

# The Future of Traffic Monitoring: **A New Perspective Using Drones**



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**UNB TRANSPORTATION GROUP**







Fredericton  
Campus

UNIVERSITY OF  
NEW BRUNSWICK



**225** YEARS  
A CELEBRATION OF SPIRIT



# Introduction





# Fredericton's First Multi-Lane ROUNABOUT

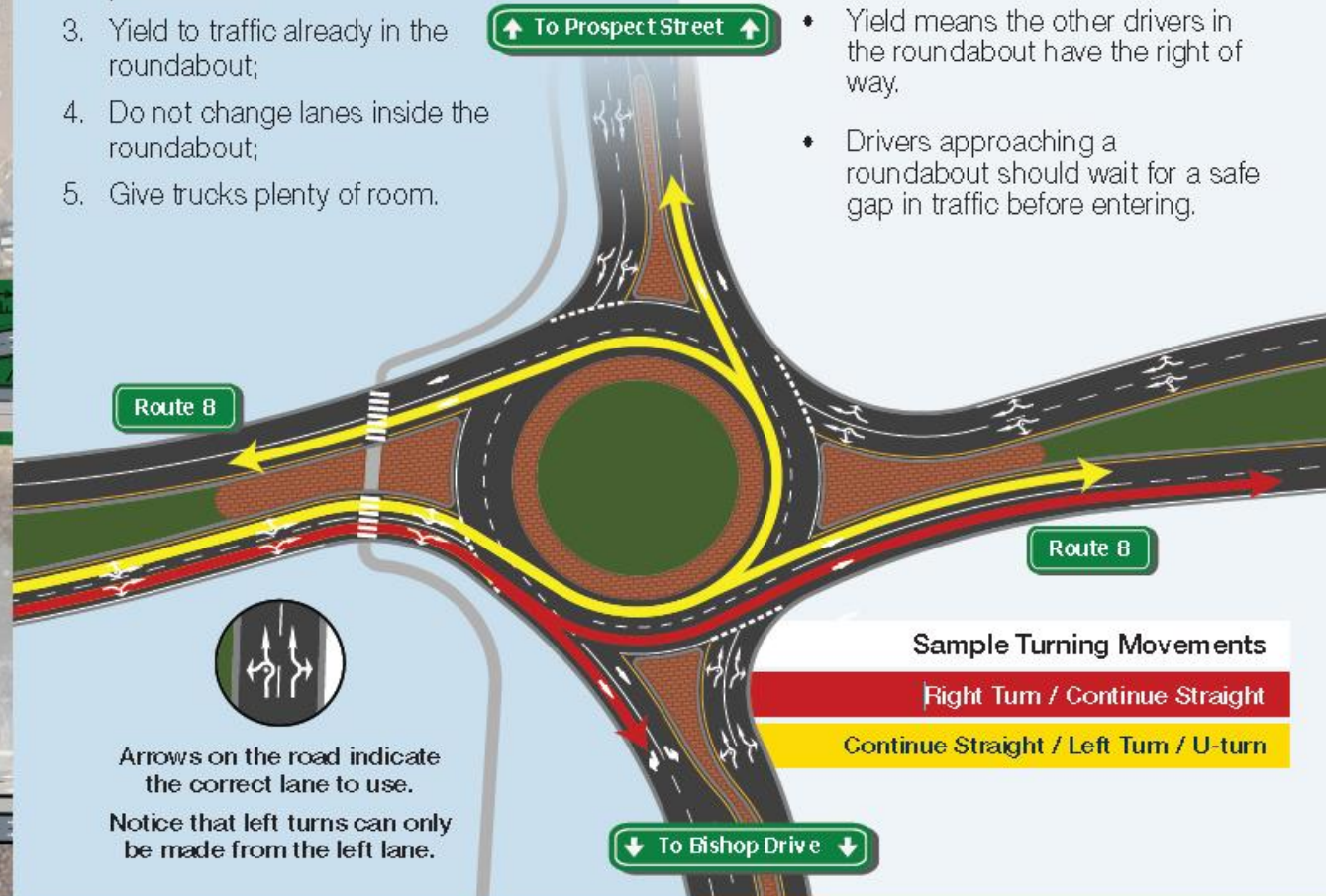
## 5 Simple Rules for Driving Multi-Lane Roundabouts:

1. Choose your lane in advance of the roundabout;
2. Slow down and yield to pedestrians;
3. Yield to traffic already in the roundabout;
4. Do not change lanes inside the roundabout;
5. Give trucks plenty of room.

## Yield ▶

The "Golden Rule"  
of driving roundabouts.

- Yield to **all** circulating traffic (don't merge), when you enter a roundabout.
- Yield means the other drivers in the roundabout have the right of way.
- Drivers approaching a roundabout should wait for a safe gap in traffic before entering.



### Sample Turning Movements

Right Turn / Continue Straight

Continue Straight / Left Turn / U-turn

## ROUTE 8 / SMYTHE STREET ROUNABOUT

Single-lane roundabouts have been operating successfully in Fredericton since 2010; however, the Route 8 / Smythe Street roundabout will be Fredericton's first multi-lane roundabout so it is important that local drivers understand how to drive this type of intersection.

**Fredericton**

For more information visit:

[www.fredericton.ca/roundabouts](http://www.fredericton.ca/roundabouts)

# City of Fredericton reports only 10 accidents on roundabout opening day

4 NB, News, Video September 23, 2015

PRINT EMAIL A- A+

POSTED BY ALEX VIETINGHOFF



Fredericton — In a pleasantly surprising press release, the City of Fredericton reported only 10 motor vehicle accidents on the opening day of the capital city's new roundabout.

While many speculated that the opening day would have at least 32 accidents and 4 deaths, the city proudly laid to rest any worries in an announcement by Mayor Brad Woodside Wednesday morning.

"They said we couldn't do it. That we'd be crazy to try. But we showed them that with a little public education and a whole of of luck, anything is possible," said Woodside.



# Data Collection



GoPro on  
Water Tower



# Data Collection



**DJI Phantom 3  
Professional**

# • VIDEO



# UAV Regulation

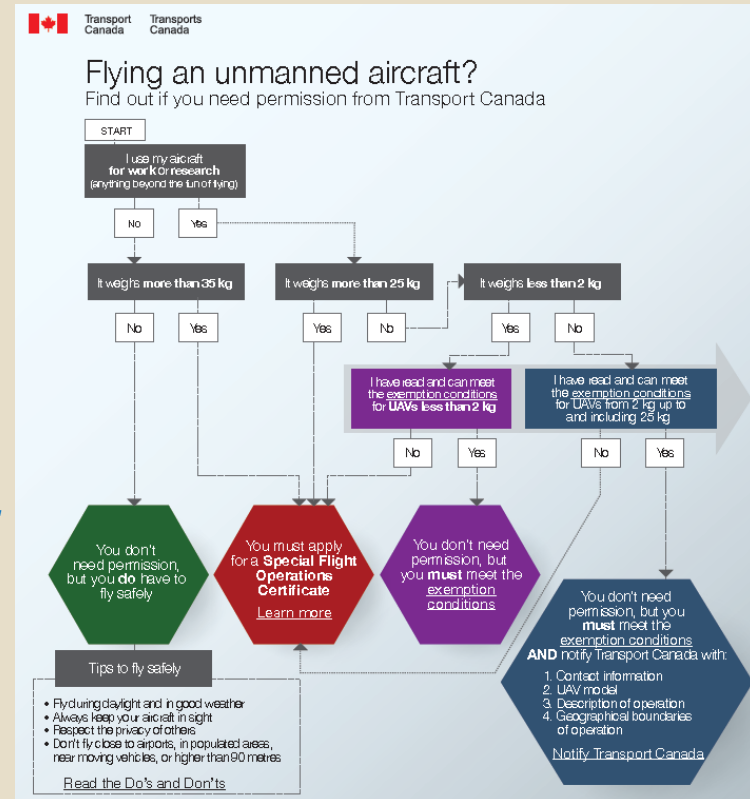
- Transport Canada is the governing body for the regulation of UAVs in Canadian Airspace

- Restricted Operator  
(work/research)

– Simplified Application (14 pg.)

***SPECIAL FLIGHT OPERATIONS CERTIFICATE***

[tc.gc.ca/SafetyFirst](https://tc.gc.ca/SafetyFirst)



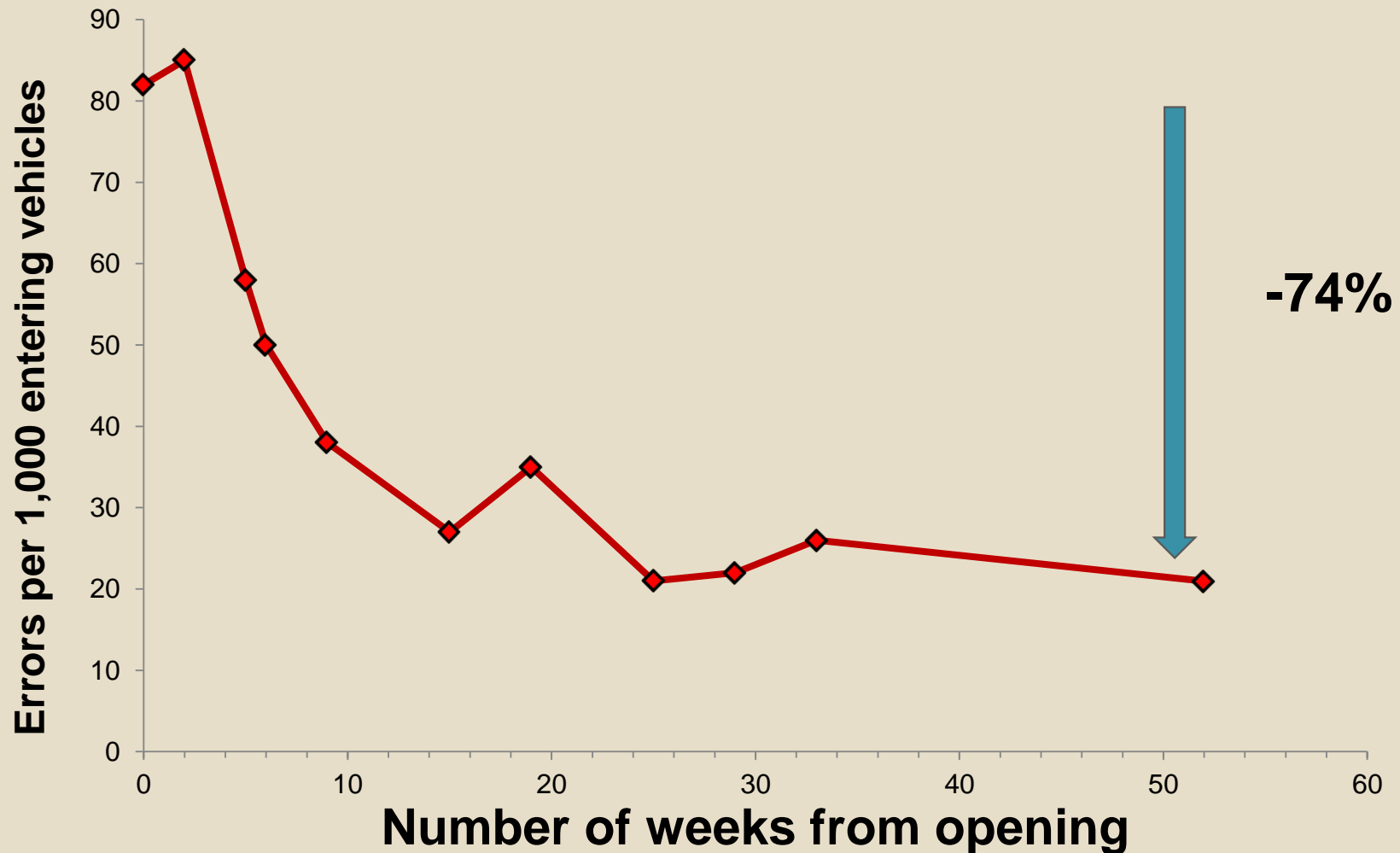
# Operational Recommendations

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- Intersection Studies
- Safety Estimation
- Origin Destination Studies
- Parking Studies
- Spot Speed Studies



# Total Driver Errors

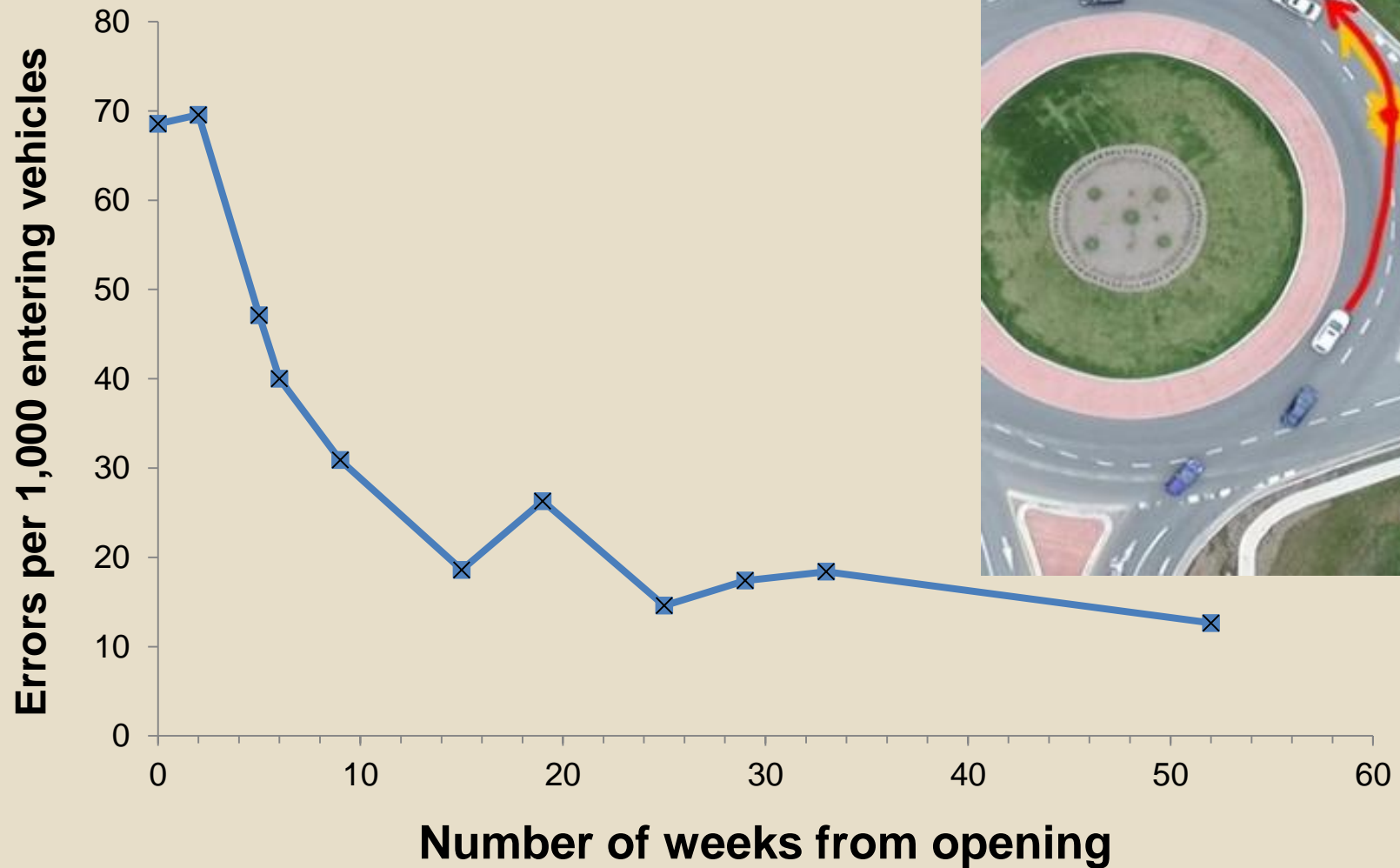


# Driver Error Types

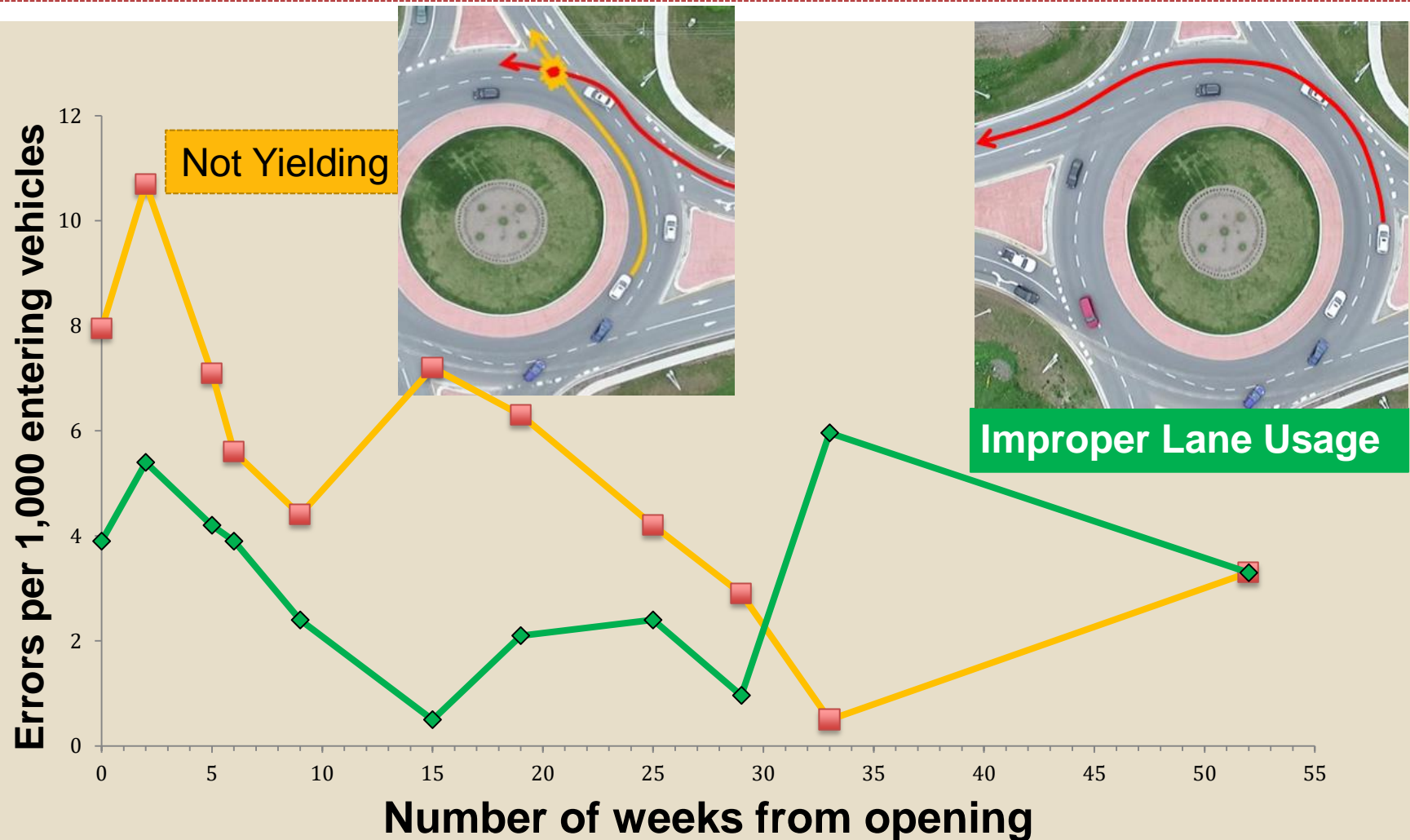
	% Reduction	% of Total Errors
	(Sept/15 to Sept/16)	(September/16)
Changing lanes within roundabout	81	60
Not yielding to traffic in roundabout	59	16
Improper lane usage	15	16
Stopping within roundabout	39	5
Not giving ROW to trucks	0	3
Left-turn (wrong way)	100	0
<b>All Errors</b>	<b>74</b>	100



# Changing Lanes Within Roundabout



# Other Errors





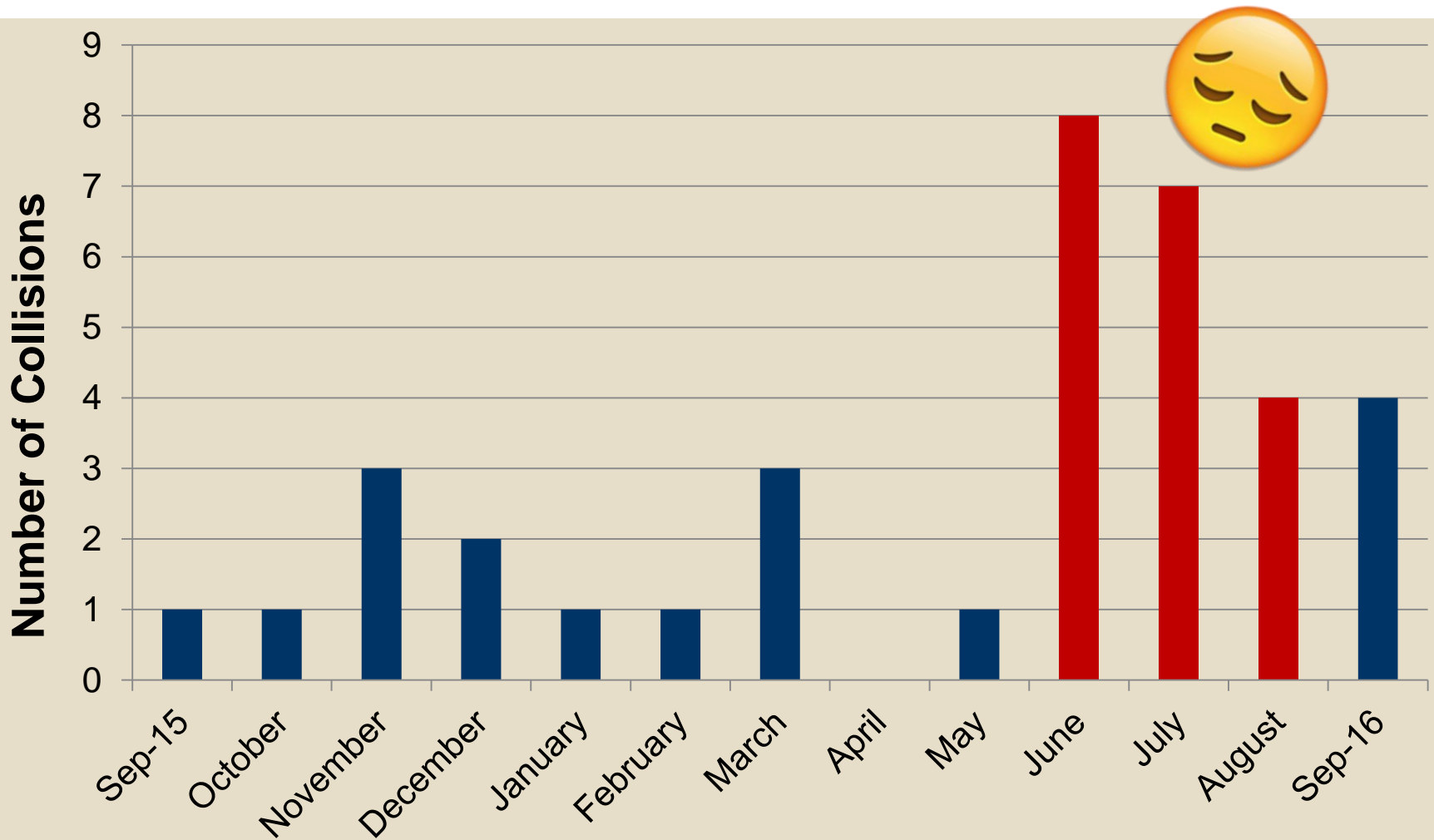
# The Yield Problem



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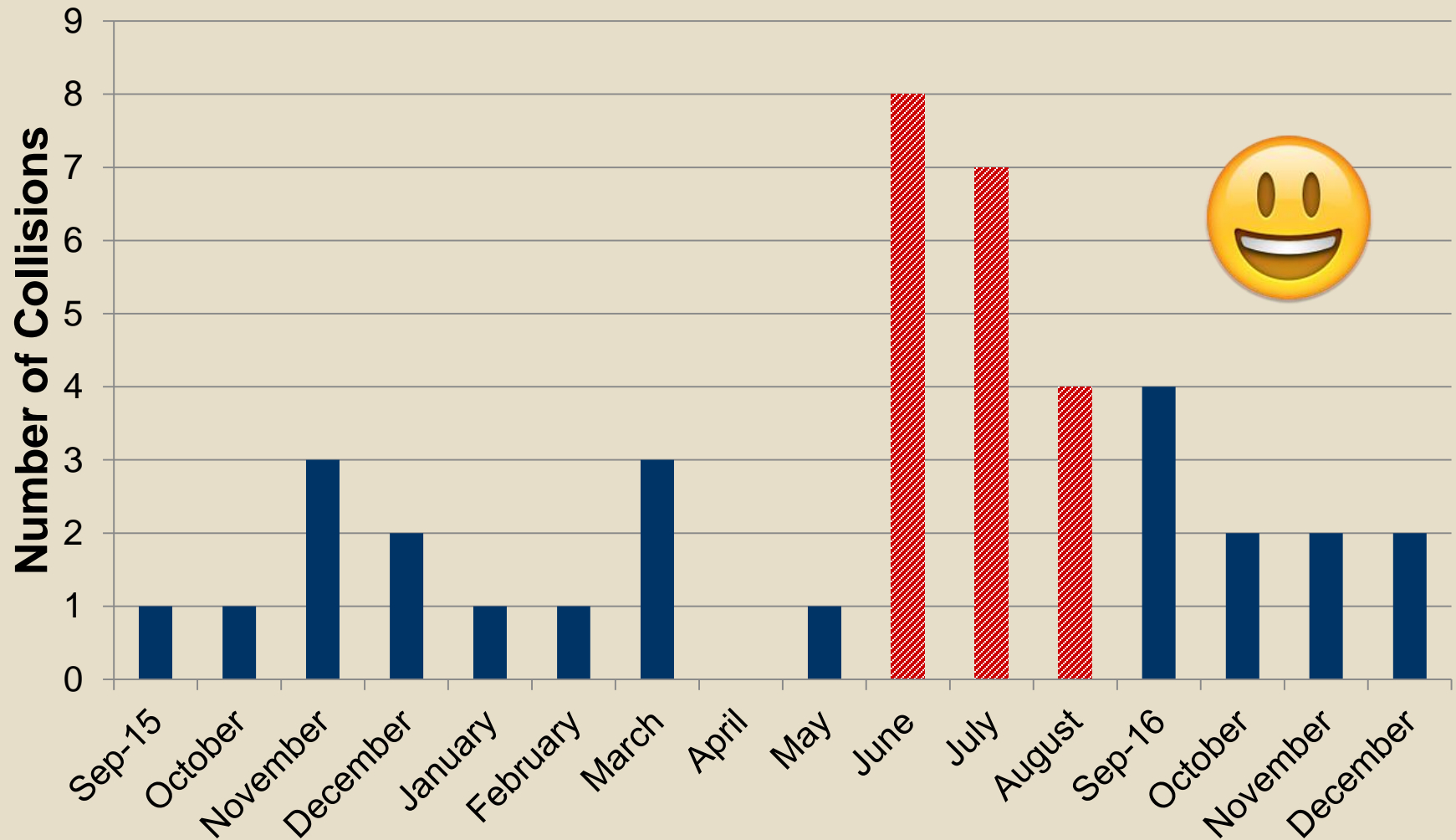


# Collisions





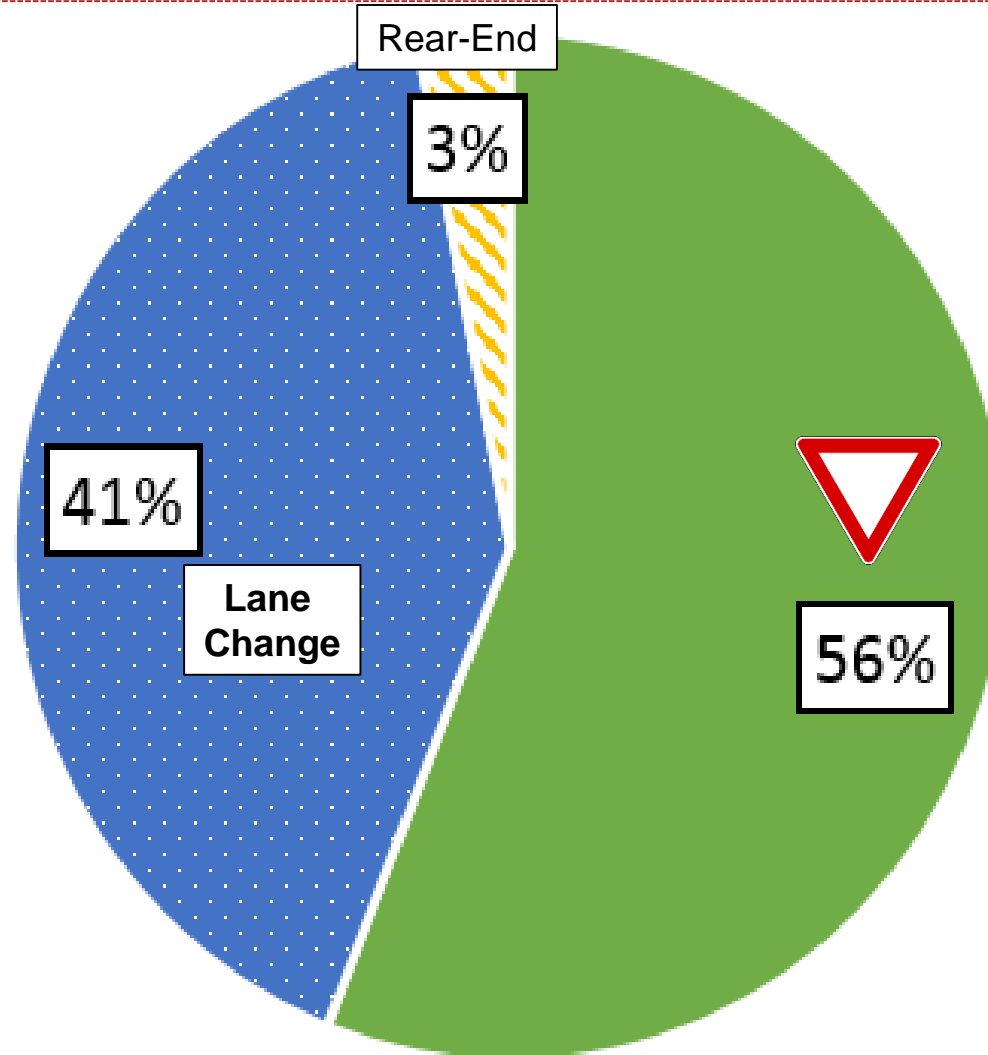
# Collisions



# Collision Performance

	<b>Expected Collisions (per 12 months)</b>	<b>Observed Collisions (per 12 months)</b>  September/15 – December/16, w/o June, July, Aug.	<b>PFI</b>
<b>PDO</b>	<b>25.6</b>	<b>21</b>	<b>-4.6</b>
<b>Injury</b>	<b>2.8</b>	<b>2</b>	<b>-0.8</b>
<b>TOTAL</b>	<b>28.4</b>	<b>23</b>	<b>-5.4</b>

# Collision Configuration





# Capacity Analysis



# Capacity Analysis

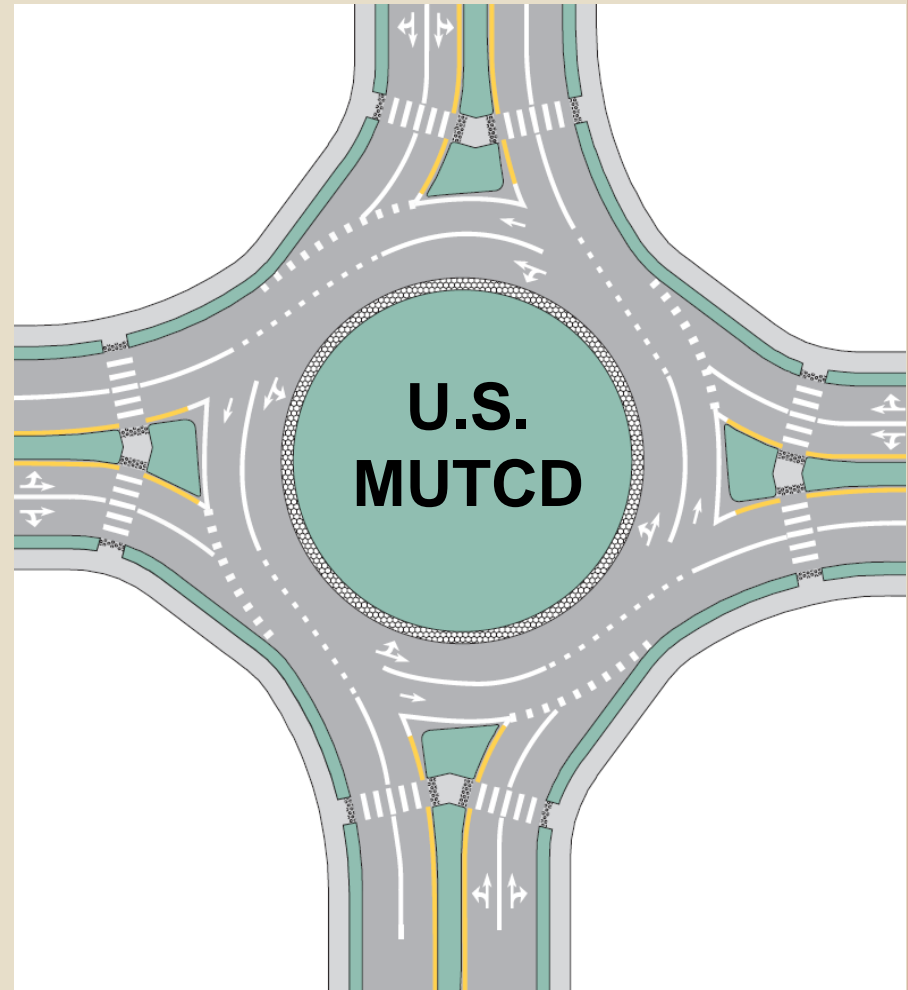
Method	Critical Headway (sec)		Follow-up Headway (sec)	Intersection Delay (sec)	LOS
	Right	Left			
HCM 2010	4.11	4.29	4.29	56.1	<b>F</b>
HCM 6	4.32	4.65	3.19		
Raff	<b>3.2-3.5</b>	<b>3.5-3.8</b>	<b>3.02</b>	23.9	<b>C</b>
Wu	<b>3.21</b>	<b>3.35</b>	<b>3.02</b>	21.4	<b>C</b>

# Conclusions

- Most error reduction by 15-20 weeks (74% reduction)
  - Most common observed error = **changing lanes** within the roundabout
  - Error causing the most accidents = **drivers not yielding** to traffic already in the roundabout
- Collision data –better than average
- Observed *Critical* Headways different than HCM6
- Pavement markings? (41% of all collisions)



# Pavement Markings





# Questions?

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