

**City of Boulder**  
**Transportation Advisory Board Agenda Item**  
**Meeting Date: October 12, 2020**

**INFORMATION ITEM:**

**Safe Streets Boulder - Vision Zero Update**

**STAFF:**

Erika Vandenbrande, Director of Transportation and Mobility  
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**EXECUTIVE SUMMARY**

The city of Boulder has a goal of zero travel-related severe crashes (serious injury and fatal). To advance this goal the city is taking a data-driven approach, analyzing crash trends, and developing a 4-Es approach (evaluation, education, engineering, and enforcement). The city's most recent [2019 Vision Zero Safe Streets Report](#) (SSBR) details actions to be taken in pursuit of our Vision Zero goals and was developed after review of all 2015-2017 crashes. This memorandum updates crash trends to include 2018 and 2019 crashes, reports on initial key findings/observations, and progress on ongoing mitigation efforts to address identified crash types and behaviors.

A summary of key findings and associated trends is provided below. A detailed summary is provided in Attachment A.

**Key Findings/Observations**

- 57 annual severe crashes average over last 5 years
- 80% of severe crashes occur on the major streets (collector and above)
- 71% of severe crashes involve vulnerable users (ped, cyclist, motorcyclist)
- 27% of severe crashes involve permissive left-turns
- 27% of severe crashes involve a cyclist without a helmet
- 17% of severe crashes involve permissive left turn & vulnerable users
- 11% of severe crashes involve motorcyclists
- 11% of severe crashes involve speed as a casual factor
- 7% of severe crashes involve DUI
- 58% of severe crashes occur at intersections
- 38% of severe crashes occur at signalized intersections
- 20% of severe crashes occur at unsignalized intersections
- 22% of severe crashes occur mid-block/non-intersection

Although the trend of approximately 60 severe crashes annually continued in 2018 and 2019, staff's assessment is that the recommended actions in the SSBR [Action Plan](#) remain sound. Based on the data,

major streets, vulnerable users, intersections, speed, and permissive left turns continue to need to be the major focus. An emphasis on cyclists wearing proper safety equipment (helmets) should be added to the action plan based on the additional data regarding helmet use and the National Transportation Safety Board [NTSB Report](#) findings regarding cycling safety. Continued changes and enhancements to our system design and operation remain an important element but renewed efforts to impact severe crash trends and behaviors through outreach/education is also required. To reduce crash levels significantly further, additional resources for capital and operational enhancements would also be needed to achieve our Vision Zero goals.

## **ONGOING VISION ZERO IMPLEMENTATION EFFORTS**

As the city's top transportation and mobility priority, travel safety is a major work program focus. A brief synopsis of ongoing efforts in each of the 4-Es -- evaluation, education, engineering, and enforcement that support the key findings of the severe crash analysis is provided below.

### **Engineering**

**Traffic Signal Operations** -- The SSBR analysis and action plan identified the need to implement more restrictive traffic signal phasing to enhance safety. These more restrictive strategies involve less permissive shared interaction between the different modes and movements (Leading Pedestrian Indication – LPI, Pedestrian Protect Left-turn Phasing, and Protected Only Left-turn phasing) and enhanced traffic signal indication when shared. Starting in 2017, city staff implemented 72 LPI, 74 FYA, 1 pedestrian-protect left-turn phasing and 36 protected-only left-turn phasing changes to the traffic signal system. In the remainder of 2020, an additional 9 traffic signal approaches will be converted to FYA, with 5 of those going to protected-only operation. Our Safer Street Grant application includes the request for funding which will allow traffic signal reconstruction resulting in changes to an additional 15 traffic signal approaches. A significant element of this effort would be to rebuild the Regent/Broadway intersection to address left-turn pedestrian conflicts at key CU pedestrian/cyclist access point. Our new traffic signal controller software has the potential of making implementation of pedestrian-protect left-turn phasing (red left-turn arrow when there is a conflicting pedestrian phase call) much easier and staff is reviewing potential locations to use this new phasing approach.

**Green Bike Lane Pavement Marking** – The SSBR action plan identified the need to proactively install green bike pavement markings at intersections to improve bicycle safety in conflict zones. In 2019, a comprehensive corridor approach was implemented on 30<sup>th</sup> Street (Diagonal to Baseline) and Folsom Street (Iris to Colorado). Additional green pavement markings are being added to the Folsom corridor during the pavement reconstruction project in 2020 and 2021. In 2020, this approach was implemented on Pine Street (Folsom to 28<sup>th</sup>) and Table Mesa Drive (Vassar to Broadway).

### **Outreach/Education**

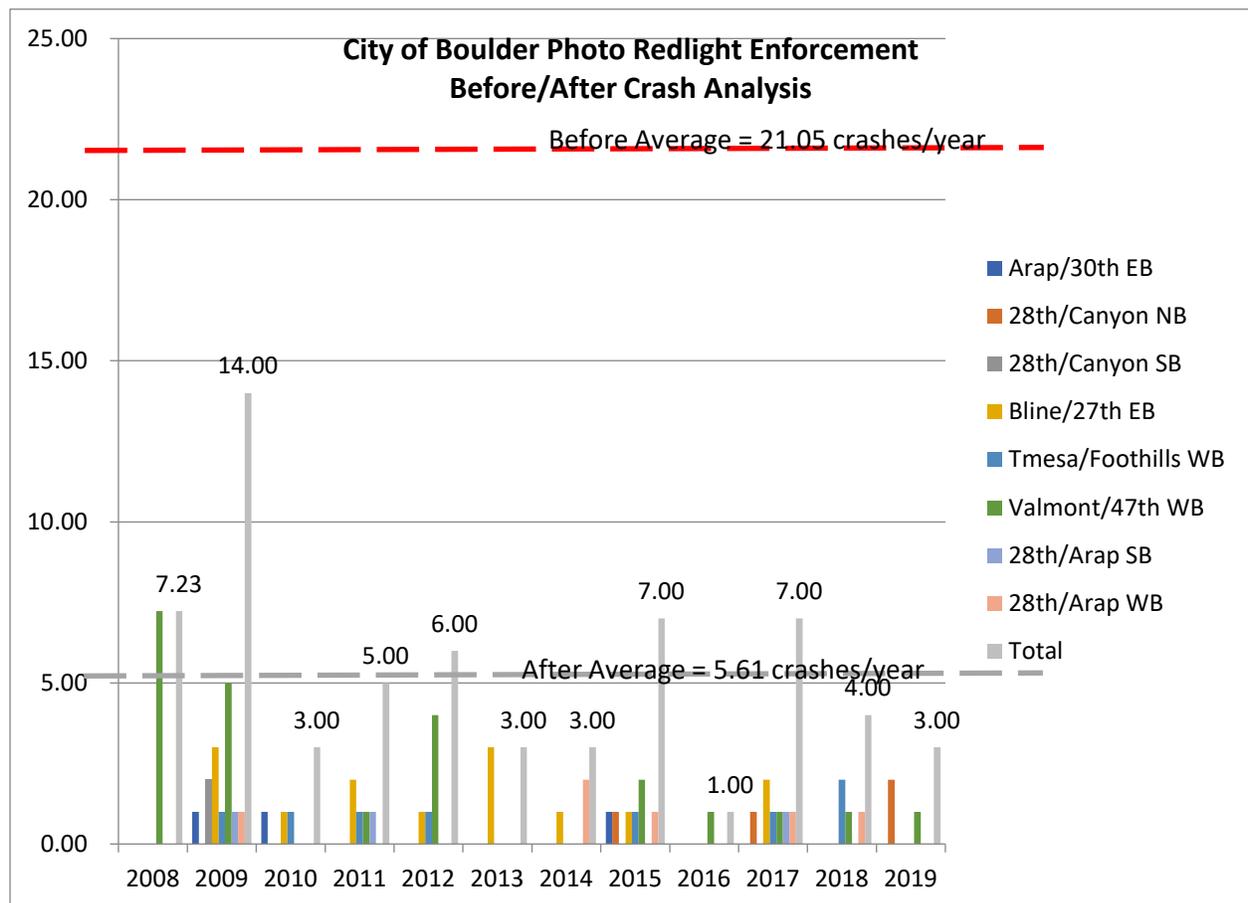
Transportation staff is implementing the 2020 Vision Zero communications strategy to guide education and outreach this year under COVID-19 conditions. The first focus was on education about the new 20 mph default speed limit (20 is Plenty). Enhanced plans are under development with communications staff to expand outreach efforts to emphasize unsafe behaviors.

### **Enforcement**

**Photo Speed Enforcement** -- In 2019 the photo vans were deployed for 3,572 hours at 53 locations, monitored 943,474 motorists, and observed 13,496 speed limit violations. A summary of the deployments include key metrics is provided in Attachment B. Top deployment locations for each metric (deployment hours, violations/hour, highest speed, 85<sup>th</sup>-percentile speed, etc.) are highlighted in yellow.

As of June 18, 2020, the city-wide default speed limit is now 20 mph on local streets. All local street speed limit signs have been replaced with Vision Zero 20 mph signs. To emphasize the new local street speed limit, photo-speed vans deployments have including additional deployment on streets with the reduced speed limit and were also applicants in the Neighborhood Speed Management Program (NSMP). In addition, on a limited basis photo speed enforcement has been expanded to issue warning notices for violations less than the state mandated 10-mph enforcement threshold (5 to 10 mph over). Examples of emphasized streets include 5200 Pennsylvania Ave W/B, 2200 Spruce St E\B, 3200 Aurora Ave W\B, and 1100 Bear Mountain Dr E/B.

Red-light Running Photo Enforcement -- The City of Boulder Red-light Violation Photo Enforcement Program started as a demonstration in 1998 with four approaches. Over the subsequent years the city has added 6 approaches (2001 – 2, 2009 – 2, 2019 – 1, 2020 – 1) and now has 10 enforced approaches. The program continues to provide significant safety benefit through the reduction of red-light running related crashes.



In summary, the number of crashes at deployed approaches caused by red-light running has reduced from an annual average of 21.1 to 5.6, a 73 percent reduction. The net effect has been a reduction of

greater than 14 red-light running crashes annually. Additional detail regarding the before/after crash history is provided in Attachment C.

Because of these safety benefits the city is moving forward to expand red-light photo enforcement at additional high red-light running crash approaches. The eastbound thru approach at the Diagonal Highway and 47<sup>th</sup> Street traffic signal is currently anticipated to be operational in the 4<sup>th</sup> quarter of 2020.

### **Evaluation**

Case studies – In support of learning as we implement different mitigation strategies, staff has been performing case studies to evaluate effectiveness. An example case study of the traffic signal phasing changes (flashing yellow arrow and Protected-only left-turn operation) at the 28<sup>th</sup> St and Jay Rd traffic signal is provided in Attachment D.

### **Next Steps**

Development of the next Vision Zero Safe Streets Report is scheduled for 2021, and will incorporate analysis of 2018, 2019, and 2020 crash data. Based on the reduced staffing and financial constraints required in the 2021 budget, the 2021 SSBR will be limited and the scope will be driven by available staff and funding resources.

### **Attachments**

- A – 2015-2019 Severe Crash Summary
- B – 2019 Photo Speed Enforcement Deployment Summary
- C – Photo Red-light Running Enforcement Before/After Crash Analysis
- D – 28<sup>th</sup>/Jay Traffic Signal Phasing Crash Mitigation Case Study

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 2018-2019 Severe Crash Data Update  
 Key Observations

2015 thru 2019 Data	Annual Occurrences	% of Total	Trend
Average 57 annual severe crashes over last 5 years	57	100%	unchanged, except 2015
80% of severe crashes occur on the major streets	45	80%	unchanged
71% of severe crashes involve vulnerable users (ped, cyclist, motorcyclist)	40	71%	unchanged
27% of severe crashes involve permissive left-turns	15	27%	unchanged
27% of severe crashes involve a cyclist without a helmet	16	27%	unknown (2 years of data)
17% of severe crashes involve permissive left turn & vulnerable users	9	17%	variable
11% of severe crashes involve motorcyclists	6	11%	unchanged
11% of severe crashes involve speed as a casual factor	6	11%	unchanged
7% of severe crashes involve DUI	4	7%	variable
58% of severe crashes occur at intersections	33	58%	unchanged
38% of severe crashes occur at signalized intersections	21	38%	unchanged
20% of severe crashes occur at unsignalized intersections	11	20%	variable
22% of severe crashes occur mid-block/non-intersection	13	22%	variable

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Severe Crash Summary -- Occurrences Type	Safe Streets Boulder Report			2018	2019	Stats		
	2015	2016	2017			Ave.	Range	
Fatal	0	6	0	3	3	2	0	6
Incapacitating	40	55	59	59	58	54	40	59
Total (Fatal + Incapacitating)	40	61	59	62	61	57	40	62
<b><u>Crash by Mode</u></b>								
Pedestrian	7	15	16	10	10	12	7	16
Cyclist	19	28	17	22	27	23	17	28
Motorcyclist (motorcycle & scooter)	1	8	7	8	6	6	1	8
Motorist	13	11	20	22	18	17	11	22
Total - (Crash by Mode)	40	62	60	62	61	57	40	62
* ped-bike crashes included in both totals								
<b><u>Permissive left turns</u></b>								
Permissive left turns at traffic signals	6	15	13	10	9	11	6	15
Permissive left turns at uncontrolled intersection/driveway	6	3	5	7	2	5	2	7
Total (permissive left turn)	12	18	18	17	11	15	11	18
<b><u>Permissive left turns at traffic signals</u></b>								
motor vehicle - motor vehicle	4	3	6	6	5	5	3	6
motor vehicle - motorcyclist	0	4	0	0	1	1	0	4
motor vehicle - pedestrian	1	3	5	2	0	2	0	5
motor vehicle - cyclist	1	5	2	2	3	3	1	5
Total (permissive left turns at traffic signals)	6	15	13	10	9	11	6	15
<b><u>Permissive left turns at uncontrolled intersection/driveway</u></b>								
motor vehicle - motor vehicle	1	0	1	2	1	1	0	2
motor vehicle - motorcyclist	0	1	0	0	0	0	0	1
motor vehicle - pedestrian	0	0	1	0	0	0	0	1
motor vehicle - cyclist	5	2	3	5	1	3	1	5
Total (permissive left turns at uncontrolled intersection)	6	3	5	7	2	5	2	7

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Severe Crash Summary -- Occurrences Type	Safe Streets Boulder Report			2018	2019	Stats		
	2015	2016	2017			Ave.	Range	
<b><u>Street Classification</u></b>								
Freeway (F)	2	1	2	1	0	1	0	2
Expressway (E)	4	4	4	4	4	4	4	4
Principal Arterial (PA)	17	24	29	24	22	23	17	29
Minor Arterial (MA)	7	15	10	12	13	11	7	15
Collector ( C)	4	5	4	9	5	5	4	9
Local (L)	6	8	7	3	7	6	3	8
Multituse Path	0	3	1	5	3	2	0	5
Private Property (PP)	0	1	2	4	7	3	0	7
Total (Street Classification)	40	61	59	62	61	57	40	62
<b><u>Crash Location</u></b>								
Signalized Intersection	14	27	21	27	18	21	14	27
Rectangular Rapid Flash Beacons (RRFBs)	1	1	1	2	4	2	1	4
Unsignalized Intersection	11	10	15	10	11	11	10	15
Right-turn bypass lane	2	0	0	0	3	1	0	3
Private Driveway	0	2	1	8	3	3	0	8
Mid-block/non-intersection	11	17	17	6	12	13	6	17
Multi-use Path	1	3	1	5	3	3	1	5
Private Property	0	1	2	4	7	3	0	7
Unknown	0	0	1	0	0	0	0	1
Total (Crash Location)	40	61	59	62	61	57	40	62
<b><u>Motorcycle &amp; Scooters</u></b>								
Motorcycle	0	6	5	5	4	4	0	6
Scooter	1	2	2	3	2	2	1	3
Total (Motorcycle/Scooter)	1	8	7	8	6	6	1	8
<b><u>Cycling-related Crash Facility</u></b>								
Bike-lane	4	10	7	8	5	7	4	10
Multi-use Path	1	3	3	5	5	3	1	5

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Severe Crash Summary -- Occurrences Type	Safe Streets Boulder Report			2018	2019	Stats		
	2015	2016	2017			Ave.	Range	
Crosswalk	4	8	1	5	9	5	1	9
Private Property	0	1	0	2	2	1	0	2
Paved Shoulder	1	0	0	1	0	0	0	1
General Purpose Lane	9	6	5	1	6	5	1	9
Unknown	0	0	1	0	0	0	0	1
Total (Cycling Facility)	19	28	17	22	27	23	17	28
<b><u>Cycling PPE</u></b>								
Helmet	data not analyzed			10	10	10	10	10
No Helmet	data not analyzed			15	16	16	15	16
Unknown/conflicting information	data not analyzed			0	1	1	0	1
Total (Cycling PPE)	data not analyzed			25	27	26	25	27
<b><u>Motorcycling PPE</u></b>								
Helmet	0	1	0	3	3	1	0	3
No Helmet	0	0	0	2	2	1	0	2
Unknown/conflicting information	1	11	7	2	1	4	1	11
Total	1	12	7	7	6	7	1	12
<b><u>DUI - Alcohol/Drugs</u></b>								
	4	1	2	9	5	4	1	9
<b><u>Speeding Casual Factor</u></b>								
Freeway (F)	2	0	2	1	0	1	0	2
Expressway (E)	0	2	1	0	1	1	0	2
Principal Arterial (PA)	1	3	2	2	4	2	1	4
Minor Arterial (MA)	1	0	1	1	1	1	0	1
Collector (C)	3	0	0	1	0	1	0	3
Local (L)	0	1	1	0	0	0	0	1
Multituse Path	0	0	0	0	1	0	0	1
Private Property (PP)	0	0	0	0	0	0	0	0
Total (Speed Causal Factor)	7	6	7	5	7	6	5	7

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Severe Crash Summary -- Occurences Type	Safe Streets Boulder Report			2018	2019	Stats	
	2015	2016	2017			Ave.	Range
<b>Speeding and DUI</b>	4	1	0	3	2	2	0 4
<b>Vulnerable Users</b>	33	47	44	52	51	45	33 52

Note: The crash data reported in this document comes from the City of Boulder’s Transportation & Mobility Department database, which is derived from the Police Department’s Record Management System. The information contained in these databases is updated periodically and may change over time.

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Severe Crash Summary -- Percentages Type	Safe Streets Boulder Report			2018	2019	Stats		
	2015	2016	2017			Ave.	Range	
Fatal	0	6	0	3	3	2	0	6
Incapacitating	40	55	59	59	58	54	40	59
Total (Fatal + Incapacitating)	40	61	59	62	61	57	40	62
<b><u>Crash by Mode</u></b>								
Pedestrian	18%	25%	27%	16%	16%	20%	16%	27%
Cyclist	48%	46%	29%	35%	44%	40%	29%	48%
Motorcyclist (motorcycle & scooter)	3%	13%	12%	13%	10%	11%	3%	13%
Motorist	33%	18%	34%	35%	30%	30%	18%	35%
Total - (Crash by Mode)	100%	102%	102%	100%	100%			
* ped-bike crashes included in both totals								
<b><u>Permissive left turns</u></b>								
Permissive left turns at traffic signals	15%	25%	22%	16%	15%	19%	15%	25%
Permissive left turns at uncontrolled intersection/driveway	15%	5%	8%	11%	3%	8%	3%	15%
Total (permissive left turn)	30%	30%	31%	27%	18%	27%	18%	31%
<b><u>Permissive left turns at traffic signals</u></b>								
motor vehicle - motor vehicle	10%	5%	10%	10%	8%	8%	5%	10%
motor vehicle - motorcyclist	0%	7%	0%	0%	2%	2%	0%	7%
motor vehicle - pedestrian	3%	5%	8%	3%	0%	4%	0%	8%
motor vehicle - cyclist	3%	8%	3%	3%	5%	5%	3%	8%
Total (permissive left turns at traffic signals)	15%	25%	22%	16%	15%	19%	15%	25%
<b><u>Permissive left turns at uncontrolled intersection/driveway</u></b>								
motor vehicle - motor vehicle	3%	0%	2%	3%	2%	2%	0%	3%
motor vehicle - motorcyclist	0%	2%	0%	0%	0%	0%	0%	2%
motor vehicle - pedestrian	0%	0%	2%	0%	0%	0%	0%	2%
motor vehicle - cyclist	13%	3%	5%	8%	2%	6%	2%	13%
Total (permissive left turns at uncontrolled intersection)	15%	5%	8%	11%	3%	8%	3%	15%

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Severe Crash Summary -- Percentages Type	Safe Streets Boulder Report			2018	2019	Stats		
	2015	2016	2017			Ave.	Range	
<b><u>Street Classification</u></b>								
Freeway (F)	5%	2%	3%	2%	0%	2%	0%	5%
Expressway (E)	10%	7%	7%	6%	7%	7%	6%	10%
Principal Arterial (PA)	43%	39%	49%	39%	36%	41%	36%	49%
Minor Arterial (MA)	18%	25%	17%	19%	21%	20%	17%	25%
Collector ( C)	10%	8%	7%	15%	8%	10%	7%	15%
Local (L)	15%	13%	12%	5%	11%	11%	5%	15%
Multituse Path	0%	5%	2%	8%	5%	4%	0%	8%
Private Property (PP)	0%	2%	3%	6%	11%	5%	0%	11%
Total (Street Classification)	100%	100%	100%	100%	100%			
<b><u>Crash Location</u></b>								
Signalized Intersection	35%	44%	36%	44%	30%	38%	30%	44%
Rectangular Rapid Flash Beacons (RRFBs)	3%	2%	2%	3%	7%	3%	2%	7%
Unsignalized Intersection	28%	16%	25%	16%	18%	20%	16%	28%
Right-turn bypass lane	5%	0%	0%	0%	5%	2%	0%	5%
Private Driveway	0%	3%	2%	13%	5%	5%	0%	13%
Mid-block/non-intersection	28%	28%	29%	10%	20%	22%	10%	29%
Multi-use Path	3%	5%	2%	8%	5%	5%	2%	8%
Private Property	0%	2%	3%	6%	11%	5%	0%	11%
Unknown	0%	0%	2%	0%	0%	0%	0%	2%
Total (Crash Location)	100%	100%	100%	100%	100%			
<b><u>Motorcycle &amp; Scooters</u></b>								
Motorcycle	0%	10%	8%	8%	7%	7%	0%	10%
Scooter	3%	3%	3%	5%	3%	4%	3%	5%
Total (Motorcycle/Scooter)	3%	13%	12%	13%	10%	11%	3%	13%
<b><u>Cycling-related Crash Facility</u></b>								
Bike-lane	10%	16%	12%	13%	8%	12%	8%	16%
Multi-use Path	3%	5%	5%	8%	8%	6%	3%	8%

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Severe Crash Summary -- Percentages Type	Safe Streets Boulder Report			2018	2019	Stats		
	2015	2016	2017			Ave.	Range	
Crosswalk	10%	13%	2%	8%	15%	10%	2%	15%
Private Property	0%	2%	0%	3%	3%	2%	0%	3%
Paved Shoulder	3%	0%	0%	2%	0%	1%	0%	3%
General Purpose Lane	23%	10%	8%	2%	10%	10%	2%	23%
Unknown	0%	0%	2%	0%	0%	0%	0%	2%
Total (Cycling Facility)	48%	46%	29%	35%	44%	40%	29%	48%
<b><u>Cycling PPE</u></b>								
Helmet	data not analyzed			16%	16%	18%	16%	16%
No Helmet				24%	26%	27%	24%	26%
Unknown/conflicting information				0%	2%	1%	0%	2%
Total (Cycling PPE)				40%	44%	46%	40%	44%
<b><u>Motorcycling PPE</u></b>								
Helmet	0%	2%	0%	5%	5%	2%	0%	5%
No Helmet	0%	0%	0%	3%	3%	1%	0%	3%
Unknown/conflicting information	3%	18%	12%	3%	2%	8%	2%	18%
Total	3%	20%	12%	11%	10%	12%	3%	20%
<b>DUI - Alcohol/Drugs</b>	10%	2%	3%	15%	8%	7%	2%	15%
<b><u>Speeding Casual Factor</u></b>								
Freeway (F)	5%	0%	3%	2%	0%	2%	0%	5%
Expressway (E)	0%	3%	2%	0%	2%	1%	0%	3%
Principal Arterial (PA)	3%	5%	3%	3%	7%	4%	3%	7%
Minor Arterial (MA)	3%	0%	2%	2%	2%	1%	0%	3%
Collector ( C)	8%	0%	0%	2%	0%	1%	0%	8%
Local (L)	0%	2%	2%	0%	0%	1%	0%	2%
Multituse Path	0%	0%	0%	0%	2%	0%	0%	2%
Private Property (PP)	0%	0%	0%	0%	0%	0%	0%	0%
Total (Speed Causal Factor)	18%	10%	12%	8%	11%	11%	8%	18%

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Severe Crash Summary -- Percentages Type	Safe Streets Boulder Report			2018	2019	Stats	
	2015	2016	2017			Ave.	Range
<b>Speeding and DUI</b>	10%	2%	0%	5%	3%	4%	0% 10%
<b>Vulnerable Users</b>	68%	84%	68%	65%	70%	71%	65% 84%

Note: the crash data reported in this document comes from the City of Boulder’s Transportation & Mobility Department database, which is derived from the Police Department’s Record Management System. The information contained in these databases is updated periodically and may change over time.

Attachment B – 2019 Photo Speed Enforcement Deployment Summary

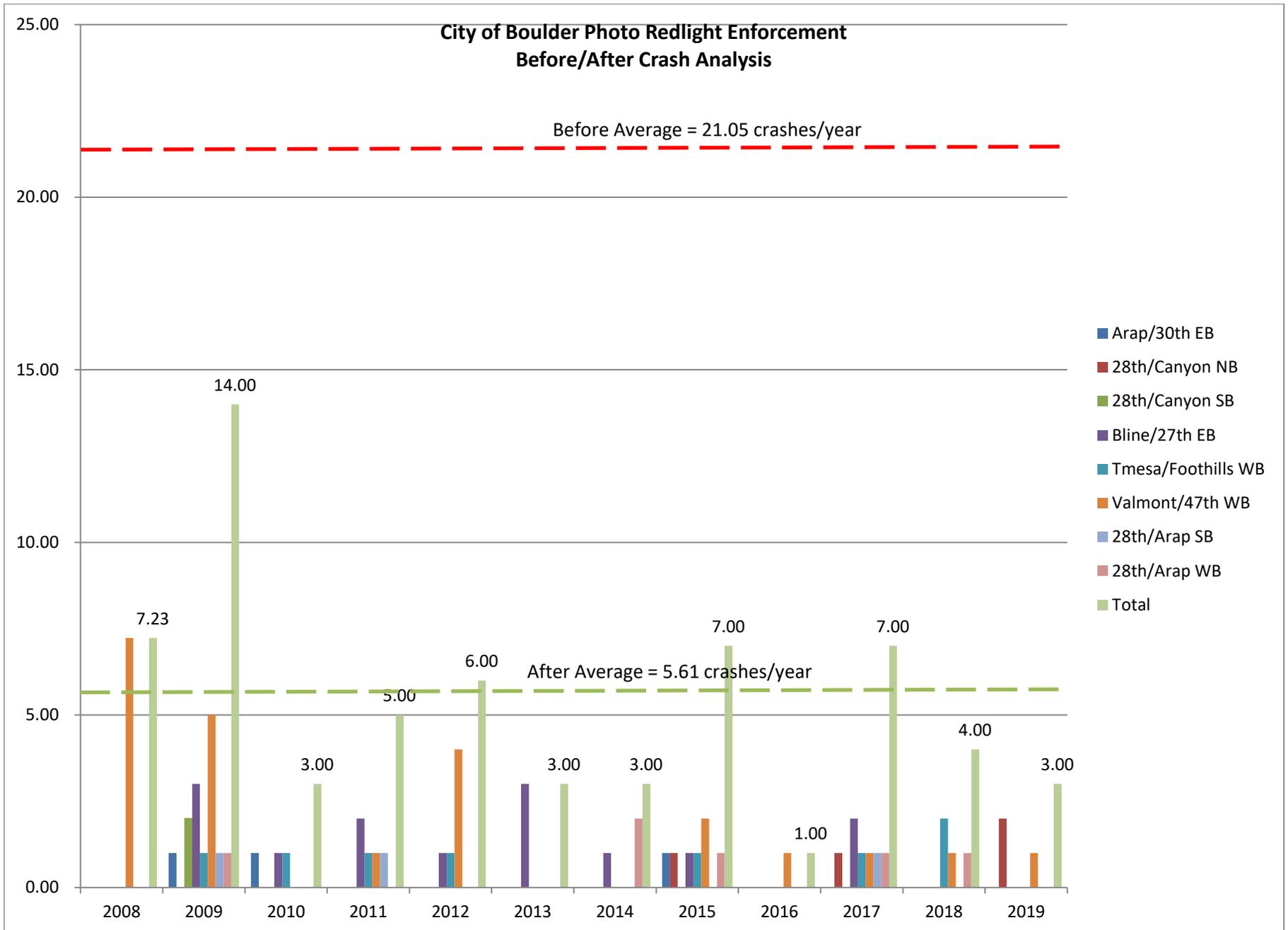
From Event Date: 01/01/2019 To Event Date: 12/31/2019

Location Code	Location Desc	School Zone	Speed Limit	Violations	Total Events	Deployment Time (Hours)	Violations /hour	Highest Speed	Speed 85 Percentile	Delta 85th vs. SL	Small sample	% > enforcement threshold
AUT151	SCHOOL ZONE - 3300 BLK TABLE MESA E/B	SZ	20	481	8,560	22.72	21.17	43	28	8		6%
AUT76	SCHOOL ZONE - 4300 BROADWAY S/B	SZ	20	199	7,693	14.26	13.95	49	25	5		3%
AUT091	SCHOOL ZONE - E/B 1700 BLOCK BASELINE RD	SZ	20	415	11,663	35.33	11.75	43	26	6		4%
AUT017	SCHOOL ZONE - 3100 FOLSOM ST N\B	SZ	20	357	9,141	33.79	10.57	44	25	5		4%
AUT055	SCHOOL ZONE - 1500 GREENBRIAR E\B	SZ	20	67	2,151	8.75	7.65	41	26	6	*	3%
AUT65	3100 MOORHEAD AVE W\B		25	180	3,252	25.07	7.18	52	32	7		6%
AUT012	100 CANYON BLVD W\B		35	832	42,549	118.24	7.04	58	39	4		2%
AUT120	E/B 1400 BLOCK BASELINE RD		25	1,739	82,666	251.70	6.91	50	30	5		2%
AUT82	3000 MOORHEAD AVE W\B		25	162	3,050	27.32	5.93	50	32	7		5%
AUT81	2900 MOORHEAD AVE W\B		25	1,269	33,470	223.71	5.67	58	31	6		4%
AUT024	1300 LEHIGH ST N\B		25	574	16,209	127.37	4.51	51	30	5		4%
AUT003	2400 9TH ST N\B		20	817	47,730	187.64	4.35	42	26	6		2%
AUT019	4400 GREENBRIAR BLVD E\B		25	250	8,477	63.91	3.91	47	31	6		3%
AUT001	3200 47TH ST S\B		30	666	37,736	178.41	3.73	57	35	5		2%
AUT066	3200 MOORHEAD AVE W\B		25	107	3,165	28.78	3.72	53	31	6		3%
AUT023	1200 LEHIGH ST N\B		25	148	5,500	40.41	3.66	44	30	5		3%
AUT013	2200 EDGEWOOD DR E\B		25	1,141	106,358	317.87	3.59	48	30	5		1%
AUT002	1100 9TH ST N\B		25	743	58,824	207.94	3.57	50	30	5		1%
AUT011	3800 BROADWAY N\B		35	531	83,311	155.19	3.42	56	37	2		1%
AUT090	E/B 1700 BLOCK BASELINE RD		25	457	50,374	135.10	3.38	52	29	4		1%
AUT46	800 9TH ST N\B		25	13	540	3.85	3.38	42	30	5	*	2%
AUT056	1500 GREENBRIAR E\B		25	205	11,785	64.45	3.18	47	30	5		2%
AUT004	SCHOOL ZONE - 1100 9TH ST N\B	SZ	20	2	205	0.66	3.02	33	24	4	*	1%
AUT026	SCHOOL ZONE - 1100 LEHIGH ST N\B	SZ	20	3	304	1.16	2.58	31	21	1	*	1%
AUT145	2300 BLK IRIS AVENUE W/B		35	47	11,526	18.32	2.57	50	37	2		0%
AUT018	3100 FOLSOM ST S\B		30	181	33,923	78.85	2.30	49	33	3		1%
AUT144	2200 BLK IRIS AVENUE W/B		35	217	56,868	95.61	2.27	60	37	2		0%
AUT152	400 BLK 55TH ST S/B		25	27	941	11.95	2.26	55	29	4		3%
AUT083	2700 BLOCK OF KALMIA AVE E/B		25	300	10,245	136.15	2.20	47	31	6		3%
AUT143	3700 BLK 26TH STREET N/B		25	141	6,736	64.42	2.19	46	30	5		2%
AUT68	3200 AURORA AVE W\B		25	186	8,371	93.98	1.98	52	31	6		2%
AUT142	3700 BLK 26TH STREET S/B		25	18	767	9.51	1.89	45	30	5	*	2%
AUT114	S/B 2600 BLOCK FOLSOM ST		30	182	45,833	98.07	1.86	49	33	3		0%
AUT141	3600 BLK 26TH STREET S/B		25	157	9,570	94.51	1.66	48	30	5		2%
AUT020	400 LEE HILL RD E\B		30	128	13,438	80.50	1.59	50	33	3		1%
AUT135	1100 BLOCK BEAR MOUNTAIN DR E/B		25	12	417	7.96	1.51	40	31	6	*	3%
AUT48	1000 9TH ST N\B		25	17	1,905	11.52	1.48	41	27	2		1%
AUT043	5900 SPINE RD N\B		30	120	8,623	84.57	1.42	54	34	4		1%
AUT139	300 BLOCK OF LINDEN AVE E/B		30	59	5,254	44.89	1.31	51	31	1		1%
AUT016	3100 FOLSOM ST N\B		30	10	3,430	8.07	1.24	44	31	1	*	0%
AUT115	E/B 1600 BLOCK BALSAM AVE		25	118	25,463	99.02	1.19	54	29	4		0%

Attachment B – 2019 Photo Speed Enforcement Deployment Summary

From Event Date: 01/01/2019 To Event Date: 12/31/2019

Location Code	Location Desc	School Zone	Speed Limit	Violations	Total Events	Deployment Time (Hours)	Violations /hour	Highest Speed	Speed 85 Percentile	Delta 85th vs. SL	Small sample	% > enforcement threshold
AUT77	600 BLOCK OF LINDEN AVE E/B		30	44	5,586	43.05	1.02	54	32	2		1%
AUT148	2100 BLK 9TH STREET S/B		25	34	11,672	33.46	1.02	45	27	2		0%
AUT136	1200 BLOCK BEAR MOUNTAIN DR E/B		25	52	3,322	53.55	0.97	44	30	5		2%
AUT138	600 BLK BASELINE RD E/B		25	7	952	7.39	0.95	45	29			
AUT153	500 BLK 55TH ST S/B		25	1	91	1.11	0.90	41	30	5	*	1%
AUT149	3300 BLK TABLE MESA E/B		30	65	30,971	76.93	0.84	46	32	2		0%
AUT022	1100 LEHIGH ST N\B		25	5	1,347	7.71	0.65	39	27	2	*	0%
AUT092	900 BLOCK 9TH ST		25	2	811	3.88	0.52	44	29	4	*	0%
AUT140	300 BLOCK OF LINDEN AVE W/B		30	2	512	4.62	0.43	42	31	1	*	0%
AUT150	1600 BLK IRIS AVENUE W/B		35	4	7,373	16.10	0.25	50	36	1		0%
AUT147	2300 BLK 9TH STREET N/B		20	2	2,812	12.58	0.16	32	22	2		0%
AUT	2300 SPRUCE ST W\B		25	0	2	0.03	0.00	18	18	(7)	*	0%
<b>Totals</b>				<b>13,496</b>	<b>943,474</b>	<b>3,571.96</b>	<b>3.78</b>	<b>60</b>				



## City of Boulder

## Photo Redlight Before and After Crash Analysis

Year	28th/Canyon		28th/Canyon		Tmesa/Foothi		Valmont/47t		28th/Arap		Total	% Reduction
	Arap/30th EB	NB	SB	Blinc/27th EB	lls WB	h WB	28th/Arap SB	WB				
Before	1.50	2.35	4.44	1.50	5.10	5.80	0.00	0.36	21.05			
After												
Average	0.27	0.35	0.18	1.24	0.71	2.06	0.27	0.53	5.61	73%		
2008	0.00	0.00	0.00	0.00	0.00	7.23	0.00	0.00	7.23	66%		
2009	1.00	0.00	2.00	3.00	1.00	5.00	1.00	1.00	14.00	33%		
2010	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	3.00	86%		
2011	0.00	0.00	0.00	2.00	1.00	1.00	1.00	0.00	5.00	76%		
2012	0.00	0.00	0.00	1.00	1.00	4.00	0.00	0.00	6.00	71%		
2013	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	3.00	86%		
2014	0.00	0.00	0.00	1.00	0.00	0.00	0.00	2.00	3.00	86%		
2015	1.00	1.00	0.00	1.00	1.00	2.00	0.00	1.00	7.00	67%		
2016	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	95%		
2017	0.00	1.00	0.00	2.00	1.00	1.00	1.00	1.00	7.00	67%		
2018	0.00	0.00	0.00	0.00	2.00	1.00	0.00	1.00	4.00	81%		
2019	0.00	2.00	0.00	0.00	0.00	1.00	0.00	0.00	3.00	86%		
<i>Min</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>1.00</i>			
<i>Max</i>	<i>1.00</i>	<i>2.00</i>	<i>2.00</i>	<i>3.00</i>	<i>2.00</i>	<i>7.23</i>	<i>1.00</i>	<i>2.00</i>	<i>14.00</i>			
<i>Mean</i>	<i>0.25</i>	<i>0.33</i>	<i>0.17</i>	<i>1.17</i>	<i>0.67</i>	<i>1.94</i>	<i>0.25</i>	<i>0.50</i>	<i>5.27</i>			
<i>Median</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>0.00</i>	<i>0.00</i>	<i>4.50</i>			

## **Vision Zero Action Plan Implementation – Case Study Follow up Vision Zero Safe Streets Report (2015-2017) Findings**

LOCATION: 28<sup>TH</sup> Street/U.S. 36 and Jay Road

Description: Signalized intersection of a two-lane arterial (28<sup>th</sup>/U.S. 36) with another two-lane roadway (Jay Road), which is a minor arterial east of the intersection and a collector west of the intersection. Jay has bike lanes and 28<sup>th</sup>/U.S. 36 has bikeable shoulders.

Crash Trends: Between 2015 and 2017, there were 13 approach-turn crashes associated with permitted left-turn phasing, with eight (2.7/year) of those involving a southbound left-turning vehicle. There were 2 (0.7/year) severe crashes at the intersection both involving permissive southbound left-turning vehicles. There was one crash involving a northbound motor vehicle sideswiping a bicycle in the shoulder. There was one crash involving a westbound right-turning vehicle sideswiping an eastbound left-turning bicycle. The northbound and southbound movements were converted to FYA displays on 10/26/2017.

Mitigation: Engineering: Change the southbound left-turn operation in the mid-day and p.m.-peak plans from protected/permitted to protected-only phasing, and the a.m.-peak and evening off-peak plans from permitted-only to protected/permitted phasing.

Interim Results (2018 and 2019):

- No severe crashes in 2018 and 2019.
- The northbound and southbound left turn movements were converted to flashing yellow arrow (FYA) left turn displays on 10/26/2017.
- The southbound left turn crash trend continued and increased after conversion to the FYA display from (2.7/year) to 5 crashes in 2018.
- The southbound left turn phasing was converted from permitted-only to protected/permitted from (06:30-9:00) and (19:00-22:00) and changed from protected/permitted to protected-only from (9:00-19:00) on 11/29/2018.
- The southbound left-turn crash trend reversed and decreased after implementation of protected/permitted and protected-only phasing from 5 crashes in 2018 to 0 crashes in 2019.
- The northbound left-turn crash trend decreased after conversion to the FYA display from (0.7/year) to 0 crashes in 2018 and 2019.

Potential emerging trends to monitor: Five red-light running crashes in 2019 (EB, NB, (3) SB)

Further study required: Need to evaluate compliance of SBLT protected-only operation. Did SBLT traffic diverted? Need to determine if southbound left turn storage bay is adequate. Reports and observations are that the southbound left turn queue is backing out into the through lane infrequently during peak traffic potentially blocking the southbound through lane and bike-lane.