2 culverts - 1 under I-70 and 1 under off-ramp - and shorten each to greatest extent possible. Maintain dry riparian banks through culvert and ideally provide some rocky cover along banks through culvert. Private lands - obtain easements and/or coordinate compatible zoning with Jefferson County.	6,700	0	2	0	2	0
21	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion,	248.2	186'	Large Bridge Underpass to facilitate deer and elk passage. Alternatively, construct Wildlife Overpass immediately to west of drainage, connecting cut slopes - whichever is cheaper based on terrain. Private lands - obtain easements.						
22	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion, preble's Aquatic Species	249	186'	Soda Creek/Soda Creek Road. Aquatic target species presence unknown Multi-use Extensive Bridge spanning local access road (west side of structure) and creek (east side of structure). Restore habitat through structure.						
23	P	Beaver Brook	1* elk, deer 2* bear, lynx, mtn lion	250	186'	Large Bridge Underpass at fill slope						
24	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	253.2	186'	Replace existing box culvert for managing bison herd with Large Bridge Underpass to accommodate wildlife (especially elk). Will need to coordinate with Denver Mountain Parks to move bison enclosure fencing back away from structure approaches to allow wildlife access to crossing structure. Concern is that this may result in a corridor of wildlife fencing that animals must learn to navigate in order to be able to use the crossing. Resident animals may be able to learn this, but must be further investigated in L2.						
25	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	254.5	186'	Extensive bridge underpass. Separate structures under EB and WB lanes preferred over one long structure. Fence median gap. Private lands - obtain easements. If terrain dictates low height, make wider.						
26	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	255.3	186'	Extensive Bridge Underpass (preferred); Alternatively, Large Bridge Underpass. Separate structures under EB and WB lanes preferred over one long structure. Fence median gap. Private lands - obtain easements. If terrain dictates low height, make wider.	0	0	0	0	0	0
21	AQU	Mt Vernon Creek	Aquatic species, Preble's jumping mouse (no occupied habitat)	256	186'	Aquatic species presence unknown. Integrate terrestrial and aquatic connectivity at site (also integrate with SWEET recommendations)						
27	Q	Mt Vernon Creek	1* elk, deer 2* bear, lynx, mtn lion	257	186'	Extensive Bridge Underpass under I-70; additional bridge under Hwy 6, if possible. Crossing location particularly important for bear and mountain lion, as well as resident deer. Private lands - obtain easements.						
Total Lump Sum							41,938	38	38	22	14	10
Miscellaneous Item Units							L.F.	L.F.	Each	Each	Each	Each
Miscellaneous Item Costs							\$5.50	\$2.00	\$6,250.00	\$55,000.00	\$6,000.00	\$1,000.00
SubTotals							\$230,659	\$76	\$237,500	\$1,210,000	\$84,000	\$10,000
Pipe Crossing Cots							\$322,740					
Miscellaneous Total:							\$2,094,975					