

# SAFETY TRACK 4B – DRIVER RISK MANAGEMENT PROGRAM

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## LYTX 2017 STATS TO GET US STARTED



CAPTURED  
**16,100,802**  
BEHAVIORS

CAPTURED  
**6,934,293**  
RISKY (SCORED) EVENTS

CLIENTS  
COACHED  
**3,759,489**  
EVENTS

CAPTURED, ON AVERAGE

<b>120</b>	OR	<b>3.34</b>
COLLISIONS PER DAY		COLLISIONS PER 10K VEHICLES

CAPTURED, ON AVERAGE

<b>297</b>	OR	<b>8.27</b>
AVOIDABLE NEAR COLLISIONS PER DAY		AVOIDABLE NEAR COLLISIONS PER 10K VEHICLES

# WHICH TYPES OF VEHICLES ARE RISKIEST?

## WASTE

### RISKIEST

Vehicle Type	Risk Per Vehicle	% of Fleet
Tanker	58.75	1%
Tractor trailer	37.55	3%
Equipment Mover	36.92	0%
Hauler / Dump Truck / Heavy	36.79	1%
Roll-off	18.68	20%

### BULK OF FLEET

Vehicle Type	Risk Per Vehicle	% of Fleet
Loader (front)	4.25	24%
Roll-off	18.68	20%
Loader (rear)	7.52	17%
Loader (side)	6.49	16%
Pickup (standard)	6.76	7%

## TRANSIT

### RISKIEST

Vehicle Type	Risk Per Vehicle	% of Fleet
Limousine	106.45	1%
Taxi	83.18	3%
Car	61.77	1%
Bus (small)	60.22	6%
Sedan / Coupe- Other	52.76	2%

### BULK OF FLEET

Vehicle Type	Risk Per Vehicle	% of Fleet
Bus (large)	24.50	20%
Paratransit / Cutaway	15.74	11%
Truck - Other	19.03	8%
Mini-van	21.46	8%
Coach	29.12	7%

## CONSTRUCTION

### RISKIEST

Vehicle Type	Risk Per Vehicle	% of Fleet
Tractor trailer	82.76	14%
Hauler / Dump Truck / Heavy	70.19	7%
Unassigned	67.19	1%
Tanker	53.90	1%
Multi-Tractor trailer	40.27	0%

### BULK OF FLEET

Vehicle Type	Risk Per Vehicle	% of Fleet
Mixer	16.17	53%
Tractor trailer	82.76	14%
Pickup (standard)	17.57	10%
Hauler / Dump Truck / Heavy	70.19	7%
Truck - Other	18.56	5%

## WHICH TYPE OF VEHICLES IS THE RISKIEST?



### **INSIGHT:**

Overall, it would appear in industries that use more specialized vehicle types (i.e. Waste, Construction), the other less common vehicle types are generating more risk than the primary vehicle types. The exception is Trucking which has 94% tractor trailer vehicles.

## WHAT DAY OF WEEK IS DO WE SEE THE RISKY BEHAVIORS?



### **INSIGHT:**

Generally, the level of risk tends to rise steadily as the work week progresses. So, Mondays tend to be the “safest” and Fridays tend to be the “riskiest”.

## WHAT DAY OF THE WEEK HAS THE HIGHEST CONCENTRATION OF RISK



### **INSIGHT:**

13 of the top 15 riskiest days in 2017 occurred during a narrow, 6-week window between 10/31/2017 and 12/14/2017. (We calculated those days by adding the top 5 riskiest single days, top 5 collision frequency single days, and top 5 avoidable near collision frequency single days to get 15 days altogether.)

### **Driver profiles are inputs to a logistic regression model**

- The model takes into consideration all of the behaviors when estimating the effects of each.

### **Sample includes data from 250,000 non-risky drivers and 75,000 risky drivers**

- Using a 1-year historical window, find drivers that have had a risky outcome and drivers that have not had a risky outcome.
- For each driver build a 6-month behavior profile from event date (near collision avoidable event or a random date for non-risky drivers).

### **Output of the model is a set of coefficients for each input (behavior indications)**

- The coefficients represent an odds ratio. In other words, how much higher (or lower) the odds of a risky outcome is when that behavior is present.
- The p-value indicates how confident we are that there is a real correlation happening and not just a fluke of the data.
- If the value appears as a “NA”, that means the p-value exceeded the minimum threshold for confidence in the data.

### **If the coefficient output for a behavior is 1, that means that there is little to no correlation of that behavior in a driver’s history compared with drivers that did not**

- The following results are the relative increase in risk compared to coefficient value of 1 (no correlation).

## NEAR COLLISION CORRELATIVE RISK

Behavior	Overall	For Hire Trucking	Government	Transit	Construction	Services	Distribution	Waste
Near Collision	187%	248%	99%	235%	108%	108%	169%	108%
Failed to Keep an Out	72%	48%	56%	82%	72%	30%	56%	50%
Intersection Awareness	61%	37%	54%	38%	#N/A	#N/A	68%	48%
Driver Unbelted Roadway	58%	42%	50%	42%	54%	34%	60%	40%
Late Response	57%	47%	41%	78%	54%	30%	62%	75%
Aggressive	56%	166%	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Collision	48%	13%	66%	61%	#N/A	#N/A	35%	52%
Following Distance: < 1 second	46%	45%	37%	63%	35%	35%	49%	61%
Near Collision - Unavoidable	44%	27%	17%	37%	37%	12%	36%	61%
Mirror Use	37%	32%	41%	29%	37%	17%	44%	25%
Falling Asleep	32%	56%	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Other Concern	31%	8%	10%	44%	#N/A	23%	28%	21%
Driver Unbelted Residential Roadway	31%	59%	#N/A	-11%	#N/A	13%	66%	#N/A
Drowsy	30%	28%	56%	#N/A	#N/A	53%	32%	#N/A
Following Distance: 1 sec to < 2 sec	29%	18%	31%	42%	64%	21%	41%	66%
Other Distraction	24%	26%	20%	26%	33%	22%	23%	20%
Failed to Stop	20%	19%	34%	#N/A	22%	26%	8%	37%
Red Light	19%	12%	10%	50%	#N/A	41%	19%	19%
Other Violation	19%	8%	33%	-12%	25%	30%	14%	43%
Cell Handheld - Observed	15%	17%	#N/A	#N/A	17%	8%	15%	33%

The difference in correlative risk in this chart gives insight into how behaviors in each industry contribute to the likelihood that a driver would be involved in a near collision, if that behavior is exhibited. A near collision behavior in Trucking or Transit is that much more correlative to having another near collision than in Waste or Government.



## COLLISION VS NEAR COLLISION CORRELATIVE RISK

Behavior	Collision	Near Collision
Collision	679%	48%
Aggressive - Level 2	527%	#N/A
Falling Asleep	78%	32%
Unsafe Lane Change	65%	#N/A
Near Collision	63%	187%
Drowsy	51%	30%
Failed to Keep an Out	32%	72%
Late Response	31%	57%
Roadway	30%	58%
Intersection Awareness	30%	61%
Near Collision - Unavoidable	25%	44%
Other Concern	23%	31%
Other Distraction	17%	24%
Red Light	17%	19%
Failed to Stop	16%	20%
Mirror Use	16%	37%
Following Distance: 1 sec to < 2 sec	15%	29%
Parking Lot	15%	13%
Posted Speed Violation	12%	#N/A
Cell Handheld - Observed	10%	15%

The collision correlations are bit noisier and less frequent than the near collision correlations. Incidents involving low speed bumps, animal strikes, and backing really pollute the collision pool when we really want to just focus on the more larger-claim incidents.

The near collision correlations are more “pure” in that sense. All near collision are generally created equal.

## METHODOLOGY



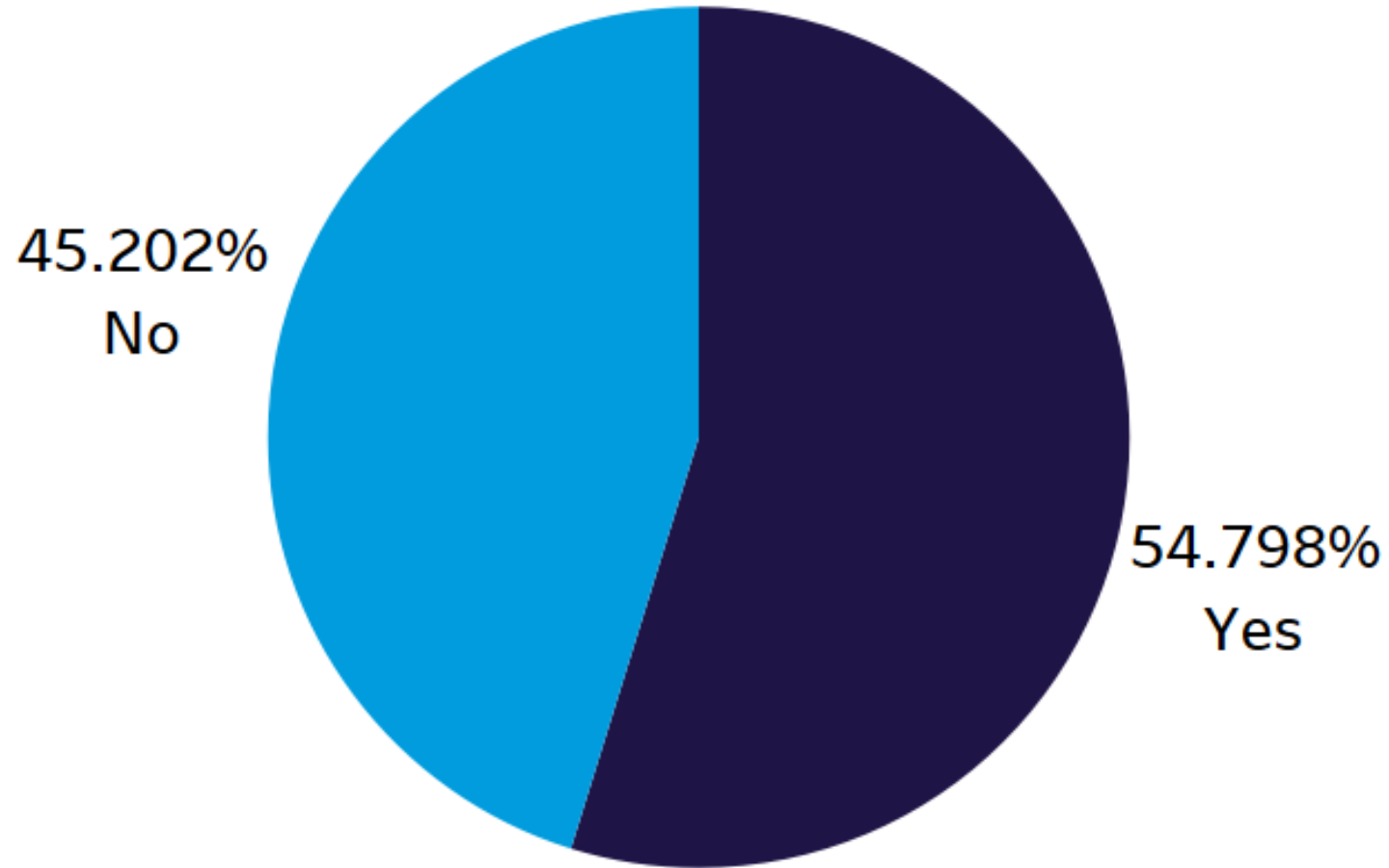
**The data team manually reviewed more than a thousand randomly selected collision clips available – roughly evenly distributed across all industries**

**Those events were cataloged by preventability (not to be read as fault), severity, location, collision type, behavior category, behavior, and any special notes**

- Preventability and severity are subjective data points based on a few general criteria and the best judgment of the analyst reviewing the video
  - A preventable incident is defined by the National Safety Council to be one in which the driver failed to do everything that reasonably could have been done to avoid a collision. In other words, when a driver commits errors and/or fails to react reasonably to the errors of others, the Council considers an incident to be preventable. When a driver commits no errors and reacts reasonably to the errors of others, the Council considers the incident to be non-preventable.
  - Severity is judged based only on the information available in the video only and is an estimation of claim dollars that would be associated on a low, medium and high scale; and most importantly, determined independently of preventability. For example, a collision involving multiple vehicles at speed will be rated as high severity regardless of that incident's preventability, while backing into a pole in a parking lot would be marked as low severity regardless of its preventability.

**This information is aggregated and compiled only in a percentage of the whole, there is no identifying information from these incidents**

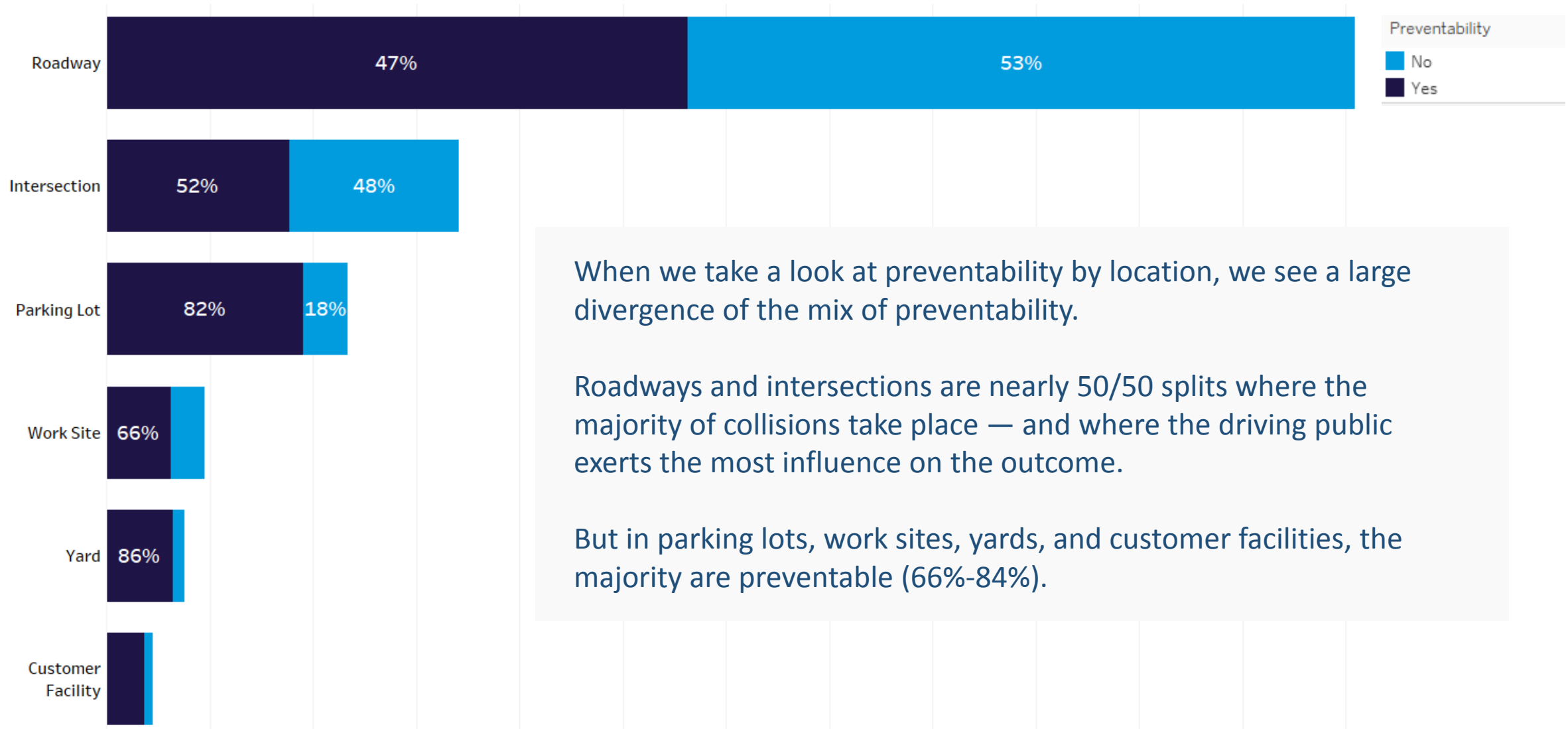
## PREVENTABILITY



Slightly more collisions were preventable than not.

This preventability split has remained fairly consistent compared to a 2015 study that showed a 53% to 47% split.

## PREVENTABILITY

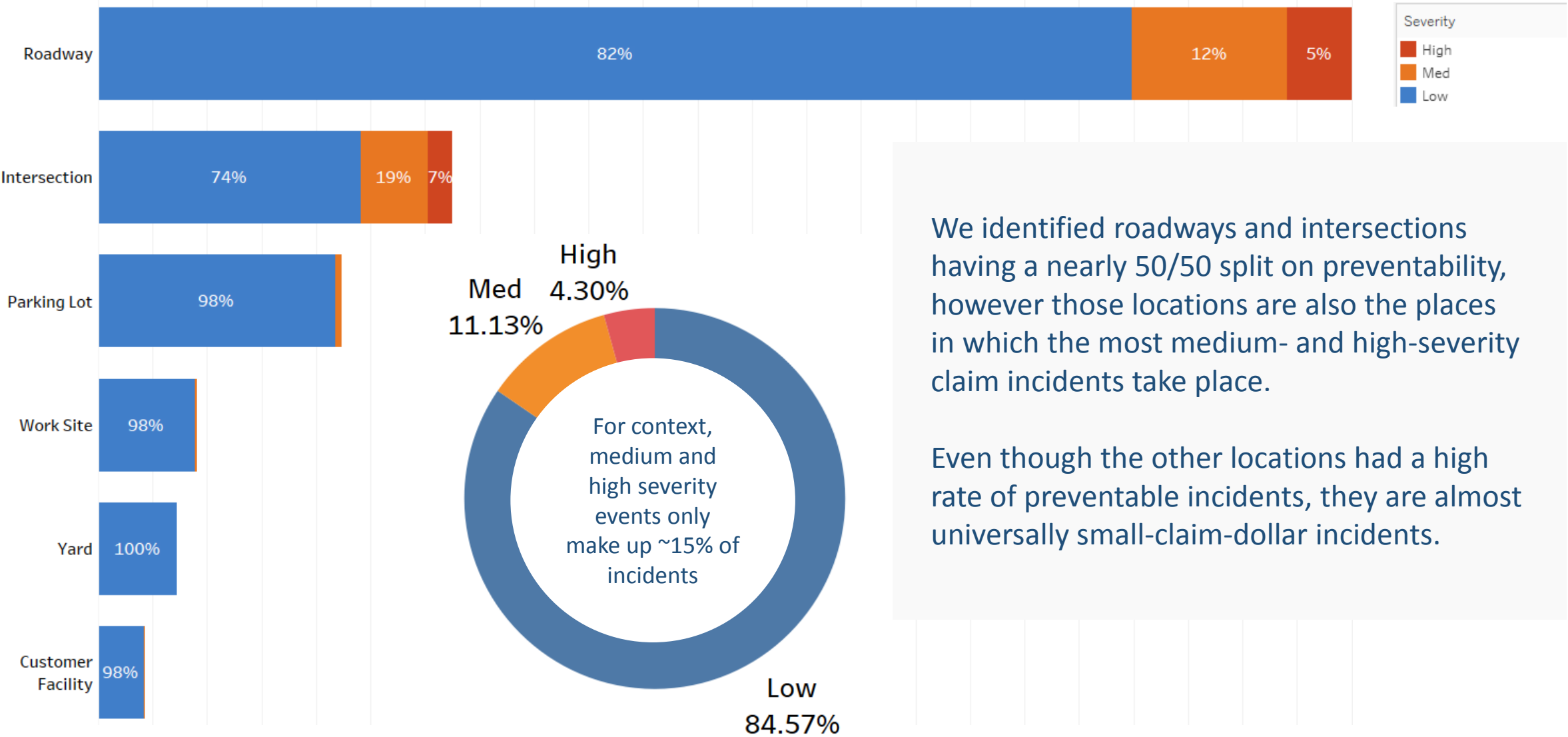


When we take a look at preventability by location, we see a large divergence of the mix of preventability.

Roadways and intersections are nearly 50/50 splits where the majority of collisions take place — and where the driving public exerts the most influence on the outcome.

But in parking lots, work sites, yards, and customer facilities, the majority are preventable (66%-84%).

LOCATION AND SEVERITY

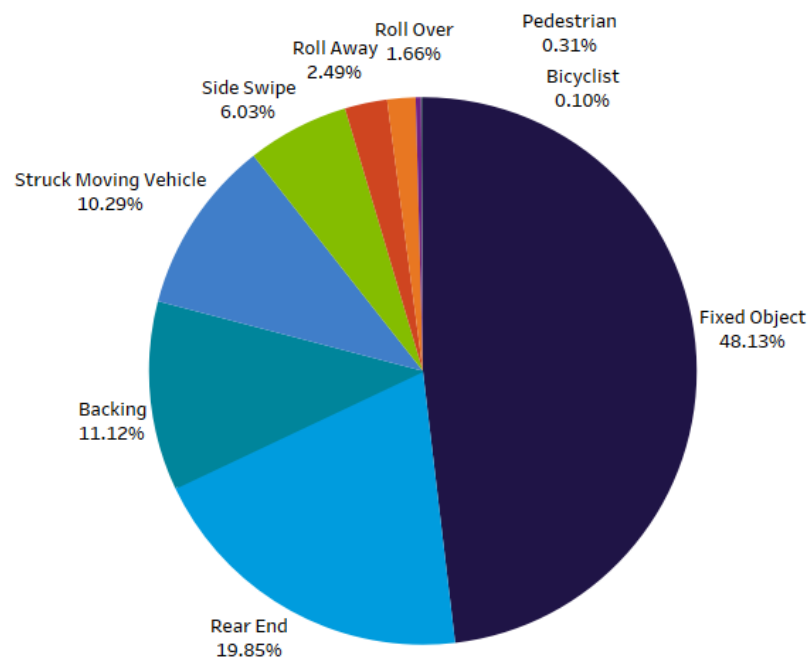


We identified roadways and intersections having a nearly 50/50 split on preventability, however those locations are also the places in which the most medium- and high-severity claim incidents take place.

Even though the other locations had a high rate of preventable incidents, they are almost universally small-claim-dollar incidents.

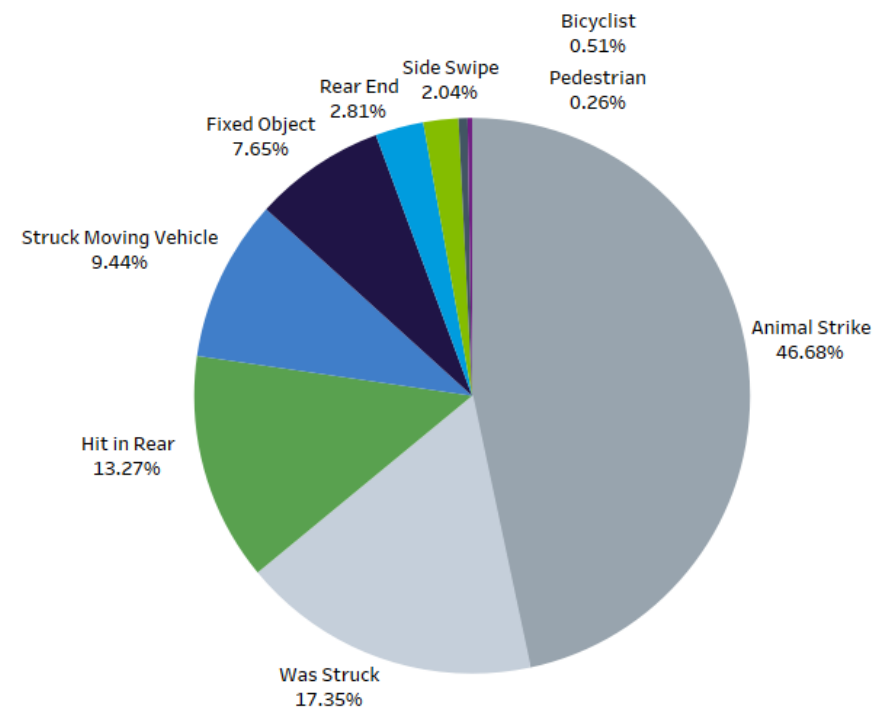
## PREVENTABILITY AND COLLISION TYPE

### PREVENTABLE

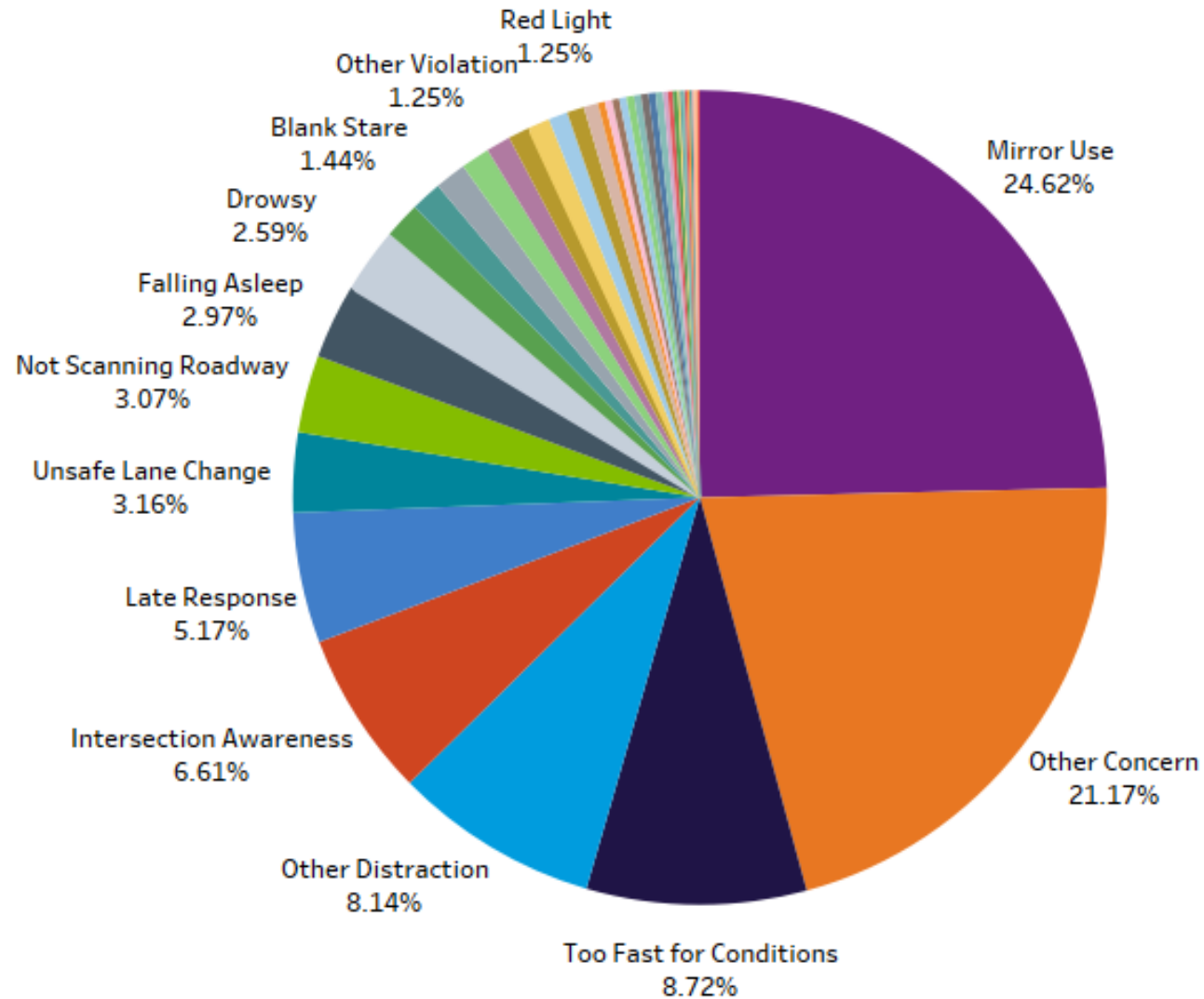


The mix of collision types are very different between preventable and not preventable incidents.

### NOT PREVENTABLE



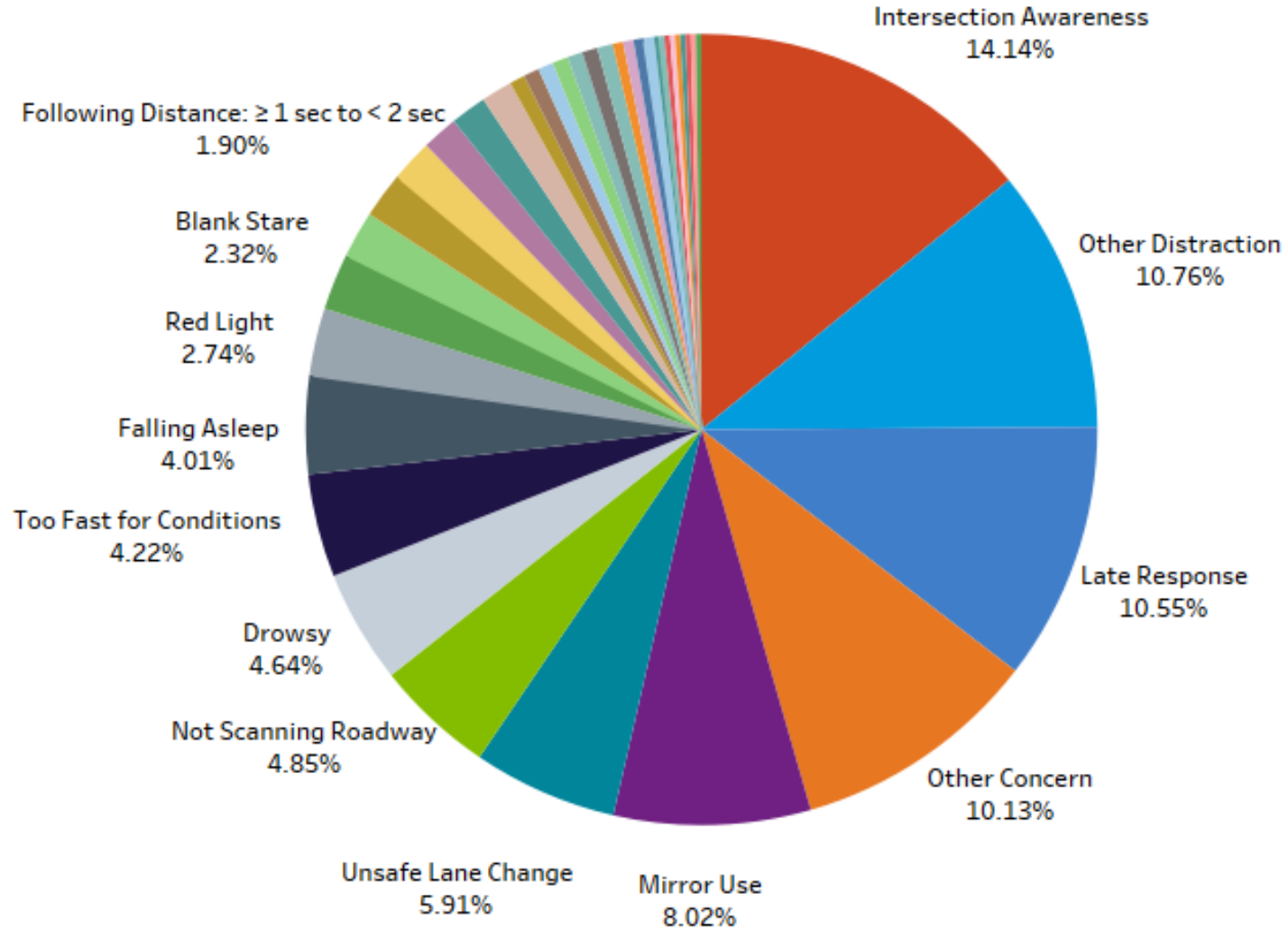
## PREVENTABLE COLLISION ROOT CAUSE BEHAVIORS



Looking at all preventable collisions, nearly half are attributable to not checking mirrors or other concern (formerly judgment error).

However, we do have the same problem with the correlation analysis in that there were lots of low speed bumps and backing incidents.

## PREVENTABLE COLLISION ROOT CAUSE BEHAVIORS

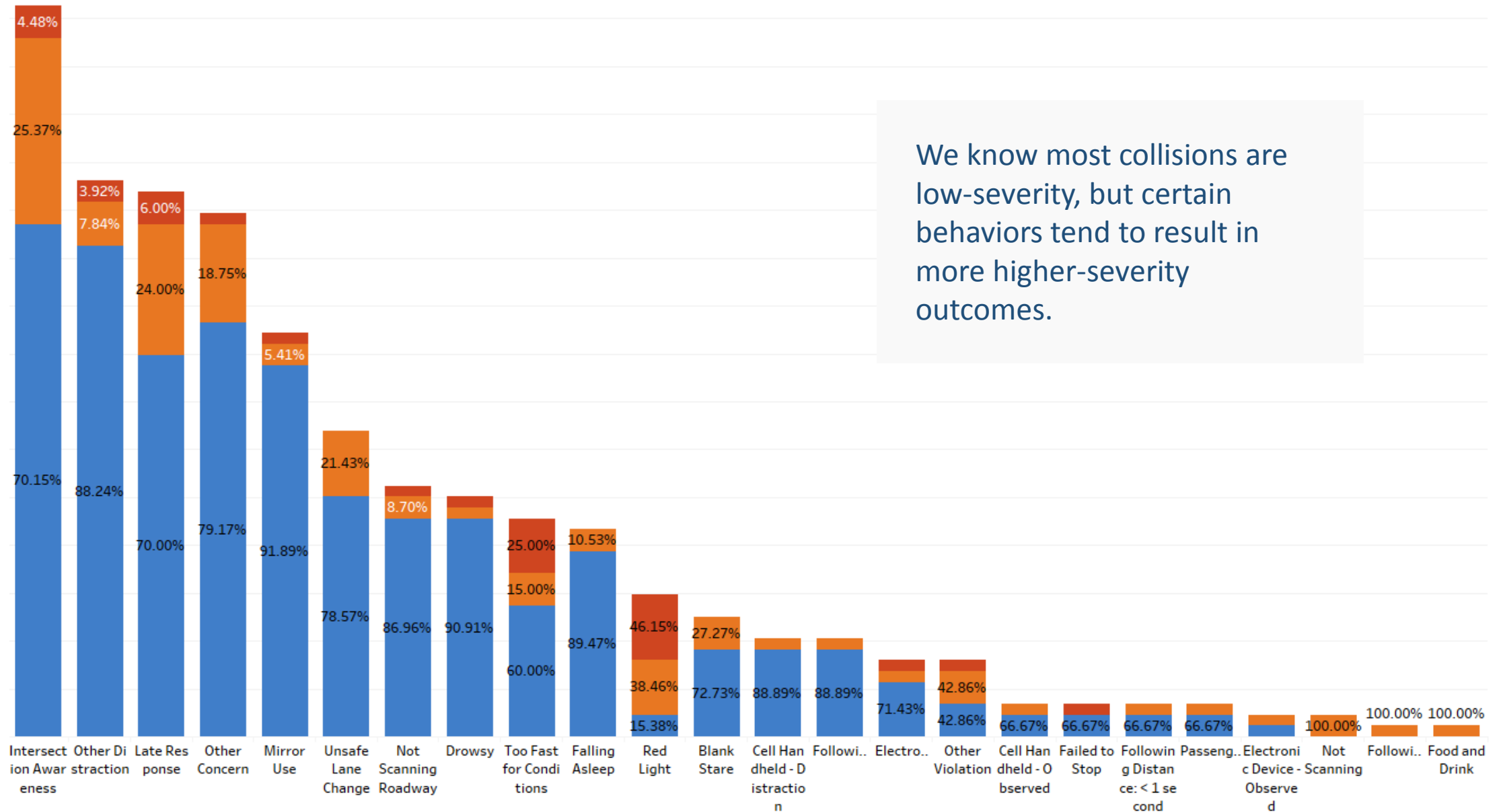


Unlike the correlation analysis, we can remove the fixed object, animal strikes, backing and hit in rear incidents, which inflate certain behaviors (i.e. mirror use), to focus more on significant outcomes.

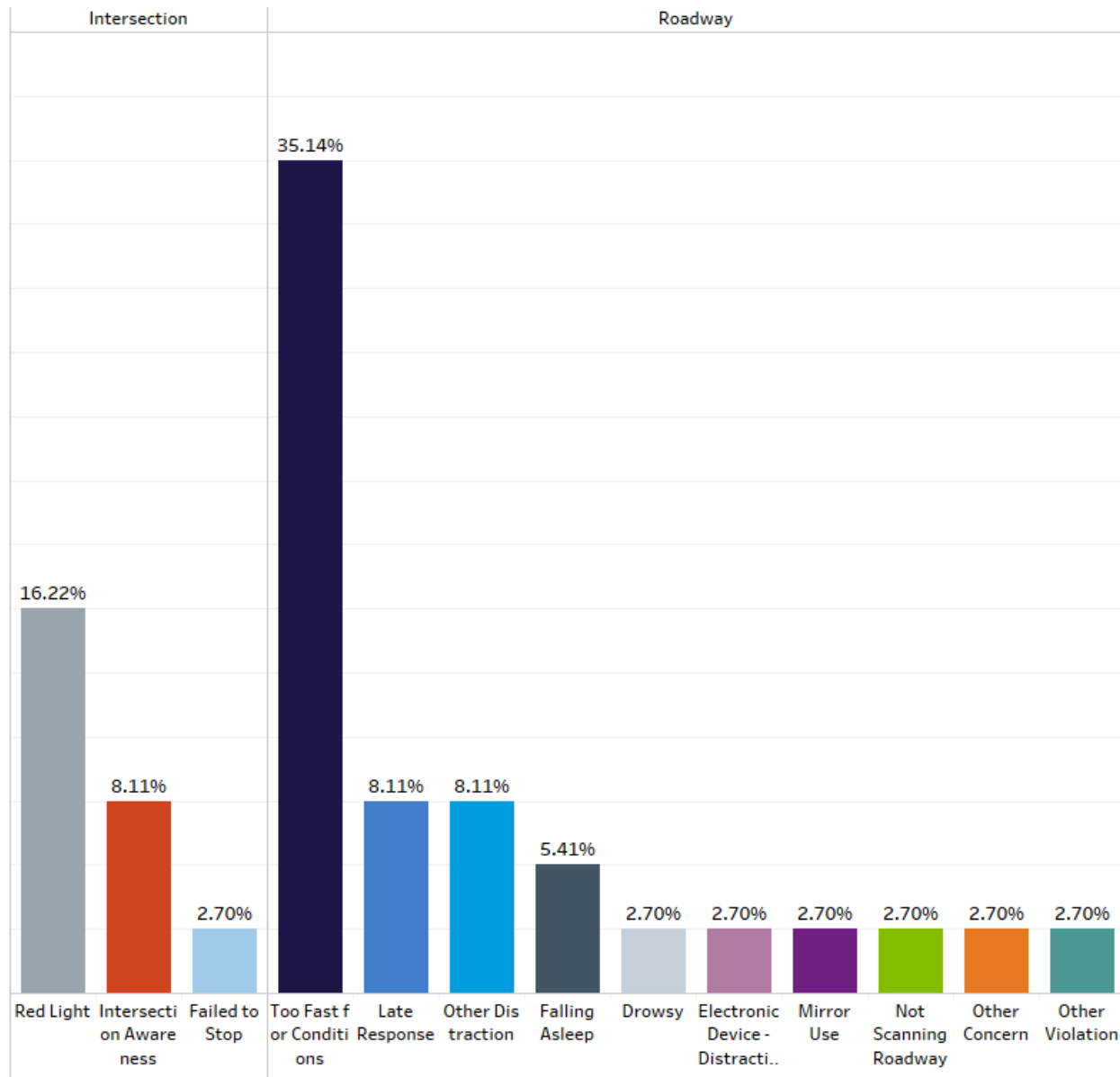
With those exclusions, we see intersection awareness, other distraction, and late response bubble to the top.



## BEHAVIORS AND SEVERITY



## BEHAVIORS AND SEVERITY



Looking at the high-severity preventable incidents, a little over 50% have too fast for conditions or a red light behavior observed.

# CASE STUDY: CITY OF ATLANTA

# CITY OF ATLANTA DRIVECAM PROGRAM



## What is DriveCam?

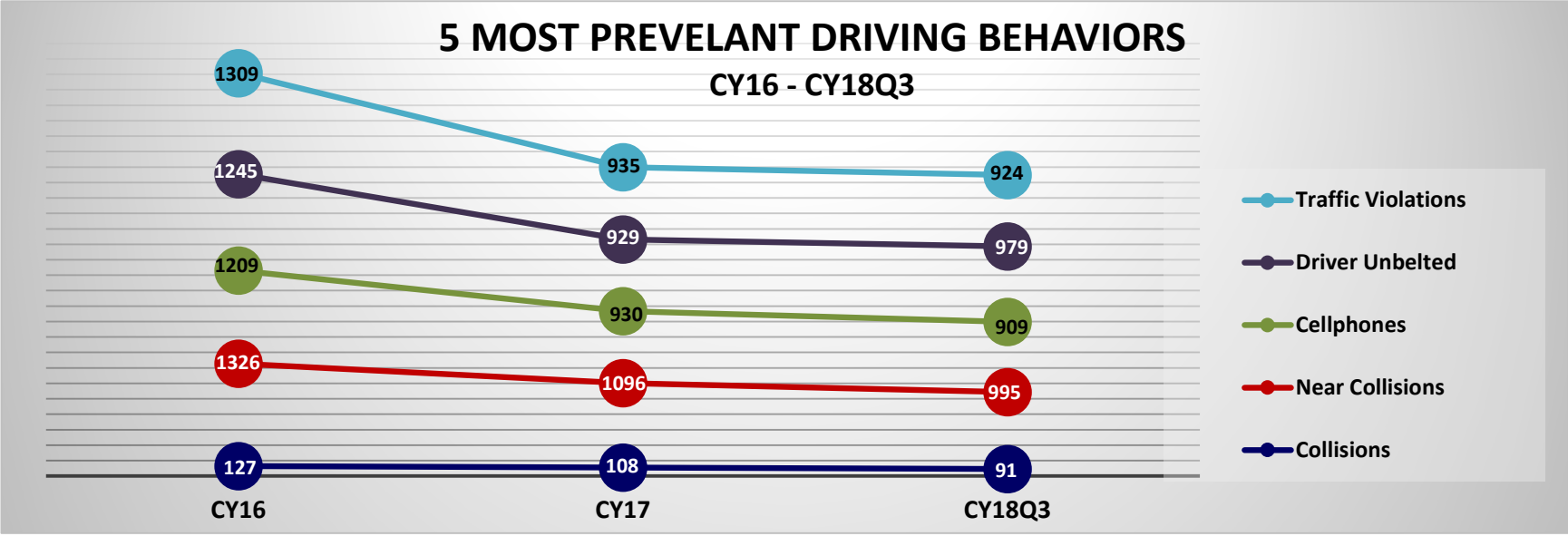
- 2-way facing camera
- Saves 12 seconds of video when activated by g-force of the vehicle (4 secs before and 8 secs after event)
- Videos reviewed by specialist to identify risky behaviors that resulted in camera activation
- Notifications to departmental liaisons responsible for coaching identified risky behaviors



## PHASED IMPLEMENTATION



# CITY OF ATLANTA PROGRAM PERFORMANCE



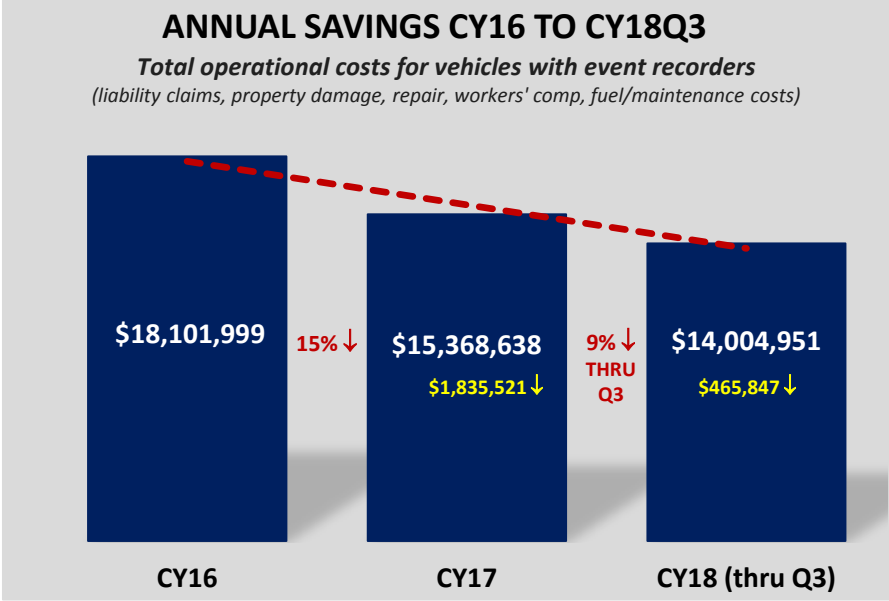
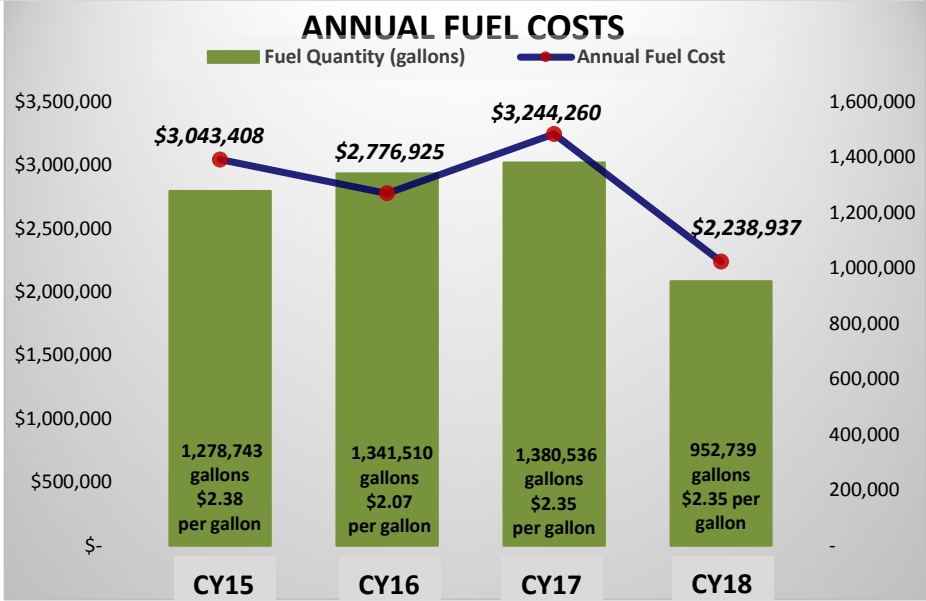
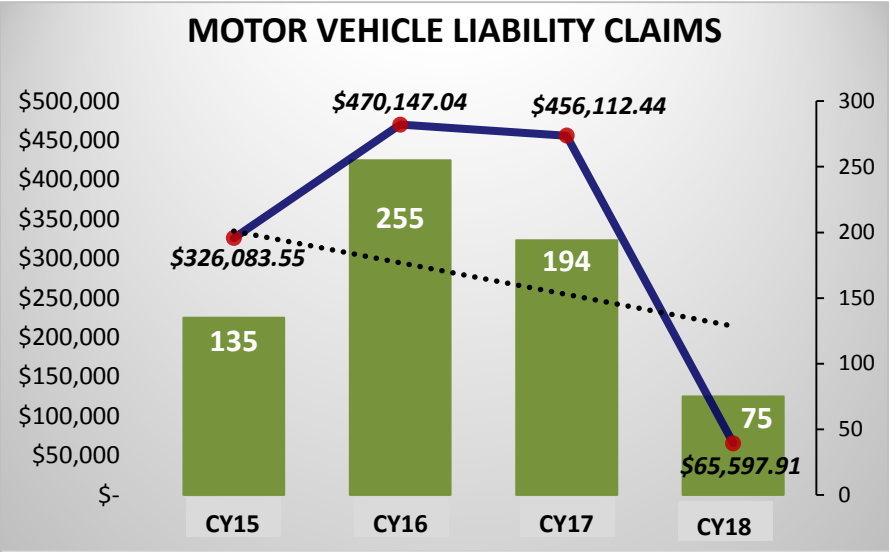
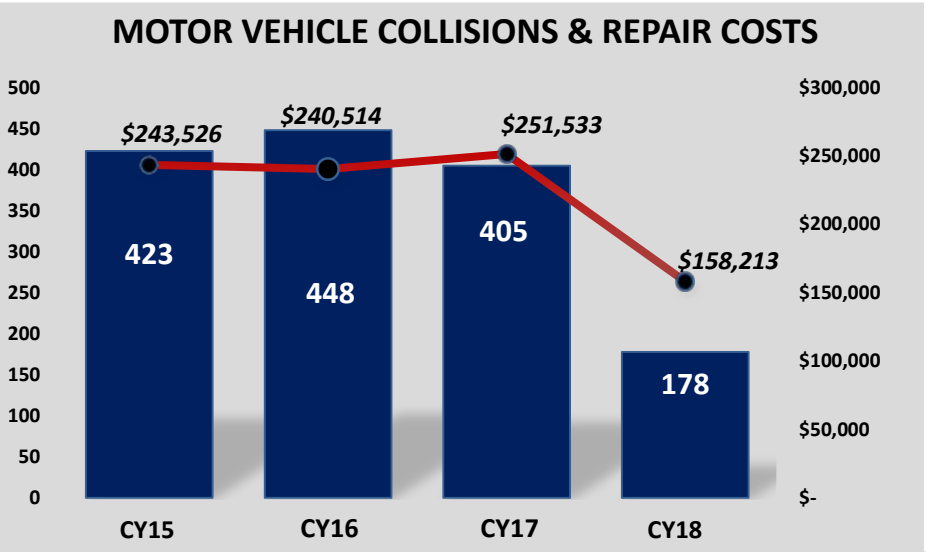
## CY16-17 RISK PERFORMANCE



## CY17-CY18Q3 RISK PERFORMANCE



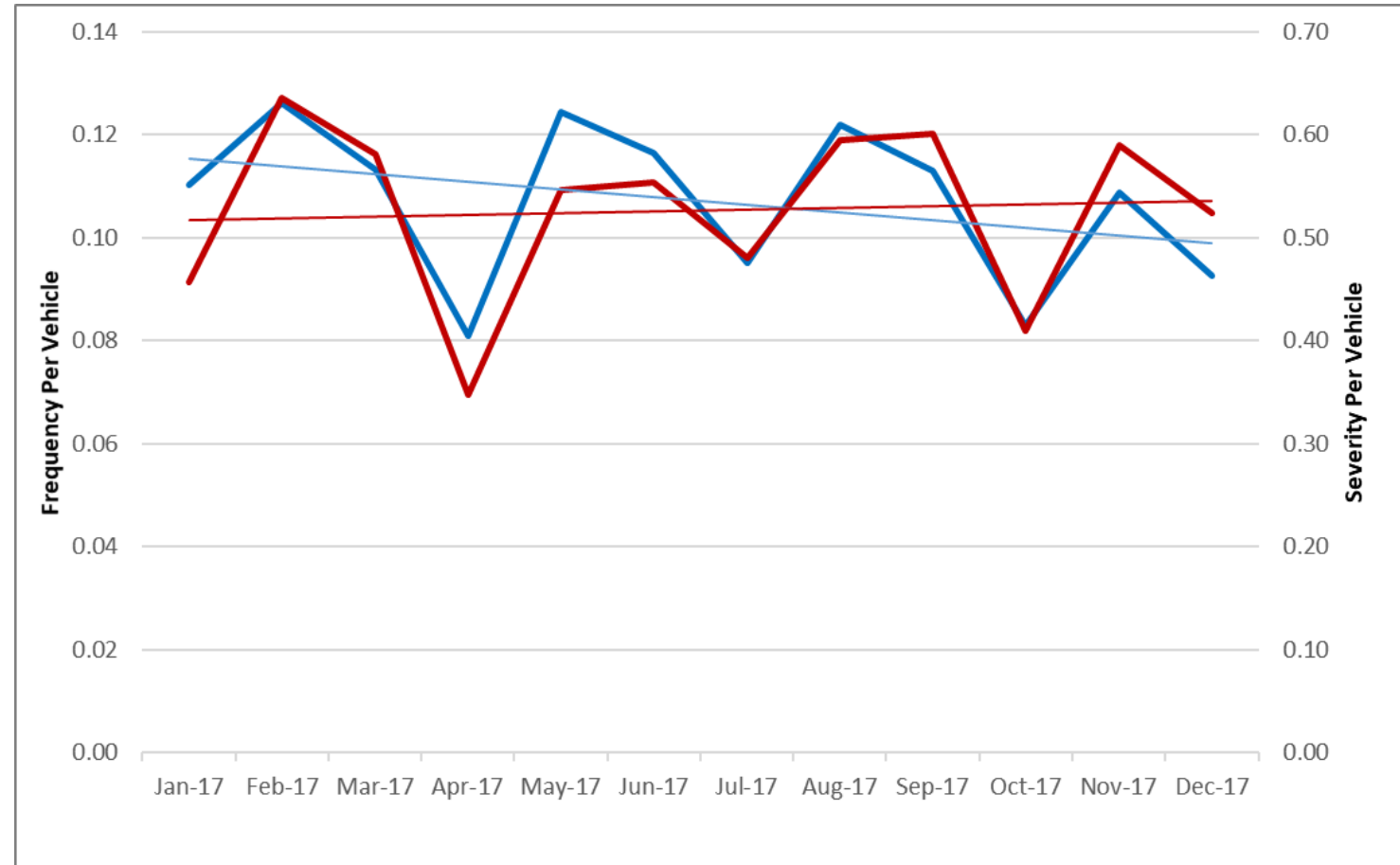
# CITY OF ATLANTA PROGRAM PERFORMANCE



## OVERVIEW OF PROGRAM PERFORMANCE-DEPARTMENT OF AVIATION



19% Improvement in  
Frequency and  
9% Improvement in  
Severity from  
Jan-Mar'17 to  
Oct-Dec'17



*Frequency = Number of Scored Events / # of Active ERs per Month*

*Severity = Number of Risky Driving Points / # of Active ERs per Month*

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## NEAR COLLISIONS-DEPARTMENT OF AVIATION

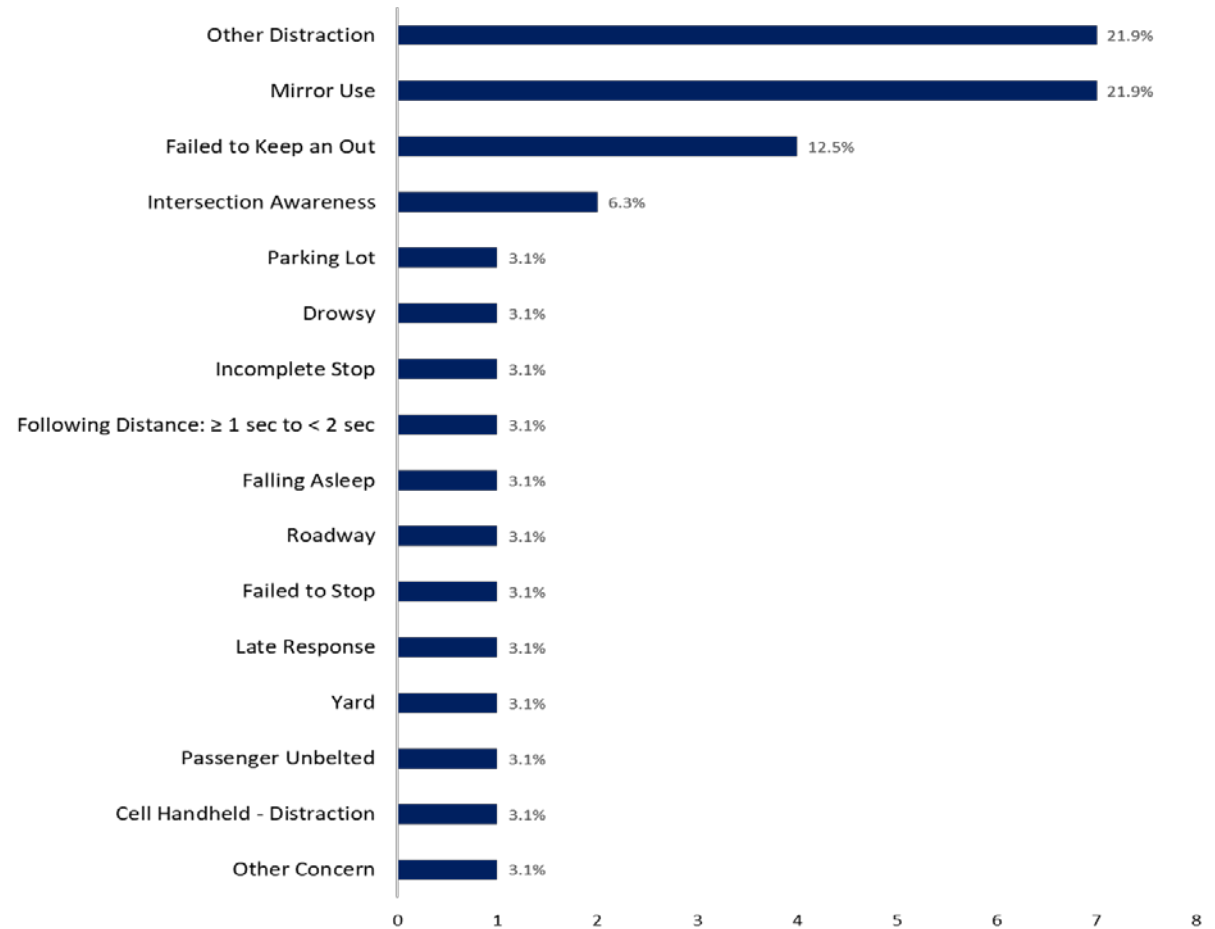


Near Collisions have increased 88%  
from Jan-Mar'17 to Oct-Dec'17

*Drivers with a NCA event are nearly 6  
times more likely to be involved in a  
collision within 6 months, than a driver  
without a NCA event.*

Top 3 Behaviors create 56% of Risk  
associated with NCs

### 30 NC events with 32 Total behaviors in 12 Months



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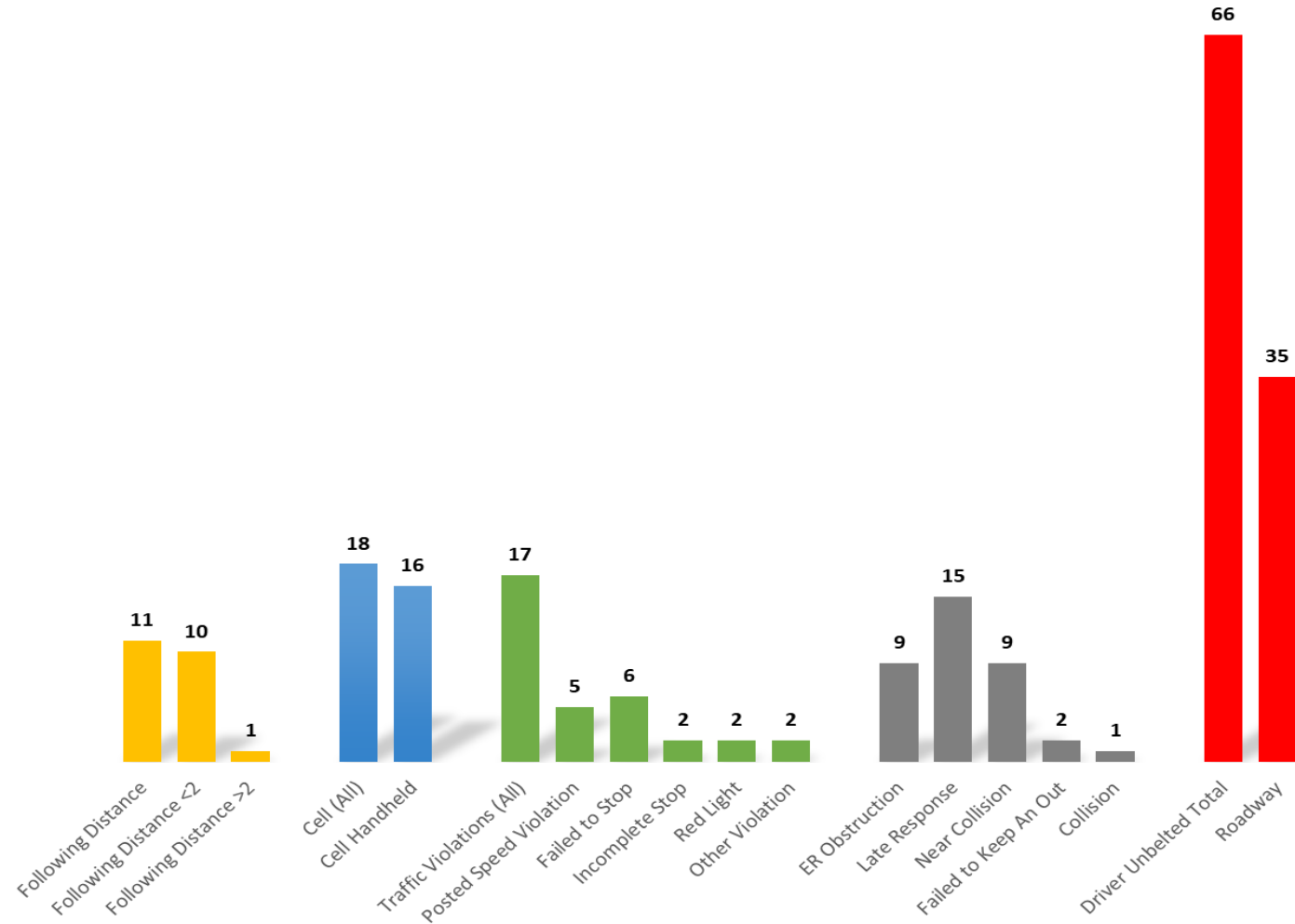
## BEHAVIOR PROFILE-DEPARTMENT OF AVIATION

Most Prevalent  
Coachable Behaviors:

Following Distance, Late  
Response, Traffic Violations,  
and ER Obstruction

*Drivers with a Following  
Distance (<2 sec) are 4.8  
times more likely to be  
involved in a collision within 6  
months than a driver without  
a FD <2 sec behavior.*

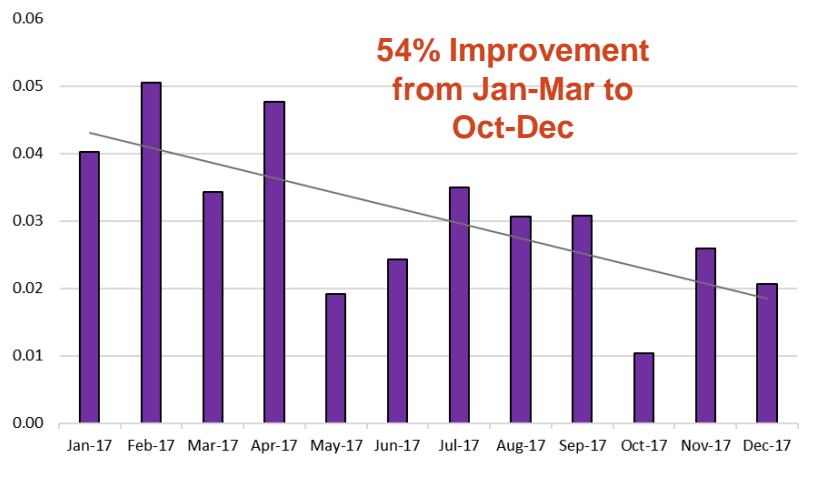
*With Traffic Violations drivers  
are 4.3 times more likely.*



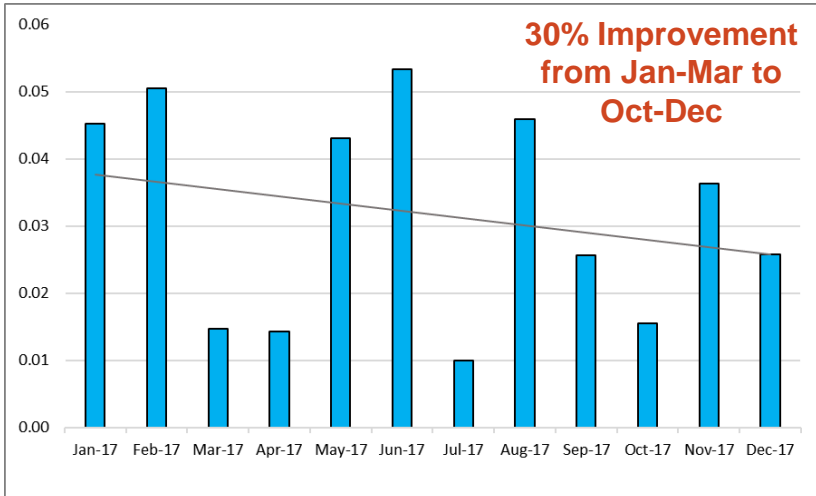
*\*Events normalized by # of Active ERs per Month*

# BEHAVIOR TRENDS-DEPARTMENT OF AVIATION

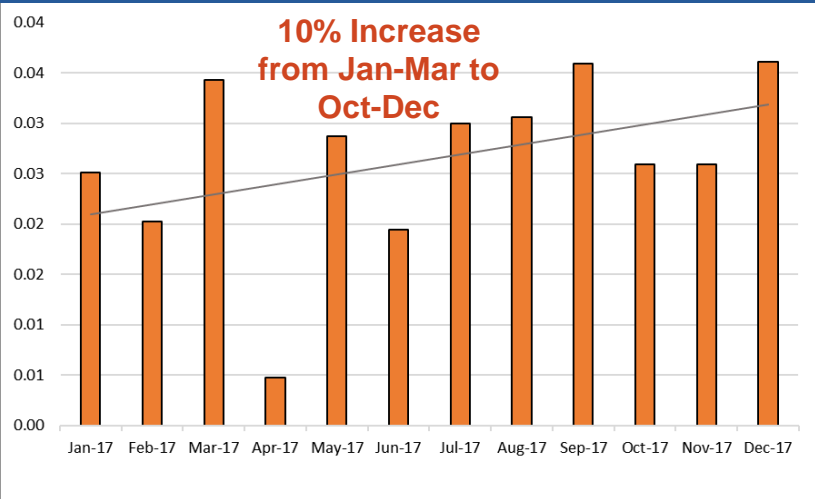
Following Distance (All)



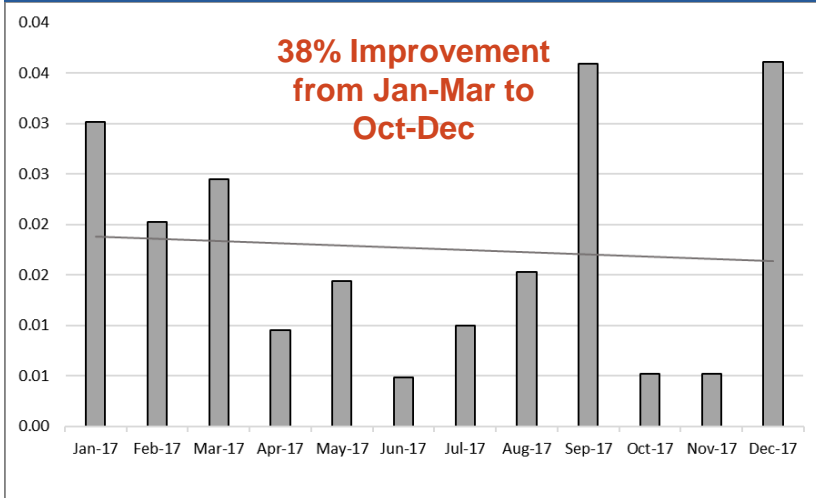
Late Response



Traffic Violations



ER Obstruction



\*Events normalized by # of Active ERs per Month

## EXAMPLES OF BEHAVIORS



Stop Sign



Stop Light, Distracted



Stop Sign, Following  
Distance, Cell, Unbelted



Unbelted, Lane Change

## OPPORTUNITIES FOR IMPROVEMENT



Utilizing spotter  
while backing



Is there another way?



Unbelted Customer  
Service 1



Unbelted Customer  
Service 2

THINGS DO HAPPEN SOMETIMES...



It's not my fault....



.... But this one was...