Community Conversation: Accelerating the Improvement in Pedestrian Safety – *Trend analysis and data-driven decision making*

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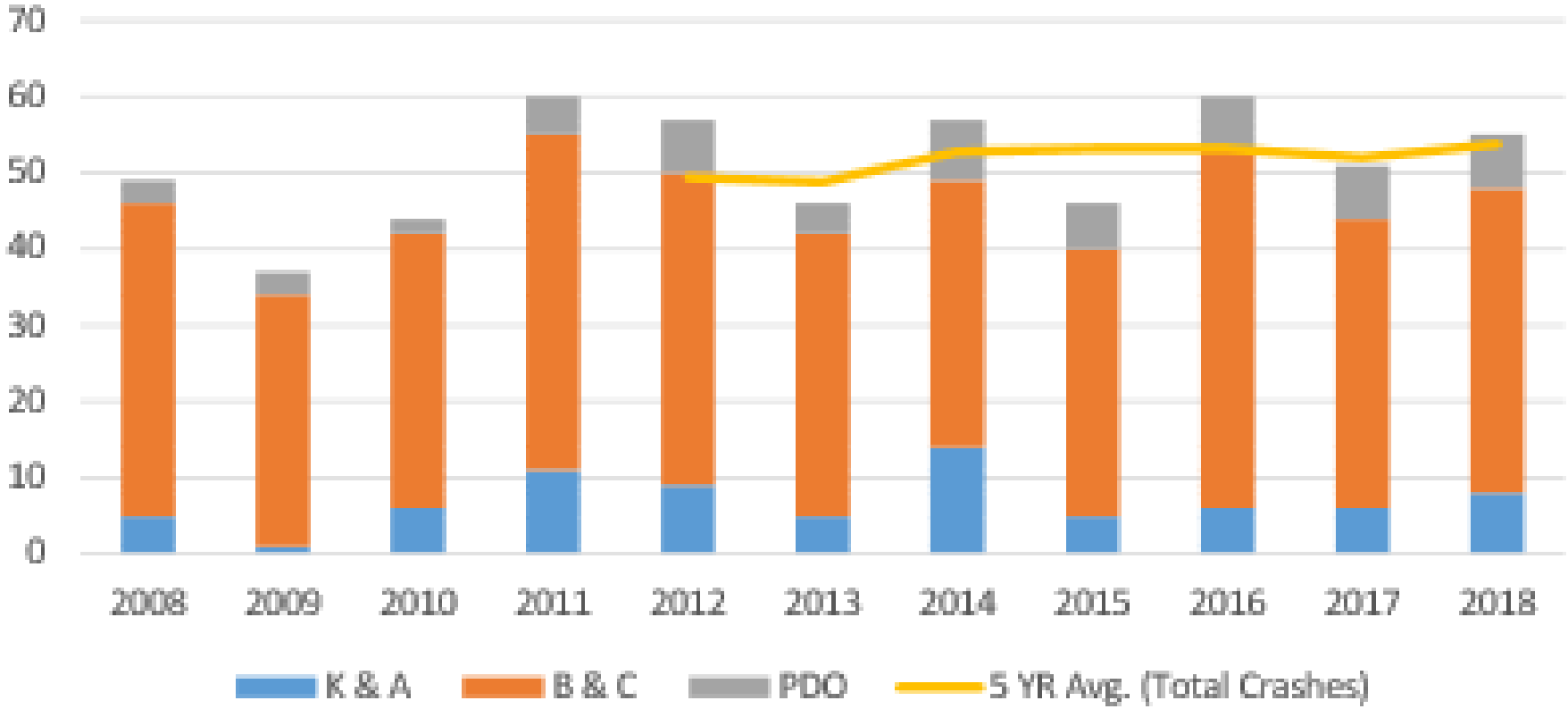
Retired Bosch Executive
July 29, 2019

Annual Pedestrian Crashes
Ann Arbor, 2008 - 2018

Absolute number of crashes excl. freeway



Fatal & Incapacitating

Non-Incapacitating & Not Visible but Pain Complaints

No Injury or Property Damage Only

Data source: City of Ann Arbor data complied by the State of Michigan

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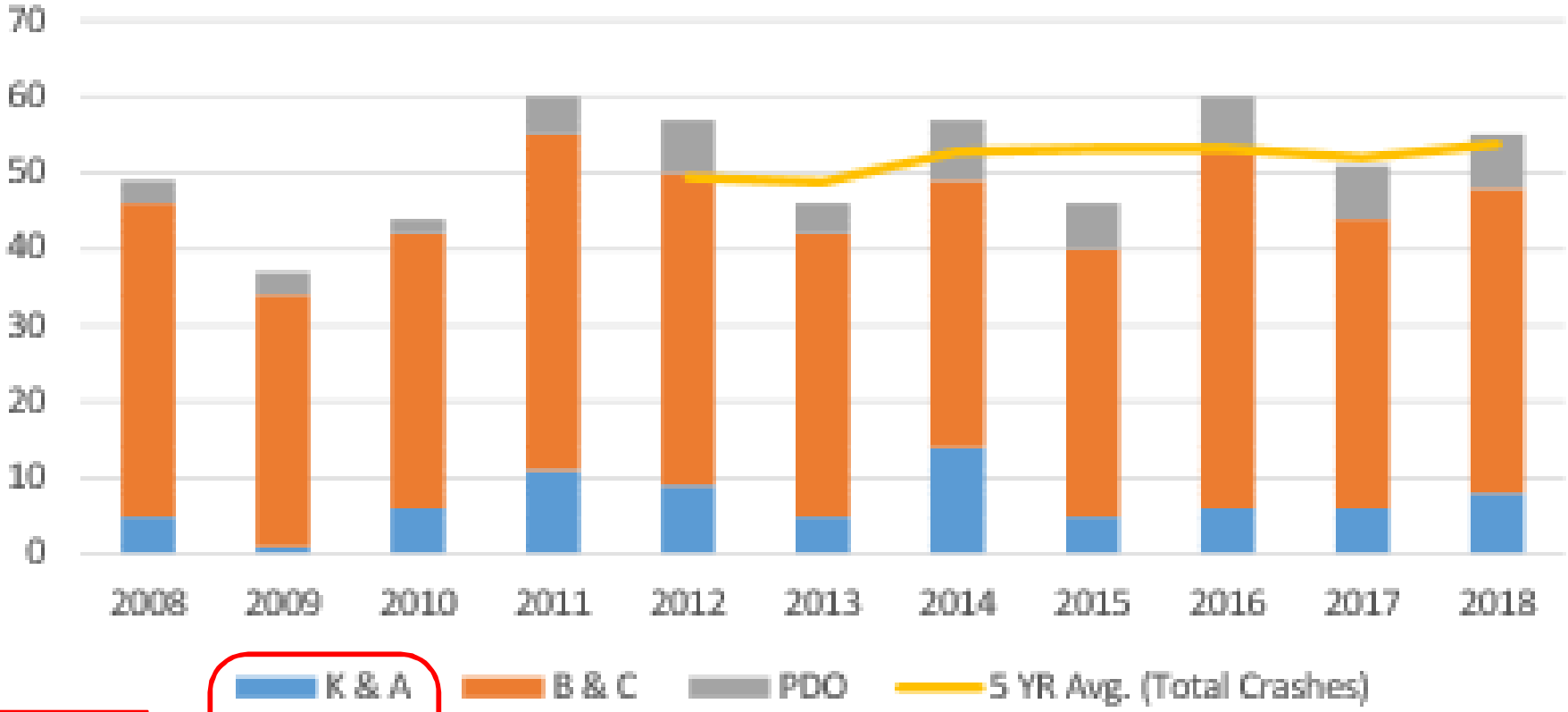

Vision Zero Focus

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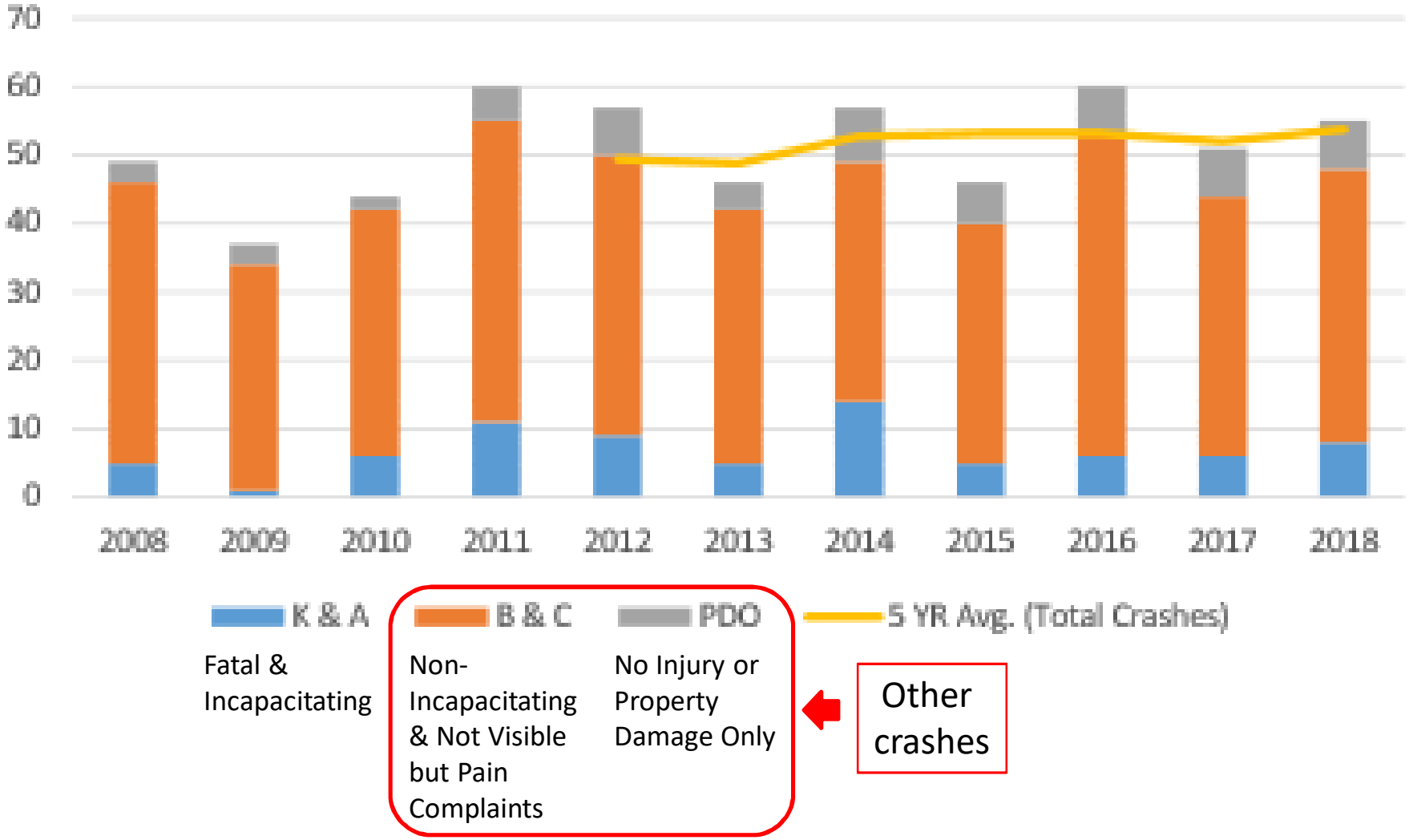

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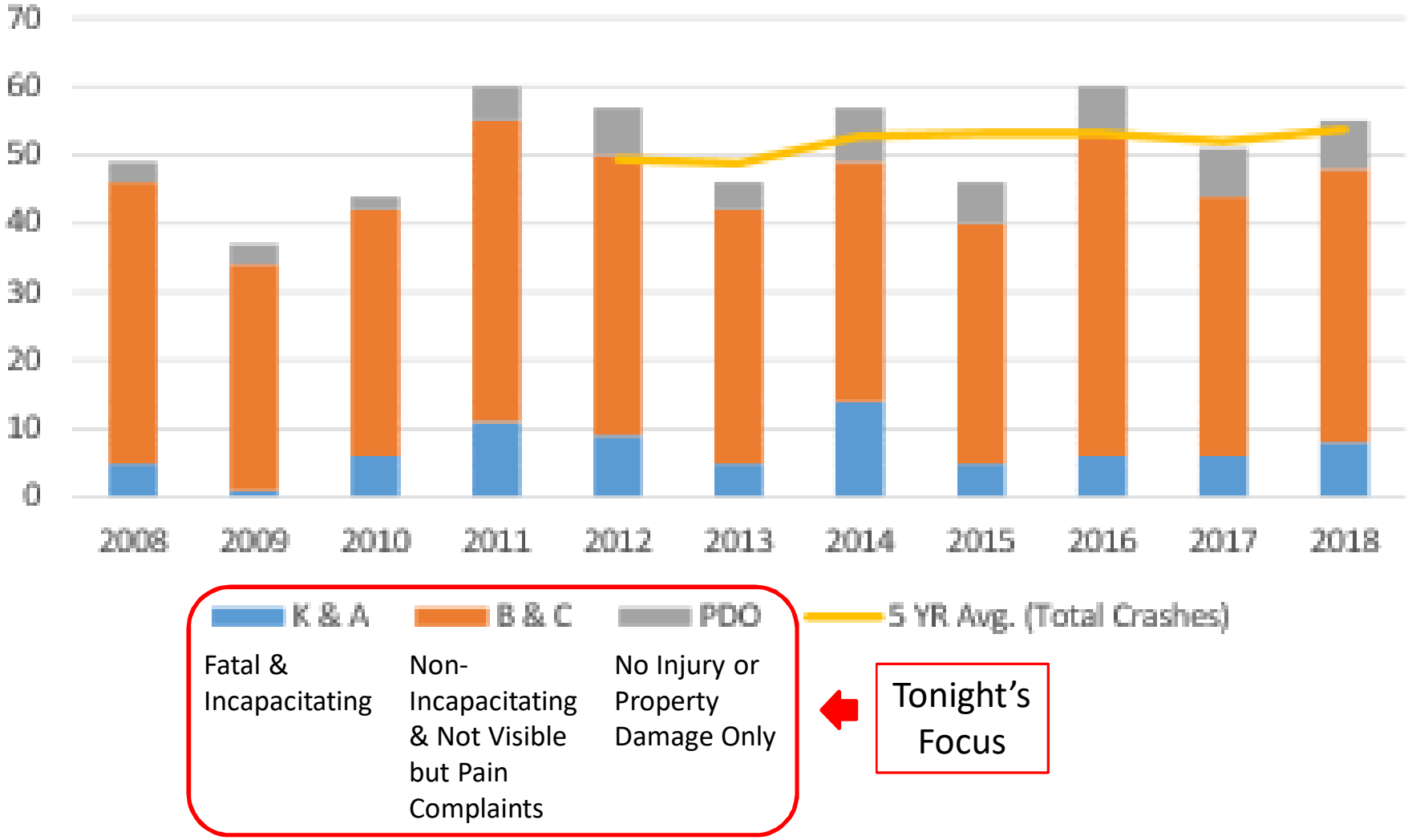

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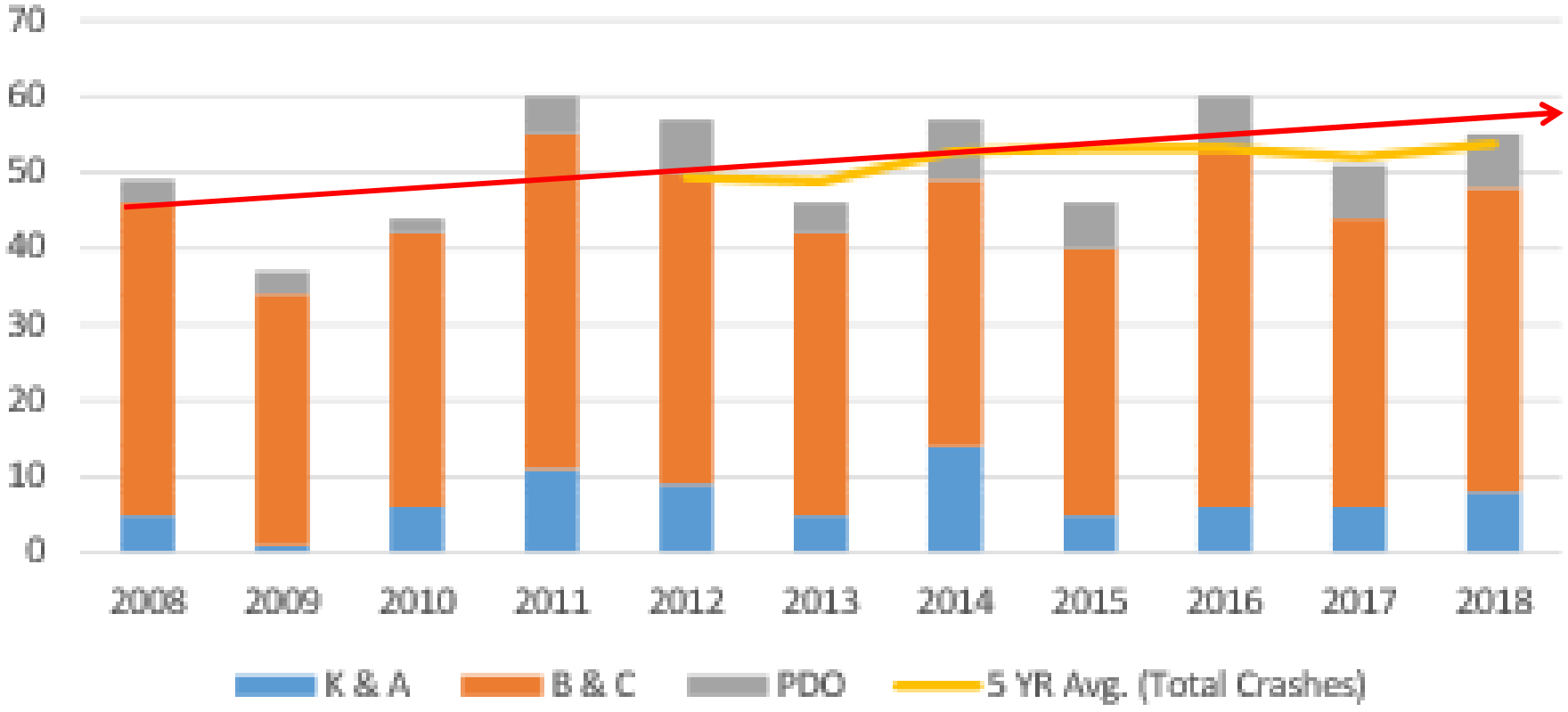

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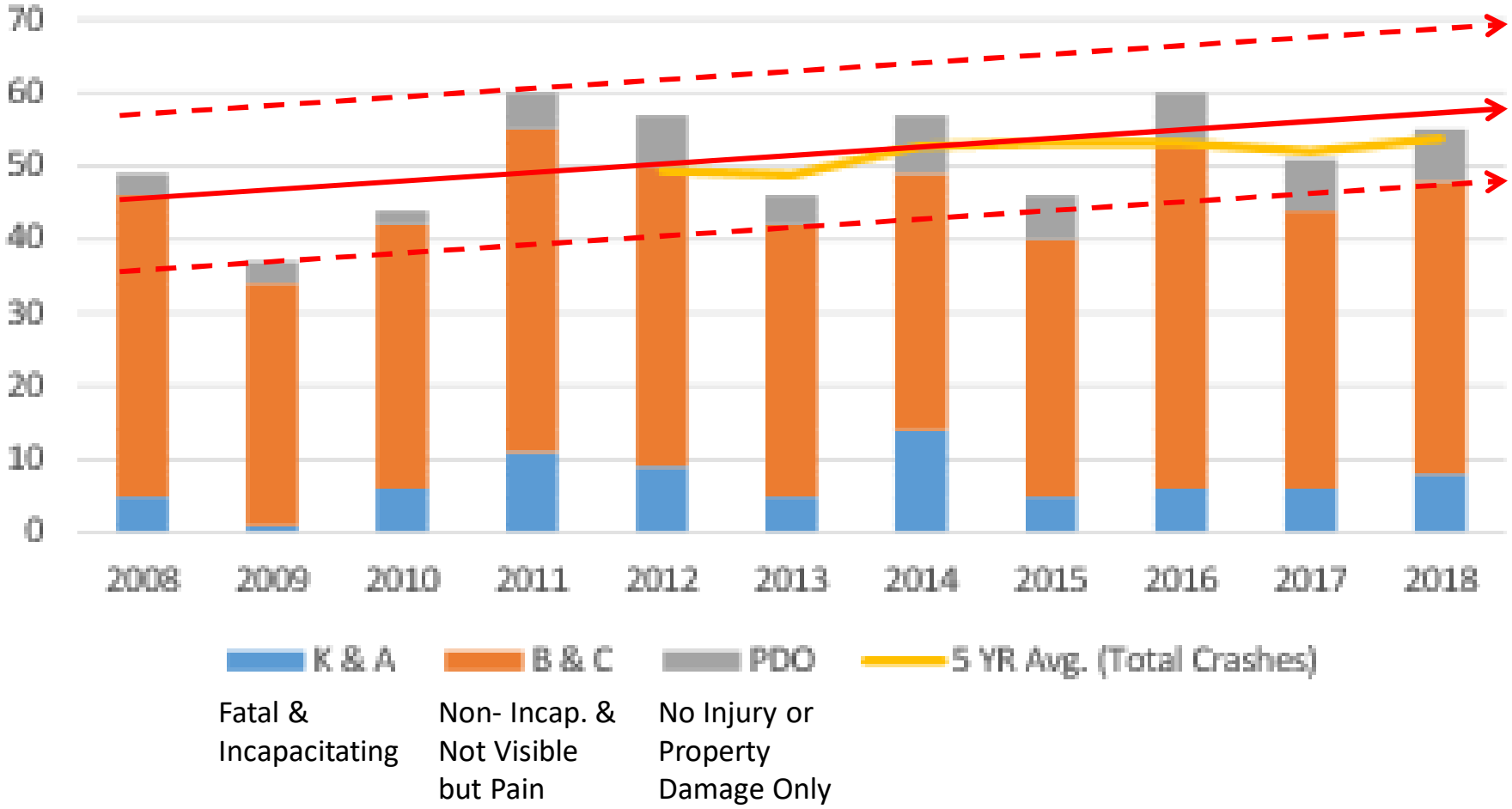


Fatal & Incapacitating

Non- Incap. & Not Visible but Pain

No Injury or Property Damage Only

Absolute number of crashes up ~ 17% since 2008;
Rolling 5 Year Average has also increased slightly

Pedestrian Crash
Data Available to Ann Arbor

Dates: 1/1/2008 to 12/31/2018

TOTAL NUMBER OF CRASHES:		563				
CRASHES BY DAY OF WEEK		**F**	**A**	**B/C and PDO**	**Total**	**% of Crashes**
Sunday	=	0	9	38	47	8.3%
Monday	=	0	7	67	74	13.1%
Tuesday	=	1	12	88	101	17.9%
Wednesday	=	1	13	75	89	15.8%
Thursday	=	1	9	86	96	17.1%
Friday	=	3	13	84	100	17.8%
Saturday	=	0	7	49	56	9.9%
CRASHES BY SURFACE CONDITION						
Dry	=	6	49	306	361	64.1%
Wet	=	0	15	137	152	27.0%
Icy	=	0	0	8	8	1.4%
Snowy	=	0	3	13	16	2.8%
Muddy	=	0	0	1	1	0.2%
Slushy	=	0	3	9	12	2.1%
Debris	=	0	0	0	0	0.0%
Water	=	0	0	0	0	0.0%
Sand	=	0	0	0	0	0.0%
Oily	=	0	0	0	0	0.0%
Other	=	0	0	5	5	0.9%
Unknown	=	0	0	6	6	1.1%
Uncoded & Errors	=	0	0	2	2	0.4%
CRASHES BY TIME OF DAY						
MDNT-01AM	=	0	0	11	11	2.0%
01AM-02AM	=	0	2	6	8	1.4%
02AM-03AM	=	0	6	10	16	2.8%
03AM-04AM	=	0	3	4	7	1.2%

CRASHES BY TYPE		**F**	**A**	**B/C and PDO**	**Total**	**% of Crashes**
Angle Driveway	=	0	0	0	0	0.0%
Angle Straight	=	0	0	0	0	0.0%
Angle Turn	=	0	0	0	0	0.0%
Animal	=	0	0	0	0	0.0%
Backing	=	0	0	0	0	0.0%
Bicycle	=	0	0	0	0	0.0%
Fixed Object	=	0	0	0	0	0.0%
Head-on	=	0	0	0	0	0.0%
Head-on Left-Turn Driveway	=	0	0	0	0	0.0%
Head-on L-Turn Not Driveway	=	0	0	0	0	0.0%
Hit Train	=	0	0	0	0	0.0%
Misc. Multiple Vehicle	=	0	0	0	0	0.0%
Misc. Single Vehicle	=	0	0	0	0	0.0%
Other Driveway	=	0	0	0	0	0.0%
Other Object	=	0	0	0	0	0.0%
Overturn	=	0	0	0	0	0.0%
Parking	=	0	0	0	0	0.0%
Pedestrian	=	6	70	487	563	100.0
Rear End Driveway	=	0	0	0	0	0.0%
Rear End Left Turn	=	0	0	0	0	0.0%
Rear End Right Turn	=	0	0	0	0	0.0%
Rear End Straight	=	0	0	0	0	0.0%
Side Swipe Opposite	=	0	0	0	0	0.0%
Side Swipe Same	=	0	0	0	0	0.0%
CRASHES BY MONTH						
January	=	0	10	46	56	9.9%
February	=	0	3	45	48	8.5%

Pedestrian Crash
Data Available to Ann Arbor

Dates: 1/1/2008 to 12/31/2018

CRASHES BY LIGHT CONDITION		F	A	B/C and PDO	Total	% of Crashes
Daylight	=	2	32	251	285	50.6%
Dawn	=	1	2	3	6	1.1%
Dusk	=	0	0	7	7	1.2%
Dark, Lighted	=	2	6	28	36	6.4%
Dark, Unlighted	=	1	30	193	224	39.8%
Other	=	0	0	0	0	0.0%
Unknown	=	0	5	0	5	0.9%
Uncoded & Errors	=	0	0	0	0	0.0%

CRASHES BY SEVERITY			
Fatal	=	6	1.1%
A-Incapacitating	=	70	12.4%
B-Non-Incapacitating	=	247	43.9%
C-Possible Injury	=	180	32.0%
Uninjured	=	60	10.7%
Uncoded & Errors	=	0	0.0%

CRASHES BY INVOLVEMENT			
Drinking	=	33	5.9%
Drugs	=	1	0.2%
Truck/Bus	=	22	3.9%
Snowmobile	=	0	0.0%
Emergency Vehicle	=	4	0.7%
Off Road Vehicle	=	0	0.0%
Pedestrian	=	563	100.0%
Bicyclist	=	0	0.0%
Farm Equipment	=	0	0.0%
Animal	=	0	0.0%
School Bus	=	0	0.0%
Motorcycle	=	1	0.2%
Train	=	0	0.0%

CRASHES BY DRIVER VIOLATION			
Careless or Negligent	=	14	2.5%
Fatal + A-Type	=	4	28.6%
Disobeyed TCD	=	18	3.2%
Fatal + A-Type	=	2	11.1%
Drove Left of Center	=	1	0.2%
Fatal + A-Type	=	0	0.0%
Drove Wrong Way	=	0	0.0%
Fatal + A-Type	=	0	0.0%
Fail to Stop ACD	=	12	2.1%
Fatal + A-Type	=	2	16.7%
Failed to Yield	=	331	58.8%
Fatal + A-Type	=	38	11.5%
Improper Backing	=	0	0.0%
Fatal + A-Type	=	0	0.0%
Improper Lane Use	=	2	0.4%
Fatal + A-Type	=	0	0.0%
Improper Pass	=	1	0.2%
Fatal + A-Type	=	0	0.0%
Improper Signal	=	1	0.2%
Fatal + A-Type	=	1	100.0%
Improper Turn	=	0	0.0%
Fatal + A-Type	=	0	0.0%
Other	=	97	17.2%
Fatal + A-Type	=	27	27.8%
Reckless Driving	=	1	0.2%
Fatal + A-Type	=	0	0.0%
Speed Too Fast	=	3	0.5%
Fatal + A-Type	=	1	33.3%
Speed Too Slow	=	0	0.0%
Fatal + A-Type	=	0	0.0%
Ran Red Light	=	22	3.9%
Fatal + A-Type	=	3	0.0%

Pedestrian Crash
Data Available to Ann Arbor

Ped Crash_GreatestInjurySeveritybyYear_20190719

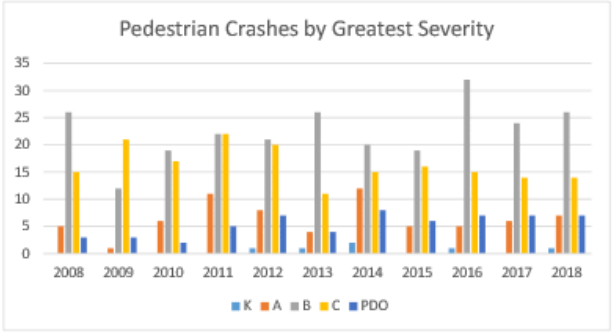
	Injury Severity					
Year	K	A	B	C	PDO	Total
2008	0	5	26	15	3	49
2009	0	1	12	21	3	37
2010	0	6	19	17	2	44
2011	0	11	22	22	5	60
2012	1	8	21	20	7	57
2013	1	4	26	11	4	46
2014	2	12	20	15	8	57
2015	0	5	19	16	6	46
2016	1	5	32	15	7	60
2017	0	6	24	14	7	51
2018	1	7	26	14	7	55

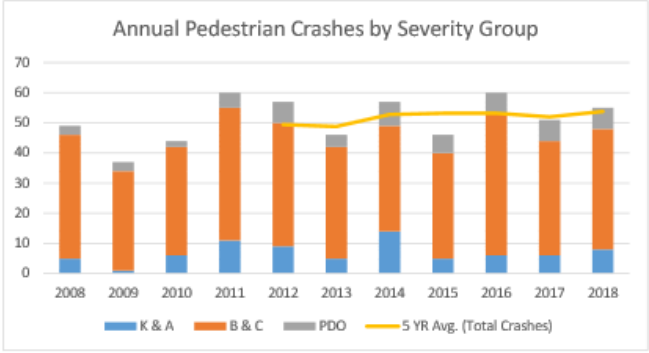
	5 Year Average Injury Severity						
Year	K	A	B	C	PDO	Total	% Change
2008							
2009							
2010							
2011							
2012	0.2	6.2	20	19	4	49.4	
2013	0.4	6	20	18.2	4.2	48.8	-1%
2014	0.8	8.2	21.6	17	5.2	52.8	8%
2015	0.8	8	21.6	16.8	6	53.2	1%
2016	1	6.8	23.6	15.4	6.4	53.2	0%
2017	0.8	6.4	24.2	14.2	6.4	52	-2%
2018	0.8	7	24.2	14.8	7	53.8	3%

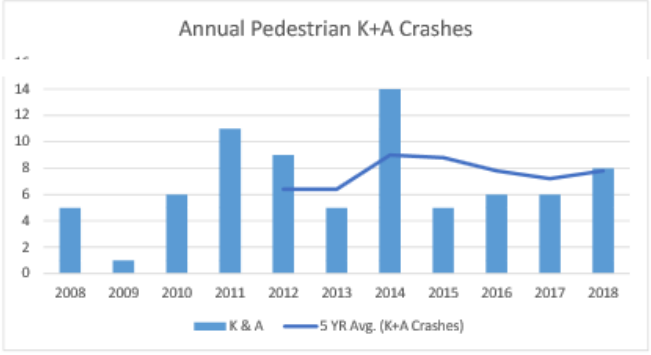
K+A=	6.4	B+C=	39
	6.4		38.2
	9		38.6
	8.8		38.4
	7.8		39
	7.8		39

Results Graphed

	Injury Severity			5 YR Avg. (K+A Crashes)	
Year	K & A	B & C	PDO	5 YR Avg. (Total Crashes)	
2008	5	41	3		
2009	1	33	3		
2010	6	36	2		
2011	11	44	5		
2012	9	41	7	49.4	6.4
2013	5	37	4	48.8	6.4
2014	14	35	8	52.8	9
2015	5	35	6	53.2	8.8
2016	6	47	7	53.2	7.8
2017	6	38	7	52	7.2
2018	8	40	7	53.8	7.8







Summary

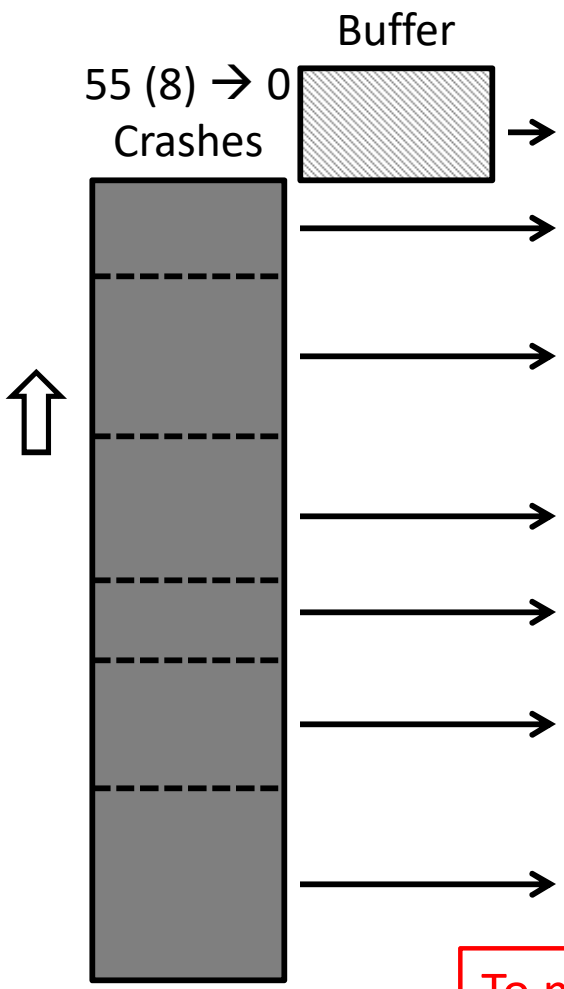
- While Ann Arbor crash performance is better than average in Michigan and Ann Arbor has the lowest fatality rate of all metro areas in the state, crashes are clearly trending up; this is true nation-wide
- Most importantly, we are far from our Vision Zero target of zero crashes by 2025
- Even one serious injury is too many. This is why we must work together to continuously improve crash outcomes
- There is always natural variation in a system, thus performance has not changed if a new outcome data point is within the natural variation of the trend and the overall system

Best-in-Class Practices vs. A2 Current Status

- Best-in-class entities:
  - Are data and information driven; they:
    - Visualize and track outcomes vs. their *long-term* historical performance
    - Set long-term *and* multiple intermediate targets
    - Benchmark their performance, programs and policies vs. best practices, for example against those of peer cities
    - Apply lessons learned elsewhere
  - Collect multiple potential root-cause factors in databases and analyze the factors using Pareto / stack-bar charts
  - Apply structured problem solving to ***all*** crashes, including near misses, to identify root causes and implement corrective actions, including *proactive* ones to eliminate accidents *before* they occur
  - Develop action plans to reduce crashes
  - Have regular, rigorous review meetings to track both metrics *and* action plan implementation progress

Best-in-Class Practices vs. A2 Current Status

Sample Project Plan



Project Description	Est. Impact	Cost	Due Date	Resp. Person/Dept.
7. Speed Radar	6	$50k	02/20	S. Jones
6. Bike Lane Impr.	6	$300k	04/20	M. Ali
5. Road Diets	9	$100k	10/24	P. Smth
4. Ped. Cross Impr.	9	$500k	09/23	S. Jones
3. Red Light Cameras	5	$50k	04/20	S. Jones
2. Educate & Comm.	10	$30k	ongoing	S. Wu
1. Enforce Speeds	16	$50k	10/19	T. Smith

To meet a goal, it's imperative to have a plan

Best-in-Class Practices vs. A2 Current Status, cont.

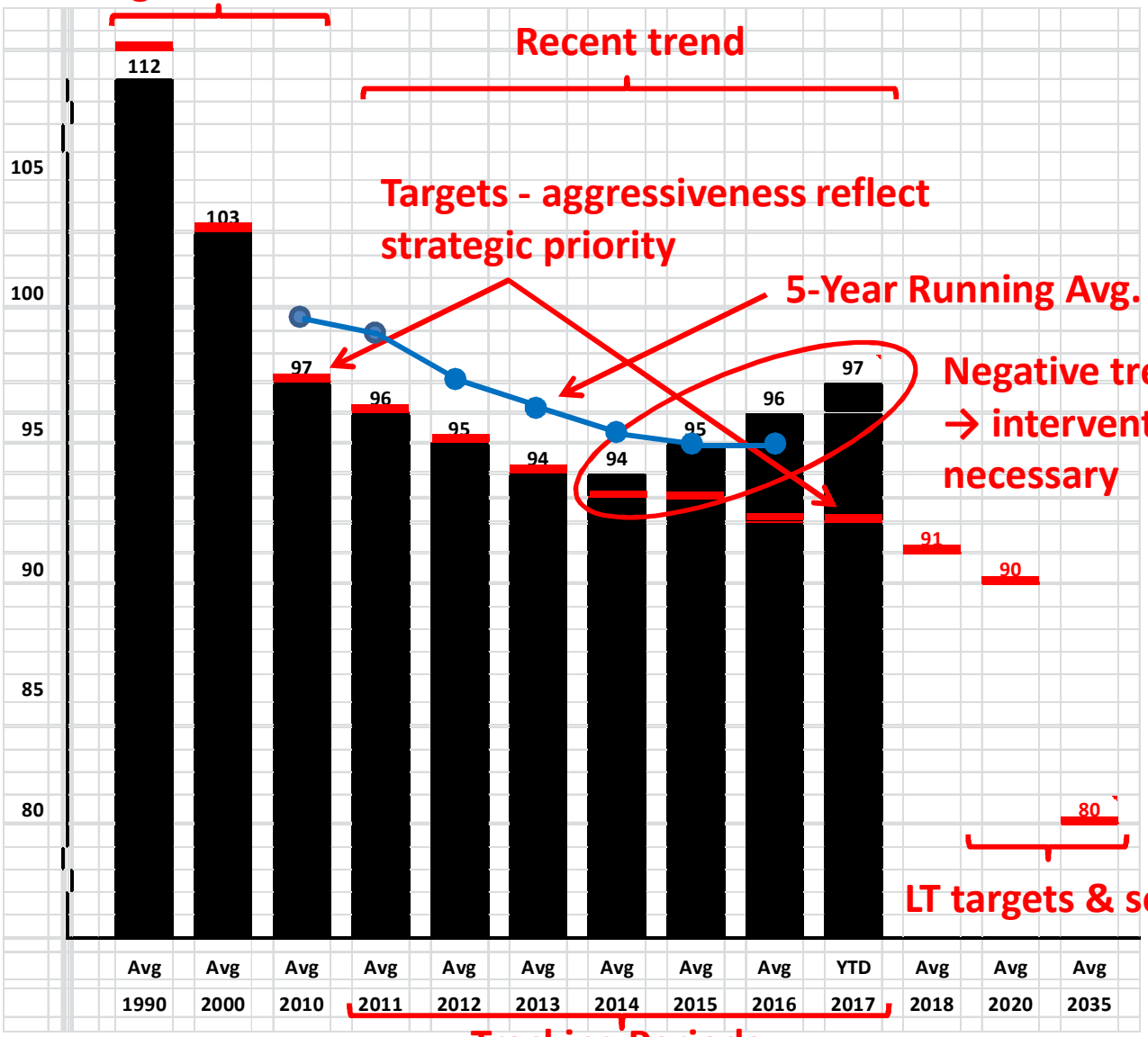
- In contrast:
  - Ann Arbor has not systematically trended and tracked pedestrian safety data and posted it in the public domain, although it has recently committed to do so along with other City metrics
  - A2 has only set a 2025 target, no intermediate ones
  - A2 has not systematically benchmarked peer cities, although it recently released plans to do so
  - A2 has not yet communicate a comprehensive action plan (similar to the example) although it may exist

Recommendations

- Implement best-practice performance tracking metrics
- Develop a pedestrian crash root-cause analysis and corrective action process, including an accompanying form / template
- Train staff – *and* recruit and train volunteers, if appropriate – to analyze each pedestrian crash using the process, form and structured problem-solving techniques
- Implement corrective measures and project plans following the PDCA cycle (**D**o, **C**heck, **A**ct / **A**djust)
- Implement regular, rigorous performance review meetings
  - Use the meetings to constantly improve not only performance but also the metrics themselves and underlying processes such as data collection and project management

Back-up

Exemplary Generic Trend Chart



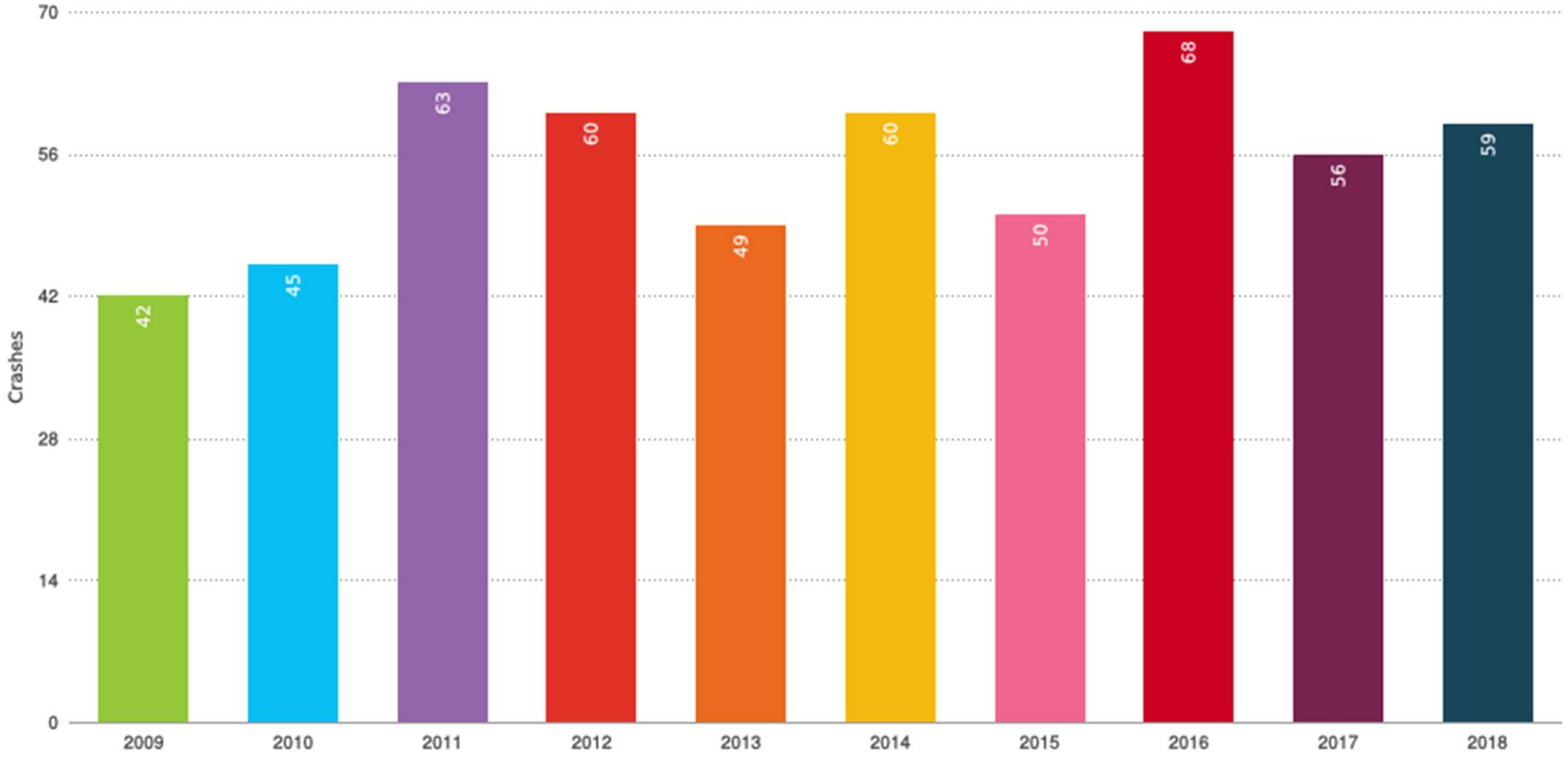
Resp. party, dir. of positive trend & status (R/Y/G)

Resp: _____

Down is Better

Annual Pedestrian Crashes
Ann Arbor, 2009 - 2018

Absolute number of crashes incl. freeway

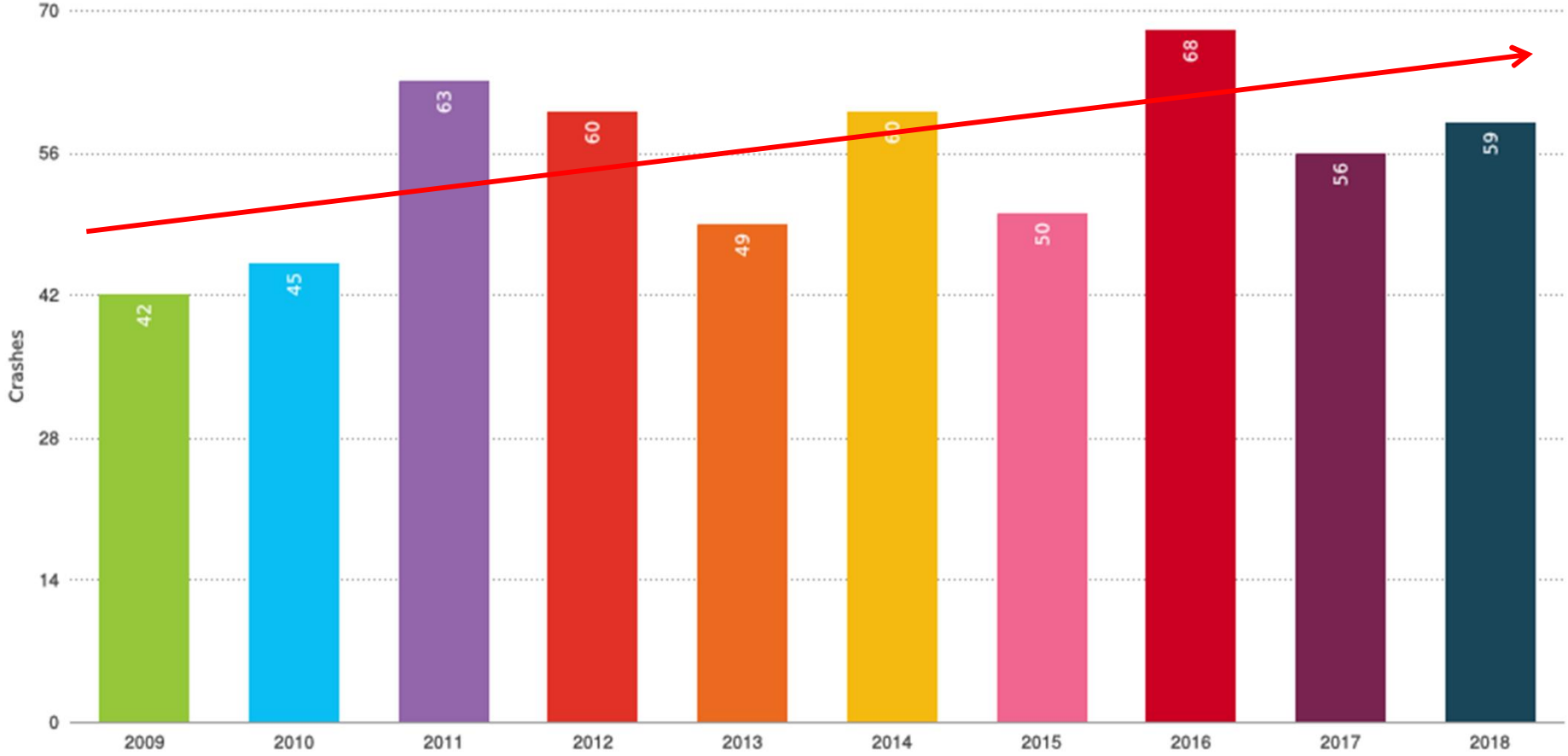


Absolute number of crashes up 40%

Data source: City of Ann Arbor data complied by the State of Michigan

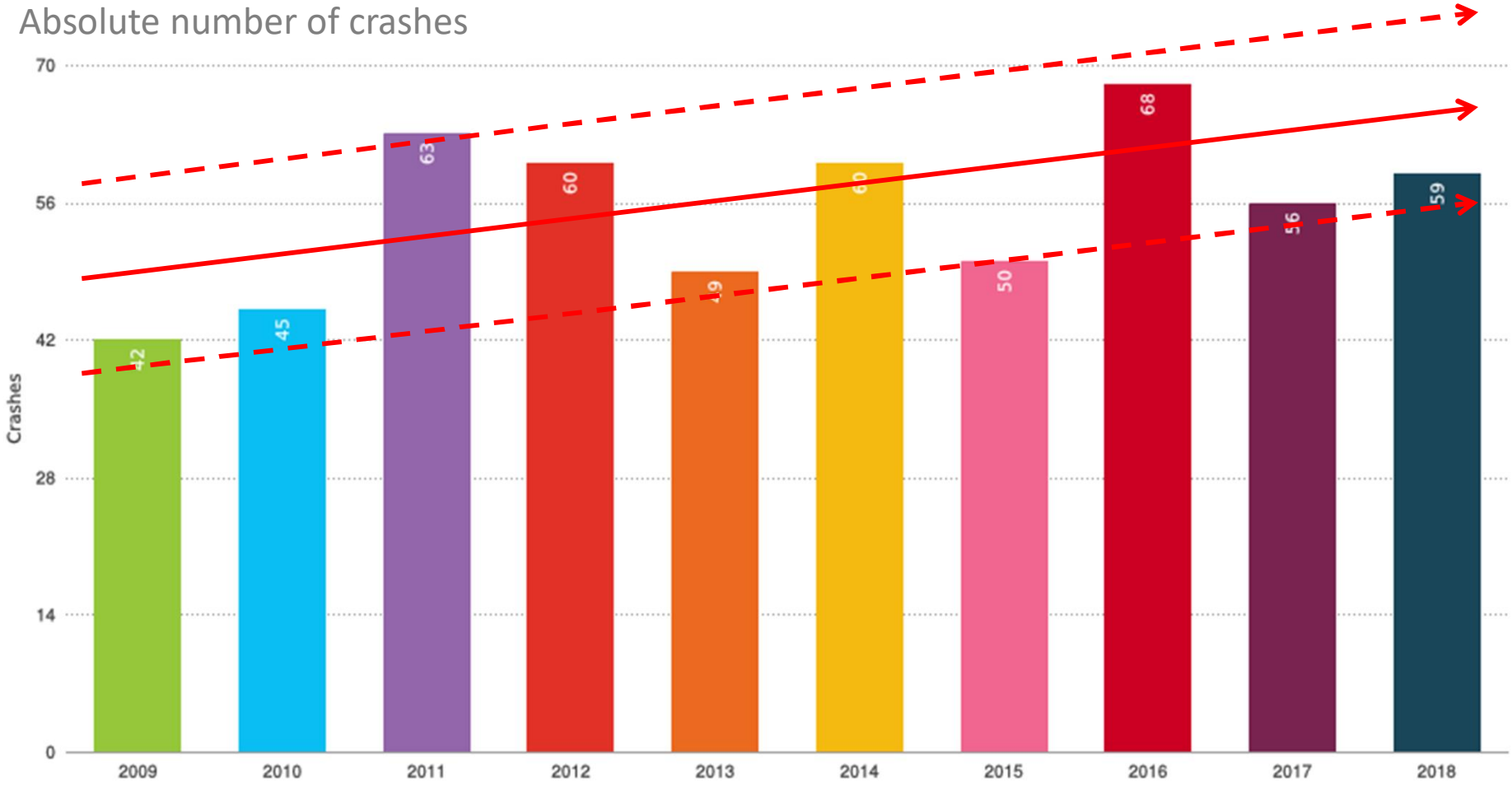
Annual Pedestrian Crashes
Ann Arbor, 2009 - 2018

Absolute number of crashes incl. freeway



Linear best fit yields similar figure of ~ 36%

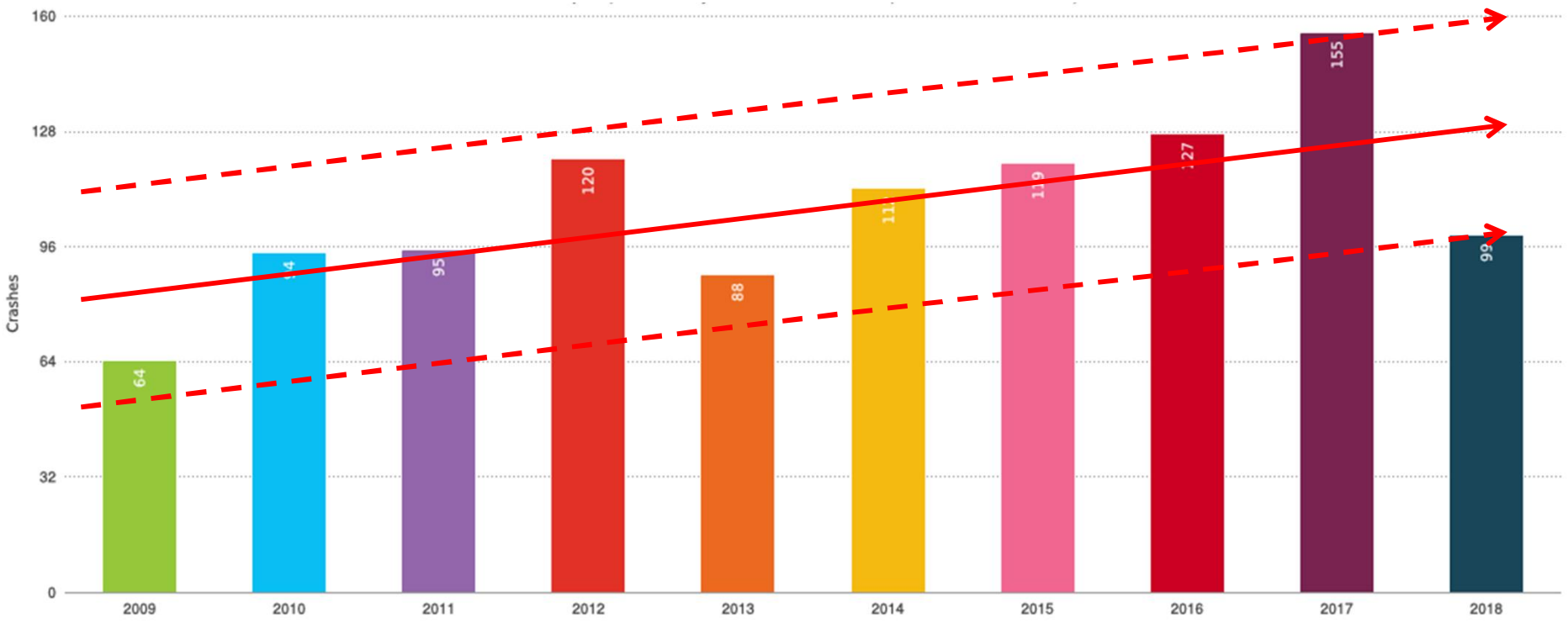
Annual Pedestrian Crashes
Ann Arbor, 2009 - 2018



All years within natural variation of the system

Annual Pedestrian Crashes
Grand Rapids, 2009 - 2018

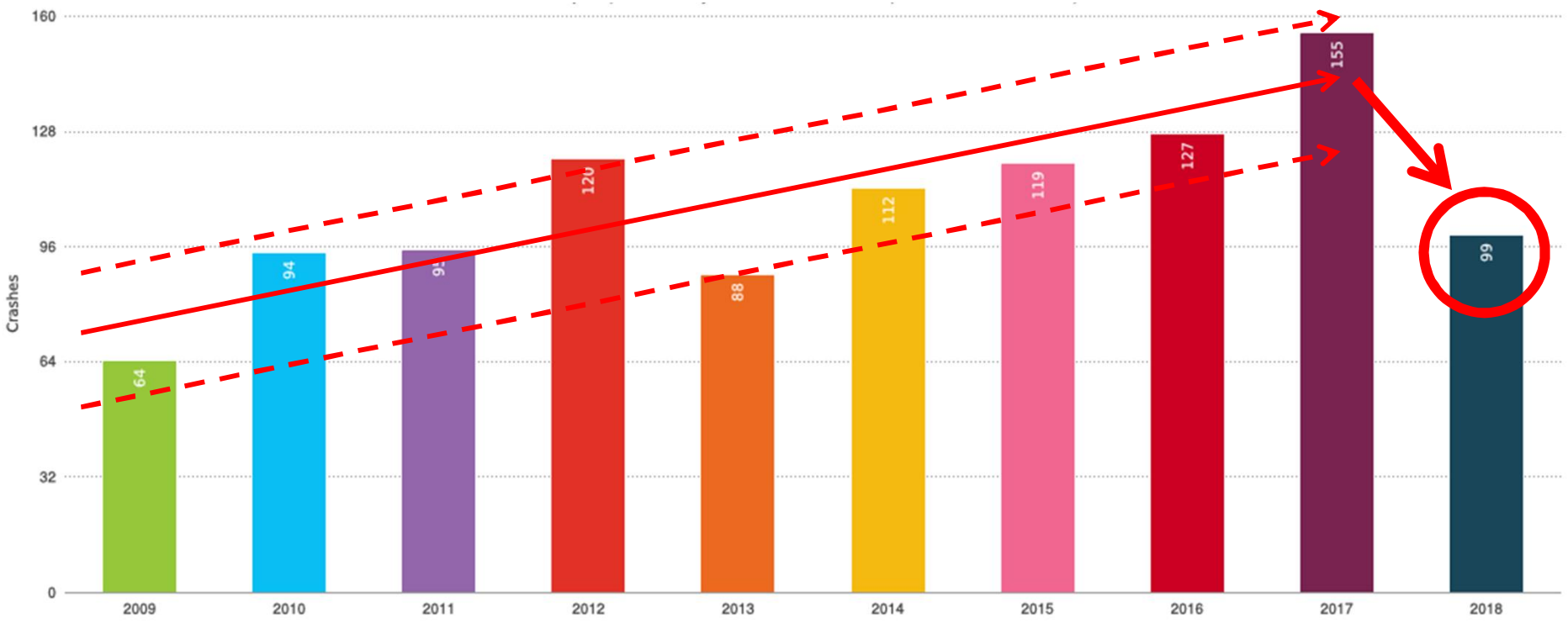
Absolute number of crashes incl. freeway



Similar trend in increased crashes …

Annual Pedestrian Crashes
Grand Rapids, 2009 - 2018

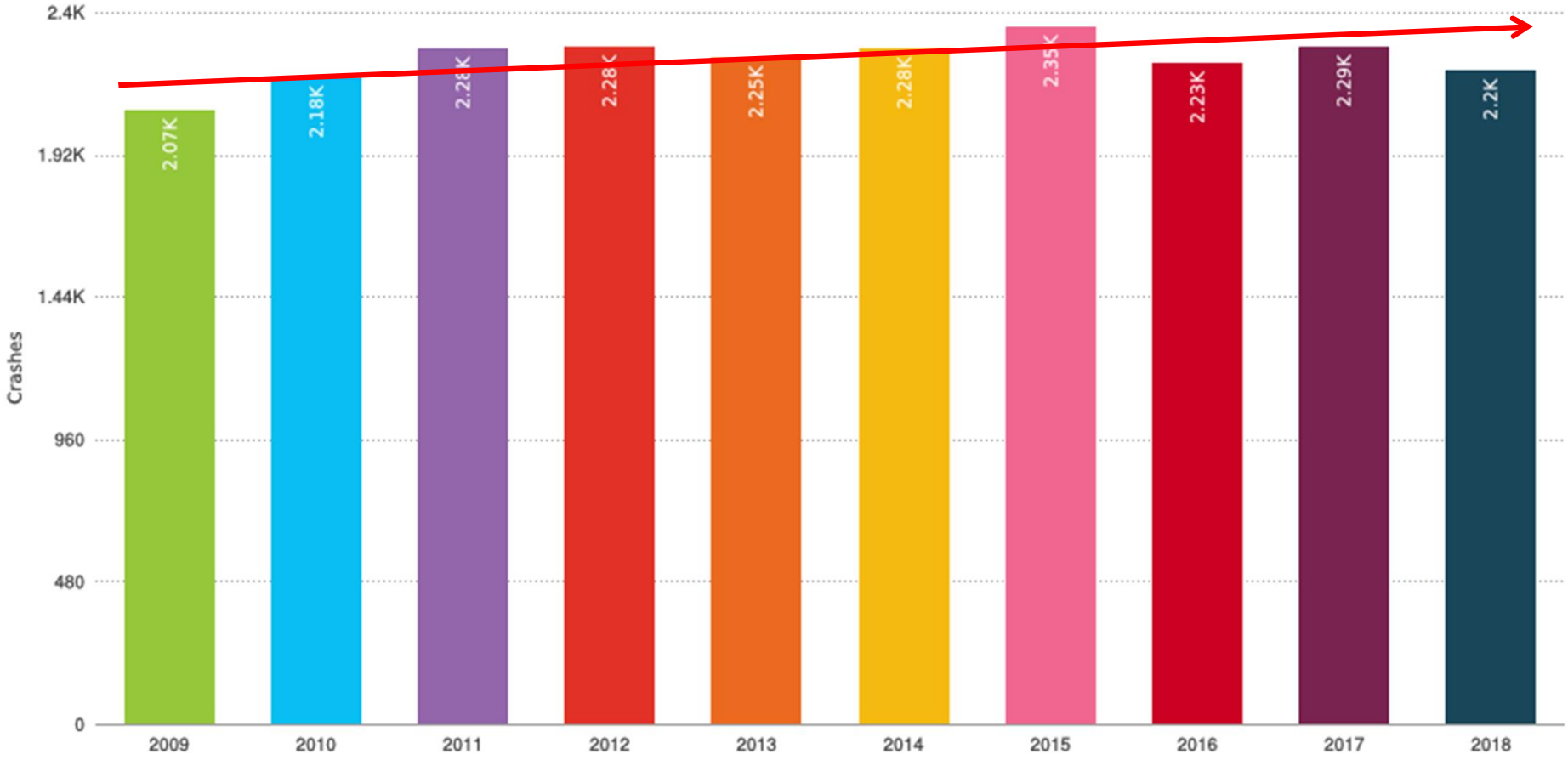
Absolute number of crashes incl. freeway



… but reevaluating the line of best fit and the range of variation, the "system" was changed in 2017 and it yielded a significant positive outcome in 2018

Annual Pedestrian Crashes
State of Michigan, 2009 - 2018

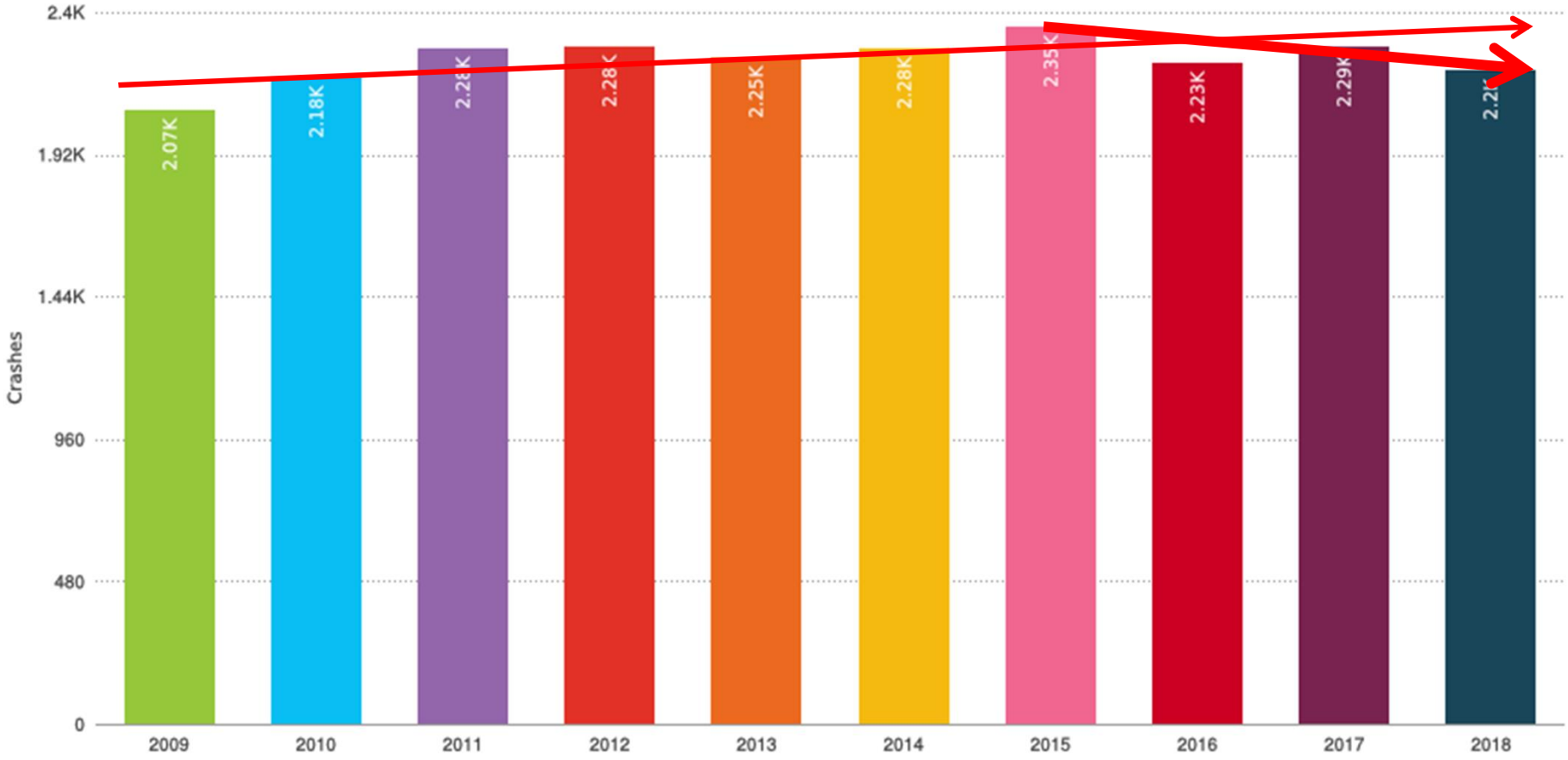
Absolute number of crashes incl. freeway



A slight increase in the number of crashes …

Annual Pedestrian Crashes
State of Michigan, 2009 - 2018

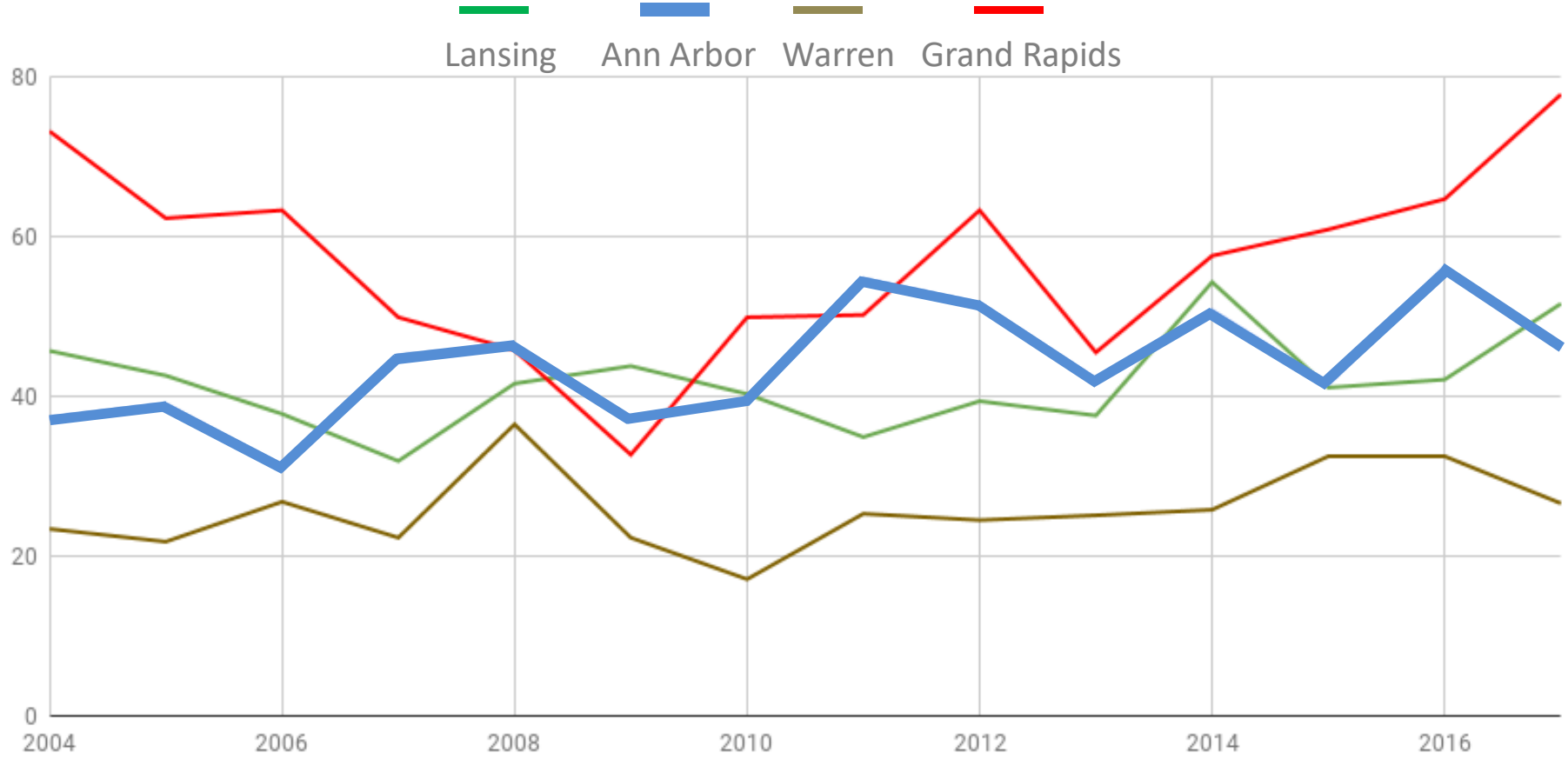
Absolute number of crashes incl. freeway



… but there seems to be a slight downward trend since 2015

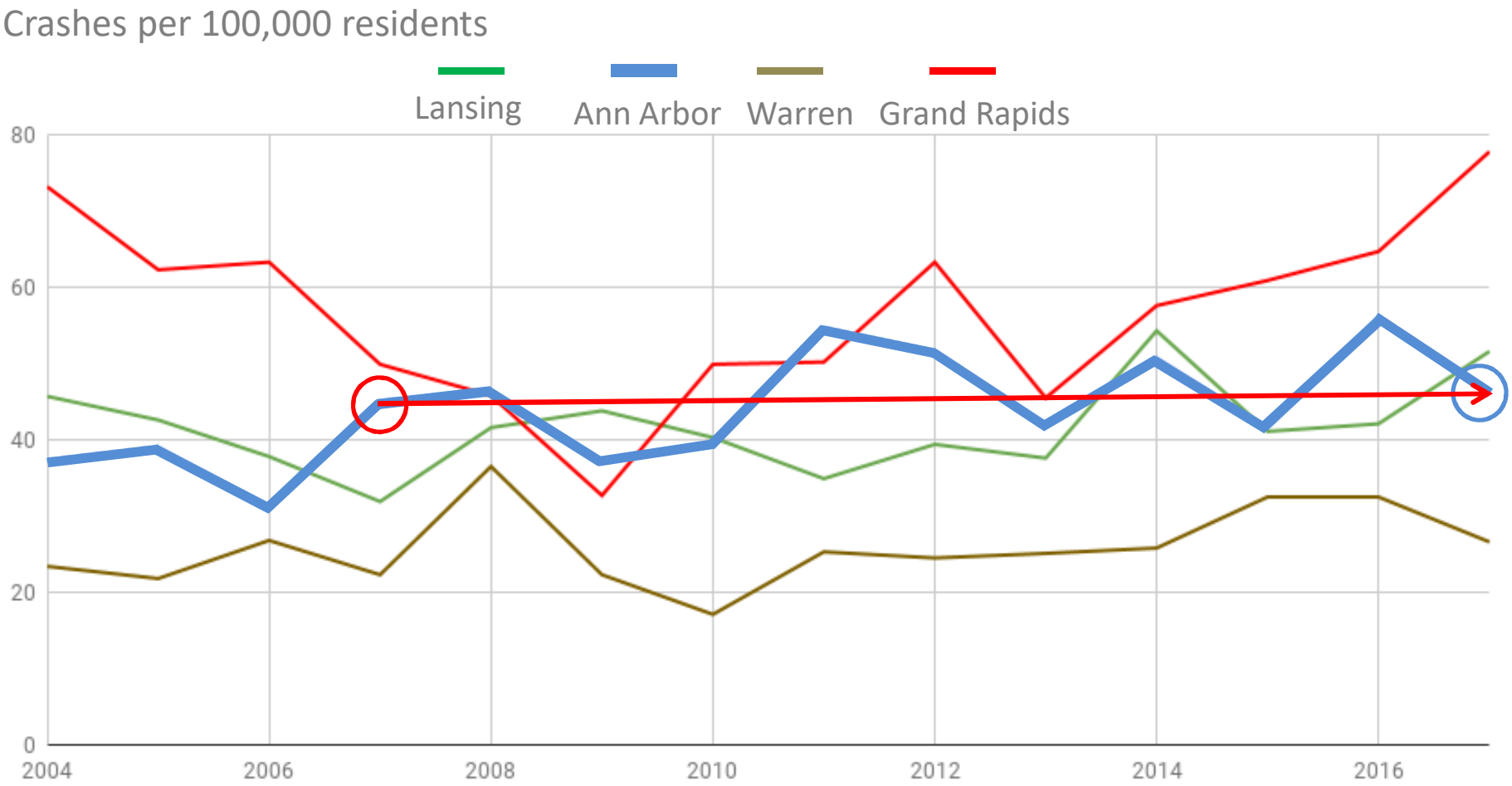
Annual Pedestrian Crash Rate
Michigan Cities, 2004 - 2017

Crashes per 100,000 residents



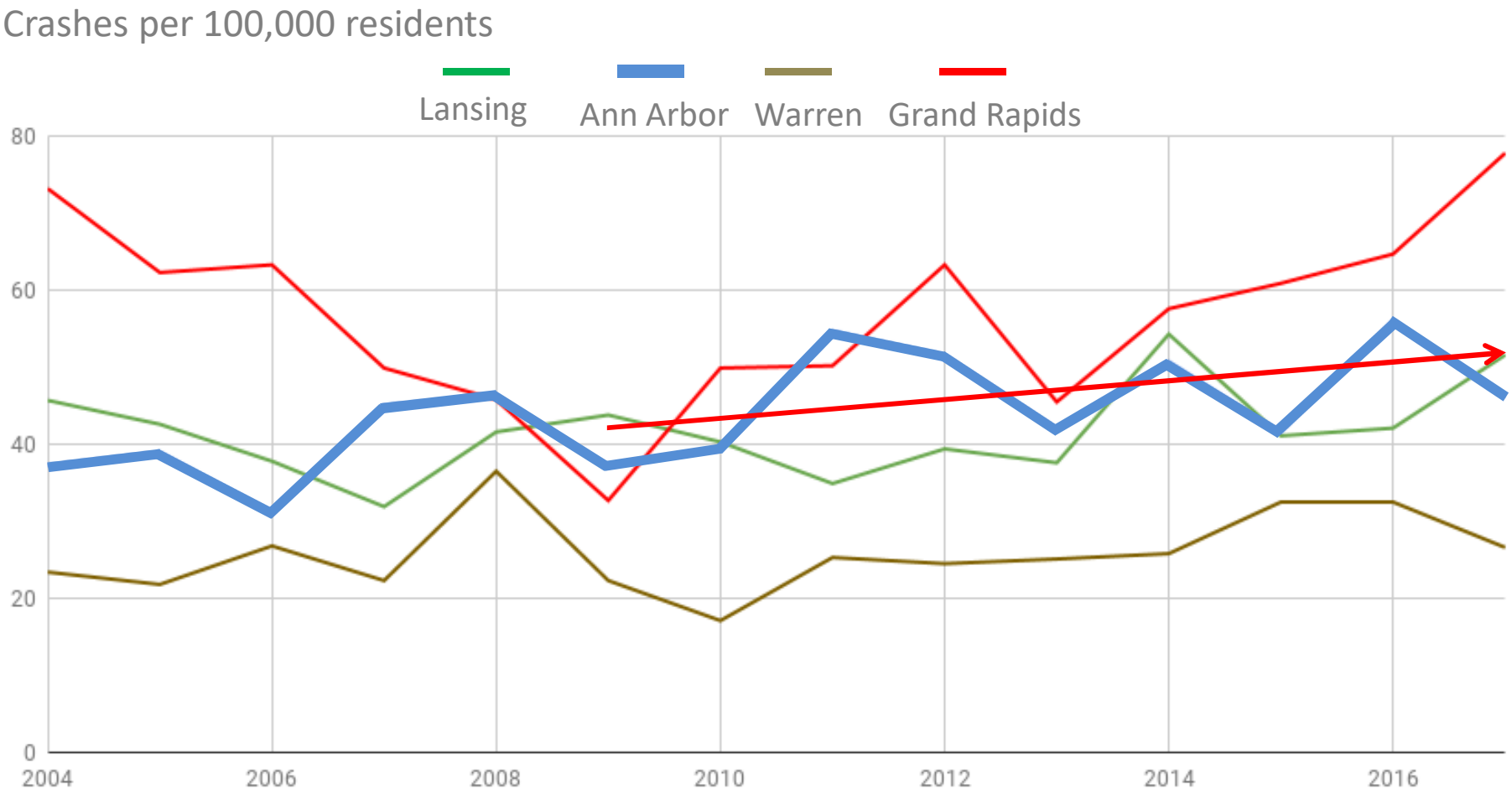
Data source: Michigan Crash Facts, a University of Michigan data project

Annual Pedestrian Crash Rate
Michigan Cities, 2009 - 2018



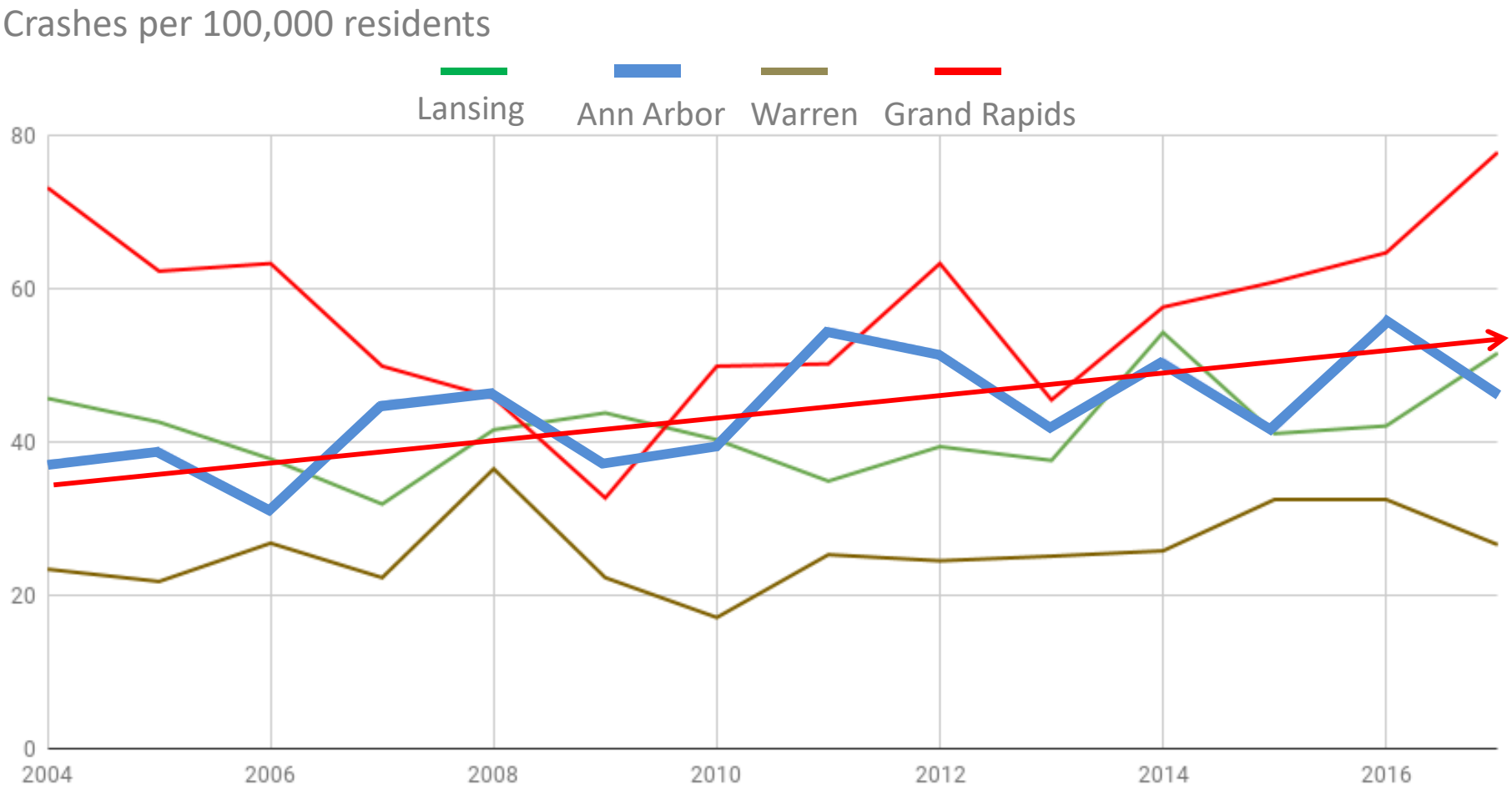
A2 pedestrian crashes increased 2% from 2007 to 2017 but …

Annual Pedestrian Crash Rate
Michigan Cities, 2009 - 2018



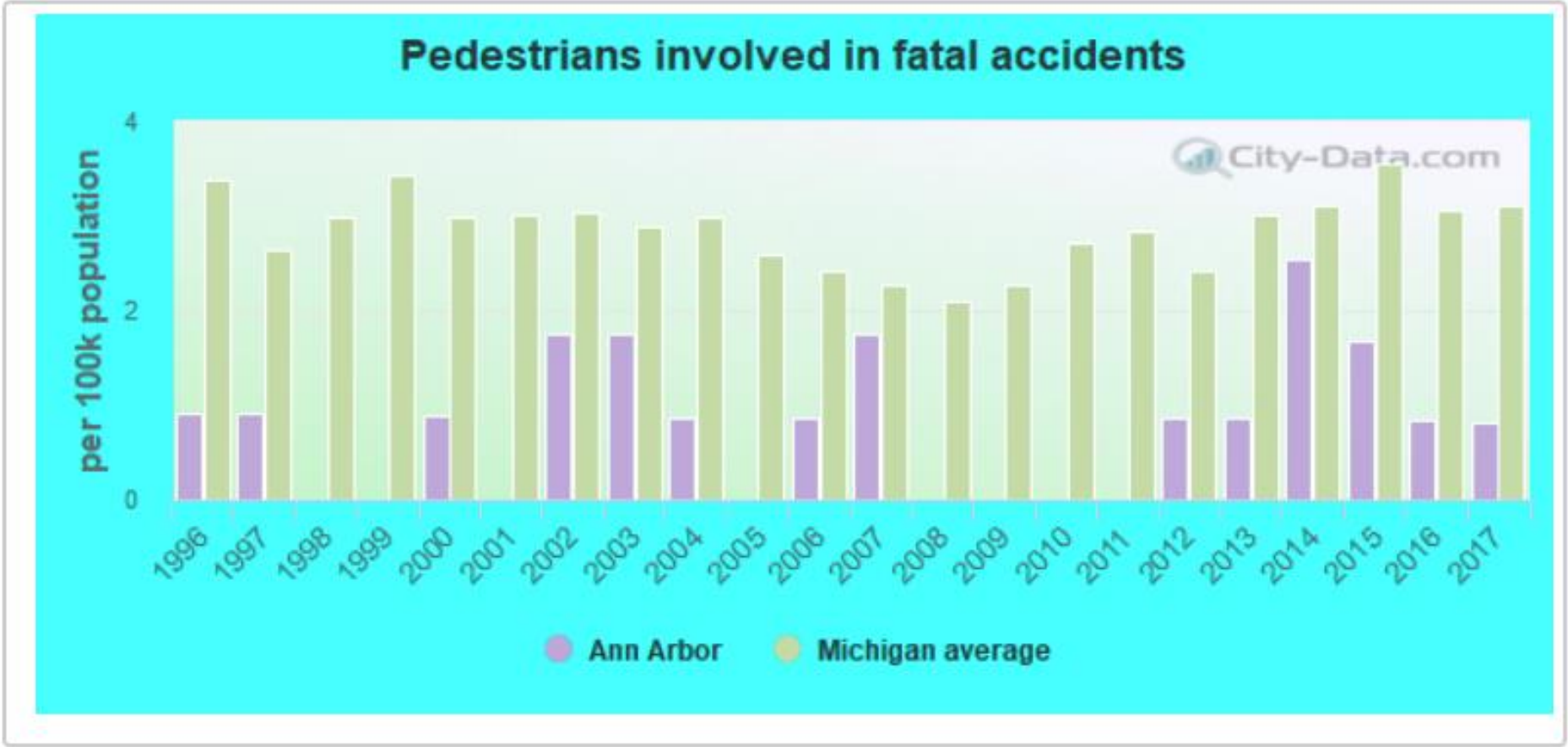
… a best fit line reveals that crashes actually increased slightly and …

Annual Pedestrian Crash Rate
Michigan Cities, 2009 - 2018



… and looking at the long-term best fit trend, the rate of increase is even greater

Annual Pedestrian Fatal Crashes
Ann Arbor vs. Michigan Average, 2009 - 2018



"… even one death is too many, which is why we should continue to seek to improve."