CITY OF THORNTON

Appendix D

BENEFIT-COST ANALYSIS CALCULATIONS

FEHR PEERS

Memorandum

Date: November 21, 2024

To: City of Thornton

From: Fehr & Peers

Subject: Benefit-Cost Analysis for Thornton Vision Zero Action Plan

DN23-0802

Introduction

Fehr & Peers conducted a benefit-cost analysis (BCA) as part of the **Thornton Vision Zero Action Plan** to support project prioritization. The BCA measures the potential safety benefits of a project against its financial costs. Rather than favoring the cheapest projects, this strategy seeks to prioritize projects expected to save the most lives relative to their cost.

A benefit-to-cost ratio was calculated for each potential safety intervention at each priority intersection location. This memo describes the data sources used for these calculations and how the calculations were conducted. The BCA calculation spreadsheet for each intervention and location is included at the end.

Data Sources

Crash Modification Factors

For each safety intervention, relevant crash modification factors (CMFs) were selected based on context and application in Thornton. Most CMFs were obtained from the U.S. Department of

Transportation's (USDOT's) Crash Modification Factors Clearinghouse. Of the CMFs sourced from the Clearinghouse, all corresponding studies received a minimum 3-star quality rating. For countermeasures where a CMF was not available on the USDOT Crash Modification Factors Clearinghouse, the Local Road Safety Manual for California's Local Road Owners[1] was used as a substitute given that such a resource does not exist in Colorado. The CMF for shared use path setbacks was sourced from a study conducted in the Netherlands,[2] given that no real-world studies of this countermeasure have been conducted in the US.

Service Life

Countermeasure service life was obtained from the CMF Clearinghouse. For countermeasures with varying lengths of service life, the average length of service life was used.

Crash Costs

Crash costs were obtained from the Colorado Highway Safety Improvement Program 2023 Annual Report[3] (**Table 1**). Colorado assigns a cost per person to crashes resulting in fatalities and injuries. Property damage only crashes are assigned a per-crash cost.

Table 1. 2023 Crash Costs from the Colorado Department of Transportation

Fatal	Serious Injury	Minor Injury	Possible Injury	Property Damage Only
$1,778,000 / Person	$1,016,000 / Person	$221,000 / Person	$120,000 / Person	$17,000 / Crash

Project Cost Estimates

The project costs used in the BCA are planning level cost estimates and do not reflect any necessary design, right-of-way acquisition, or labor costs. Opinions of probable cost were developed by identifying major pay items and establishing rough quantities to determine a rough order of magnitude cost. Unit costs are based on 2024 dollars and were assigned based on historical cost data from CDOT Cost Data. Cost opinions do not include easement and right-of-

[1] Caltrans. Local Road Safety Manual: A Manual for California's Local Road Owners. Version 1.7, April 2024. Available from https://dot.ca.gov/-/media/dot-media/programs/local-assistance/documents/hsip/2024/lrsm2024-v2.pdf.

2 Schepers, J.P., P.A. Kroeze, W. Sweers, and J.C. Wust. Road Factors and Bicycle-Motor Vehicle Crashes at Unsignalized Priority Intersections. Accident Analysis and Prevention, Vol. 43, Issue 3, 2011, pp. 853-861.

[3] Colorado Department of Transportation. Colorado Highway Safety Improvement Program. 2023 Annual Report. 2024. Available from https://highways.dot.gov/sites/fhwa.dot.gov/files/2024-04/HSIP%28Colorado%29%202023%20Report.pdf.

way acquisition; permitting, inspection, or construction management; engineering, surveying, geotechnical investigation, environmental documentation, special site remediation, escalation, or the cost for ongoing maintenance. The overall cost opinions are intended to be general and used only for planning purposes. Construction costs will vary based on the ultimate project scope, actual site conditions and constraints, schedule, and economic conditions at the time of construction.

Calculation Methodology

For each location, the benefit of an intervention in terms of crash cost reduction was calculated. Only crashes of the type mitigated by the intervention recommended at each location were counted in these calculations. First, crash costs were calculated based on the number of people who were killed or injured plus the number of property damage only crashes that occurred at each location between 2018 and 2022. This cost was annualized to estimate the annual cost associated with taking no action at a particular location. These costs were updated using the CMFs to estimate the potential change in crash costs if a countermeasure were installed at a particular location. The difference between the annual crash costs with and without countermeasures represents the estimated project benefit.

Total project costs were calculated by dividing the estimated project cost by the estimated service life of the project. This provides an annual cost estimate of a particular safety intervention.

Finally, the cost-to-benefit ratio was calculated by dividing the annual project benefit by the annual project cost. **Table 2** summarizes the BCA ratio of the combined recommended projects.

The attached sheets show the following data and calculations used in the BCA analysis:

- **Crash Modification Factor (CMF**) – Data source of the CMF used for each recommended safety intervention.
- **Project Cost Estimates** – Organized by project type.
- **Benefit-Cost Analysis (BCA) Calculations** – Shown for each recommended safety intervention and location.

Table 2. Benefit-Cost Ratio of Combined Projects

Safety Intervention	CMF Applied	Number of Locations	Total Estimated Benefits	Total Estimated Project Costs	Benefit-Cost Ratio (BCR)
Red-Light Running Countermeasures	Improve signal timing (coordination, phases, red, yellow, or operation)	39	$63,338,100	$42,900	1,476
	Add 3-inch yellow retroreflective sheeting to signal backplates	39	$63,338,100	$321,750	196
	Install flashing beacons as advance warning	5	$10,932,480	$56,250	194
	Increase yellow interval and all-red interval	39	$4,222,540	$42,900	98
	Install red light cameras	39	$75,871,080	$11,232,000	6.8
Adjust WALK Signal	Increase length of signal phases to allow pedestrians more crossing time	13	$12,029,880	$14,300	841
Protected Left Turn Operations	Change from permitted-protected to protected on major approach	36	$195,922,980	$459,000	427
Protected Right Turn Operations	Add exclusive pedestrian phasing	1	$252,000	$1,100	229
Leading Pedestrian Interval	Implement leading pedestrian interval	15	$4,323,260	$56,250	76
Restrict Left Turns / Signalize / Positive Offset	Install raised median (approach turn & broadside)	1	$3,797,200	$112,500	33
	Convert stop-controlled intersection to roundabout	1	$1,680,190	$162,000*	10
	Install a traffic signal (left turn crashes only)	4	$1,118,520	$2,544,000	0.4
Prohibit Right Turn on Red	Prohibit right turn on red	15	$2,059,056	$326,250	6.3
Set Back Shared Use Path	Deflect bikeway approach 7-16 feet from main roadway	8	$3,209,400	$516,000	6.2
Tighten the Turn Radius	Change corner right-turn radius	17	$4,061,460	$1,351,500	3
Install Refuge Median	Install raised median / refuge islands	7	$13,532,400	$7,045,500	1.9

Safety Intervention	CMF Applied	Number of Locations	Total Estimated Benefits	Total Estimated Project Costs	Benefit-Cost Ratio (BCR)
Regular Maintenance of Crosswalk	Install high-visibility crosswalks	41	$2,221,520	$1,445,250	1.5
New or Improved Pedestrian Crossing	Install raised median / refuge islands	8	$4,338,000	$8,052,000	0.5

* Project cost estimate based on mini-roundabout.

Crash Modification Factors (CMF)

Safety Recommendation	Countermeasure	Crash Modification Factor	CMF ID	Quality	Crash Type Mitigated	Severity	Area Type	Average Service Life	Source
Red-light Running Countermeasures	Add 3-inch yellow retroreflective sheeting to signal backplates	0.85	1410	4	All	All	Urban	10	CMF Clearinghouse
Red-light Running Countermeasures	Install Flashing Beacons as Advance Warning	0.7	S10	N/A	All	All	All	8	CA Local Roadway Safety Manual
Red-light Running Countermeasures	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	0.85	S03	N/A	All	All		10	CA Local Roadway Safety Manual
Red-light Running Countermeasures	Increase yellow interval and add all red interval	0.99	4203	3	All	All	Urban		CMF Clearinghouse
Red-light Running Countermeasures	Install red-light cameras	0.623	6878	5	Angle (broadside and approach turn crashes)	All	Urban & Suburban	10	CMF Clearinghouse
Protected Left Turn operations	Change from Permitted-protected to Protected on Major Approach	0.01	339	4	Angle (broadside and approach turn crashes)	All	Urban	10	CMF Clearinghouse
Protected Right Turn Operations	Add exclusive pedestrian phasing	0.65	5244	3	Vehicle/Pedestrian	All	Urban	10	CMF Clearinghouse
Restrict Left Turns/Positive Offset Left Turn/Signalize	Install Raised Median	0.45	2220	4	Angle (broadside and approach turn crashes)	All	Urban	20	CMF Clearinghouse
Restrict Left Turns/Positive Offset Left Turn/Signalize	Convert stop-controlled intersection to roundabout	0.581	4876	4	All	A (serious injury),B (minor injury),C (possible injury)	All	25	CMF Clearinghouse
Restrict Left Turns/Positive Offset Left Turn/Signalize	Install a Traffic Signal	0.45	7847	4	Left turn	All	Urban	10	CMF Clearinghouse
Prohibit Right-on-Red	Prohibit Right-Turn-on-Red	0.98	5194	N/A	All crash types except vehicle-pedestrian and vehicle-bicycle	All		6	CMF Clearinghouse
Leading Pedestrian Interval (LPI)	Leading Pedestrian Intervals	0.81	9903	5	Vehicle/Pedestrian	All	Urban & Suburban	10	CMF Clearinghouse
Regular Maintenance of Crosswalk	Install High-Visibility Crosswalk	0.6	4123	2	Vehicle/Pedestrian	All		1	CMF Clearinghouse
Tighten Turn Radius	Change Corner Right Turn Radius	0.93 (decresasing from 40 to 30 feet)	11215	3	Vehicle/Pedestrian	All	Urban & Suburban	20	CMF Clearinghouse

Crash Modification Factors (CMF)

Safety Recommendation	Countermeasure	Crash Modification Factor	CMF ID	Quality	Crash Type Mitigated	Severity	Area Type	Average Service Life	Source
Install Refuge Median	Install Raised Median / Refuge Islands (NSI)	0.55	NS19PB	N/A	Ped & Bike	All		20	CA Local Roadway Safety Manual
New or Improved Pedestrian Crossing	Install Raised Median / Refuge Islands (NSI)	0.55	NS19PB	N/A	Ped & Bike	All		20	CA Local Roadway Safety Manual
Setback Shared Use Path	Deflect bikeway approach 7-16 feet from main roadway	0.55		N/A	Ped & Bike	All	Urban	20	Schepers, J.P., P.A. Kroeze, W. Sweers, and J.C. Wust. Road Factors and Bicycle-Motor Vehicle Crashes at Unsignalized Priority Intersections. Accident Analysis and Prevention, Vol. 43, Issue 3, 2011, pp. 853-861.

Project Cost Estimates

Opinions of probable cost were developed by identifying major pay items and establishing rough quantities to determine a rough order of magnitude cost. Unit costs are based on 2024 dollars and were assigned based on historical cost data from CDOT Cost Data. Cost opinions do not include easement and right-of-way acquisition; permitting, inspection, or construction management; engineering, surveying, geotechnical investigation, environmental documentation, special site remediation, escalation, or the cost for ongoing maintenance. The overall cost opinions are intended to be general and used only for planning purposes. Toole Design Group, LLC makes no guarantees or warranties regarding the cost estimate herein. Construction costs will vary based on the ultimate project scope, actual site conditions and constraints, schedule, and economic conditions at the time of construction.

Toole recommends a contingency of 30% be added to planning-level cost opinions.
Toole recommends adding 10% for mobilization and 10% for traffic control to the total project cost.
The Total Cost column includes the countermeasure cost plus a 30% contingency, 10% for mobilization, and 10% for traffic control.
This cost opinion does not include the cost of labor or earthwork for any countermeasure treatment (exceptions noted). Contact City for recent labor costs.

Number	*Countermeasure Treatment*	*Example Location/Typical Intersection*	*Countermeasure Cost*	*Total Cost*	
1	Add 3-inch yellow retroreflective sheeting to signal backplates – all approaches	4 legs; 6-lane road with double-left intersecting 4-lane road with single left	$5,500	$8,250	
2	Install Flashing Beacons as Advance Warning – one approach	Rural-urban interface such as E 104th Ave and Riverdale Rd	$7,500	$11,250	
3	Install red-light cameras – all approaches	4 legs; 6-lane road with double-left intersecting 4-lane road with single left	$192,000	$288,000	
4	Change from Permitted-protected to Protected on Major Approach - all approaches (assume 4-section signal head)	N Pecos St & Thornton Pkwy	$8,500	$12,750	*Costs developed just for major approach*
5	Conversion of stop-controlled intersection to roundabout	E 112th Ave & Cherry Dr	$108,000	$162,000	
6	Install Raised Median	W 84th Ave & Acoma Way	$75,000	$112,500	
7	Install a Traffic Signal	Holly St & E 121st Ave	$424,000	$636,000	
8	Increase Triangle Sight Distance (i.e., remove visibility obstructions) – for Steele Street approach	E 112th Ave & Steele St	$200	$300	*Unit costs were developed for vegetation removal; sight distance obstructions at this location appear to be fences on private property*
9	Prohibit Right-Turn-on-Red – all approaches	E 128th Ave & Washington St	$14,500	$21,750	
10	Leading Pedestrian Intervals – major approach	E 130th Ave & Washington St	$2,500	$3,750	
11	Install High-Visibility Crosswalk – all four legs	84th Ave & Washington St	$23,500	$35,250	
12	Tighten Corner Right Turn Radius – all for corners	Thornton Pkwy & Washington St	$53,000	$79,500	
13	Install curb extensions	84th Ave & Washington St – remove one southbound right turn lane	$82,600	$123,900	
14	Install Raised Median / Refuge Islands (NSI) – two legs	88th Ave and Washinton Street	$671,000	$1,006,500	
15	Set back shared use path	Emerson St & E 128th Ave – north side of 128th Ave crossing Emerson Street	$43,000	$64,500	*Unit cost assumed sufficient ROW for shared use path setback. Costs are for relocating the pathway, but in this particular location, we'd recommend a raised crossing since ideal 15'+ setback cannot be accommodated*

Project Cost Estimates

Opinions of probable cost were developed by identifying major pay items and establishing rough quantities to determine a rough order of magnitude cost. Unit costs are based on 2024 dollars and were assigned based on historical cost data from CDOT Cost Data. Cost opinions do not include easement and right-of-way acquisition; permitting, inspection, or construction management; engineering, surveying, geotechnical investigation, environmental documentation, special site remediation, escalation, or the cost for ongoing maintenance. The overall cost opinions are intended to be general and used only for planning purposes. Toole Design Group, LLC makes no guarantees or warranties regarding the cost estimate herein. Construction costs will vary based on the ultimate project scope, actual site conditions and constraints, schedule, and economic conditions at the time of construction.

This cost opinion does not include a contingency percentage. Toole recommends a contingency of 20% be added to project cost.
This cost opinion does not include costs for mobilization or temporary traffic control. Toole recommends adding 10% for mobilization and 10% for traffic control to the total project cost.
This cost opinion does not include the cost of labor or earthwork for any countermeasure treatment (exceptions noted). Contact City for recent labor costs.

Assumptions/Notes

**Permanent treatments done in concrete are assumed for all treatments unless stated otherwise.*
**ABC = Aggregate Base Course (8" thick)*
**HMA = Hot Mix Asphalt*
**Curb ramp includes cost of detectable warning surface*

Countermeasure Quantities

Costs collected from Colorado cost data, unless otherwise noted

Signage

	Unit	Unit Cost
sign panel	SF	$45.00
sign post	LF	$36.00
removal of sign panel	EA	$100.00
removal of sign	EA	$250.00

Signals/Traffic

	Unit	Unit Cost	
Signal Head	EA	$2,500.00	
Removal of Signal Head	EA	$230.00	**This item includes signal head removal only*
Traffic Signal Pole	EA	$10,000.00	
Traffic Signal Pedestal Pole	EA	$5,500.00	
Mast Arm and Pole	EA	$32,000.00	**40' mast arm with luminaire*
Signal Pole Base	EA	$20,000.00	
PHB/HAWK	EA	$150,000.00	**Cost for one PHB. Need 2 PHB's per crossing*
Flashing Beacon	EA	$7,500.00	
Pedestrian Signal	EA	$37,825.00	**1 pole and mast arm, 2 signal heads, 1 ped push button*
Ped Signal Face	EA	$900.00	
Ped Push Button	EA	$825.00	
Ped Push Button Pole	EA	$2,000.00	
Detection Camera	EA	$14,000.00	
Electrical for Signalized Intersection	EA	$125,000.00	**Assumes 500' of 3" Conduit at $55/LF, 1000' of 2" Conduit at $45/LF, new transformer from Xcel at $10000 and $40000 wiring fee*
Pull Boxes	EA	$1,500.00	
Service Meter Cabinet	EA	$9,000.00	
Signal Cabinet	EA	$56,000.00	**Assumes all hardware and software included*
Signal Head Backplates	EA	$440.00	
Signal Coordination	PER CORRIDOR	$660.00	**Cost for this item came from the City per email on 9/16/2024.*
Signal Retiming	PER CORRIDOR	$1,100.00	**Cost for this item came from the City per email on 9/16/2024.*
Intersection Rephasing	PER CORRIDOR	$1,000.00	**Cost for this item came from the City per email on 10/xx/2024.*

Reference Images

Pedestrian Signal:

Project Cost Estimates

**Information and cost for the Automated Enforcement Program came from the City per email on 9/16/2024.*

Automated Enforcement Program

	Unit	Unit Cost
Red Light Camera	EA	$48,000.00
Single Speed Enforcement Mobile Vehicle	EA	$100,000.00
Staff	PER YEAR	$150,000.00

Concrete Work

	Unit	Unit Cost
Removal of Asphalt Mat	SY	$2.50
Concrete Removal	SY	$85.00
Curb & Gutter Removal	LF	$20.00
Removal of Curb Ramp	SY	$45.00
ABC	CY	$200.00
Concrete	SY	$170.00
Concrete - Commercial Driveway (8")	SY	$230.00
DWS	SF	$90.00
Curb and Gutter	LF	$68.00
Mountable Curb and Gutter	LF	$68.00
Concrete Curb Ramp	SY	$300.00
Inlet/CB Relocation	EA	$13,000.00

**Curb ramp dimensions:*
6' width, 7' length ramp, 6' wide aprons on both side

Markings

	Unit	Quantity	Unit Cost	Total cost
Removal of Pavement Marking	SF		$2.50	
Bike Symbols	SF	12	$23.00	**$276.00**
Turn Arrow	SF	16.1	$23.00	**$370.30**
High Visibility Crosswalk bars (two-lane crossing)	SF	100	$15.00	**$1,500.00**
High Visibility Crosswalk bars (four-lane crossing)	SF	200	$15.00	**$3,000.00**

**10' long 2' wide crosswalk bars at 5' spacing (5 bars)*

**10' long 2' wide crosswalk bars at 5' spacing (10 bars)*

Maintenance

	Unit	Quantity	Unit Cost	Total cost
Foliage Removal/Clearing	PER HOUR	4	$30.00	**$120.00**

**Removal of fences assumed to be a private cost*

Advance Warning Signs

	Unit	Quantity	Unit Cost	Total cost
Stop Ahead (W3-1) (30"x30")	SF	6.25	$45.00	$281.25
Sign Post	LF	12.00	$36.00	$432.00
			Total Cost Per Sign	**$713.25**
Crosswalk + Directional Arrow (W11-2 + W16-7P) (36"x36") + (24"x12")	SF	11	$45.00	$495.00
Sign Post	LF	13.00	$36.00	$468.00
			Total Cost Per Sign	**$963.00**
Trail Crossing (W11-15 + W11-15P) (36"x36") + (24"x18")	SF	12	$45.00	$540.00
Sign Post	LF	14.00	$36.00	$504.00
			Total Cost Per Sign	**$1,044.00**

**Most installations would require 2 or more signs, at least 1 in each direction of motor vehicle travel*


W3-1


W16-7P

W11-15*

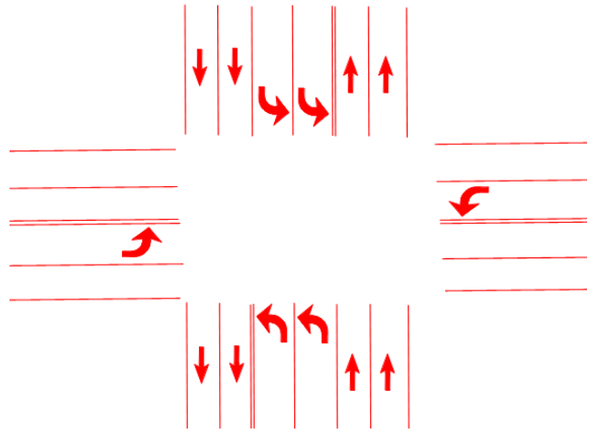
W11-15P* (optional)

Project Cost Estimates

Assumptions/Notes	*Countermeasure Quantities*	*Reference Images*

Add 3-inch Yellow Retroreflective Sheeting to Signal Backplates
(all approaches)

	Unit	Quantity	Unit Cost	Total cost
Typical intersection: 4 legs; 6-lane road with double-left intersecting 4-lane road with single left				
# of Intersection Legs on Major St	EA	2		
# of Intersection Legs on Minor St	EA	2		
# of Signal Heads on Major St	EA	4		
# of Signal Heads on Minor St	EA	2		
Signal Head Backplates	EA	12.00	$440.00	$5,280.00
				$5,280.00
			TOTAL	**$5,500.00**



Project Cost Estimates

Assumptions/Notes	*Countermeasure Quantities*	*Reference Images*

Install Flashing Beacons as Advance Warning
(one approach)

	Unit	Quantity	Unit Cost	Total cost
Flashing Beacon	EA	1	$7,500.00	$7,500.00
			TOTAL	**$7,500.00**

**Assume flashing beacon operates continuously and is not timed with signal*
**Cost of flashing beacon includes sign face. See CDOT S-614-14*

Example: Rural-urban interface such as E 104 th Ave and Riverdale Rd

Project Cost Estimates

Assumptions/Notes	*Countermeasure Quantities*					*Reference Images*
	Install Red-Light Cameras *(all approaches)*					
		Unit	**Quantity**	**Unit Cost**	**Total cost**	
Typical intersection: 4 legs; 6-lane road with double-left intersecting 4-lane road with single left	# of Intersection Legs	EA	4			
**Assume program-level costs (staff, vehicle, etc) are not included*	Red Light Camera	EA	4	$48,000.00	$192,000.00	
				TOTAL	**$192,000.00**	

Project Cost Estimates

Assumptions/Notes	*Countermeasure Quantities*	*Reference Images*

*Assume 4-section signal head

*Remove "left turn yield on flashing yellow arrow" sign

*Assume signs will be mounted on mast arm

Change from Permitted-Protected to Protected on Major Approach

(all approaches)

	Unit	Quantity	Unit Cost	Total cost
Removal of Signal Head	EA	2	$230.00	$460.00
Signal Head	EA	2	$2,500.00	$5,000.00
Signal Retiming	EA	1	$1,100.00	$1,100.00
Intersection Rephasing	PER CORRIDOR	1	$1,000.00	$1,000.00
Removal of Sign	EA	2	$100.00	$200.00
Left on Green Arrow Only Sign (R10-5) (30"x36")	SF	15	$45.00	$675.00
				$8,435.00
			TOTAL	**$8,500.00**

Example: N Pecos St & Thornton Pkwy

Project Cost Estimates

Assumptions/Notes

**These calculations assume all concrete work is built on existing surface.*

*Assume mini-roundabout, 45', because ROW is not available for a larger size due to houses directly behind ROW
*Assume same thickness as commercial driveway (8") to allow larger vehicles to track over roundabout
*Assume splitter islands are triangles for simplified calcs

**Removal of stop sign on minor street approaches*

**Removal of double yellow centerline and white lane line for 200' approaching intersection, the length of the left turn pocket*

**New bike symbols to direct bike path around roundabout*

**Crosswalks on all four legs of intersection*

**Assume no changes to bike lane*

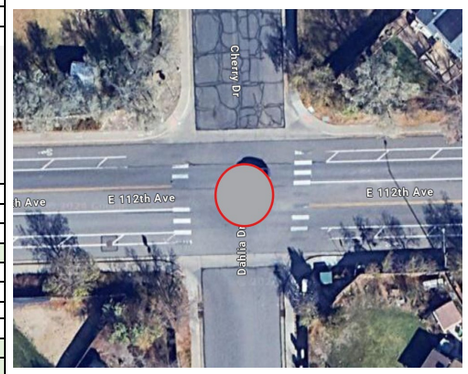
Countermeasure Quantities

Conversion of Stop-Controlled Intersection to Roundabout

	Unit	Quantity	Unit Cost	Total cost
Diameter	FT	45		
Radius	FT	22.5		
Splitter Island				
Length	FT	40		
Width at Intersection	FT	10		
Area	SF	200		
Perimeter	FT	90.6		
Concrete Roundabout				
Concrete - Commercial Driveway (8")	SY	177	$230.00	$40,623.75
Mountable Curb and Gutter	LF	141.3	$68.00	$9,608.40
				$50,232.15
Concrete Medians on Minor St Approach				
Concrete	SY	22.2	$170.00	$3,777.78
Curb and Gutter	LF	90.6	$68.00	$6,160.80
DWS	SF	16	$90.00	$1,440.00
		Total Cost of 1 Splitter Island		$11,378.58
		Total Cost of 4 Splitter Islands		$45,514.31
Signage and Pavement Markings				
Yield Signs (36"x36"x36")+ Roundabout Signs (30"x30") x4	SF	10.75	$40.00	$1,720.00
Sign Post x4	LF	13.00	$36.00	$1,872.00
Removal of Signs	EA	2.00	$250.00	$500.00
Removal of Pavement Marking	SF	600.00	$2.50	$1,500.00
Bike Symbols	EA	2.00	$276.00	$552.00
High Visibility Crosswalk bars (two-lane crossing)	SF	100.00	$15.00	$6,000.00
				$12,144.00
			TOTAL	**$108,000.00**

Reference Images

Example: E 112th Ave & Cherry Dr



Design Guidance from CDOT:

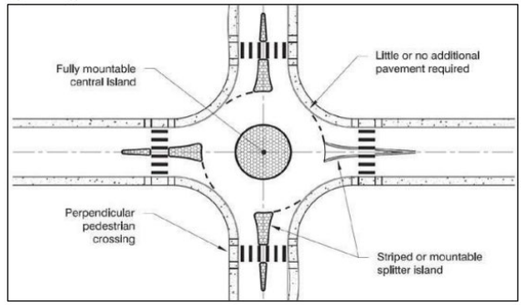
Table 9-2 provides typical ranges of inscribed diameters for various roundabout configurations.

Table 9-2 Typical Inscribed Diameter Ranges

Roundabout Configuration	Typical Design Vehicle	Common Inscribed Circle Diameter Range*
Mini-Roundabout	SU-30	45 to 95ft
Single-Lane Roundabout	B-40	90 to 150 ft
	WB-50	105 to 150 ft
	WB-67	130 to 180 ft
Multilane Roundabout (2 lanes)	WB-50	105 to 220 ft
	WB-67	165 to 220 ft
Multilane Roundabout (3 lanes)	WB-50	200 to 250 ft
	WB-67	220 to 300 ft

* Assumes 90° angles between entries and no more than 4 legs. List of possible design vehicles is not all-inclusive.

Figure 9-2 Typical Mini-Roundabout



Project Cost Estimates

Assumptions/Notes	*Countermeasure Quantities*	*Reference Images*

Install Raised Median

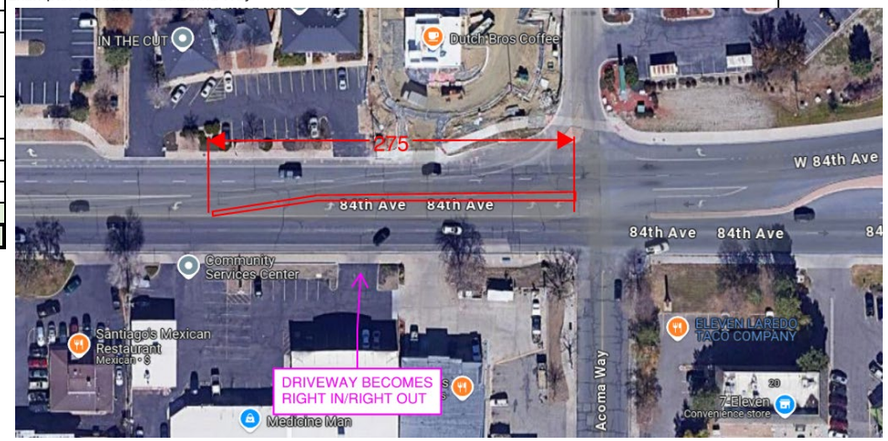
	Unit	Quantity	Unit Cost	Total cost
Median Length	FT	275		
Median Width	FT	7		
Perimeter of Median	FT	564		
Proposed Median				
Concrete	SY	214	$170.00	$36,361.11
Curb & Gutter	LF	564	$68.00	$38,352.00
Removal of Pavement Marking	SF	32.2	$2.50	$80.50
				$74,793.61
			TOTAL	**$75,000.00**

*Dimensions of Raised Median simplified for calculations. Width of existing turn lane varies from 16.5'-20'. Wdith of raised median would vary to maintain 10'-11' turn lane width.

**These calculations assume the concrete raised median is built on existing surface.*

**Existing westbound left turn arrows to be removed*

Example: W 84th Ave & Acoma Way



Project Cost Estimates

Assumptions/Notes	*Countermeasure Quantities*				
	Install a Traffic Signal				
		Unit	**Quantity**	**Unit Cost**	**Total cost**
**Assumes no ROW needed*	# of Intersection Legs	EA	3		
	High Visibility Crosswalk				
**Assumes no new curb ramps and no new crossing to be added on the south side of the intersection. Example intersection has two existing crosswalks: north side of Holly and across 121st.*	High Visibility Crosswalk bars (four-lane crossing)	SF	200.00	$15.00	$3,000.00
				Total Cost Per Crossing	$3,000.00
				Total Cost Per Intersection	$6,000.00
	Signals				
	Signal Head	EA	7	$2,500.00	$17,500.00
**40' mast arm with luminaire*	Mast Arm and Pole	EA	3	$32,000.00	$96,000.00
**1 base for each mast arm + 1 base for pedestal pole*	Signal Pole Base	EA	4	$20,000.00	$80,000.00
	Traffic Signal Pedestal Pole	EA	1	$5,500.00	$5,500.00
**2 ped signal faces to be mounted on pedestal pole, 2 to be mounted on mast arms in northeast and southwest corners*	Ped Signal Face	EA	4	$900.00	$3,600.00
	Ped Push Button	EA	4	$825.00	$3,300.00
**Detection Camera for side street, assumes microwave vehicle radar detector*	Detection Camera	EA	1	$14,000.00	$14,000.00
	Electrical for Signalized Intersection	EA	1	$125,000.00	$125,000.00
	Pull Boxes	EA	4	$1,500.00	$6,000.00
	Service Meter Cabinet	EA	1	$9,000.00	$9,000.00
**Assumes complete cabinet with all hardware and software*	Signal Cabinet	EA	1	$56,000.00	$56,000.00
	Signal Coordination	PER CORRIDOR	1	$660.00	$660.00
	Signal Timing	PER CORRIDOR	1	$1,100.00	$1,100.00
					$417,660.00
				TOTAL	**$424,000.00**

Reference Images

Example: Holly St & E 121st Ave

*Existing curb ramps for north south crossing across 121st and 1 east west crossing at north side of intersection

Project Cost Estimates

Assumptions/Notes	*Countermeasure Quantities*	*Reference Images*

Increase Triangle Sight Distance

Maintenance

	Unit	Quantity	Unit Cost	Total cost
Foliage Removal/Clearing	PER HOUR	4	$30.00	$120.00
			TOTAL	**$200.00**

**Removal of fences assumed to be a private cost*

Example: E 112th Ave & Steele St

Project Cost Estimates

Assumptions/Notes	*Countermeasure Quantities*	*Reference Images*

Prohibit Right-Turn-on-Red
(all approaches)

Example: E 128th Ave & Washington St

	Unit	Quantity	Unit Cost	Total cost
Signals				
Signal Head	EA	4	$2,500.00	$10,000.00
Removal of Signal Head	EA	4	$230.00	$920.00
Intersection Rephasing	PER CORRIDOR	1	$1,000.00	$1,000.00
No Turn on Red Sign (R10-11) (36"x48")	SF	48	$45.00	$2,160.00
				$14,080.00
			TOTAL	**$14,500.00**

**Replace existing signal heads for right turn lanes with signals that include red arrow*

**Additional corridor signal coordination costs not included*

Project Cost Estimates

Assumptions/Notes	*Countermeasure Quantities*	*Reference Images*

**Assume this can be done at intersection level and signal coordination is not needed.*
**Assume controller does not need to be updated.*

Leading Pedestrian Intervals
(major approach)

	Unit	Quantity	Unit Cost	Total cost
Signals				
Signal Retiming	PER CORRIDOR	1	$1,100.00	$1,100.00
Intersection Rephasing	PER CORRIDOR	1	$1,000.00	$1,000.00
				$2,100.00
			TOTAL	**$2,500.00**

Example: E 130th Ave & Washington St

Project Cost Estimates

Assumptions/Notes	*Countermeasure Quantities*	*Reference Images*

Install High-Visibility Crosswalk – all four legs

	Unit	Quantity	Unit Cost	Total cost
Crossing Distance - Washington	FT	100		
Crossing Distance - 84th	FT	94		
Wdith of Crosswalk Bars	FT	2		
Length of Crosswalk Bars	FT	10		
High Visibility Crosswalk - Washington	SF	400.00	$15.00	$6,000.00
High Visibility Crosswalk - 84th	SF	376.00	$15.00	$5,640.00
			Total Cost Per Intersection	$23,280.00
			TOTAL	**$23,500.00**

**Assume crosswalk bars at 5' spacing*

Example: 84th Ave & Washington St

Project Cost Estimates

Assumptions/Notes	*Countermeasure Quantities*	*Reference Images*

Tighten Corner Right Turn Radius
(all four corners)

*Quantities from CADD based on 30' corner radii

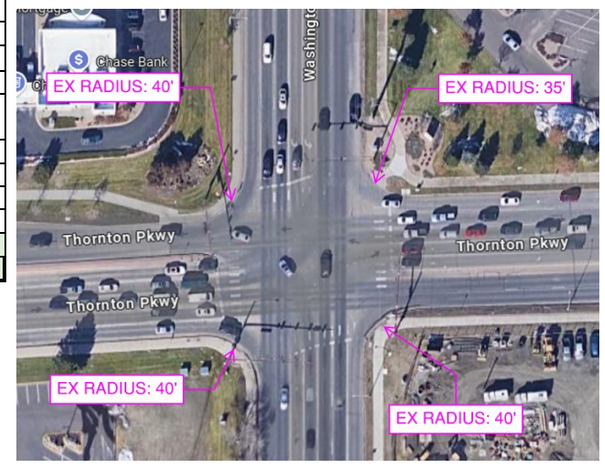
*Assume curb ramps, on average are 144 sf (existing sidewalk is ~8' wide:, each ramp is 6'x8' + landing area is 6'x8')

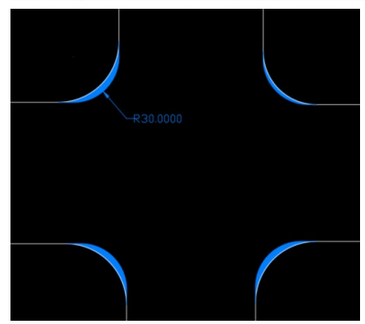
*Assume ABC is 8" thick

*Concrete quantity includes addition of sidewalk

	Unit	Quantity	Unit Cost	Total cost
Removal of Asphalt Mat	SY	57.82	$2.50	$144.56
Curb & Gutter Removal	LF	243.50	$20.00	$4,870.00
Removal of Curb Ramp	SY	64	$45.00	$2,880.00
ABC	CY	38.74	$200.00	$7,748.18
Curb and Gutter	LF	258.5	$68.00	$17,578.00
Concrete Curb Ramp	SY	64	$300.00	$19,200.00
Concrete	SY	57.82	$170.00	$9,829.78
				$52,420.73
			TOTAL	**$53,000.00**

Example: Thornton Pkwy & Washington St





Project Cost Estimates

Assumptions/Notes	*Countermeasure Quantities*	*Reference Images*

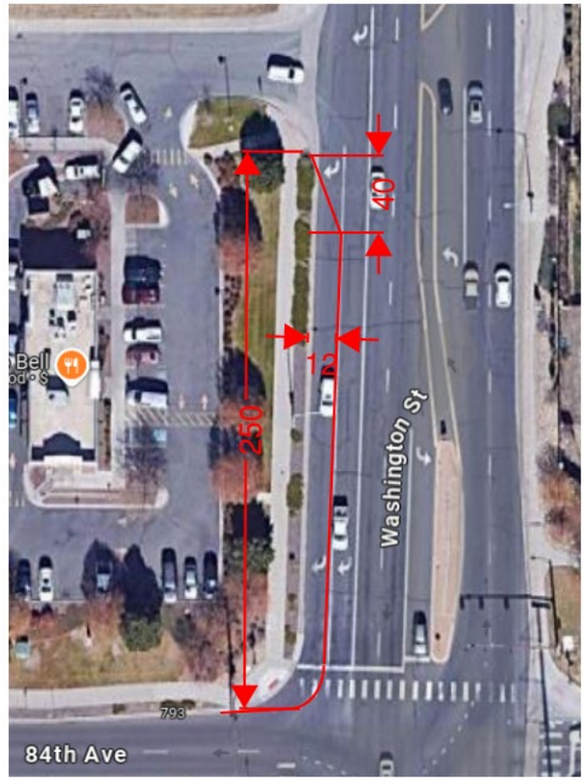
Install Curb Extensions

	Unit	Quantity	Unit Cost	Total cost
Width	FT	12		
Total Length Along Curb	FT	250		
Taper Length Along Curb	FT	40		
Taper Length	FT	41.76		
Area of Curb Ext	SF	2760		
Removal of Curb and Gutter	LF	250	$20.00	$5,000.00
Removal of Curb Ramp	SY	9.33	$45.00	$420.00
Curb and Gutter	LF	263.76	$0.00	$0.00
Concrete Curb Ramp	SY	9.33	$300.00	$2,800.00
Concrete	SY	306.67	$200.00	$61,333.33
Inlet/CB Relocation	EA	1	$13,000.00	$13,000.00
				$82,553.33
			TOTAL	**$82,600.00**

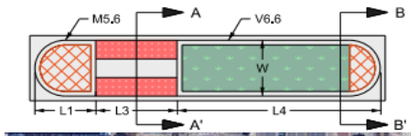
**These calculations assume the concrete curb extension is built on existing surface.*
**Curb ramp dimensions:*
6' width, 7' length ramp, 6' wide aprons on both side

**Curb extension material is concrete*

Example: 84th Ave & Washington St – remove one SBR turn lane



Project Cost Estimates

Assumptions/Notes	*Countermeasure Quantities*					*Reference Images*
	Install Raised Median / Refuge Islands (NSI) *(two legs)*					Example: 88th Ave and Washinton Street
		Unit	**Quantity**	**Unit Cost**	**Total cost**	**TYPICAL CONDITION**
	Refuge Width (W)	FT	8			
	Length of Median - East	FT	385			
	Length of Median - West	FT	160			
	Length of Ped Refuge Area (L3)	FT	10			
*These calculations assume the median is built on existing surface. *Ped Refuge Median material is concrete	**Proposed Median - West**					
	Concrete	SY	142	$200.00	$28,444.44	
	DWS	SF	40	$90.00	$3,600.00	
	Curb & Gutter	LF	336	$68.00	$22,848.00	
*Assume no signage is needed since this is a signalized intersection				**Total, West Refuge Island**	$54,892.44	
*These calculations assume the median is built on existing surface. *Ped Refuge Median material is concrete	**Proposed Median - East**					
	Concrete	SY	3080	$200.00	$616,000.00	
	DWS	SF	40	$0.00	$0.00	
	Curb & Gutter	LF	786	$0.00	$0.00	
*Assume no signage is needed since this is a signalized intersection				**Total, East Refuge Island**	$616,000.00	
*Assume no updates needed to crosswalk markings				**Total, Two Refuge Islands**	**$671,000.00**	

Project Cost Estimates

Assumptions/Notes

*In example intersection, there is not enough ROW to setback SUP 15-20' and still provide a smooth taper for the SUP setback

*Assume public ROW is available and no acquisition required

*Assumed dimensions for example intersection

*Earthwork: Demo area not including existing SUP

*Assume existing curb ramp is 10' wide, 7' long ramp

*Assume crosswalk bars are same width as SUP.

Countermeasure Quantities

Setback Shared Use Path (north side crossing)

	Unit	Quantity	Unit Cost	Total cost
Demo of Existing SUP				
Demo Along Main Roadway	FT	50		
Proposed SUP Setback	FT	20		
Existing SUP width	FT	10		
Proposed SUP width	FT	10		
Demo Along Side Street	FT	30		
Demo Area	SY	166.7		
Existing Median Width	FT	10.0		
Concrete Removal	SY	55.56	$85.00	$4,722.22
Earthwork (6" thick)	CY	18.52	$40.00	$740.74
Removal of Curb Ramps	SY	7.78	$45.00	$350.00
Removal of Curb and Gutter	LF	10	$20.00	$200.00
Concrete Removal - Existing Median	SY	17	$85.00	$1,416.67
			Total, one side	$6,012.96
Proposed SUP				
Concrete	SY	55.56	$170.00	$9,444.44
Sod	SF	111.11	$10.00	$1,111.11
Concrete Curb Ramp	SY	7.78	$300.00	$2,333.33
Curb and Gutter	LF	10	$68.00	$680.00
High Visibility Crosswalk bars (two-lane crossing)	SF	100.00	$15.00	$1,500.00
			Total, one side	$15,068.89
			TOTAL, both sides	**$43,000.00**

Reference Images

Example: Emerson St & E 128th Ave – north side of 128th Ave crossing Emerson Street

Benefit-Cost Analysis (BCA) Calculations

				Crash Costs with No Safety Countermeasures											Crash Costs WITH Safety Countermeasures																		
Recommendation Category	Countermeasure	Crash Modification Factor	Location	Fatalities	$1,778,000 / Person	Serious Injuries	$1,016,000 / Person	Minor Injuries	$221,000 / Person	Possible Injuries	$120,000 / Person	Property Damage Only	$17,000 / Crash	5-Year Crash Costs without Safety Countermeasures	Fatalities	$1,778,000 / Person	Serious Injuries	$1,016,000 / Person	Minor Injuries	$221,000 / Person	Possible Injuries	$120,000 / Person	Property Damage Only	$17,000 / Crash	5-Year Crash Costs WITH Safety Countermeasures	Annual Crash Costs, No Safety Countermeasures	Annual Crash Costs, WITH Safety Countermeasures	Annual Benefit WITH Countermeasure	Service Life (Years)	Total Project Benefit	Project Cost	Benefit / Cost	Notes
	Add 3-inch yellow retroreflective sheeting to signal backplates	0.85	E 128th Ave & Washington St	0	$ -	0	$ -	5	$ 1,105,000	9	$ 1,080,000	58	$ 986,000	$ 3,171,000	0.00	$ -	0.00	$ -	4.25	$ 939,250	7.65	$ 918,000	49.30	$ 838,100	$ 2,695,350	$ 634,200	$ 539,070	$ 95,130	10	$ 951,300	$ 8,250	115.3	
			E 84th Ave & Washington St	2	$ 3,556,000	2	$ 2,032,000	1	$ 221,000	20	$ 2,400,000	77	$ 1,309,000	$ 9,518,000	1.70	$ 3,022,600	1.70	$ 1,727,200	0.85	$ 187,850	17.00	$ 2,040,000	65.45	$ 1,112,650	$ 8,090,300	$ 1,903,600	$ 1,618,060	$ 285,540		$ 2,855,400	$ 8,250	346.1	
			E 104th Ave & Washington St	0	$ -	1	$ 1,016,000	5	$ 1,105,000	14	$ 1,680,000	85	$ 1,445,000	$ 5,246,000	0.00	$ -	0.85	$ 863,600	4.25	$ 939,250	11.90	$ 1,428,000	72.25	$ 1,228,250	$ 4,459,100	$ 1,049,200	$ 891,820	$ 157,380		$ 1,573,800	$ 8,250	190.8	
			Pennsylvania St & Washington Center Pkwy & Washington St	0	$ -	1	$ 1,016,000	3	$ 663,000	9	$ 1,080,000	17	$ 289,000	$ 3,048,000	0.00	$ -	0.85	$ 863,600	2.55	$ 563,550	7.65	$ 918,000	14.45	$ 245,650	$ 2,590,800	$ 609,600	$ 518,160	$ 91,440		$ 914,400	$ 8,250	110.8	
			E 120th Ave & Grant St	0	$ -	0	$ -	6	$ 1,326,000	7	$ 840,000	60	$ 1,020,000	$ 3,186,000	0.00	$ -	0.00	$ -	5.10	$ 1,127,100	5.95	$ 714,000	51.00	$ 867,000	$ 2,708,100	$ 637,200	$ 541,620	$ 95,580		$ 955,800	$ 8,250	115.9	
			Colorado Blvd & E 112th Ave	0	$ -	5	$ 5,080,000	4	$ 884,000	23	$ 2,760,000	52	$ 884,000	$ 9,608,000	0.00	$ -	4.25	$ 4,318,000	3.40	$ 751,400	19.55	$ 2,346,000	44.20	$ 751,400	$ 8,166,800	$ 1,921,600	$ 1,633,360	$ 288,240		$ 2,882,400	$ 8,250	349.4	
			Colorado Blvd & E 115th Ave	1	$ 1,778,000	4	$ 4,064,000	3	$ 663,000	5	$ 600,000	5	$ 85,000	$ 7,190,000	0.85	$ 1,511,300	3.40	$ 3,454,400	2.55	$ 563,550	4.25	$ 510,000	4.25	$ 72,250	$ 6,111,500	$ 1,438,000	$ 1,222,300	$ 215,700		$ 2,157,000	$ 8,250	261.5	
			Colorado Blvd & E 120th Ave	4	$ 7,112,000	4	$ 4,064,000	6	$ 1,326,000	32	$ 3,840,000	114	$ 1,938,000	$ 18,280,000	3.40	$ 6,045,200	3.40	$ 3,454,400	5.10	$ 1,127,100	27.20	$ 3,264,000	96.90	$ 1,647,300	$ 15,538,000	$ 3,656,000	$ 3,107,600	$ 548,400		$ 5,484,000	$ 8,250	664.7	
			Colorado Blvd & E 136th Ave	0	$ -	1	$ 1,016,000	7	$ 1,547,000	13	$ 1,560,000	44	$ 748,000	$ 4,871,000	0.00	$ -	0.85	$ 863,600	5.95	$ 1,314,950	11.05	$ 1,326,000	37.40	$ 635,800	$ 4,140,350	$ 974,200	$ 828,070	$ 146,130		$ 1,461,300	$ 8,250	177.1	
			Corona St & E 88th Ave	0	$ -	2	$ 2,032,000	0	$ -	9	$ 1,080,000	26	$ 442,000	$ 3,554,000	0.00	$ -	1.70	$ 1,727,200	0.00	$ -	7.65	$ 918,000	22.10	$ 375,700	$ 3,020,900	$ 710,800	$ 604,180	$ 106,620		$ 1,066,200	$ 8,250	129.2	
			E 144th Ave & Washington St	0	$ -	0	$ -	1	$ 221,000	9	$ 1,080,000	24	$ 408,000	$ 1,709,000	0.00	$ -	0.00	$ -	0.85	$ 187,850	7.65	$ 918,000	20.40	$ 346,800	$ 1,452,650	$ 341,800	$ 290,530	$ 51,270		$ 512,700	$ 8,250	62.1	
			E 88th Ave & Washington St	0	$ -	4	$ 4,064,000	2	$ 442,000	22	$ 2,640,000	91	$ 1,547,000	$ 8,693,000	0.00	$ -	3.40	$ 3,454,400	1.70	$ 375,700	18.70	$ 2,244,000	77.35	$ 1,314,950	$ 7,389,050	$ 1,738,600	$ 1,477,810	$ 260,790		$ 2,607,900	$ 8,250	316.1	
			Huron St & W 88th Ave	0	$ -	1	$ 1,016,000	6	$ 1,326,000	25	$ 3,000,000	37	$ 629,000	$ 5,971,000	0.00	$ -	0.85	$ 863,600	5.10	$ 1,127,100	21.25	$ 2,550,000	31.45	$ 534,650	$ 5,075,350	$ 1,194,200	$ 1,015,070	$ 179,130		$ 1,791,300	$ 8,250	217.1	
			Pecos St & W 88th Ave	0	$ -	0	$ -	3	$ 663,000	5	$ 600,000	23	$ 391,000	$ 1,654,000	0.00	$ -	0.00	$ -	2.55	$ 563,550	4.25	$ 510,000	19.55	$ 332,350	$ 1,405,900	$ 330,800	$ 281,180	$ 49,620		$ 496,200	$ 8,250	60.1	
			E 120th Ave & Pennsylvania St	0	$ -	1	$ 1,016,000	9	$ 1,989,000	14	$ 1,680,000	41	$ 697,000	$ 5,382,000	0.00	$ -	0.85	$ 863,600	7.65	$ 1,690,650	11.90	$ 1,428,000	34.85	$ 592,450	$ 4,574,700	$ 1,076,400	$ 914,940	$ 161,460		$ 1,614,600	$ 8,250	195.7	
			E 120th Ave & Washington St	0	$ -	0	$ -	8	$ 1,768,000	12	$ 1,440,000	64	$ 1,088,000	$ 4,296,000	0.00	$ -	0.00	$ -	6.80	$ 1,502,800	10.20	$ 1,224,000	54.40	$ 924,800	$ 3,651,600	$ 859,200	$ 730,320	$ 128,880		$ 1,288,800	$ 8,250	156.2	
			Thornton Pkwy & Washington St	2	$ 3,556,000	4	$ 4,064,000	4	$ 884,000	30	$ 3,600,000	98	$ 1,666,000	$ 13,770,000	1.70	$ 3,022,600	3.40	$ 3,454,400	3.40	$ 751,400	25.50	$ 3,060,000	83.30	$ 1,416,100	$ 11,704,500	$ 2,754,000	$ 2,340,900	$ 413,100		$ 4,131,000	$ 8,250	500.7	
			Grant St & E 102nd Ave	0	$ -	0	$ -	0	$ -	6	$ 720,000	18	$ 306,000	$ 1,026,000	0.00	$ -	0.00	$ -	0.00	$ -	5.10	$ 612,000	15.30	$ 260,100	$ 872,100	$ 205,200	$ 174,420	$ 30,780		$ 307,800	$ 8,250	37.3	
			E 144th Ave & Lincoln St	0	$ -	0	$ -	1	$ 221,000	8	$ 960,000	38	$ 646,000	$ 1,827,000	0.00	$ -	0.00	$ -	0.85	$ 187,850	6.80	$ 816,000	32.30	$ 549,100	$ 1,552,950	$ 365,400	$ 310,590	$ 54,810		$ 548,100	$ 8,250	66.4	
			E 128th Ave & Lafayette St	0	$ -	0	$ -	3	$ 663,000	5	$ 600,000	19	$ 323,000	$ 1,586,000	0.00	$ -	0.00	$ -	2.55	$ 563,550	4.25	$ 510,000	16.15	$ 274,550	$ 1,348,100	$ 317,200	$ 269,620	$ 47,580		$ 475,800	$ 8,250	57.7	
			Eppinger Blvd & Washington St	0	$ -	1	$ 1,016,000	0	$ -	7	$ 840,000	34	$ 578,000	$ 2,434,000	0.00	$ -	0.85	$ 863,600	0.00	$ -	5.95	$ 714,000	28.90	$ 491,300	$ 2,068,900	$ 486,800	$ 413,780	$ 73,020		$ 730,200	$ 8,250	88.5	
			Huron St & W Thornton Pkwy	0	$ -	2	$ 2,032,000	11	$ 2,431,000	29	$ 3,480,000	91	$ 1,547,000	$ 9,490,000	0.00	$ -	1.70	$ 1,727,200	9.35	$ 2,066,350	24.65	$ 2,958,000	77.35	$ 1,314,950	$ 8,066,500	$ 1,898,000	$ 1,613,300	$ 284,700		$ 2,847,000	$ 8,250	345.1	
			E 104th Ave & Riverdale Rd	0	$ -	2	$ 2,032,000	5	$ 1,105,000	9	$ 1,080,000	22	$ 374,000	$ 4,591,000	0.00	$ -	1.70	$ 1,727,200	4.25	$ 939,250	7.65	$ 918,000	18.70	$ 317,900	$ 3,902,350	$ 918,200	$ 780,470	$ 137,730		$ 1,377,300	$ 8,250	166.9	
			E 98th Ave & Grant St	0	$ -	1	$ 1,016,000	2	$ 442,000	11	$ 1,320,000	22	$ 374,000	$ 3,152,000	0.00	$ -	0.85	$ 863,600	1.70	$ 375,700	9.35	$ 1,122,000	18.70	$ 317,900	$ 2,679,200	$ 630,400	$ 535,840	$ 94,560		$ 945,600	$ 8,250	114.6	
			E 97th Ave & Grant St	0	$ -	0	$ -	6	$ 1,326,000	13	$ 1,560,000	26	$ 442,000	$ 3,328,000	0.00	$ -	0.00	$ -	5.10	$ 1,127,100	11.05	$ 1,326,000	22.10	$ 375,700	$ 2,828,800	$ 665,600	$ 565,760	$ 99,840		$ 998,400	$ 8,250	121.0	
			E 88th Ave & Pearl St	0	$ -	4	$ 4,064,000	9	$ 1,989,000	27	$ 3,240,000	45	$ 765,000	$ 10,058,000	0.00	$ -	3.40	$ 3,454,400	7.65	$ 1,690,650	22.95	$ 2,754,000	38.25	$ 650,250	$ 8,549,300	$ 2,011,600	$ 1,709,860	$ 301,740		$ 3,017,400	$ 8,250	365.7	
			Grant St & Thornton Pkwy	0	$ -	5	$ 5,080,000	16	$ 3,536,000	35	$ 4,200,000	89	$ 1,513,000	$ 14,329,000	0.00	$ -	4.25	$ 4,318,000	13.60	$ 3,005,600	29.75	$ 3,570,000	75.65	$ 1,286,050	$ 12,179,650	$ 2,865,800	$ 2,435,930	$ 429,870		$ 4,298,700	$ 8,250	521.1	
			Thornton Pkwy & Gale Blvd	0	$ -	0	$ -	4	$ 884,000	12	$ 1,440,000	22	$ 374,000	$ 2,698,000	0.00	$ -	0.00	$ -	3.40	$ 751,400	10.20	$ 1,224,000	18.70	$ 317,900	$ 2,293,300	$ 539,600	$ 458,660	$ 80,940		$ 809,400	$ 8,250	98.1	
			Colorado Blvd & E 160th Ave	1	$ 1,778,000	1	$ 1,016,000	9	$ 1,989,000	14	$ 1,680,000	24	$ 408,000	$ 6,871,000	0.85	$ 1,511,300	0.85	$ 863,600	7.65	$ 1,690,650	11.90	$ 1,428,000	20.40	$ 346,800	$ 5,840,350	$ 1,374,200	$ 1,168,070	$ 206,130		$ 2,061,300	$ 8,250	249.9	
			E 112th Ave & Holly St	0	$ -	0	$ -	0	$ -	3	$ 360,000	23	$ 391,000	$ 751,000	0.00	$ -	0.00	$ -	0.00	$ -	2.55	$ 306,000	19.55	$ 332,350	$ 638,350	$ 150,200	$ 127,670	$ 22,530		$ 225,300	$ 8,250	27.3	
			E 144th Ave & York St	0	$ -	1	$ 1,016,000	3	$ 663,000	12	$ 1,440,000	16	$ 272,000	$ 3,391,000	0.00	$ -	0.85	$ 863,600	2.55	$ 563,550	10.20	$ 1,224,000	13.60	$ 231,200	$ 2,882,350	$ 678,200	$ 576,470	$ 101,730		$ 1,017,300	$ 8,250	123.3	
			E 104th Ave & Irma Dr	0	$ -	0	$ -	3	$ 663,000	9	$ 1,080,000	31	$ 527,000	$ 2,270,000	0.00	$ -	0.00	$ -	2.55	$ 563,550	7.65	$ 918,000	26.35	$ 447,950	$ 1,929,500	$ 454,000	$ 385,900	$ 68,100		$ 681,000	$ 8,250	82.5	
			E 104th Ave & Fox Run Pkwy	0	$ -	1	$ 1,016,000	5	$ 1,105,000	13	$ 1,560,000	39	$ 663,000	$ 4,344,000	0.00	$ -	0.85	$ 863,600	4.25	$ 939,250	11.05	$ 1,326,000	33.15	$ 563,550	$ 3,692,400	$ 868,800	$ 738,480	$ 130,320		$ 1,303,200	$ 8,250	158.0	
			E 98th Ave & Washington St	1	$ 1,778,000	1	$ 1,016,000	7	$ 1,547,000	20	$ 2,400,000	47	$ 799,000	$ 7,540,000	0.85	$ 1,511,300	0.85	$ 863,600	5.95	$ 1,314,950	17.00	$ 2,040,000	39.95	$ 679,150	$ 6,409,000	$ 1,508,000	$ 1,281,800	$ 226,200		$ 2,262,000	$ 8,250	274.2	
			Thornton Pkwy & York St	0	$ -	2	$ 2,032,000	0	$ -	2	$ 240,000	12	$ 204,000	$ 2,476,000	0.00	$ -	1.70	$ 1,727,200	0.00	$ -	1.70	$ 204,000	10.20	$ 173,400	$ 2,104,600	$ 495,200	$ 420,920	$ 74,280		$ 742,800	$ 8,250	90.0	
			Colorado Blvd & E 100th Ave	0	$ -	3	$ 3,048,000	7	$ 1,547,000	26	$ 3,120,000	42	$ 714,000	$ 8,429,000	0.00	$ -	2.55	$ 2,590,800	5.95	$ 1,314,950	22.10	$ 2,652,000	35.70	$ 606,900	$ 7,164,650	$ 1,685,800	$ 1,432,930	$ 252,870		$ 2,528,700	$ 8,250	306.5	
			Colorado Blvd & E 121st Ave	0	$ -	0	$ -	4	$ 884,000	7	$ 840,000	27	$ 459,000	$ 2,183,000	0.00	$ -	0.00	$ -	3.40	$ 751,400	5.95	$ 714,000	22.95	$ 390,150	$ 1,855,550	$ 436,600	$ 371,110	$ 65,490		$ 654,900	$ 8,250	79.4	
			Quebec St & E 120th Ave	1	$ 1,778,000	2	$ 2,032,000	6	$ 1,326,000	13	$ 1,560,000	28	$ 476,000	$ 7,172,000	0.85	$ 1,511,300	1.70	$ 1,727,200	5.10	$ 1,127,100	11.05	$ 1,326,000	23.80	$ 404,600	$ 6,096,200	$ 1,434,400	$ 1,219,240	$ 215,160		$ 2,151,600	$ 8,250	260.8	
			E 120th Ave & Unnamed Rd (3900 120th Ave)	0	$ -	0	$ -	1	$ 221,000	11	$ 1,320,000	29	$ 493,000	$ 2,034,000	0.00	$ -	0.00	$ -	0.85	$ 187,850	9.35	$ 1,122,000	24.65	$ 419,050	$ 1,728,900	$ 406,800	$ 345,780	$ 61,020		$ 610,200	$ 8,250	74.0	
			Subtotal											**$ 211,127,000**											**$ 179,457,950**	**$ 42,225,400**	**$ 35,891,590**	**$ 6,333,810**		**$ 63,338,100**	**$ 321,750**	**196.9**	
	Install Flashing Beacons as Advance Warning	0.7	E 104th Ave & Riverdale Rd	0	$ -	2	$ 2,032,000	5	$ 1,105,000	9	$ 1,080,000	22	$ 374,000	$ 4,591,000	0.00	$ -	1.40	$ 1,422,400	3.50	$ 773,500	6.30	$ 756,000	15.40	$ 261,800	$ 3,213,700	$ 918,200	$ 642,740	$ 275,460	8	$ 2,203,680	$ 11,250	195.9	Cost assumes implementation on one approach
			Colorado Blvd & E 160th Ave	1	$ 1,778,000	1	$ 1,016,000	9	$ 1,989,000	14	$ 1,680,000	24	$ 408,000	$ 6,871,000	0.70	$ 1,244,600	0.70	$ 711,200	6.30	$ 1,392,300	9.80	$ 1,176,000	16.80	$ 285,600	$ 4,809,700	$ 1,374,200	$ 961,940	$ 412,260		$ 3,298,080	$ 11,250	293.2	
			E 112th Ave & Holly St	0	$ -	0	$ -	0	$ -	3	$ 360,000	23	$ 391,000	$ 751,000	0.00	$ -	0.00	$ -	0.00	$ -	2.10	$ 252,000	16.10	$ 273,700	$ 525,700	$ 150,200	$ 105,140	$ 45,060		$ 360,480	$ 11,250	32.0	
			E 144th Ave & York St	0	$ -	1	$ 1,016,000	3	$ 663,000	12	$ 1,440,000	16	$ 272,000	$ 3,391,000	0.00	$ -	0.70	$ 711,200	2.10	$ 464,100	8.40	$ 1,008,000	11.20	$ 190,400	$ 2,373,700	$ 678,200	$ 474,740	$ 203,460		$ 1,627,680	$ 11,250	144.7	
			Quebec St & E 120th Ave	1	$ 1,778,000	2	$ 2,032,000	6	$ 1,326,000	13	$ 1,560,000	28	$ 476,000	$ 7,172,000	0.70	$ 1,244,600	1.40	$ 1,422,400	4.20	$ 928,200	9.10	$ 1,092,000	19.60	$ 333,200	$ 5,020,400	$ 1,434,400	$ 1,004,080	$ 430,320		$ 3,442,560	$ 11,250	306.0	
			Subtotal											**$ 22,776,000**											**$ 15,943,200**	**$ 4,555,200**	**$ 3,188,640**	**$ 1,366,560**		**$ 10,932,480**	**$ 56,250**	**194.4**	
	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	0.85	E 128th Ave & Washington St	0	$ -	0	$ -	5	$ 1,105,000	9	$ 1,080,000	58	$ 986,000	$ 3,171,000	0.00	$ -	0.00	$ -	4.25	$ 939,250	7.65	$ 918,000	49.30	$ 838,100	$ 2,695,350	$ 634,200	$ 539,070	$ 95,130	10	$ 951,300	$1,100	864.8	For greatest benefit, apply to multiple signals along a corridor
			E 84th Ave & Washington St	2	$ 3,556,000	2	$ 2,032,000	1	$ 221,000	20	$ 2,400,000	77	$ 1,309,000	$ 9,518,000	1.70	$ 3,022,600	1.70	$ 1,727,200	0.85	$ 187,850	17.00	$ 2,040,000	65.45	$ 1,112,650	$ 8,090,300	$ 1,903,600	$ 1,618,060	$ 285,540		$ 2,855,400	$1,100	2595.8	
			E 104th Ave & Washington St	0	$ -	1	$ 1,016,000	5	$ 1,105,000	14	$ 1,680,000	85	$ 1,445,000	$ 5,246,000	0.00	$ -	0.85	$ 863,600	4.25	$ 939,250	11.90	$ 1,428,000	72.25	$ 1,228,250	$ 4,459,100	$ 1,049,200	$ 891,820	$ 157,380		$ 1,573,800	$1,100	1430.7	
			Pennsylvania St & Washington Center Pkwy & Washington St	0	$ -	1	$ 1,016,000	3	$ 663,000	9	$ 1,080,000	17	$ 289,000	$ 3,048,000	0.00	$ -	0.85	$ 863,600	2.55	$ 563,550	7.65	$ 918,000	14.45	$ 245,650	$ 2,590,800	$ 609,600	$ 518,160	$ 91,440		$ 914,400	$1,100	831.3	
			E 120th Ave & Grant St	0	$ -	0	$ -	6	$ 1,326,000	7	$ 840,000	60	$ 1,020,000	$ 3,186,000	0.00	$ -	0.00	$ -	5.10	$ 1,127,100	5.95	$ 714,000	51.00	$ 867,000	$ 2,708,100	$ 637,200	$ 541,620	$ 95,580		$ 955,800	$1,100	868.9	
			Colorado Blvd & E 112th Ave	0	$ -	5	$ 5,080,000	4	$ 884,000	23	$ 2,760,000	52	$ 884,000	$ 9,608,000	0.00	$ -	4.25	$ 4,318,000	3.40	$ 751,400	19.55	$ 2,346,000	44.20	$ 751,400	$ 8,166,800	$ 1,921,600	$ 1,633,360	$ 288,240		$ 2,882,400	$1,100	2620.4	
			Colorado Blvd & E 115th Ave	1	$ 1,778,000	4	$ 4,064,000	3	$ 663,000	5	$ 600,000	5	$ 85,000	$ 7,190,000	0.85	$ 1,511,300	3.40	$ 3,454,400	2.55	$ 563,550	4.25	$ 510,000	4.25	$ 72,250	$ 6,111,500	$ 1,438,000	$ 1,222,300	$ 215,700		$ 2,157,000	$1,100	1960.9	
			Colorado Blvd & E 120th Ave	4	$ 7,112,000	4	$ 4,064,000	6	$ 1,326,000	32	$ 3,840,000	114	$ 1,938,000	$ 18,280,000	3.40	$ 6,045,200	3.40	$ 3,454,400	5.10	$ 1,127,100	27.20	$ 3,264,000	96.90	$ 1,647,300	$ 15,538,000	$ 3,656,000	$ 3,107,600	$ 548,400		$ 5,484,000	$1,100	4985.5	
			Colorado Blvd & E 136th Ave	0	$ -	1	$ 1,016,000	7	$ 1,547,000	13	$ 1,560,000	44	$ 748,000	$ 4,871,000	0.00	$ -	0.85	$ 863,600	5.95	$ 1,314,950	11.05	$ 1,326,000	37.40	$ 635,800	$ 4,140,350	$ 974,200	$ 828,070	$ 146,130		$ 1,461,300	$1,100	1328.5	
			Corona St & E 88th Ave	0	$ -	2	$ 2,032,000	0	$ -	9	$ 1,080,000	26	$ 442,000	$ 3,554,000	0.00	$ -	1.70	$ 1,727,200	0.00	$ -	7.65	$ 918,000	22.10	$ 375,700	$ 3,020,900	$ 710,800	$ 604,180	$ 106,620		$ 1,066,200	$1,100	969.3	
			E 144th Ave & Washington St	0	$ -	0	$ -	1	$ 221,000	9	$ 1,080,000	24	$ 408,000	$ 1,709,000	0.00	$ -	0.00	$ -	0.85	$ 187,850	7.65	$ 918,000	20.40	$ 346,800	$ 1,452,650	$ 341,800	$ 290,530	$ 51,270		$ 512,700	$1,100	466.1	
			E 88th Ave & Washington St	0	$ -	4	$ 4,064,000	2	$ 442,000	22	$ 2,640,000	91	$ 1,547,000	$ 8,693,000	0.00	$ -	3.40	$ 3,454,400	1.70	$ 375,700	18.70	$ 2,244,000	77.35	$ 1,314,950	$ 7,389,050	$ 1,738,600	$ 1,477,810	$ 260,790		$ 2,607,900	$1,100	2370.8	
			Huron St & W 88th Ave	0	$ -	1	$ 1,016,000	6	$ 1,326,000	25	$ 3,000,000	37	$ 629,000	$ 5,971,000	0.00	$ -	0.85	$ 863,600	5.10	$ 1,127,100	21.25	$ 2,550,000	31.45	$ 534,650	$ 5,075,350	$ 1,194,200	$ 1,015,070	$ 179,130		$ 1,791,300	$1,100	1628.5	
			Pecos St & W 88th Ave	0	$ -	0	$ -	3	$ 663,000	5	$ 600,000	23	$ 391,000	$ 1,654,000	0.00	$ -	0.00	$ -	2.55	$ 563,550	4.25	$ 510,000	19.55	$ 332,350	$ 1,405,900	$ 330,800	$ 281,180	$ 49,620		$ 496,200	$1,100	451.1	
			E 120th Ave & Pennsylvania St	0	$ -	1	$ 1,016,000	9	$ 1,989,000	14	$ 1,680,000	41	$ 697,000	$ 5,382,000	0.00	$ -	0.85	$ 863,600	7.65	$ 1,690,650	11.90	$ 1,428,000	34.85	$ 592,450	$ 4,574,700	$ 1,076,400	$ 914,940	$ 161,460		$ 1,614,600	$1,100	1467.8	
			E 120th Ave & Washington St	0	$ -	0	$ -	8	$ 1,768,000	12	$ 1,440,000	64	$ 1,088,000	$ 4,296,000	0.00	$ -	0.00	$ -	6.80	$ 1,502,800	10.20	$ 1,224,000	54.40	$ 924,800	$ 3,651,600	$ 859,200	$ 730,320	$ 128,880		$ 1,288,800	$1,100	1171.6	
			Thornton Pkwy & Washington St	2	$ 3,556,000	4	$ 4,064,000	4	$ 884,000	30	$ 3,600,000	98	$ 1,666,000	$ 13,770,000	1.70	$ 3,022,600	3.40	$ 3,454,400	3.40	$ 751,400	25.50	$ 3,060,000	83.30	$ 1,416,100	$ 11,704,500	$ 2,754,000	$ 2,340,900	$ 413,100		$ 4,131,000	$1,100	3755.5	
			Grant St & E 102nd Ave	0	$ -	0	$ -	0	$ -	6	$ 720,000	18	$ 306,000	$ 1,026,000	0.00	$ -	0.00	$ -	0.00	$ -	5.10	$ 612,000	15.30	$ 260,100	$ 872,100	$ 205,200	$ 174,420	$ 30,780		$ 307,800	$1,100	279.8	
			E 144th Ave & Lincoln St	0	$ -	0	$ -	1	$ 221,000	8	$ 960,000	38	$ 646,000	$ 1,827,000	0.00	$ -	0.00	$ -	0.85	$ 187,850	6.80	$ 816,000	32.30	$ 549,100	$ 1,552,950	$ 365,400	$ 310,590	$ 54,810		$ 548,100	$1,100	498.3	
			E 128th Ave & Lafayette St	0	$ -	0	$ -	3	$ 663,000	5	$ 600,000	19	$ 323,000	$ 1,586,000	0.00	$ -	0.00	$ -	2.55	$ 563,550	4.25	$ 510,000	16.15	$ 274,550	$ 1,348,100	$ 317,200	$ 269,620	$ 47,580		$ 475,800	$1,100	432.5	
			Eppinger Blvd & Washington St	0	$ -	1	$ 1,016,000	0	$ -	7	$ 840,000	34	$ 578,000	$ 2,434,000	0.00	$ -	0.85	$ 863,600	0.00	$ -	5.95	$ 714,000	28.90	$ 491,300	$ 2,068,900	$ 486,800	$ 413,780	$ 73,020		$ 730,200	$1,100	663.8	
			Huron St & W Thornton Pkwy	0	$ -	2	$ 2,032,000	11	$ 2,431,000	29	$ 3,480,000	91	$ 1,547,000	$ 9,490,000	0.00	$ -	1.70	$ 1,727,200	9.35	$ 2,066,350	24.65	$ 2,958,000	77.35	$ 1,314,950	$ 8,066,500	$ 1,898,000	$ 1,613,300	$ 284,700		$ 2,847,000	$1,100	2588.2	
			E 104th Ave & Riverdale Rd	0	$ -	2	$ 2,032,000	5	$ 1,105,000	9	$ 1,080,000	22	$ 374,000	$ 4,591,000	0.00	$ -	1.70	$ 1,727,200	4.25	$ 939,250	7.65	$ 918,000	18.70	$ 317,900	$ 3,902,350	$ 918,200	$ 780,470	$ 137,730		$ 1,377,300	$1,100	1252.1	
			E 98th Ave & Grant St	0	$ -	1	$ 1,016,000	2	$ 442,000	11	$ 1,320,000	22	$ 374,000	$ 3,152,000	0.00	$ -	0.85	$ 863,600	1.70	$ 375,700	9.35	$ 1,122,000	18.70	$ 317,900	$ 2,679,200	$ 630,400	$ 535,840	$ 94,560		$ 945,600	$1,100	859.6	
			E 97th Ave & Grant St	0	$ -	0	$ -	6	$ 1,326,000	13	$ 1,560,000	26	$ 442,000	$ 3,328,000	0.00	$ -	0.00	$ -	5.10	$ 1,127,100	11.05	$ 1,326,000	22.10	$ 375,700	$ 2,828,800	$ 665,600	$ 565,760	$ 99,840		$ 998,400	$1,100	907.6	
			E 88th Ave & Pearl St	0	$ -	4	$ 4,064,000	9	$ 1,989,000	27	$ 3,240,000	45	$ 765,000	$ 10,058,000	0.00	$ -	3.40	$ 3,454,400	7.65	$ 1,690,650	22.95	$ 2,754,000	38.25	$ 650,250	$ 8,549,300	$ 2,011,600	$ 1,709,860	$ 301,740		$ 3,017,400	$1,100	2743.1	
			Grant St & Thornton Pkwy	0	$ -	5	$ 5,080,000	16	$ 3,536,000	35	$ 4,200,000	89	$ 1,513,000	$ 14,329,000	0.00	$ -	4.25	$ 4,318,000	13.60	$ 3,005,600	29.75	$ 3,570,000	75.65	$ 1,286,050	$ 12,179,650	$ 2,865,800	$ 2,435,930	$ 429,870		$ 4,298,700	$1,100	3907.9	
			Thornton Pkwy & Gale Blvd	0	$ -	0	$ -	4	$ 884,000	12	$ 1,440,000	22	$ 374,000	$ 2,698,000	0.00	$ -	0.00	$ -	3.40	$ 751,400	10.20	$ 1,224,000	18.70	$ 317,900	$ 2,293,300	$ 539,600	$ 458,660	$ 80,940		$ 809,400	$1,100	735.8	
			Colorado Blvd & E 160th Ave	1	$ 1,778,000	1	$ 1,016,000	9	$ 1,989,000	14	$ 1,680,000	24	$ 408,000	$ 6,871,000	0.85	$ 1,511,300	0.85	$ 863,600	7.65	$ 1,690,650	11.90	$ 1,428,000	20.40	$ 346,800	$ 5,840,350	$ 1,374,200	$ 1,168,070	$ 206,130		$ 2,061,300	$1,100	1873.9	
			E 112th Ave & Holly St	0	$ -	0	$ -	0	$ -	3	$ 360,000	23	$ 391,000	$ 751,000	0.00	$ -	0.00	$ -	0.00	$ -	2.55	$ 306,000	19.55	$ 332,350	$ 638,350	$ 150,200	$ 127,670	$ 22,530		$ 225,300	$1,100	204.8	
			E 144th Ave & York St	0	$ -	1	$ 1,016,000	3	$ 663,000	12	$ 1,440,000	16	$ 272,000	$ 3,391,000	0.00	$ -	0.85	$ 863,600	2.55	$ 563,550	10.20	$ 1,224,000	13.60	$ 231,200	$ 2,882,350	$ 678,200	$ 576,470	$ 101,730		$ 1,017,300	$1,100	924.8	
			E 104th Ave & Irma Dr	0	$ -	0	$ -	3	$ 663,000	9	$ 1,080,000	31	$ 527,000	$ 2,270,000	0.00	$ -	0.00	$ -	2.55	$ 563,550	7.65	$ 918,000	26.35	$ 447,950	$ 1,929,500	$ 454,000	$ 385,900	$ 68,100		$ 681,000	$1,100	619.1	
			E 104th Ave & Fox Run Pkwy	0	$ -	1	$ 1,016,000	5	$ 1,105,000	13	$ 1,560,000	39	$ 663,000	$ 4,344,000	0.00	$ -	0.85	$ 863,600	4.25	$ 939,250	11.05	$ 1,326,000	33.15	$ 563,550	$ 3,692,400	$ 868,800	$ 738,480	$ 130,320		$ 1,303,200	$1,100	1184.7	
es			E 98th Ave & Washington St	1	$ 1,778,000	1	$ 1,016,000	7	$ 1,547,000	20	$ 2,400,000	47	$ 799,000	$ 7,540,000	0.85	$ 1,511,300	0.85	$ 863,600	5.95	$ 1,314,950	17.00	$ 2,040,000	39.95	$ 679,150	$ 6,409,000	$ 1,508,000	$ 1,281,800	$ 226,200		$ 2,262,000	$1,100	2056.4	

Benefit-Cost Analysis (BCA) Calculations

Recommendation Category	Countermeasure	Crash Modification Factor	Location	Fatalities	$1,778,000 / Person	Serious Injuries	$1,016,000 / Person	Minor Injuries	$221,000 / Person	Possible Injuries	$120,000 / Person	Property Damage Only	$17,000 / Crash	5-Year Crash Costs without Safety Countermeasures	Fatalities	$1,778,000 / Person	Serious Injuries	$1,016,000 / Person	Minor Injuries	$221,000 / Person	Possible Injuries	$120,000 / Person	Property Damage Only	$17,000 / Crash	5-Year Crash Costs WITH Safety Countermeasures	Annual Crash Costs, No Safety Countermeasures	Annual Crash Costs, WITH Safety Countermeasures	Annual Benefit WITH Countermeasure	Service Life (Years)	Total Project Benefit	Project Cost	Benefit / Cost	Notes
				Crash Costs with No Safety Countermeasures											Crash Costs WITH Safety Countermeasures																		
Red-Light Running Countermeasur			Thornton Pkwy & York St	0	$ -	2	$2,032,000	0	$ -	2	$240,000	12	$204,000	$2,476,000	0.00	$ -	1.70	$1,727,200	0.00	$ -	1.70	$204,000	10.20	$173,400	$2,104,600	$495,200	$420,920	$74,280		$742,800	$1,100	675.3	
			Colorado Blvd & E 100th Ave	0	$ -	3	$3,048,000	7	$1,547,000	26	$3,120,000	42	$714,000	$8,429,000	0.00	$ -	2.55	$2,590,800	5.95	$1,314,950	22.10	$2,652,000	35.70	$606,900	$7,164,650	$1,685,800	$1,432,930	$252,870		$2,528,700	$1,100	2298.8	
			Colorado Blvd & E 121st Ave	0	$ -	0	$ -	4	$884,000	7	$840,000	27	$459,000	$2,183,000	0.00	$ -	0.00	$ -	3.40	$751,400	5.95	$714,000	22.95	$390,150	$1,855,550	$436,600	$371,110	$65,490		$654,900	$1,100	595.4	
			Quebec St & E 120th Ave	1	$1,778,000	2	$2,032,000	6	$1,326,000	13	$1,560,000	28	$476,000	$7,172,000	0.85	$1,511,300	1.70	$1,727,200	5.10	$1,127,100	11.05	$1,326,000	23.80	$404,600	$6,096,200	$1,434,400	$1,219,240	$215,160		$2,151,600	$1,100	1956.0	
			E 120th Ave & Unnamed Rd (3900 120th Ave)	0	$ -	0	$ -	1	$221,000	11	$1,320,000	29	$493,000	$2,034,000	0.00	$ -	0.00	$ -	0.85	$187,850	9.35	$1,122,000	24.65	$419,050	$1,728,900	$406,800	$345,780	$61,020		$610,200	$1,100	554.7	
			Subtotal											**$211,127,000**											**$179,457,950**	**$42,225,400**	**$35,891,590**	**$6,333,810**		**$63,338,100**	**$42,900**	**1476.4**	
			E 128th Ave & Washington St	0	$ -	0	$ -	5	$1,105,000	9	$1,080,000	58	$986,000	$3,171,000	0.00	$ -	0.00	$ -	4.95	$1,093,950	8.91	$1,069,200	57.42	$976,140	$3,139,290	$634,200	$627,858	$6,342		$63,420	$1,100	57.7	
			E 84th Ave & Washington St	2	$3,556,000	2	$2,032,000	1	$221,000	20	$2,400,000	77	$1,309,000	$9,518,000	1.98	$3,520,440	1.98	$2,011,680	0.99	$218,790	19.80	$2,376,000	76.23	$1,295,910	$9,422,820	$1,903,600	$1,884,564	$19,036		$190,360	$1,100	173.1	
			E 104th Ave & Washington St	0	$ -	1	$1,016,000	5	$1,105,000	14	$1,680,000	85	$1,445,000	$5,246,000	0.00	$ -	0.99	$1,005,840	4.95	$1,093,950	13.86	$1,663,200	84.15	$1,430,550	$5,193,540	$1,049,200	$1,038,708	$10,492		$104,920	$1,100	95.4	
			Pennsylvania St & Washington Center Pkwy & Washington St	0	$ -	1	$1,016,000	3	$663,000	9	$1,080,000	17	$289,000	$3,048,000	0.00	$ -	0.99	$1,005,840	2.97	$656,370	8.91	$1,069,200	16.83	$286,110	$3,017,520	$609,600	$603,504	$6,096		$60,960	$1,100	55.4	
			E 120th Ave & Grant St	0	$ -	0	$ -	6	$1,326,000	7	$840,000	60	$1,020,000	$3,186,000	0.00	$ -	0.00	$ -	5.94	$1,312,740	6.93	$831,600	59.40	$1,009,800	$3,154,140	$637,200	$630,828	$6,372		$63,720	$1,100	57.9	
			Colorado Blvd & E 112th Ave	0	$ -	5	$5,080,000	4	$884,000	23	$2,760,000	52	$884,000	$9,608,000	0.00	$ -	4.95	$5,029,200	3.96	$875,160	22.77	$2,732,400	51.48	$875,160	$9,511,920	$1,921,600	$1,902,384	$19,216		$192,160	$1,100	174.7	
			Colorado Blvd & E 115th Ave	1	$1,778,000	4	$4,064,000	3	$663,000	5	$600,000	5	$85,000	$7,190,000	0.99	$1,760,220	3.96	$4,023,360	2.97	$656,370	4.95	$594,000	4.95	$84,150	$7,118,100	$1,438,000	$1,423,620	$14,380		$143,800	$1,100	130.7	
			Colorado Blvd & E 120th Ave	4	$7,112,000	4	$4,064,000	6	$1,326,000	32	$3,840,000	114	$1,938,000	$18,280,000	3.96	$7,040,880	3.96	$4,023,360	5.94	$1,312,740	31.68	$3,801,600	112.86	$1,918,620	$18,097,200	$3,656,000	$3,619,440	$36,560		$365,600	$1,100	332.4	
			Colorado Blvd & E 136th Ave	0	$ -	1	$1,016,000	7	$1,547,000	13	$1,560,000	44	$748,000	$4,871,000	0.00	$ -	0.99	$1,005,840	6.93	$1,531,530	12.87	$1,544,400	43.56	$740,520	$4,822,290	$974,200	$964,458	$9,742		$97,420	$1,100	88.6	
			Corona St & E 88th Ave	0	$ -	2	$2,032,000	0	$ -	9	$1,080,000	26	$442,000	$3,554,000	0.00	$ -	1.98	$2,011,680	0.00	$ -	8.91	$1,069,200	25.74	$437,580	$3,518,460	$710,800	$703,692	$7,108		$71,080	$1,100	64.6	
			E 144th Ave & Washington St	0	$ -	0	$ -	1	$221,000	9	$1,080,000	24	$408,000	$1,709,000	0.00	$ -	0.00	$ -	0.99	$218,790	8.91	$1,069,200	23.76	$403,920	$1,691,910	$341,800	$338,382	$3,418		$34,180	$1,100	31.1	
			E 88th Ave & Washington St	0	$ -	4	$4,064,000	2	$442,000	22	$2,640,000	91	$1,547,000	$8,693,000	0.00	$ -	3.96	$4,023,360	1.98	$437,580	21.78	$2,613,600	90.09	$1,531,530	$8,606,070	$1,738,600	$1,721,214	$17,386		$173,860	$1,100	158.1	
			Huron St & W 88th Ave	0	$ -	1	$1,016,000	6	$1,326,000	25	$3,000,000	37	$629,000	$5,971,000	0.00	$ -	0.99	$1,005,840	5.94	$1,312,740	24.75	$2,970,000	36.63	$622,710	$5,911,290	$1,194,200	$1,182,258	$11,942		$119,420	$1,100	108.6	
			Pecos St & W 88th Ave	0	$ -	0	$ -	3	$663,000	5	$600,000	23	$391,000	$1,654,000	0.00	$ -	0.00	$ -	2.97	$656,370	4.95	$594,000	22.77	$387,090	$1,637,460	$330,800	$327,492	$3,308		$33,080	$1,100	30.1	
			E 120th Ave & Pennsylvania St	0	$ -	1	$1,016,000	9	$1,989,000	14	$1,680,000	41	$697,000	$5,382,000	0.00	$ -	0.99	$1,005,840	8.91	$1,969,110	13.86	$1,663,200	40.59	$690,030	$5,328,180	$1,076,400	$1,065,636	$10,764		$107,640	$1,100	97.9	
			E 120th Ave & Washington St	0	$ -	0	$ -	8	$1,768,000	12	$1,440,000	64	$1,088,000	$4,296,000	0.00	$ -	0.00	$ -	7.92	$1,750,320	11.88	$1,425,600	63.36	$1,077,120	$4,253,040	$859,200	$850,608	$8,592		$85,920	$1,100	78.1	
			Thornton Pkwy & Washington St	2	$3,556,000	4	$4,064,000	4	$884,000	30	$3,600,000	98	$1,666,000	$13,770,000	1.98	$3,520,440	3.96	$4,023,360	3.96	$875,160	29.70	$3,564,000	97.02	$1,649,340	$13,632,300	$2,754,000	$2,726,460	$27,540		$275,400	$1,100	250.4	
			Grant St & E 102nd Ave	0	$ -	0	$ -	0	$ -	6	$720,000	18	$306,000	$1,026,000	0.00	$ -	0.00	$ -	0.00	$ -	5.94	$712,800	17.82	$302,940	$1,015,740	$205,200	$203,148	$2,052		$20,520	$1,100	18.7	
			E 144th Ave & Lincoln St	0	$ -	0	$ -	1	$221,000	8	$960,000	38	$646,000	$1,827,000	0.00	$ -	0.00	$ -	0.99	$218,790	7.92	$950,400	37.62	$639,540	$1,808,730	$365,400	$361,746	$3,654		$36,540	$1,100	33.2	
			E 128th Ave & Lafayette St	0	$ -	0	$ -	3	$663,000	5	$600,000	19	$323,000	$1,586,000	0.00	$ -	0.00	$ -	2.97	$656,370	4.95	$594,000	18.81	$319,770	$1,570,140	$317,200	$314,028	$3,172		$31,720	$1,100	28.8	
	Increase yellow interval and all-red interval	0.99	Eppinger Blvd & Washington St	0	$ -	1	$1,016,000	0	$ -	7	$840,000	34	$578,000	$2,434,000	0.00	$ -	0.99	$1,005,840	0.00	$ -	6.93	$831,600	33.66	$572,220	$2,409,660	$486,800	$481,932	$4,868	10	$48,680	$1,100	44.3	
			Huron St & W Thornton Pkwy	0	$ -	2	$2,032,000	11	$2,431,000	29	$3,480,000	91	$1,547,000	$9,490,000	0.00	$ -	1.98	$2,011,680	10.89	$2,406,690	28.71	$3,445,200	90.09	$1,531,530	$9,395,100	$1,898,000	$1,879,020	$18,980		$189,800	$1,100	172.5	
			E 104th Ave & Riverdale Rd	0	$ -	2	$2,032,000	5	$1,105,000	9	$1,080,000	22	$374,000	$4,591,000	0.00	$ -	1.98	$2,011,680	4.95	$1,093,950	8.91	$1,069,200	21.78	$370,260	$4,545,090	$918,200	$909,018	$9,182		$91,820	$1,100	83.5	
			E 98th Ave & Grant St	0	$ -	1	$1,016,000	2	$442,000	11	$1,320,000	22	$374,000	$3,152,000	0.00	$ -	0.99	$1,005,840	1.98	$437,580	10.89	$1,306,800	21.78	$370,260	$3,120,480	$630,400	$624,096	$6,304		$63,040	$1,100	57.3	
			E 97th Ave & Grant St	0	$ -	0	$ -	6	$1,326,000	13	$1,560,000	26	$442,000	$3,328,000	0.00	$ -	0.00	$ -	5.94	$1,312,740	12.87	$1,544,400	25.74	$437,580	$3,294,720	$665,600	$658,944	$6,656		$66,560	$1,100	60.5	
			E 88th Ave & Pearl St	0	$ -	4	$4,064,000	9	$1,989,000	27	$3,240,000	45	$765,000	$10,058,000	0.00	$ -	3.96	$4,023,360	8.91	$1,969,110	26.73	$3,207,600	44.55	$757,350	$9,957,420	$2,011,600	$1,991,484	$20,116		$201,160	$1,100	182.9	
			Grant St & Thornton Pkwy	0	$ -	5	$5,080,000	16	$3,536,000	35	$4,200,000	89	$1,513,000	$14,329,000	0.00	$ -	4.95	$5,029,200	15.84	$3,500,640	34.65	$4,158,000	88.11	$1,497,870	$14,185,710	$2,865,800	$2,837,142	$28,658		$286,580	$1,100	260.5	
			Thornton Pkwy & Gale Blvd	0	$ -	0	$ -	4	$884,000	12	$1,440,000	22	$374,000	$2,698,000	0.00	$ -	0.00	$ -	3.96	$875,160	11.88	$1,425,600	21.78	$370,260	$2,671,020	$539,600	$534,204	$5,396		$53,960	$1,100	49.1	
			Colorado Blvd & E 160th Ave	1	$1,778,000	1	$1,016,000	9	$1,989,000	14	$1,680,000	24	$408,000	$6,871,000	0.99	$1,760,220	0.99	$1,005,840	8.91	$1,969,110	13.86	$1,663,200	23.76	$403,920	$6,802,290	$1,374,200	$1,360,458	$13,742		$137,420	$1,100	124.9	
			E 112th Ave & Holly St	0	$ -	0	$ -	0	$ -	3	$360,000	23	$391,000	$751,000	0.00	$ -	0.00	$ -	0.00	$ -	2.97	$356,400	22.77	$387,090	$743,490	$150,200	$148,698	$1,502		$15,020	$1,100	13.7	
			E 144th Ave & York St	0	$ -	1	$1,016,000	3	$663,000	12	$1,440,000	16	$272,000	$3,391,000	0.00	$ -	0.99	$1,005,840	2.97	$656,370	11.88	$1,425,600	15.84	$269,280	$3,357,090	$678,200	$671,418	$6,782		$67,820	$1,100	61.7	
			E 104th Ave & Irma Dr	0	$ -	0	$ -	3	$663,000	9	$1,080,000	31	$527,000	$2,270,000	0.00	$ -	0.00	$ -	2.97	$656,370	8.91	$1,069,200	30.69	$521,730	$2,247,300	$454,000	$449,460	$4,540		$45,400	$1,100	41.3	
			E 104th Ave & Fox Run Pkwy	0	$ -	1	$1,016,000	5	$1,105,000	13	$1,560,000	39	$663,000	$4,344,000	0.00	$ -	0.99	$1,005,840	4.95	$1,093,950	12.87	$1,544,400	38.61	$656,370	$4,300,560	$868,800	$860,112	$8,688		$86,880	$1,100	79.0	
			E 98th Ave & Washington St	1	$1,778,000	1	$1,016,000	7	$1,547,000	20	$2,400,000	47	$799,000	$7,540,000	0.99	$1,760,220	0.99	$1,005,840	6.93	$1,531,530	19.80	$2,376,000	46.53	$791,010	$7,464,600	$1,508,000	$1,492,920	$15,080		$150,800	$1,100	137.1	
			Thornton Pkwy & York St	0	$ -	2	$2,032,000	0	$ -	2	$240,000	12	$204,000	$2,476,000	0.00	$ -	1.98	$2,011,680	0.00	$ -	1.98	$237,600	11.88	$201,960	$2,451,240	$495,200	$490,248	$4,952		$49,520	$1,100	45.0	
			Colorado Blvd & E 100th Ave	0	$ -	3	$3,048,000	7	$1,547,000	26	$3,120,000	42	$714,000	$8,429,000	0.00	$ -	2.97	$3,017,520	6.93	$1,531,530	25.74	$3,088,800	41.58	$706,860	$8,344,710	$1,685,800	$1,668,942	$16,858		$168,580	$1,100	153.3	
			Colorado Blvd & E 121st Ave	0	$ -	0	$ -	4	$884,000	7	$840,000	27	$459,000	$2,183,000	0.00	$ -	0.00	$ -	3.96	$875,160	6.93	$831,600	26.73	$454,410	$2,161,170	$436,600	$432,234	$4,366		$43,660	$1,100	39.7	
			Quebec St & E 120th Ave	1	$1,778,000	2	$2,032,000	6	$1,326,000	13	$1,560,000	28	$476,000	$7,172,000	0.99	$1,760,220	1.98	$2,011,680	5.94	$1,312,740	12.87	$1,544,400	27.72	$471,240	$7,100,280	$1,434,400	$1,420,056	$14,344		$143,440	$1,100	130.4	
			E 120th Ave & Unnamed Rd (3900 120th Ave)	0	$ -	0	$ -	1	$221,000	11	$1,320,000	29	$493,000	$2,034,000	0.00	$ -	0.00	$ -	0.99	$218,790	10.89	$1,306,800	28.71	$488,070	$2,013,660	$406,800	$402,732	$4,068		$40,680	$1,100	37.0	
			Subtotal											**$211,127,000**											**$209,015,730**	**$42,225,400**	**$41,803,146**	**$422,254**		**$4,222,540**	**$42,900**	**98.4**	
			E 128th Ave & Washington St	0	$ -	0	$ -	3	$663,000	1	$120,000	6	$102,000	$885,000	0.00	$ -	0.00	$ -	2.03	$448,188	0.68	$81,120	4.06	$68,952	$598,260	$177,000	$119,652	$57,348		$573,480	$288,000	2.0	
			E 84th Ave & Washington St	1	$1,778,000	0	$ -	1	$221,000	12	$1,440,000	16	$272,000	$3,711,000	0.68	$1,201,928	0.00	$ -	0.68	$149,396	8.11	$973,440	10.82	$183,872	$2,508,636	$742,200	$501,727	$240,473		$2,404,728	$288,000	8.3	
			E 104th Ave & Washington St	0	$ -	0	$ -	2	$442,000	6	$720,000	25	$425,000	$1,587,000	0.00	$ -	0.00	$ -	1.35	$298,792	4.06	$486,720	16.90	$287,300	$1,072,812	$317,400	$214,562	$102,838		$1,028,376	$288,000	3.6	
			Pennsylvania St & Washington Center Pkwy & Washington St	0	$ -	0	$ -	1	$221,000	5	$600,000	5	$85,000	$906,000	0.00	$ -	0.00	$ -	0.68	$149,396	3.38	$405,600	3.38	$57,460	$612,456	$181,200	$122,491	$58,709		$587,088	$288,000	2.0	
			E 120th Ave & Grant St	0	$ -	0	$ -	1	$221,000	2	$240,000	7	$119,000	$580,000	0.00	$ -	0.00	$ -	0.68	$149,396	1.35	$162,240	4.73	$80,444	$392,080	$116,000	$78,416	$37,584		$375,840	$288,000	1.3	
			Colorado Blvd & E 112th Ave	0	$ -	3	$3,048,000	3	$663,000	14	$1,680,000	23	$391,000	$5,782,000	0.00	$ -	2.03	$2,060,448	2.03	$448,188	9.46	$1,135,680	15.55	$264,316	$3,908,632	$1,156,400	$781,726	$374,674		$3,746,736	$288,000	13.0	
			Colorado Blvd & E 115th Ave	0	$ -	1	$1,016,000	0	$ -	1	$120,000	2	$34,000	$1,170,000	0.00	$ -	0.68	$686,816	0.00	$ -	0.68	$81,120	1.35	$22,984	$790,920	$234,000	$158,184	$75,816		$758,160	$288,000	2.6	
			Colorado Blvd & E 120th Ave	3	$5,334,000	1	$1,016,000	3	$663,000	16	$1,920,000	32	$544,000	$9,477,000	2.03	$3,605,784	0.68	$686,816	2.03	$448,188	10.82	$1,297,920	21.63	$367,744	$6,406,452	$1,895,400	$1,281,290	$614,110		$6,141,096	$288,000	21.3	
			Colorado Blvd & E 136th Ave	0	$ -	1	$1,016,000	4	$884,000	6	$720,000	12	$204,000	$2,824,000	0.00	$ -	0.68	$686,816	2.70	$597,584	4.06	$486,720	8.11	$137,904	$1,909,024	$564,800	$381,805	$182,995		$1,829,952	$288,000	6.4	
			Corona St & E 88th Ave	0	$ -	1	$1,016,000	0	$ -	5	$600,000	10	$170,000	$1,786,000	0.00	$ -	0.68	$686,816	0.00	$ -	3.38	$405,600	6.76	$114,920	$1,207,336	$357,200	$241,467	$115,733		$1,157,328	$288,000	4.0	
			E 144th Ave & Washington St	0	$ -	0	$ -	1	$221,000	5	$600,000	7	$119,000	$940,000	0.00	$ -	0.00	$ -	0.68	$149,396	3.38	$405,600	4.73	$80,444	$635,440	$188,000	$127,088	$60,912		$609,120	$288,000	2.1	
			E 88th Ave & Washington St	0	$ -	0	$ -	1	$221,000	4	$480,000	25	$425,000	$1,126,000	0.00	$ -	0.00	$ -	0.68	$149,396	2.70	$324,480	16.90	$287,300	$761,176	$225,200	$152,235	$72,965		$729,648	$288,000	2.5	
			Huron St & W 88th Ave	0	$ -	1	$1,016,000	5	$1,105,000	16	$1,920,000	14	$238,000	$4,279,000	0.00	$ -	0.68	$686,816	3.38	$746,980	10.82	$1,297,920	9.46	$160,888	$2,892,604	$855,800	$578,521	$277,279		$2,772,792	$288,000	9.6	
			Pecos St & W 88th Ave	0	$ -	0	$ -	3	$663,000	4	$480,000	8	$136,000	$1,279,000	0.00	$ -	0.00	$ -	2.03	$448,188	2.70	$324,480	5.41	$91,936	$864,604	$255,800	$172,921	$82,879		$828,792	$288,000	2.9	
			E 120th Ave & Pennsylvania St	0	$ -	1	$1,016,000	2	$442,000	5	$600,000	2	$34,000	$2,092,000	0.00	$ -	0.68	$686,816	1.35	$298,792	3.38	$405,600	1.35	$22,984	$1,414,192	$418,400	$282,838	$135,562		$1,355,616	$288,000	4.7	
			E 120th Ave & Washington St	0	$ -	0	$ -	4	$884,000	2	$240,000	12	$204,000	$1,328,000	0.00	$ -	0.00	$ -	2.70	$597,584	1.35	$162,240	8.11	$137,904	$897,728	$265,600	$179,546	$86,054		$860,544	$288,000	3.0	
			Thornton Pkwy & Washington St	2	$3,556,000	4	$4,064,000	2	$442,000	12	$1,440,000	19	$323,000	$9,825,000	1.35	$2,403,856	2.70	$2,747,264	1.35	$298,792	8.11	$973,440	12.84	$218,348	$6,641,700	$1,965,000	$1,328,340	$636,660		$6,366,600	$288,000	22.1	
			Grant St & E 102nd Ave	0	$ -	0	$ -	0	$ -	4	$480,000	8	$136,000	$616,000	0.00	$ -	0.00	$ -	0.00	$ -	2.70	$324,480	5.41	$91,936	$416,416	$123,200	$83,283	$39,917		$399,168	$288,000	1.4	
			E 144th Ave & Lincoln St	0	$ -	0	$ -	1	$221,000	1	$120,000	8	$136,000	$477,000	0.00	$ -	0.00	$ -	0.68	$149,396	0.68	$81,120	5.41	$91,936	$322,452	$95,400	$64,490	$30,910		$309,096	$288,000	1.1	
	Install red light cameras	0.676 (approach turn & broadside crashes only)	E 128th Ave & Lafayette St	0	$ -	0	$ -	1	$221,000	1	$120,000	9	$153,000	$494,000	0.00	$ -	0.00	$ -	0.68	$149,396	0.68	$81,120	6.08	$103,428	$333,944	$98,800	$66,789	$32,011	10	$320,112	$288,000	1.1	Cost assumes implementation on all approaches
			Eppinger Blvd & Washington St	0	$ -	1	$1,016,000	0	$ -	3	$360,000	5	$85,000	$1,461,000	0.00	$ -	0.68	$686,816	0.00	$ -	2.03	$243,360	3.38	$57,460	$987,636	$292,200	$197,527	$94,673		$946,728	$288,000	3.3	
			Huron St & W Thornton Pkwy	0	$ -	1	$1,016,000	11	$2,431,000	18	$2,160,000	39	$663,000	$6,270,000	0.00	$ -	0.68	$686,816	7.44	$1,643,356	12.17	$1,460,160	26.36	$448,188	$4,238,520	$1,254,000	$847,704	$406,296		$4,062,960	$288,000	14.1	
			E 104th Ave & Riverdale Rd	0	$ -	2	$2,032,000	5	$1,105,000	4	$480,000	8	$136,000	$3,753,000	0.00	$ -	1.35	$1,373,632	3.38	$746,980	2.70	$324,480	5.41	$91,936	$2,537,028	$750,600	$507,406	$243,194		$2,431,944	$288,000	8.4	
			E 98th Ave & Grant St	0	$ -	1	$1,016,000	1	$221,000	10	$1,200,000	11	$187,000	$2,624,000	0.00	$ -	0.68	$686,816	0.68	$149,396	6.76	$811,200	7.44	$126,412	$1,773,824	$524,800	$354,765	$170,035		$1,700,352	$288,000	5.9	
			E 97th Ave & Grant St	0	$ -	0	$ -	6	$1,326,000	13	$1,560,000	17	$289,000	$3,175,000	0.00	$ -	0.00	$ -	4.06	$896,376	8.79	$1,054,560	11.49	$195,364	$2,146,300	$635,000	$429,260	$205,740		$2,057,400	$288,000	7.1	
			E 88th Ave & Pearl St	0	$ -	3	$3,048,000	6	$1,326,000	24	$2,880,000	21	$357,000	$7,611,000	0.00	$ -	2.03	$2,060,448	4.06	$896,376	16.22	$1,946,880	14.20	$241,332	$5,145,036	$1,522,200	$1,029,007	$493,193		$4,931,928	$288,000	17.1	
			Grant St & Thornton Pkwy	0	$ -	5	$5,080,000	9	$1,989,000	19	$2,280,000	17	$289,000	$9,638,000	0.00	$ -	3.38	$3,434,080	6.08	$1,344,564	12.84	$1,541,280	11.49	$195,364	$6,515,288	$1,927,600	$1,303,058	$624,542		$6,245,424	$288,000	21.7	
			Thornton Pkwy & Gale Blvd	0	$ -	0	$ -	3	$663,000	7	$840,000	5	$85,000	$1,588,000	0.00	$ -	0.00	$ -	2.03	$448,188	4.73	$567,840	3.38	$57,460	$1,073,488	$317,600	$214,698	$102,902		$1,029,024	$288,000	3.6	
			Colorado Blvd & E 160th Ave	0	$ -	1	$1,016,000	7	$1,547,000	7	$840,000	13	$221,000	$3,624,000	0.00	$ -	0.68	$686,816	4.73	$1,045,772	4.73	$567,840	8.79	$149,396	$2,449,824	$724,800	$489,965	$234,835		$2,348,352	$288,000	8.2	
			E 112th Ave & Holly St	0	$ -	0	$ -	0	$ -	2	$240,000	12	$204,000	$444,000	0.00	$ -	0.00	$ -	0.00	$ -	1.35	$162,240	8.11	$137,904	$300,144	$88,800	$60,029	$28,771		$287,712	$288,000	1.0	
			E 144th Ave & York St	0	$ -	1	$1,016,000	2	$442,000	4	$480,000	3	$51,000	$1,989,000	0.00	$ -	0.68	$686,816	1.35	$298,792	2.70	$324,480	2.03	$34,476	$1,344,564	$397,800	$268,913	$128,887		$1,288,872	$288,000	4.5	
			E 104th Ave & Irma Dr	0	$ -	0	$ -	1	$221,000	4	$480,000	6	$102,000	$803,000	0.00	$ -	0.00	$ -	0.68	$149,396	2.70	$324,480	4.06	$68,952	$542,828	$160,600	$108,566	$52,034		$520,344	$288,000	1.8	

Benefit-Cost Analysis (BCA) Calculations

Recommendation Category	Countermeasure	Crash Modification Factor	Location	Crash Costs with No Safety Countermeasures: Fatalities	$1,778,000 / Person	Serious Injuries	$1,016,000 / Person	Minor Injuries	$221,000 / Person	Possible Injuries	$120,000 / Person	Property Damage Only	$17,000 / Crash	5-Year Crash Costs without Safety Countermeasures	Crash Costs WITH Safety Countermeasures: Fatalities	$1,778,000 / Person	Serious Injuries	$1,016,000 / Person	Minor Injuries	$221,000 / Person	Possible Injuries	$120,000 / Person	Property Damage Only	$17,000 / Crash	5-Year Crash Costs WITH Safety Countermeasures	Annual Crash Costs, No Safety Countermeasures	Annual Crash Costs, WITH Safety Countermeasures	Annual Benefit WITH Countermeasure	Service Life (Years)	Total Project Benefit	Project Cost	Benefit / Cost	Notes
			E 104th Ave & Fox Run Pkwy	0	-	1	1,016,000	3	663,000	7	840,000	14	238,000	2,757,000	0.00	-	0.68	686,816	2.03	448,188	4.73	567,840	9.46	160,888	1,863,732	551,400	372,746	178,654		1,786,536	288,000	6.2	
			E 98th Ave & Washington St	1	1,778,000	1	1,016,000	6	1,326,000	11	1,320,000	19	323,000	5,763,000	0.68	1,201,928	0.68	686,816	4.06	896,376	7.44	892,320	12.84	218,348	3,895,788	1,152,600	779,158	373,442		3,734,424	288,000	13.0	
			Thornton Pkwy & York St	0	-	0	-	0	-	0	-	6	102,000	102,000	0.00	-	0.00	-	0.00	-	0.00	-	4.06	68,952	68,952	20,400	13,790	6,610		66,096	288,000	0.2	
			Colorado Blvd & E 100th Ave	0	-	3	3,048,000	4	884,000	13	1,560,000	15	255,000	5,747,000	0.00	-	2.03	2,060,448	2.70	597,584	8.79	1,054,560	10.14	172,380	3,884,972	1,149,400	776,994	372,406		3,724,056	288,000	12.9	
			Colorado Blvd & E 121st Ave	0	-	0	-	3	663,000	5	600,000	13	221,000	1,484,000	0.00	-	0.00	-	2.03	448,188	3.38	405,600	8.79	149,396	1,003,184	296,800	200,637	96,163		961,632	288,000	3.3	
			Quebec St & E 120th Ave	1	1,778,000	2	2,032,000	5	1,105,000	11	1,320,000	7	119,000	6,354,000	0.68	1,201,928	1.35	1,373,632	3.38	746,980	7.44	892,320	4.73	80,444	4,295,304	1,270,800	859,061	411,739		4,117,392	288,000	14.3	
			E 120th Ave & Unnamed Rd (3900 120th Ave)	0	-	0	-	1	221,000	3	360,000	9	153,000	734,000	0.00	-	0.00	-	0.68	149,396	2.03	243,360	6.08	103,428	496,184	146,800	99,237	47,563		475,632	288,000	1.7	
			Subtotal											**117,085,000**										**79,149,460**	**23,417,000**	**15,829,892**	**7,587,108**		**75,871,080**	**11,232,000**	**6.8**	
Protected Left Turn Operations			Conifer Rd & W 84th Ave	0	-	0	-	2	442,000	6	720,000	11	187,000	1,349,000	0.00	-	0.00	-	0.02	4,420	0.06	7,200	0.11	1,870	13,490	269,800	2,696	267,102		2,671,020	12,750	209.5	
			Colorado Blvd & E 112th Ave	0	-	3	3,048,000	3	663,000	14	1,680,000	23	391,000	5,782,000	0.00	-	0.03	30,480	0.03	6,630	0.14	16,800	0.23	3,910	57,820	1,156,400	11,564	1,144,836		11,448,360	12,750	897.9	
			Corona St & E 88th Ave	0	-	1	1,016,000	0	-	5	600,000	10	170,000	1,786,000	0.00	-	0.01	10,160	0.00	-	0.05	6,000	0.10	1,700	17,860	357,200	3,572	353,628		3,536,280	12,750	277.4	
			E 88th Ave & Grant St	0	-	0	-	1	221,000	9	1,080,000	15	255,000	1,556,000	0.00	-	0.00	-	0.01	2,210	0.09	10,800	0.15	2,550	15,560	311,200	3,112	308,088		3,080,880	12,750	241.6	
			Huron St & W 88th Ave	0	-	1	1,016,000	5	1,105,000	16	1,920,000	14	238,000	4,279,000	0.00	-	0.01	10,160	0.05	11,050	0.16	19,200	0.14	2,380	42,790	855,800	8,558	847,242		8,472,420	12,750	664.5	
			Pecos St & W 88th Ave	0	-	0	-	3	663,000	4	480,000	8	136,000	1,279,000	0.00	-	0.00	-	0.03	6,630	0.04	4,800	0.08	1,360	12,790	255,800	2,558	253,242		2,532,420	12,750	198.6	
			E 120th Ave & Pennsylvania St	0	-	1	1,016,000	2	442,000	5	600,000	2	34,000	2,092,000	0.00	-	0.01	10,160	0.02	4,420	0.05	6,000	0.02	340	20,920	418,400	4,184	414,216		4,142,160	12,750	324.9	
			Sheldon Dr & Washington St	0	-	0	-	0	-	2	240,000	11	187,000	427,000	0.00	-	0.00	-	0.00	-	0.02	2,400	0.11	1,870	4,270	85,400	854	84,546		845,460	12,750	66.3	
			Grant St & E 102nd Ave	0	-	0	-	0	-	4	480,000	8	136,000	616,000	0.00	-	0.00	-	0.00	-	0.04	4,800	0.08	1,360	6,160	123,200	1,232	121,968		1,219,680	12,750	95.7	
			E 88th Ave & Rainbow Ave & York St	0	-	0	-	6	1,326,000	12	1,440,000	7	119,000	2,885,000	0.00	-	0.00	-	0.06	13,260	0.12	14,400	0.07	1,190	28,850	577,000	5,770	571,230		5,712,300	12,750	448.0	
			W Thornton Pkwy & Pecos St	0	-	0	-	4	884,000	10	1,200,000	13	221,000	2,305,000	0.00	-	0.00	-	0.04	8,840	0.10	12,000	0.13	2,210	23,050	461,000	4,610	456,390		4,563,900	12,750	358.0	
			Thornton Pkwy & Civic Center Dr	0	-	0	-	2	442,000	3	360,000	1	17,000	819,000	0.00	-	0.00	-	0.02	4,420	0.03	3,600	0.01	170	8,190	163,800	1,638	162,162		1,621,620	12,750	127.2	
			Colorado Blvd & Woodglen Blvd	0	-	0	-	0	-	0	-	1	17,000	17,000	0.00	-	0.00	-	0.00	-	0.00	-	0.01	170	170	3,400	34	3,366		33,660	12,750	2.6	
			E 128th Ave & Lafayette St	0	-	0	-	1	221,000	1	120,000	9	153,000	494,000	0.00	-	0.00	-	0.01	2,210	0.01	1,200	0.09	1,530	4,940	98,800	988	97,812		978,120	12,750	76.7	
			Eppinger Blvd & Washington St	0	-	1	1,016,000	0	-	3	360,000	5	85,000	1,461,000	0.00	-	0.01	10,160	0.00	-	0.03	3,600	0.05	850	14,610	292,200	2,922	289,278		2,892,780	12,750	226.9	
			Huron St & W Thornton Pkwy	0	-	1	1,016,000	11	2,431,000	18	2,160,000	39	663,000	6,270,000	0.00	-	0.01	10,160	0.11	24,310	0.18	21,600	0.39	6,630	62,700	1,254,000	12,540	1,241,460		12,414,600	12,750	973.7	
			E 104th Ave & Riverdale Rd	0	-	2	2,032,000	5	1,105,000	4	480,000	8	136,000	3,753,000	0.00	-	0.02	20,320	0.05	11,050	0.04	4,800	0.08	1,360	37,530	750,600	7,506	743,094		7,430,940	12,750	582.8	
	Change from Permitted-protected to Protected on Major Approach	0.01 (approach turn & broadside crashes only)	E 98th Ave & Grant St	0	-	1	1,016,000	1	221,000	10	1,200,000	11	187,000	2,624,000	0.00	-	0.01	10,160	0.01	2,210	0.10	12,000	0.11	1,870	26,240	524,800	5,248	519,552		5,195,520	12,750	407.5	Cost assumes implementation on major approach only
			Colorado Blvd & E 138th Ave	0	-	0	-	2	442,000	4	480,000	10	170,000	1,092,000	0.00	-	0.00	-	0.02	4,420	0.04	4,800	0.10	1,700	10,920	218,400	2,184	216,216	10	2,162,160	12,750	169.6	
			E 97th Ave & Grant St	0	-	0	-	6	1,326,000	13	1,560,000	17	289,000	3,175,000	0.00	-	0.00	-	0.06	13,260	0.13	15,600	0.17	2,890	31,750	635,000	6,350	628,650		6,286,500	12,750	493.1	
			E 88th Ave & Pearl St	0	-	3	3,048,000	6	1,326,000	24	2,880,000	21	357,000	7,611,000	0.00	-	0.03	30,480	0.06	13,260	0.24	28,800	0.21	3,570	76,110	1,522,200	15,222	1,506,978		15,069,780	12,750	1181.9	
			Madison St & E 120th Ave	0	-	0	-	6	1,326,000	13	1,560,000	11	187,000	3,073,000	0.00	-	0.00	-	0.06	13,260	0.13	15,600	0.11	1,870	30,730	614,600	6,146	608,454		6,084,540	12,750	477.2	
			Grant St & Thornton Pkwy	0	-	5	5,080,000	9	1,989,000	19	2,280,000	17	289,000	9,638,000	0.00	-	0.05	50,800	0.09	19,890	0.19	22,800	0.17	2,890	96,380	1,927,600	19,276	1,908,324		19,083,240	12,750	1496.7	
			Thornton Pkwy & Gale Blvd	0	-	0	-	3	663,000	7	840,000	5	85,000	1,588,000	0.00	-	0.00	-	0.03	6,630	0.07	8,400	0.05	850	15,880	317,600	3,176	314,424		3,144,240	12,750	246.6	
			Colorado Blvd & E 160th Ave	0	-	1	1,016,000	7	1,547,000	7	840,000	13	221,000	3,624,000	0.00	-	0.01	10,160	0.07	15,470	0.07	8,400	0.13	2,210	36,240	724,800	7,248	717,552		7,175,520	12,750	562.8	
			E 144th Ave & York St	0	-	1	1,016,000	2	442,000	4	480,000	3	51,000	1,989,000	0.00	-	0.01	10,160	0.02	4,420	0.04	4,800	0.03	510	19,890	397,800	3,978	393,822		3,938,220	12,750	308.9	
			E 104th Ave & Irma Dr	0	-	0	-	1	221,000	4	480,000	6	102,000	803,000	0.00	-	0.00	-	0.01	2,210	0.04	4,800	0.06	1,020	8,030	160,600	1,606	158,994		1,589,940	12,750	124.7	
			E 104th Ave & Fox Run Pkwy	0	-	1	1,016,000	3	663,000	7	840,000	14	238,000	2,757,000	0.00	-	0.01	10,160	0.03	6,630	0.07	8,400	0.14	2,380	27,570	551,400	5,514	545,886		5,458,860	12,750	428.1	
			E 98th Ave & Washington St	1	1,778,000	1	1,016,000	6	1,326,000	11	1,320,000	19	323,000	5,763,000	0.01	17,780	0.01	10,160	0.06	13,260	0.11	13,200	0.19	3,230	57,630	1,152,600	11,526	1,141,074		11,410,740	12,750	895.0	
			Thornton Pkwy & York St	0	-	0	-	0	-	0	-	6	102,000	102,000	0.00	-	0.00	-	0.00	-	0.00	-	0.06	1,020	1,020	20,400	204	20,196		201,960	12,750	15.8	
			Colorado Blvd & E 100th Ave	0	-	3	3,048,000	4	884,000	13	1,560,000	15	255,000	5,747,000	0.00	-	0.03	30,480	0.04	8,840	0.13	15,600	0.15	2,550	57,470	1,149,400	11,494	1,137,906		11,379,060	12,750	892.5	
			Colorado Blvd & E 108th Ave	0	-	0	-	0	-	3	360,000	3	51,000	411,000	0.00	-	0.00	-	0.00	-	0.03	3,600	0.03	510	4,110	82,200	822	81,378		813,780	12,750	63.8	
			Colorado Blvd & E 121st Ave	0	-	0	-	3	663,000	5	600,000	13	221,000	1,484,000	0.00	-	0.00	-	0.03	6,630	0.05	6,000	0.13	2,210	14,840	296,800	2,968	293,832		2,938,320	12,750	230.5	
			Colorado Blvd & Cypress Dr & Riverdale Rd	0	-	1	1,016,000	0	-	5	600,000	7	119,000	1,735,000	0.00	-	0.01	10,160	0.00	-	0.05	6,000	0.07	1,190	17,350	347,000	3,470	343,530		3,435,300	12,750	269.4	
			W 84th Ave & Huron St	0	-	1	1,016,000	2	442,000	5	600,000	9	153,000	2,211,000	0.00	-	0.01	10,160	0.02	4,420	0.05	6,000	0.09	1,530	22,110	442,200	4,422	437,778		4,377,780	12,750	343.4	
			Quebec St & E 120th Ave	1	1,778,000	2	2,032,000	5	1,105,000	11	1,320,000	7	119,000	6,354,000	0.01	17,780	0.02	20,320	0.05	11,050	0.11	13,200	0.07	1,190	63,540	1,270,800	12,708	1,258,092		12,580,920	12,750	986.7	
			Subtotal											**98,951,000**										**989,510**	**19,790,200**	**197,902**	**19,592,298**		**195,922,980**	**459,000**	**426.8**	
Restrict Left Turns / Signalize / Positive Offset	Install raised median (approach turn & broadside)	0.45	W 84th Ave & Acoma Way	0	-	0	-	2	442,000	9	1,080,000	12	204,000	1,726,000	0.00	-	0.00	-	0.90	198,900	4.05	486,000	5.40	91,800	776,700	345,200	155,340	189,860	20	3,797,200	112,500	33.8	
			Subtotal											**1,726,000**										**776,700**	**345,200**	**155,340**	**189,860**		**3,797,200**	**112,500**	**33.8**	
	Convert stop-controlled intersection to roundabout	0.581	E 112th Ave & Cherry Dr	0	-	0	-	2	442,000	3	360,000	2	34,000	836,000	0.00	-	0.00	-	1.16	256,802	1.74	209,160	2.00	34,000	499,962	1,270,800	99,992	67,208	25	1,680,190	162,000	10.4	
			Subtotal											**836,000**										**499,962**	**167,200**	**99,992**	**67,208**		**1,680,190**	**162,000**	**10.4**	
	Install a traffic signal (left turn crashes only)	0.61	Holly St & E 121st Ave	0	-	0	-	1	221,000	0	-	7	119,000	340,000	0.00	-	0.00	-	0.61	134,810	0.00	-	4.27	72,590	207,400	68,000	41,480	26,520		265,200	$636,000	0.4	
			Holly St & E 117th Ave	0	-	0	-	1	221,000	1	120,000	6	102,000	443,000	0.00	-	0.00	-	0.61	134,810	0.61	73,200	3.66	62,220	270,230	88,600	54,046	34,554		345,540	$636,000	0.5	
			E 120th Ave & Unnamed Rd (2500 E 120th Ave)	0	-	0	-	0	-	5	600,000	3	51,000	651,000	0.00	-	0.00	-	0.00	-	3.05	366,000	1.83	31,110	397,110	130,200	79,422	50,778	10	507,780	$636,000	0.8	
			Colorado Blvd & E 470 Ramp	0	-	0	-	0	-	0	-	0	-	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	-	-	-	-		-	$636,000	0.0	
			Subtotal											**1,434,000**										**874,740**	**286,800**	**174,948**	**111,852**		**1,118,520**	**$2,544,000**	**0.4**	
Protected Right Turn Operations	Add exclusive pedestrian phasing	0.65 (bike & pedestrian crashes)	Colorado Blvd & E 88th Ave	0	-	0	-	0	-	3	360,000	0	-	360,000	0	-	0	-	0	-	1.95	234,000	0	-	234,000	72,000	46,800	25,200	10	252,000	1,100	229.1	Cost assumes existing signal head can accommodate LPI
			Subtotal											**360,000**										**234,000**	**72,000**	**46,800**	**25,200**		**252,000**	**$1,100**	**229.1**	
Prohibit Right Turn on Red	Prohibit Right Turn on Red	0.98	E 128th Ave & Washington St	0	-	0	-	5	1,105,000	9	1,080,000	58	986,000	3,171,000	0.00	-	0.00	-	4.90	1,082,900	8.82	1,058,400	56.84	966,280	3,107,580	634,200	621,516	12,684		76,104	$21,750	3.5	
			E 84th Ave & Washington St	2	3,556,000	2	2,032,000	1	221,000	20	2,400,000	77	1,309,000	9,518,000	1.96	3,484,880	1.96	1,991,360	0.98	216,580	19.60	2,352,000	75.46	1,282,820	9,327,640	1,903,600	1,865,528	38,072		228,432	$21,750	10.5	
			Conifer Rd & W 84th Ave	1	1,778,000	0	-	3	663,000	8	960,000	43	731,000	4,132,000	0.98	1,742,440	0.00	-	2.94	649,740	7.84	940,800	42.14	716,380	4,049,360	826,400	809,872	16,528		99,168	$21,750	4.6	
			Pennsylvania St & Washington Center Pkwy & Washington St	0	-	1	1,016,000	3	663,000	9	1,080,000	17	289,000	3,048,000	0.00	-	0.98	995,680	2.94	649,740	8.82	1,058,400	16.66	283,220	2,987,040	609,600	597,406	12,192		73,152	$21,750	3.4	
			E 120th Ave & Grant St	0	-	0	-	6	1,326,000	7	840,000	60	1,020,000	3,186,000	0.00	-	0.00	-	5.88	1,299,480	6.86	823,200	58.80	999,600	3,122,280	637,200	624,456	12,744		76,464	$21,750	3.5	
			Colorado Blvd & E 112th Ave	0	-	5	5,080,000	4	884,000	23	2,760,000	52	884,000	9,608,000	0.00	-	4.90	4,978,400	3.92	866,320	22.54	2,704,800	50.96	866,320	9,415,840	1,921,600	1,883,168	38,432		230,592	$21,750	10.6	
			Colorado Blvd & E 115th Ave	1	1,778,000	4	4,064,000	3	663,000	5	600,000	5	85,000	7,190,000	0.98	1,742,440	3.92	3,982,720	2.94	649,740	4.90	588,000	4.90	83,300	7,046,200	1,438,000	1,409,240	28,760		172,560	$21,750	7.9	Cost assumes installation on all approaches
			E 88th Ave & Grant St	0	-	2	2,032,000	4	884,000	13	1,560,000	43	731,000	5,207,000	0.00	-	1.96	1,991,360	3.92	866,320	12.74	1,528,800	42.14	716,380	5,102,860	1,041,400	1,020,572	20,828	6	124,968	$21,750	5.7	
			E 88th Ave & Welby Rd	0	-	1	1,016,000	0	-	2	240,000	22	374,000	1,630,000	0.00	-	0.98	995,680	0.00	-	1.96	235,200	21.56	366,520	1,597,400	326,000	319,480	6,520		39,120	$21,750	1.8	
			E 88th Ave & Washington St	0	-	4	4,064,000	2	442,000	22	2,640,000	91	1,547,000	8,693,000	0.00	-	3.92	3,982,720	1.96	433,160	21.56	2,587,200	89.18	1,516,060	8,519,140	1,738,600	1,703,828	34,772		208,632	$21,750	9.6	
			E 120th Ave & Pennsylvania St	0	-	1	1,016,000	9	1,989,000	14	1,680,000	41	697,000	5,382,000	0.00	-	0.98	995,680	8.82	1,949,220	13.72	1,646,400	40.18	683,060	5,274,360	1,076,400	1,054,872	21,528		129,168	$21,750	5.9	
			Thornton Pkwy & Washington St	2	3,556,000	4	4,064,000	4	884,000	30	3,600,000	98	1,666,000	13,770,000	1.96	3,484,880	3.92	3,982,720	3.92	866,320	29.40	3,528,000	96.04	1,632,680	13,494,600	2,754,000	2,698,920	55,080		330,480	$21,750	15.2	
			E 88th Ave & Rainbow Ave & York St	0	-	1	1,016,000	7	1,547,000	14	1,680,000	14	238,000	4,481,000	0.00	-	0.98	995,680	6.86	1,516,060	13.72	1,646,400	13.72	233,240	4,391,380	896,200	878,276	17,924		107,544	$21,750	4.9	

Benefit-Cost Analysis (BCA) Calculations

Recommendation Category	Countermeasure	Crash Modification Factor	Location	Crash Costs with No Safety Countermeasures: Fatalities	$1,778,000 / Person	Serious Injuries	$1,016,000 / Person	Minor Injuries	$221,000 / Person	Possible Injuries	$120,000 / Person	Property Damage Only	$17,000 / Crash	5-Year Crash Costs without Safety Countermeasures	Crash Costs WITH Safety Countermeasures: Fatalities	$1,778,000 / Person	Serious Injuries	$1,016,000 / Person	Minor Injuries	$221,000 / Person	Possible Injuries	$120,000 / Person	Property Damage Only	$17,000 / Crash	5-Year Crash Costs WITH Safety Countermeasures	Annual Crash Costs, No Safety Countermeasures	Annual Crash Costs, WITH Safety Countermeasures	Annual Benefit WITH Countermeasure	Service Life (Years)	Total Project Benefit	Project Cost	Benefit / Cost	Notes
			Eppinger Blvd & Washington St	0	$ -	1	$ 1,016,000	0	$ -	7	$ 840,000	34	$ 578,000	$ 2,434,000	0.00	$ -	0.98	$ 995,680	0.00	$ -	6.86	$ 823,200	33.32	$ 566,440	$ 2,385,320	$ 486,800	$ 477,064	$ 9,736		$ 58,416	$21,750	2.7	
			E 104th Ave & Fox Run Pkwy	0	$ -	1	$ 1,016,000	5	$ 1,105,000	13	$ 1,560,000	39	$ 663,000	$ 4,344,000	0.00	$ -	0.98	$ 995,680	4.90	$ 1,082,900	12.74	$ 1,528,800	38.22	$ 649,740	$ 4,257,120	$ 868,800	$ 851,424	$ 17,376		$ 104,256	$21,750	4.8	
			Subtotal											**$ 85,794,000**											**$ 84,078,120**	**$ 17,158,800**	**$ 16,815,624**	**$ 343,176**		**$ 2,059,056**	**$326,250**	**6.3**	
Leading Pedestrian Interval	Implement leading pedestrian interval	0.81 (bike & pedestrian crashes)	Colorado Blvd & E 88th Ave	0	$ -	0	$ -	0	$ -	3	$ 360,000	0	$ -	$ 360,000	0.00	$ -	0.00	$ -	0.00	$ -	2.43	$ 291,600	0.00	$ -	$ 291,600	$ 72,000	$ 58,320	$ 13,680		$ 136,800	$ 3,750	36.5	
			E 84th Ave & Washington St	0	$ -	1	$ 1,016,000	0	$ -	1	$ 120,000	0	$ -	$ 1,136,000	0.00	$ -	0.81	$ 822,960	0.00	$ -	0.81	$ 97,200	0.00	$ -	$ 920,160	$ 227,200	$ 184,032	$ 43,168		$ 431,680	$ 3,750	115.1	
			E 104th Ave & Washington St	0	$ -	0	$ -	1	$ 221,000	0	$ -	2	$ 34,000	$ 255,000	0.00	$ -	0.00	$ -	0.81	$ 179,010	0.00	$ -	1.62	$ 27,540	$ 206,550	$ 51,000	$ 41,310	$ 9,690		$ 96,900	$ 3,750	25.8	
			E 120th Ave & Grant St	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0.00	$ -	0.00	$ -	0.81	$ 179,010	0.00	$ -	0.00	$ -	$ 179,010	$ 44,200	$ 35,802	$ 8,398		$ 83,980	$ 3,750	22.4	
			Colorado Blvd & E 120th Ave	1	$ 1,778,000	0	$ -	0	$ -	1	$ 120,000	1	$ 17,000	$ 1,915,000	0.81	$ 1,440,180	0.00	$ -	0.00	$ -	0.81	$ 97,200	0.81	$ 13,770	$ 1,551,150	$ 383,000	$ 310,230	$ 72,770		$ 727,700	$ 3,750	194.1	
			Washington St & E 130th Ave	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0.00	$ -	0.00	$ -	0.81	$ 179,010	0.00	$ -	0.00	$ -	$ 179,010	$ 44,200	$ 35,802	$ 8,398		$ 83,980	$ 3,750	22.4	
			E 88th Ave & Grant St	0	$ -	2	$ 2,032,000	2	$ 442,000	1	$ 120,000	2	$ 34,000	$ 2,628,000	0.00	$ -	1.62	$ 1,645,920	1.62	$ 358,020	0.81	$ 97,200	1.62	$ 27,540	$ 2,128,680	$ 525,600	$ 425,736	$ 99,864		$ 998,640	$ 3,750	266.3	
			E 88th Ave & Washington St	0	$ -	1	$ 1,016,000	1	$ 221,000	2	$ 240,000	0	$ -	$ 1,477,000	0.00	$ -	0.81	$ 822,960	0.81	$ 179,010	1.62	$ 194,400	0.00	$ -	$ 1,196,370	$ 295,400	$ 239,274	$ 56,126	10	$ 561,260	$ 3,750	149.7	
			E 120th Ave & Washington St	0	$ -	0	$ -	2	$ 442,000	2	$ 240,000	0	$ -	$ 682,000	0.00	$ -	0.00	$ -	1.62	$ 358,020	1.62	$ 194,400	0.00	$ -	$ 552,420	$ 136,400	$ 110,484	$ 25,916		$ 259,160	$ 3,750	69.1	
			Eppinger Blvd & Washington St	0	$ -	0	$ -	0	$ -	1	$ 120,000	2	$ 34,000	$ 154,000	0.00	$ -	0.00	$ -	0.81	$ 97,200	1.62	$ 27,540	$ 124,740	$ 30,800	$ 24,948	$ 5,852		$ 58,520	$ 3,750	15.6	
			E 88th Ave & Pearl St	0	$ -	1	$ 1,016,000	1	$ 221,000	0	$ -	2	$ 34,000	$ 1,271,000	0.00	$ -	0.81	$ 822,960	0.81	$ 179,010	0.00	$ -	1.62	$ 27,540	$ 1,029,510	$ 254,200	$ 205,902	$ 48,298		$ 482,980	$ 3,750	128.8	
			Holly St & E 136th Ave	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0.00	$ -	0.00	$ -	0.81	$ 179,010	0.00	$ -	0.00	$ -	$ 179,010	$ 44,200	$ 35,802	$ 8,398		$ 83,980	$ 3,750	22.4	
			E 98th Ave & Washington St	0	$ -	0	$ -	0	$ -	1	$ 120,000	1	$ 17,000	$ 137,000	0.00	$ -	0.00	$ -	0.00	$ -	0.81	$ 97,200	0.81	$ 13,770	$ 110,970	$ 27,400	$ 22,194	$ 5,206		$ 52,060	$ 3,750	13.9	
			Colorado Blvd & E 100th Ave	0	$ -	0	$ -	1	$ 221,000	1	$ 120,000	1	$ 17,000	$ 358,000	0.00	$ -	0.00	$ -	0.81	$ 179,010	0.81	$ 97,200	0.81	$ 13,770	$ 289,980	$ 71,600	$ 57,996	$ 13,604		$ 136,040	$ 3,750	36.3	
			Colorado Blvd & Cypress Dr & Riverdale Rd	0	$ -	0	$ -	1	$ 221,000	1	$ 120,000	0	$ -	$ 341,000	0.00	$ -	0.00	$ -	0.81	$ 179,010	0.81	$ 97,200	0.00	$ -	$ 276,210	$ 68,200	$ 55,242	$ 12,958		$ 129,580	$ 3,750	34.6	
			Subtotal											**$ 11,377,000**											**$ 9,215,370**	**$ 2,275,400**	**$ 1,843,074**	**$ 432,326**		**$ 4,323,260**	**$ 56,250**	**76.9**	
Adjust WALK Signal	Increase length of signal phases to allow pedestrians more crossing time	0.49 (bike & pedestrian crashes)	Colorado Blvd & E 88th Ave	0	$ -	0	$ -	0	$ -	3	$ 360,000	0	$ -	$ 360,000	0	$ -	0	$ -	0	$ -	1.47	$ 176,400	0	$ -	$ 176,400	$ 72,000	$ 35,280	$ 36,720		$ 367,200	$ 1,100	333.8	
			E 84th Ave & Washington St	0	$ -	1	$ 1,016,000	0	$ -	1	$ 120,000	0	$ -	$ 1,136,000	0	$ -	0.49	$ 497,840	0	$ -	0.49	$ 58,800	0	$ -	$ 556,640	$ 227,200	$ 111,328	$ 115,872		$ 1,158,720	$ 1,100	1053.4	
			E 104th Ave & Washington St	0	$ -	0	$ -	1	$ 221,000	0	$ -	2	$ 34,000	$ 255,000	0	$ -	0	$ -	0.49	$ 108,290	0	$ -	0.98	$ 16,660	$ 124,950	$ 51,000	$ 24,990	$ 26,010		$ 260,100	$ 1,100	236.5	
			E 120th Ave & Grant St	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0	$ -	0	$ -	0.49	$ 108,290	0	$ -	0	$ -	$ 108,290	$ 44,200	$ 21,658	$ 22,542		$ 225,420	$ 1,100	204.9	
			Corona St & E 88th Ave	0	$ -	1	$ 1,016,000	0	$ -	0	$ -	1	$ 17,000	$ 1,033,000	0	$ -	0.49	$ 497,840	0	$ -	0	$ -	0.49	$ 8,330	$ 506,170	$ 206,600	$ 101,234	$ 105,366		$ 1,053,660	$ 1,100	957.9	
			E 88th Ave & Grant St	0	$ -	2	$ 2,032,000	2	$ 442,000	1	$ 120,000	2	$ 34,000	$ 2,628,000	0	$ -	0.98	$ 995,680	0.98	$ 216,580	0.49	$ 58,800	0.98	$ 16,660	$ 1,287,720	$ 525,600	$ 257,544	$ 268,056		$ 2,680,560	$ 1,100	2436.9	
			E 88th Ave & Washington St	0	$ -	1	$ 1,016,000	1	$ 221,000	2	$ 240,000	0	$ -	$ 1,477,000	0	$ -	0.49	$ 497,840	0.49	$ 108,290	0.98	$ 117,600	0	$ -	$ 723,730	$ 295,400	$ 144,746	$ 150,654	10	$ 1,506,540	$ 1,100	1369.6	
			E 120th Ave & Washington St	0	$ -	0	$ -	2	$ 442,000	2	$ 240,000	0	$ -	$ 682,000	0	$ -	0	$ -	0.98	$ 216,580	0.98	$ 117,600	0	$ -	$ 334,180	$ 136,400	$ 66,836	$ 69,564		$ 695,640	$ 1,100	632.4	
			E 88th Ave & Rainbow Ave & York St	0	$ -	1	$ 1,016,000	1	$ 221,000	0	$ -	0	$ -	$ 1,237,000	0	$ -	0.49	$ 497,840	0.49	$ 108,290	0	$ -	0	$ -	$ 606,130	$ 247,400	$ 121,226	$ 126,174		$ 1,261,740	$ 1,100	1147.0	
			Eppinger Blvd & Washington St	0	$ -	0	$ -	1	$ 221,000	1	$ 120,000	2	$ 34,000	$ 154,000	0	$ -	0	$ -	0	$ -	0.49	$ 58,800	0.98	$ 16,660	$ 75,460	$ 30,800	$ 15,092	$ 15,708		$ 157,080	$ 1,100	142.8	
			E 104th Ave & Fox Run Pkwy	0	$ -	0	$ -	2	$ 442,000	0	$ -	1	$ 17,000	$ 459,000	0	$ -	0	$ -	0.98	$ 216,580	0	$ -	0.49	$ 8,330	$ 224,910	$ 91,800	$ 44,982	$ 46,818		$ 468,180	$ 1,100	425.6	
			Thornton Pkwy & York St	0	$ -	2	$ 2,032,000	0	$ -	0	$ -	0	$ -	$ 2,032,000	0	$ -	0.98	$ 995,680	0	$ -	0	$ -	0	$ -	$ 995,680	$ 406,400	$ 199,136	$ 207,264		$ 2,072,640	$ 1,100	1884.2	
			Colorado Blvd & E 121st Ave	0	$ -	0	$ -	0	$ -	1	$ 120,000	0	$ -	$ 120,000	0	$ -	0	$ -	0	$ -	0.49	$ 58,800	0	$ -	$ 58,800	$ 24,000	$ 11,760	$ 12,240		$ 122,400	$ 1,100	111.3	
			Subtotal											**$ 11,794,000**											**$ 5,779,060**	**$ 2,358,800**	**$ 1,155,812**	**$ 1,202,988**		**$ 12,029,880**	**$ 14,300**	**841.3**	
Regular Maintenance of Crosswalk	Install High-Visibility Crosswalks	0.6 (bike & pedestrian crashes)	E 128th Ave & Washington St	0	$ -	0	$ -	0	$ -	1	$ 120,000	2	$ 34,000	$ 154,000	0	$ -	0	$ -	0	$ -	0.6	$ 72,000	1.2	$ 20,400	$ 92,400	$ 30,800	$ 18,480	$ 12,320		$ 12,320	$ 35,250	0.3	
			E 84th Ave & Washington St	0	$ -	1	$ 1,016,000	0	$ -	1	$ 120,000	0	$ -	$ 1,136,000	0	$ -	0.6	$ 609,600	0	$ -	0.6	$ 72,000	0	$ -	$ 681,600	$ 227,200	$ 136,320	$ 90,880		$ 90,880	$ 35,250	2.6	
			Conifer Rd & W 84th Ave	1	$ 1,778,000	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 1,795,000	0.6	$ 1,066,800	0	$ -	0	$ -	0	$ -	0.6	$ 10,200	$ 1,077,000	$ 359,000	$ 215,400	$ 143,600		$ 143,600	$ 35,250	4.1	
			E 104th Ave & Washington St	0	$ -	0	$ -	1	$ 221,000	0	$ -	2	$ 34,000	$ 255,000	0	$ -	0	$ -	0.6	$ 132,600	0	$ -	1.2	$ 20,400	$ 153,000	$ 51,000	$ 30,600	$ 20,400		$ 20,400	$ 35,250	0.6	
			Pennsylvania St & Washington Center Pkwy & Wa	0	$ -	1	$ 1,016,000	0	$ -	0	$ -	0	$ -	$ 1,016,000	0	$ -	0.6	$ 609,600	0	$ -	0	$ -	0	$ -	$ 609,600	$ 203,200	$ 121,920	$ 81,280		$ 81,280	$ 35,250	2.3	
			E 120th Ave & Grant St	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0	$ -	0	$ -	0.6	$ 132,600	0	$ -	0	$ -	$ 132,600	$ 44,200	$ 26,520	$ 17,680		$ 17,680	$ 35,250	0.5	
			Colorado Blvd & E 112th Ave	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 17,000	0	$ -	0	$ -	0	$ -	0	$ -	0.6	$ 10,200	$ 10,200	$ 3,400	$ 2,040	$ 1,360		$ 1,360	$ 35,250	0.0	
			Colorado Blvd & E 115th Ave	1	$ 1,778,000	0	$ -	0	$ -	1	$ 120,000	0	$ -	$ 1,898,000	0.6	$ 1,066,800	0	$ -	0	$ -	0.6	$ 72,000	0	$ -	$ 1,138,800	$ 379,600	$ 227,760	$ 151,840		$ 151,840	$ 35,250	4.3	
			Colorado Blvd & E 120th Ave	1	$ 1,778,000	0	$ -	0	$ -	1	$ 120,000	1	$ 17,000	$ 1,915,000	0.6	$ 1,066,800	0	$ -	0	$ -	0.6	$ 72,000	0.6	$ 10,200	$ 1,149,000	$ 383,000	$ 229,800	$ 153,200		$ 153,200	$ 35,250	4.3	
			Colorado Blvd & E 136th Ave	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 17,000	0	$ -	0	$ -	0	$ -	0	$ -	0.6	$ 10,200	$ 10,200	$ 3,400	$ 2,040	$ 1,360		$ 1,360	$ 35,250	0.0	
			Corona St & E 88th Ave	0	$ -	1	$ 1,016,000	0	$ -	0	$ -	1	$ 17,000	$ 1,033,000	0	$ -	0.6	$ 609,600	0	$ -	0	$ -	0.6	$ 10,200	$ 619,800	$ 206,600	$ 123,960	$ 82,640		$ 82,640	$ 35,250	2.3	
			E 112th Ave & Steele St	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 17,000	0	$ -	0	$ -	0	$ -	0	$ -	0.6	$ 10,200	$ 10,200	$ 3,400	$ 2,040	$ 1,360		$ 1,360	$ 35,250	0.0	
			Washington St & E 130th Ave	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0	$ -	0	$ -	0	$ -	0.6	$ 132,600	0	$ -	$ 132,600	$ 44,200	$ 26,520	$ 17,680		$ 17,680	$ 35,250	0.5	
			E 88th Ave & Grant St	0	$ -	2	$ 2,032,000	2	$ 442,000	1	$ 120,000	2	$ 34,000	$ 2,628,000	0	$ -	1.2	$ 1,219,200	1.2	$ 265,200	0.6	$ 72,000	1.2	$ 20,400	$ 1,576,800	$ 525,600	$ 315,360	$ 210,240		$ 210,240	$ 35,250	6.0	
			E 88th Ave & Welby Rd	0	$ -	1	$ 1,016,000	0	$ -	0	$ -	0	$ -	$ 1,016,000	0	$ -	0.6	$ 609,600	0	$ -	0	$ -	0	$ -	$ 609,600	$ 203,200	$ 121,920	$ 81,280		$ 81,280	$ 35,250	2.3	
			E 88th Ave & Washington St	0	$ -	1	$ 1,016,000	1	$ 221,000	2	$ 240,000	0	$ -	$ 1,477,000	0	$ -	0.6	$ 609,600	0.6	$ 132,600	1.2	$ 144,000	0	$ -	$ 886,200	$ 295,400	$ 177,240	$ 118,160		$ 118,160	$ 35,250	3.4	
			Huron St & W 88th Ave	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0	$ -	0	$ -	0.6	$ 132,600	0	$ -	0	$ -	$ 132,600	$ 44,200	$ 26,520	$ 17,680		$ 17,680	$ 35,250	0.5	
			Pecos St & Milky Way	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 17,000	0	$ -	0	$ -	0	$ -	0	$ -	0.6	$ 10,200	$ 10,200	$ 3,400	$ 2,040	$ 1,360		$ 1,360	$ 35,250	0.0	
			Pecos St & W 88th Ave	0	$ -	0	$ -	1	$ 221,000	1	$ 120,000	1	$ 17,000	$ 137,000	0	$ -	0	$ -	0	$ -	0.6	$ 72,000	0.6	$ 10,200	$ 82,200	$ 27,400	$ 16,440	$ 10,960		$ 10,960	$ 35,250	0.3	
			E 120th Ave & Pennsylvania St	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 17,000	0	$ -	0	$ -	0	$ -	0	$ -	0.6	$ 10,200	$ 10,200	$ 3,400	$ 2,040	$ 1,360		$ 1,360	$ 35,250	0.0	
			E 120th Ave & Saint Paul St	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0	$ -	0	$ -	0.6	$ 132,600	0	$ -	0	$ -	$ 132,600	$ 44,200	$ 26,520	$ 17,680	1	$ 17,680	$ 35,250	0.5	
			E 120th Ave & Washington St	0	$ -	0	$ -	2	$ 442,000	2	$ 240,000	0	$ -	$ 682,000	0	$ -	0	$ -	1.2	$ 265,200	1.2	$ 144,000	0	$ -	$ 409,200	$ 136,400	$ 81,840	$ 54,560		$ 54,560	$ 35,250	1.5	
			Sheldon Dr & Washington St	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 17,000	0	$ -	0	$ -	0	$ -	0	$ -	0.6	$ 10,200	$ 10,200	$ 3,400	$ 2,040	$ 1,360		$ 1,360	$ 35,250	0.0	
			Thornton Pkwy & Washington St	0	$ -	0	$ -	1	$ 221,000	2	$ 240,000	1	$ 17,000	$ 478,000	0	$ -	0	$ -	0.6	$ 132,600	1.2	$ 144,000	0.6	$ 10,200	$ 286,800	$ 95,600	$ 57,360	$ 38,240		$ 38,240	$ 35,250	1.1	
			E 88th Ave & Rainbow Ave & York St	0	$ -	1	$ 1,016,000	1	$ 221,000	0	$ -	0	$ -	$ 1,237,000	0	$ -	0.6	$ 609,600	0.6	$ 132,600	0	$ -	0	$ -	$ 742,200	$ 247,400	$ 148,440	$ 98,960		$ 98,960	$ 35,250	2.8	
			Huron St & Planet Pl & Star Point Plr	0	$ -	0	$ -	0	$ -	1	$ 120,000	0	$ -	$ 120,000	0	$ -	0	$ -	0	$ -	0.6	$ 72,000	0	$ -	$ 72,000	$ 24,000	$ 14,400	$ 9,600		$ 9,600	$ 35,250	0.3	
			Colorado Blvd & Woodglen Blvd	0	$ -	2	$ 2,032,000	0	$ -	0	$ -	0	$ -	$ 2,032,000	0	$ -	1.2	$ 1,219,200	0	$ -	0	$ -	0	$ -	$ 1,219,200	$ 406,400	$ 243,840	$ 162,560		$ 162,560	$ 35,250	4.6	
			E 128th Ave & Lafayette St	0	$ -	0	$ -	0	$ -	1	$ 120,000	0	$ -	$ 120,000	0	$ -	0	$ -	0	$ -	0.6	$ 72,000	0	$ -	$ 72,000	$ 24,000	$ 14,400	$ 9,600		$ 9,600	$ 35,250	0.3	
			Eppinger Blvd & Pearl St	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0	$ -	0	$ -	0	$ -	0.6	$ 132,600	0	$ -	$ 132,600	$ 44,200	$ 26,520	$ 17,680		$ 17,680	$ 35,250	0.5	
			Eppinger Blvd & Washington St	0	$ -	0	$ -	0	$ -	1	$ 120,000	2	$ 34,000	$ 154,000	0	$ -	0	$ -	0	$ -	0.6	$ 72,000	1.2	$ 20,400	$ 92,400	$ 30,800	$ 18,480	$ 12,320		$ 12,320	$ 35,250	0.3	
			E 88th Ave & Pearl St	0	$ -	1	$ 1,016,000	1	$ 221,000	0	$ -	2	$ 34,000	$ 1,271,000	0	$ -	0.6	$ 609,600	0.6	$ 132,600	0	$ -	1.2	$ 20,400	$ 762,600	$ 254,200	$ 152,520	$ 101,680		$ 101,680	$ 35,250	2.9	
			Madison St & E 120th Ave	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0	$ -	0	$ -	0.6	$ 132,600	0	$ -	0	$ -	$ 132,600	$ 44,200	$ 26,520	$ 17,680		$ 17,680	$ 35,250	0.5	
			Holly St & E 136th Ave	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0	$ -	0	$ -	0.6	$ 132,600	0	$ -	0	$ -	$ 132,600	$ 44,200	$ 26,520	$ 17,680		$ 17,680	$ 35,250	0.5	
			E 104th Ave & Fox Run Pkwy	0	$ -	0	$ -	2	$ 442,000	0	$ -	1	$ 17,000	$ 459,000	0	$ -	0	$ -	1.2	$ 265,200	0	$ -	0.6	$ 10,200	$ 275,400	$ 91,800	$ 55,080	$ 36,720		$ 36,720	$ 35,250	1.0	
			E 98th Ave & Washington St	0	$ -	0	$ -	0	$ -	1	$ 120,000	1	$ 17,000	$ 137,000	0	$ -	0	$ -	0	$ -	0.6	$ 72,000	0.6	$ 10,200	$ 82,200	$ 27,400	$ 16,440	$ 10,960		$ 10,960	$ 35,250	0.3	
			Thornton Pkwy & York St	0	$ -	2	$ 2,032,000	0	$ -	0	$ -	0	$ -	$ 2,032,000	0	$ -	1.2	$ 1,219,200	0	$ -	0	$ -	0	$ -	$ 1,219,200	$ 406,400	$ 243,840	$ 162,560		$ 162,560	$ 35,250	4.6	
			Colorado Blvd & E 100th Ave	0	$ -	0	$ -	1	$ 221,000	1	$ 120,000	1	$ 17,000	$ 358,000	0	$ -	0	$ -	0.6	$ 132,600	0.6	$ 72,000	0.6	$ 10,200	$ 214,800	$ 71,600	$ 42,960	$ 28,640		$ 28,640	$ 35,250	0.8	
			Colorado Blvd & E 108th Ave	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 120,000	0	$ -	0	$ -	0	$ -	0.6	$ 72,000	0	$ -	$ 72,000	$ 24,000	$ 14,400	$ 9,600		$ 9,600	$ 35,250	0.3	
			Colorado Blvd & E 121st Ave	0	$ -	0	$ -	0	$ -	1	$ 120,000	0	$ -	$ 120,000	0	$ -	0	$ -	0	$ -	0.6	$ 72,000	0	$ -	$ 72,000	$ 24,000	$ 14,400	$ 9,600		$ 9,600	$ 35,250	0.3	
			Colorado Blvd & Cypress Dr & Riverdale Rd	0	$ -	0	$ -	1	$ 221,000	1	$ 120,000	0	$ -	$ 341,000	0	$ -	0	$ -	0.6	$ 132,600	0.6	$ 72,000	0	$ -	$ 204,600	$ 68,200	$ 40,920	$ 27,280		$ 27,280	$ 35,250	0.8	
			W 84th Ave & Huron St	1	$ 1,778,000	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 1,999,000	0.6	$ 1,066,800	0	$ -	0.6	$ 132,600	0	$ -	0	$ -	$ 1,199,400	$ 399,800	$ 239,880	$ 159,920		$ 159,920	$ 35,250	4.5	
			Subtotal											**$ 27,769,000**											**$ 16,661,400**	**$ 5,553,800**	**$ 3,332,280**	**$ 2,221,520**		**$ 2,221,520**	**$ 1,445,250**	**1.5**	
			E 128th Ave & Emerson St	0	$ -	0	$ -	0	$ -	1	$ 120,000	0	$ -	$ 120,000	0	$ -	0	$ -	0	$ -	0.935	$ 112,200	0	$ -	$ 112,200	$ 24,000	$ 22,440	$ 1,560		$ 31,200	$79,500	0.4	
			E 128th Ave & Washington St	0	$ -	0	$ -	1	$ 221,000	1	$ 120,000	2	$ 34,000	$ 154,000	0	$ -	0	$ -	0	$ -	0.935	$ 112,200	1.87	$ 31,790	$ 143,990	$ 30,800	$ 28,798	$ 2,002		$ 40,040	$79,500	0.5	
			E 84th Ave & Washington St	0	$ -	1	$ 1,016,000	0	$ -	1	$ 120,000	0	$ -	$ 1,136,000	0	$ -	0.935	$ 949,960	0	$ -	0.935	$ 112,200	0	$ -	$ 1,062,160	$ 227,200	$ 212,432	$ 14,768		$ 295,360	$79,500	3.7	
			Pennsylvania St & Washington Center Pkwy & Wa	0	$ -	1	$ 1,016,000	0	$ -	0	$ -	0	$ -	$ 1,016,000	0	$ -	0.935	$ 949,960	0	$ -	0	$ -	0	$ -	$ 949,960	$ 203,200	$ 189,992	$ 13,208		$ 264,160	$79,500	3.3	
			E 120th Ave & Grant St	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0	$ -	0	$ -	0.935	$ 206,635	0	$ -	0	$ -	$ 206,635	$ 44,200	$ 41,327	$ 2,873		$ 57,460	$79,500	0.7	
			Colorado Blvd & E 112th Ave	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 17,000	0	$ -	0	$ -	0	$ -	0	$ -	0.935	$ 15,895	$ 15,895	$ 3,400	$ 3,179	$ 221		$ 4,420	$79,500	0.1	

Benefit-Cost Analysis (BCA) Calculations

Recommendation Category	Countermeasure	Crash Modification Factor	Location	Crash Costs with No Safety Countermeasures: Fatalities	$1,778,000 / Person	Serious Injuries	$1,016,000 / Person	Minor Injuries	$221,000 / Person	Possible Injuries	$120,000 / Person	Property Damage Only	$17,000 / Crash	5-Year Crash Costs without Safety Countermeasures	Crash Costs WITH Safety Countermeasures: Fatalities	$1,778,000 / Person	Serious Injuries	$1,016,000 / Person	Minor Injuries	$221,000 / Person	Possible Injuries	$120,000 / Person	Property Damage Only	$17,000 / Crash	5-Year Crash Costs WITH Safety Countermeasures	Annual Crash Costs, No Safety Countermeasures	Annual Crash Costs, WITH Safety Countermeasures	Annual Benefit WITH Countermeasure	Service Life (Years)	Total Project Benefit	Project Cost	Benefit / Cost	Notes
Tighten the Turn Radius	Change corner right-turn radius	0.935 (bike & pedestrian crashes, assuming radius reduction from 40 to 30 feet)	Colorado Blvd & E 115th Ave	1	$ 1,778,000	0	$ -	0	$ -	1	$ 120,000	0	$ -	$ 1,898,000	0.935	$ 1,662,430	0	$ -	0	$ -	0.935	$ 112,200	0	$ -	$ 1,774,630	$ 379,600	$ 354,926	$ 24,674	20	$ 493,480	$79,500	6.2	
			Washington St & E 130th Ave	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0	$ -	0	$ -	0.935	$ 206,635	0	$ -	0	$ -	$ 206,635	$ 44,200	$ 41,327	$ 2,873		$ 57,460	$79,500	0.7	
			E 88th Ave & Grant St	0	$ -	2	$ 2,032,000	2	$ 442,000	1	$ 120,000	2	$ 34,000	$ 2,628,000	0	$ -	1.87	$ 1,899,920	1.87	$ 413,270	0.935	$ 112,200	1.87	$ 31,790	$ 2,457,180	$ 525,600	$ 491,436	$ 34,164		$ 683,280	$79,500	8.6	
			E 88th Ave & Welby Rd	0	$ -	1	$ 1,016,000	0	$ -	0	$ -	0	$ -	$ 1,016,000	0	$ -	0.935	$ 949,960	0	$ -	0	$ -	0	$ -	$ 949,960	$ 203,200	$ 189,992	$ 13,208		$ 264,160	$79,500	3.3	
			E 88th Ave & Washington St	0	$ -	1	$ 1,016,000	1	$ 221,000	2	$ 240,000	0	$ -	$ 1,477,000	0	$ -	0.935	$ 949,960	0.935	$ 206,635	1.87	$ 224,400	0	$ -	$ 1,380,995	$ 295,400	$ 276,199	$ 19,201		$ 384,020	$79,500	4.8	
			Thornton Pkwy & Washington St	0	$ -	0	$ -	1	$ 221,000	2	$ 240,000	1	$ 17,000	$ 478,000	0	$ -	0	$ -	0.935	$ 206,635	1.87	$ 224,400	0.935	$ 15,895	$ 446,930	$ 95,600	$ 89,386	$ 6,214		$ 124,280	$79,500	1.6	
			E 88th Ave & Rainbow Ave & York St	0	$ -	1	$ 1,016,000	1	$ 221,000	0	$ -	0	$ -	$ 1,237,000	0	$ -	0.935	$ 949,960	0.935	$ 206,635	0	$ -	0	$ -	$ 1,156,595	$ 247,400	$ 231,319	$ 16,081		$ 321,620	$79,500	4.0	
			Colorado Blvd & Woodglen Blvd	0	$ -	2	$ 2,032,000	0	$ -	0	$ -	0	$ -	$ 2,032,000	0	$ -	1.87	$ 1,899,920	0	$ -	0	$ -	0	$ -	$ 1,899,920	$ 406,400	$ 379,984	$ 26,416		$ 528,320	$79,500	6.6	
			E 88th Ave & Pearl St	0	$ -	1	$ 1,016,000	1	$ 221,000	0	$ -	2	$ 34,000	$ 1,271,000	0	$ -	0.935	$ 949,960	0.935	$ 206,635	0	$ -	1.87	$ 31,790	$ 1,188,385	$ 254,200	$ 237,677	$ 16,523		$ 330,460	$79,500	4.2	
			Colorado Blvd & E 100th Ave	0	$ -	0	$ -	1	$ 221,000	1	$ 120,000	1	$ 17,000	$ 358,000	0	$ -	0	$ -	0.935	$ 206,635	0.935	$ 112,200	0.935	$ 15,895	$ 334,730	$ 71,600	$ 66,946	$ 4,654		$ 93,080	$79,500	1.2	
			Colorado Blvd & Cypress Dr & Riverdale Rd	0	$ -	0	$ -	1	$ 221,000	1	$ 120,000	0	$ -	$ 341,000	0	$ -	0	$ -	0.935	$ 206,635	0.935	$ 112,200	0	$ -	$ 318,835	$ 68,200	$ 63,767	$ 4,433		$ 88,660	$79,500	1.1	
			Subtotal											**$ 15,621,000**											**$ 14,605,635**	**$ 3,124,200**	**$ 2,921,127**	**$ 203,073**		**$ 4,061,460**	**$1,351,500**	**3.0**	
Install Refuge Median	Install Raised Median / Refuge Islands	0.55 (bike & pedestrian crashes)	Colorado Blvd & E 88th Ave	0	$ -	0	$ -	0	$ -	3	$ 360,000	0	$ -	$ 360,000	0	$ -	0	$ -	0	$ -	1.65	$ 198,000	0	$ -	$ 198,000	$ 72,000	$ 39,600	$ 32,400		$ 648,000	$1,006,500	0.6	
			E 84th Ave & Washington St	0	$ -	1	$ 1,016,000	0	$ -	1	$ 120,000	0	$ -	$ 1,136,000	0	$ -	0.55	$ 558,800	0	$ -	0.55	$ 66,000	0	$ -	$ 624,800	$ 227,200	$ 124,960	$ 102,240		$ 2,044,800	$1,006,500	2.0	
			E 120th Ave & Grant St	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0	$ -	0	$ -	0.55	$ 121,550	0	$ -	0	$ -	$ 121,550	$ 44,200	$ 24,310	$ 19,890		$ 397,800	$1,006,500	0.4	
			E 88th Ave & Grant St	0	$ -	2	$ 2,032,000	2	$ 442,000	1	$ 120,000	2	$ 34,000	$ 2,628,000	0	$ -	1.1	$ 1,117,600	1.1	$ 243,100	0.55	$ 66,000	1.1	$ 18,700	$ 1,445,400	$ 525,600	$ 289,080	$ 236,520		$ 4,730,400	$1,006,500	4.7	
			E 120th Ave & Washington St	0	$ -	0	$ -	2	$ 442,000	2	$ 240,000	0	$ -	$ 682,000	0	$ -	0	$ -	1.1	$ 243,100	1.1	$ 132,000	0	$ -	$ 375,100	$ 136,400	$ 75,020	$ 61,380	20	$ 1,227,600	$1,006,500	1.2	
			E 104th Ave & Fox Run Pkwy	0	$ -	0	$ -	2	$ 442,000	0	$ -	1	$ 17,000	$ 459,000	0	$ -	0	$ -	1.1	$ 243,100	0	$ -	0.55	$ 9,350	$ 252,450	$ 91,800	$ 50,490	$ 41,310		$ 826,200	$1,006,500	0.8	
			Thornton Pkwy & York St	0	$ -	2	$ 2,032,000	0	$ -	0	$ -	0	$ -	$ 2,032,000	0	$ -	1.1	$ 1,117,600	0	$ -	0	$ -	0	$ -	$ 1,117,600	$ 406,400	$ 223,520	$ 182,880		$ 3,657,600	$1,006,500	3.6	
			Subtotal											**$ 7,518,000**											**$ 4,134,900**	**$ 1,503,600**	**$ 826,980**	**$ 676,620**		**$ 13,532,400**	**$7,045,500**	**1.9**	
New or Improved Pedestrian Crossing	Install Raised Median / Refuge Islands	0.55 (bike & pedestrian crashes)	E 128th Ave & Emerson St	0	$ -	0	$ -	0	$ -	1	$ 120,000	0	$ -	$ 120,000	0	$ -	0	$ -	0	$ -	0.55	$ 66,000	0	$ -	$ 66,000	$ 24,000	$ 13,200	$ 10,800		$ 216,000	$1,006,500	0.2	
			Conifer Rd & W 84th Ave	1	$ 1,778,000	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 1,795,000	0.55	$ 977,900	0	$ -	0	$ -	0	$ -	0.55	$ 9,350	$ 987,250	$ 359,000	$ 197,450	$ 161,550		$ 3,231,000	$1,006,500	3.2	
			Pecos St & Milky Way	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 17,000	0	$ -	0	$ -	0	$ -	0	$ -	0.55	$ 9,350	$ 9,350	$ 3,400	$ 1,870	$ 1,530		$ 30,600	$1,006,500	0.0	
			Colorado Blvd & E 135th Dr & E 135th Pl	0	$ -	0	$ -	1	$ 221,000	1	$ 120,000	0	$ -	$ 341,000	0	$ -	0	$ -	0.55	$ 121,550	0.55	$ 66,000	0	$ -	$ 187,550	$ 68,200	$ 37,510	$ 30,690		$ 613,800	$1,006,500	0.6	
			Huron St & Planet Pl & Star Point Plr	0	$ -	0	$ -	0	$ -	1	$ 120,000	0	$ -	$ 120,000	0	$ -	0	$ -	0	$ -	0.55	$ 66,000	0	$ -	$ 66,000	$ 24,000	$ 13,200	$ 10,800	20	$ 216,000	$1,006,500	0.2	
			Holly St & E 117th Ave	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 17,000	0	$ -	0	$ -	0	$ -	0	$ -	0.55	$ 9,350	$ 9,350	$ 3,400	$ 1,870	$ 1,530		$ 30,600	$1,006,500	0.0	
			York St and E 151st Ave	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	$ -	$ -	$ -	$ -		$ -	$1,006,500	0.0	
			E 120th Ave & Unnamed Rd (2500 E 120th Ave)	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	$ -	$ -	$ -	$ -		$ -	$1,006,500	0.0	
			Subtotal											**$ 2,410,000**											**$ 1,325,500**	**$ 482,000**	**$ 265,100**	**$ 216,900**		**$ 4,338,000**	**$8,052,000**	**0.5**	
Set Back Shared Use Path	Deflect bikeway approach 7-16 feet from main roadway	0.55 (bike & pedestrian crashes)	E 128th Ave & Emerson St	0	$ -	0	$ -	0	$ -	1	$ 120,000	0	$ -	$ 120,000	0	$ -	0	$ -	0	$ -	0.55	$ 66,000	0	$ -	$ 66,000	$ 24,000	$ 13,200	$ 10,800		$ 216,000	$64,500	3.3	
			Pennsylvania St & Washington Center Pkwy & Wa	0	$ -	1	$ 1,016,000	0	$ -	0	$ -	0	$ -	$ 1,016,000	0	$ -	0.55	$ 558,800	0	$ -	0	$ -	0	$ -	$ 558,800	$ 203,200	$ 111,760	$ 91,440		$ 1,828,800	$64,500	28.4	
			E 112th Ave & Steele St	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 17,000	0	$ -	0	$ -	0	$ -	0	$ -	0.55	$ 9,350	$ 9,350	$ 3,400	$ 1,870	$ 1,530		$ 30,600	$64,500	0.5	
			Holly St & E 121st Ave	0	$ -	0	$ -	1	$ 221,000	0	$ -	2	$ 34,000	$ 255,000	0	$ -	0	$ -	0.55	$ 121,550	0	$ -	1.1	$ 18,700	$ 140,250	$ 51,000	$ 28,050	$ 22,950		$ 459,000	$64,500	7.1	CMF based on a
			Pecos St & Milky Way	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 17,000	0	$ -	0	$ -	0	$ -	0	$ -	0.55	$ 9,350	$ 9,350	$ 3,400	$ 1,870	$ 1,530	20	$ 30,600	$64,500	0.5	study conducted in
			E 120th Ave & Saint Paul St	0	$ -	0	$ -	1	$ 221,000	0	$ -	0	$ -	$ 221,000	0	$ -	0	$ -	0.55	$ 121,550	0	$ -	0	$ -	$ 121,550	$ 44,200	$ 24,310	$ 19,890		$ 397,800	$64,500	6.2	the Netherlands
			Huron St & Planet Pl & Star Point Plr	0	$ -	0	$ -	0	$ -	1	$ 120,000	0	$ -	$ 120,000	0	$ -	0	$ -	0	$ -	0.55	$ 66,000	0	$ -	$ 66,000	$ 24,000	$ 13,200	$ 10,800		$ 216,000	$64,500	3.3	
			Holly St & E 117th Ave	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 17,000	$ 17,000	0	$ -	0	$ -	0	$ -	0	$ -	0.55	$ 9,350	$ 9,350	$ 3,400	$ 1,870	$ 1,530		$ 30,600	$64,500	0.5	
			Subtotal											**$ 1,783,000**											**$ 980,650**	**$ 356,600**	**$ 196,130**	**$ 160,470**		**$ 3,209,400**	**$516,000**	**6.2**	