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Evaluation of Bike Boxes at Signalized Intersections [Presentation]

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An Evaluation of Bike Boxes at Signalized Intersections in Portland, OR

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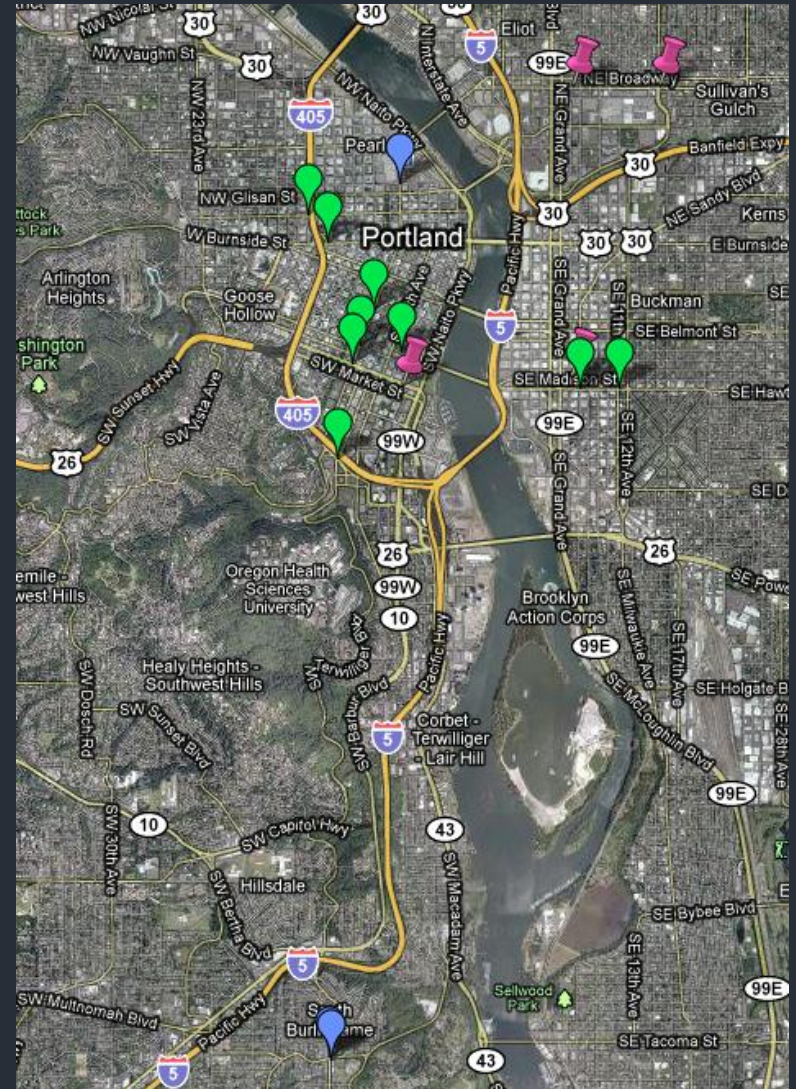


Bike Boxes in Portland

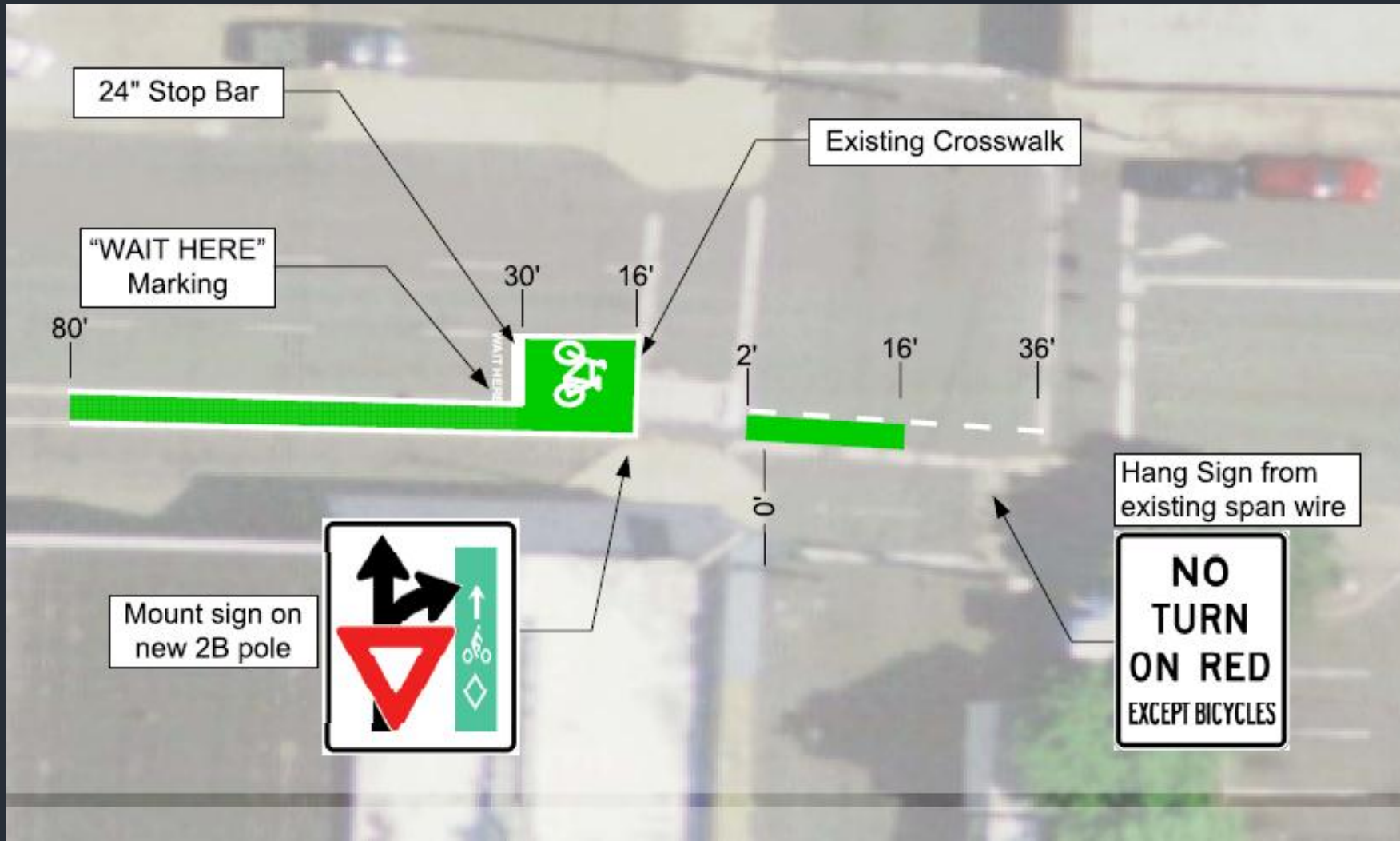
9 - Green Bike Boxes



3 - Uncolored Bike Boxes



Typical Design





Our Research Questions

- Do road users (motorists and cyclists) understand the markings?
- Do road users behave as intended?
- Are the markings improving safety?
- Does color (green vs. no color) matter?

Methods: Video Data

- Pre & Post video
 - 10 bike box (7 green, 3 uncolored)
 - 2 control
 - 2 peak and 1 off-peak hours analyzed per location
 - *+56 more hours for conflict analysis*
 - Before video: Jan to March 2008
 - After video: April to June 2009



Methods: Surveys

- Intercept survey of bicyclists
 - 5 bike box intersections
 - 47% response rate (468 of 997)
- On-line survey of motorists
 - 24% response rate (717 of 3,020)





Do Users Understand the Markings?



Motorist Survey

If you approached an intersection with a red light where should you stop your car?



2% in box
1% either
3% don't know



94%

9% in box
<1% either
1% don't know

89%



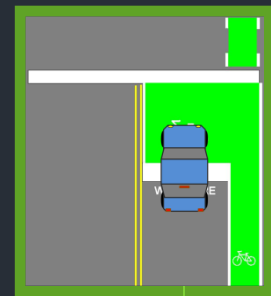
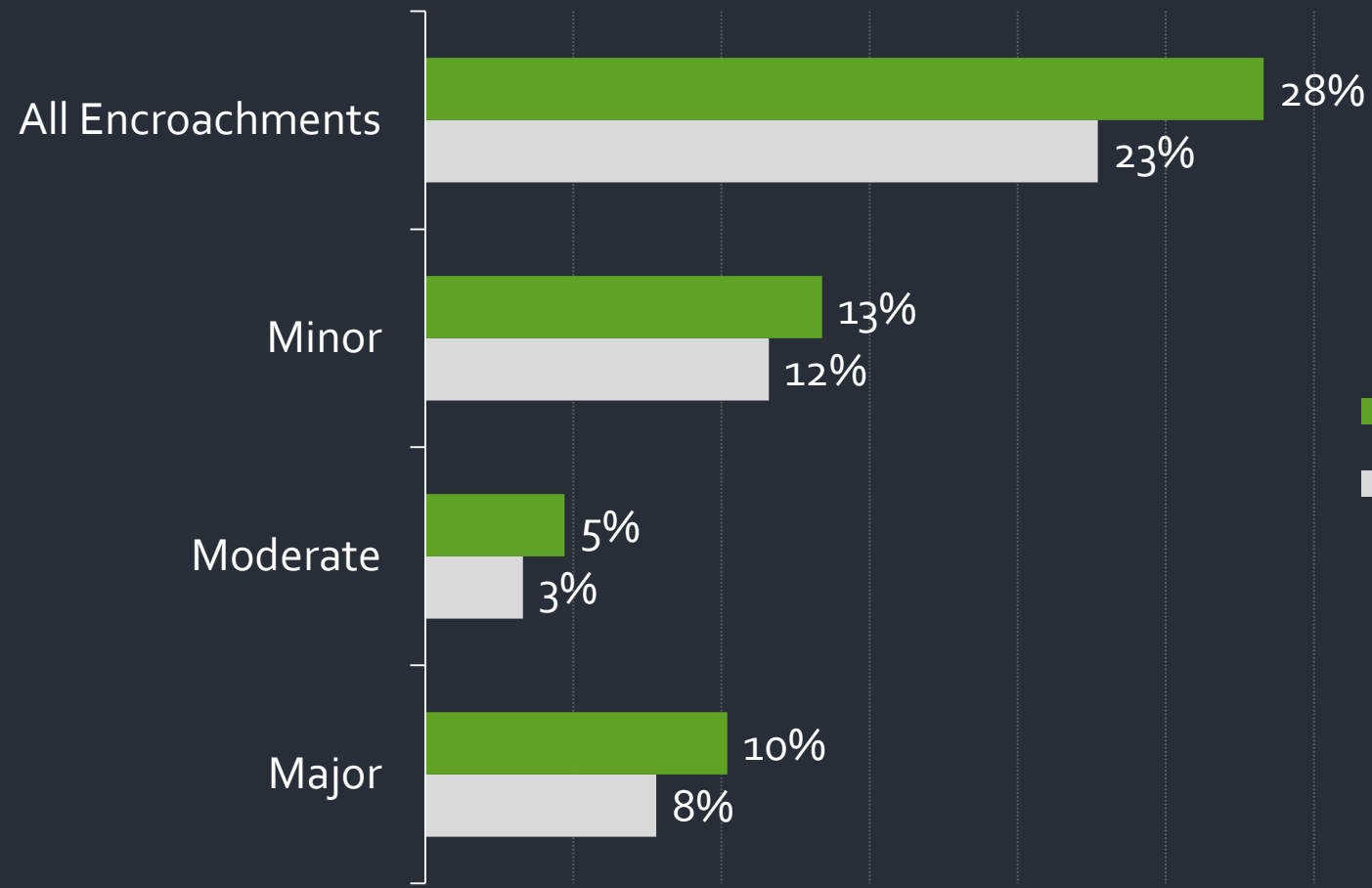


Do Users Behave as Intended?

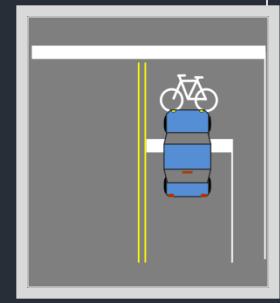


Motorist Encroachment in the Bike Box

% of motor vehicles arriving on red signal encroaching in the bike box

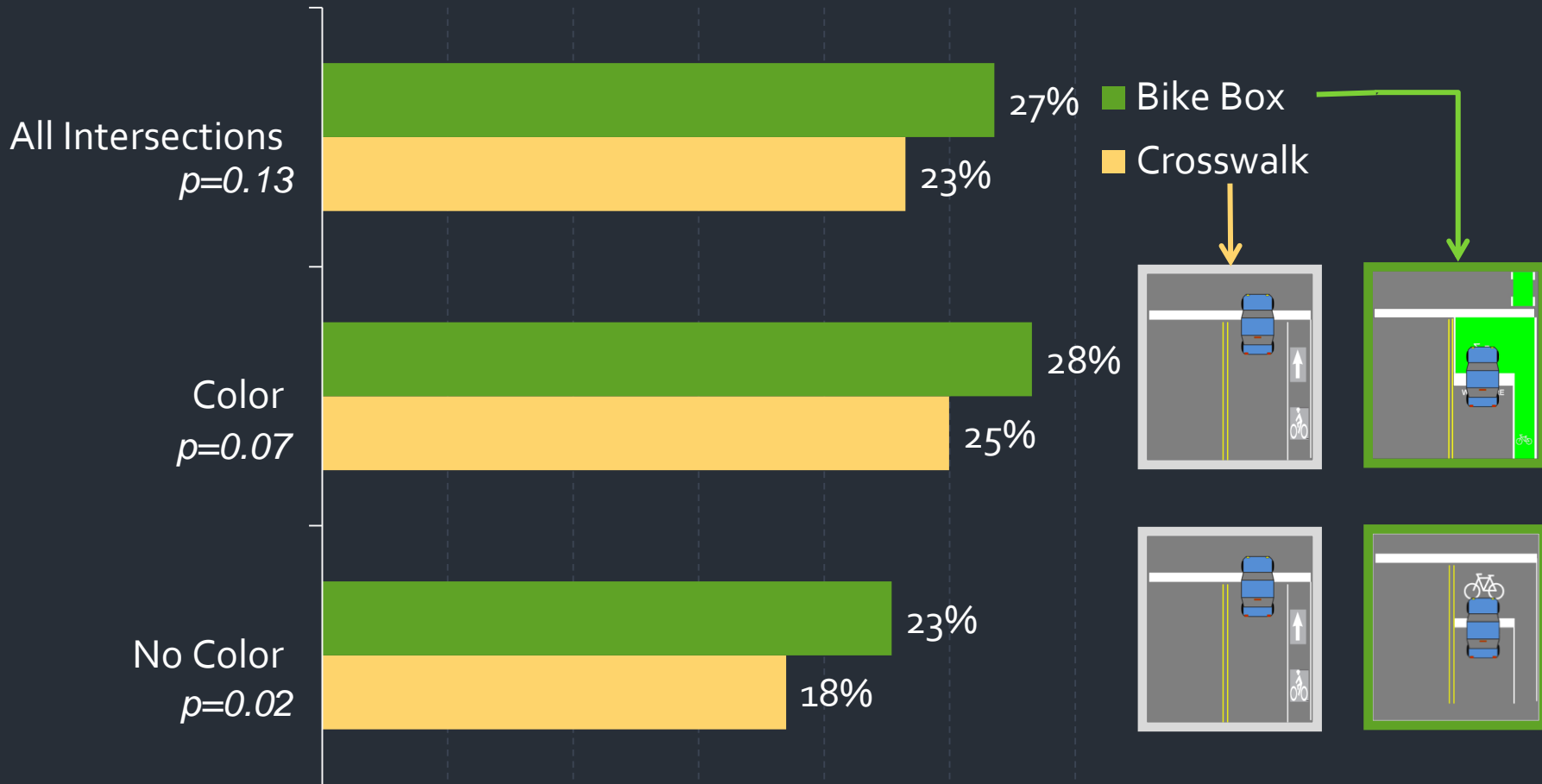


■ Color
■ No Color

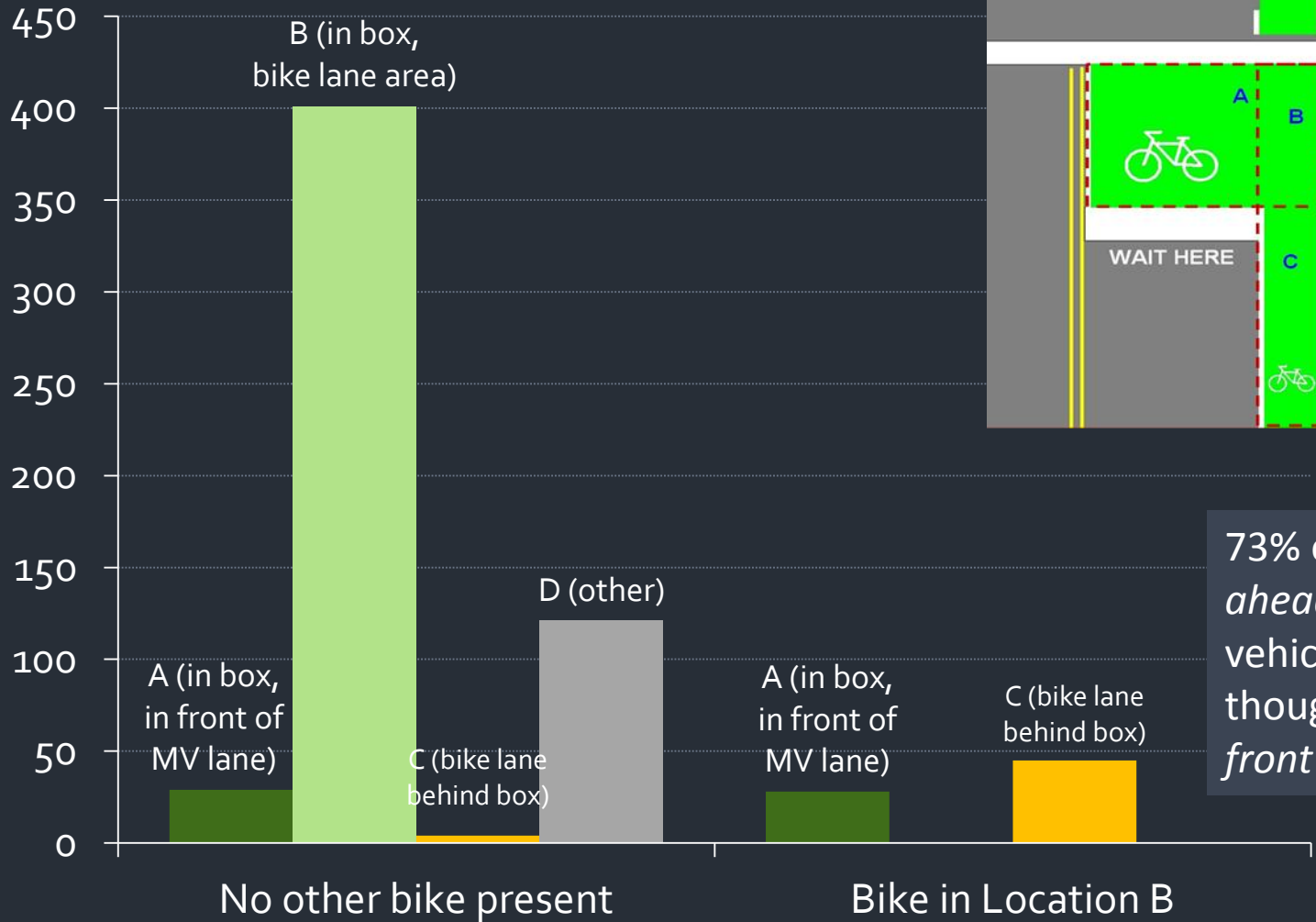


Comparing Encroachments of Motor Vehicles in Bike Boxes (Post) vs. Crosswalks (Pre)

% of motor vehicles arriving on red signal encroaching



Location of Stopped Cyclist in Box



73% of cyclists stop *ahead* of motor vehicle (A or B), though only 9% *in front* (area A)



Are the markings improving safety?

Video data

- Motor vehicle encroachment into crosswalk

- Cyclist encroachment into crosswalk

- Motor vehicle encroachment into bike lane

- Yielding behavior

- Conflicts

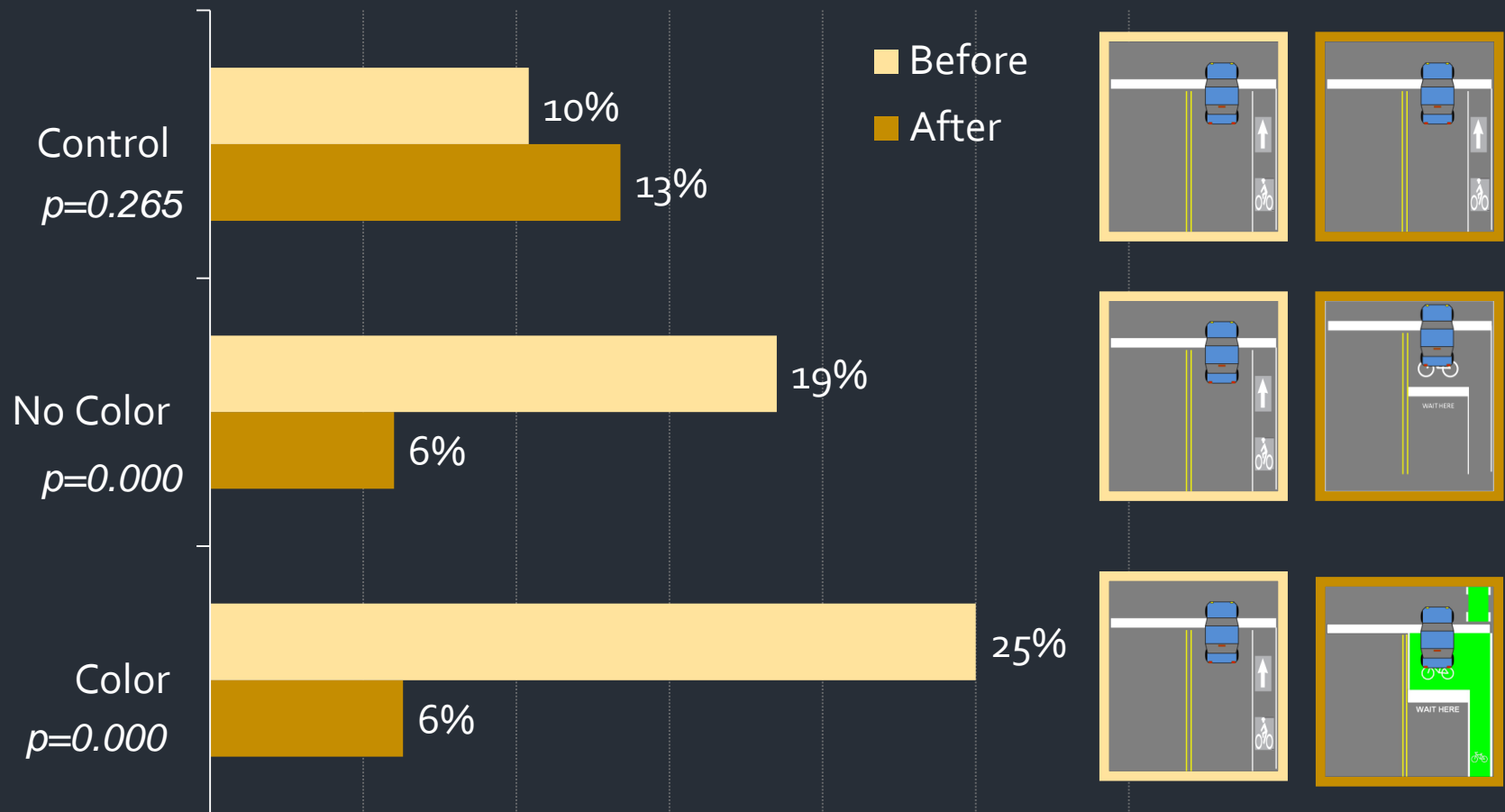
Survey data

- Perceptions of safety (motorists and cyclists)



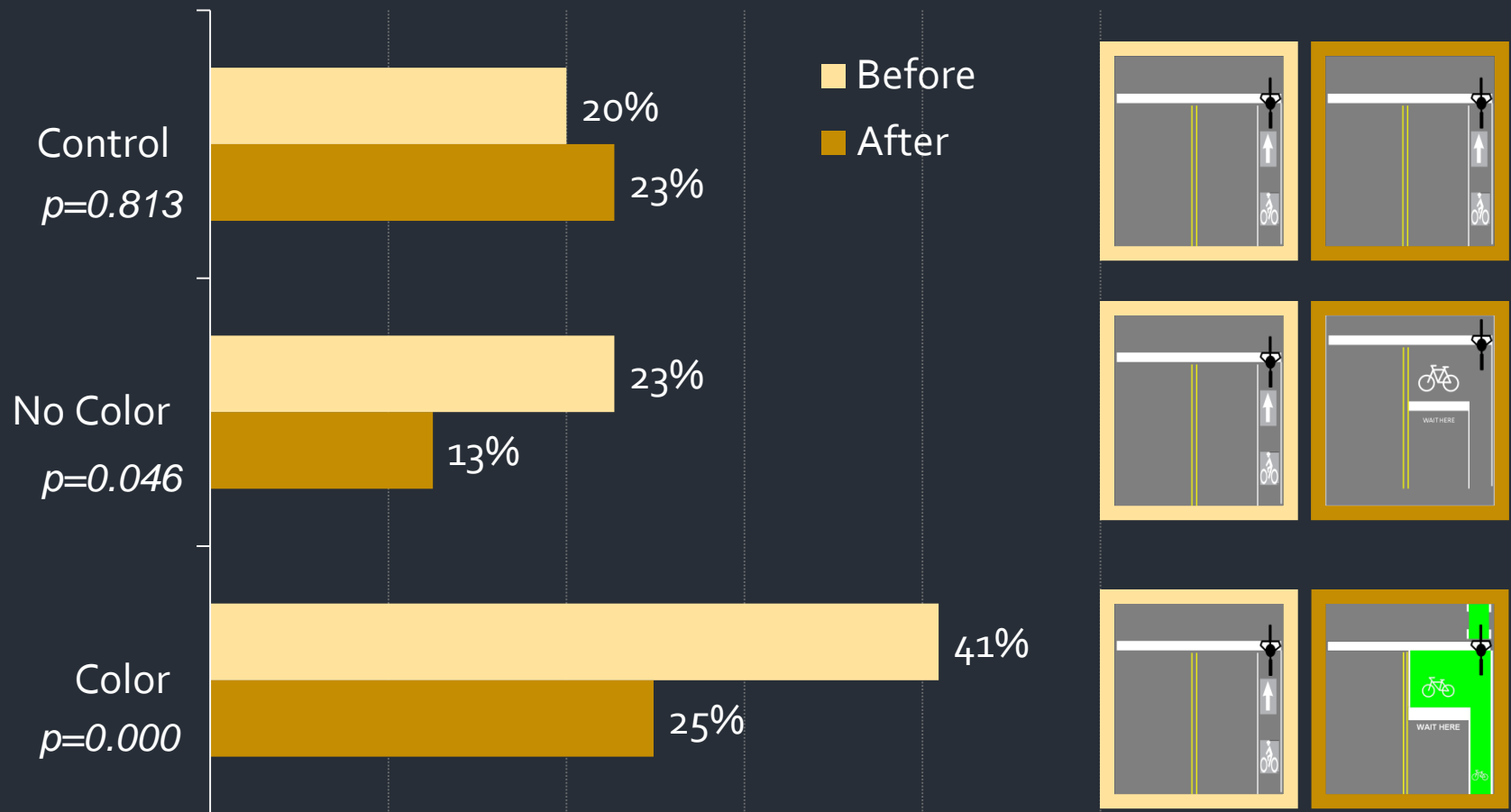
Motor Vehicle Encroachment in Crosswalk

% of motor vehicles arriving on red signal encroaching in the crosswalk



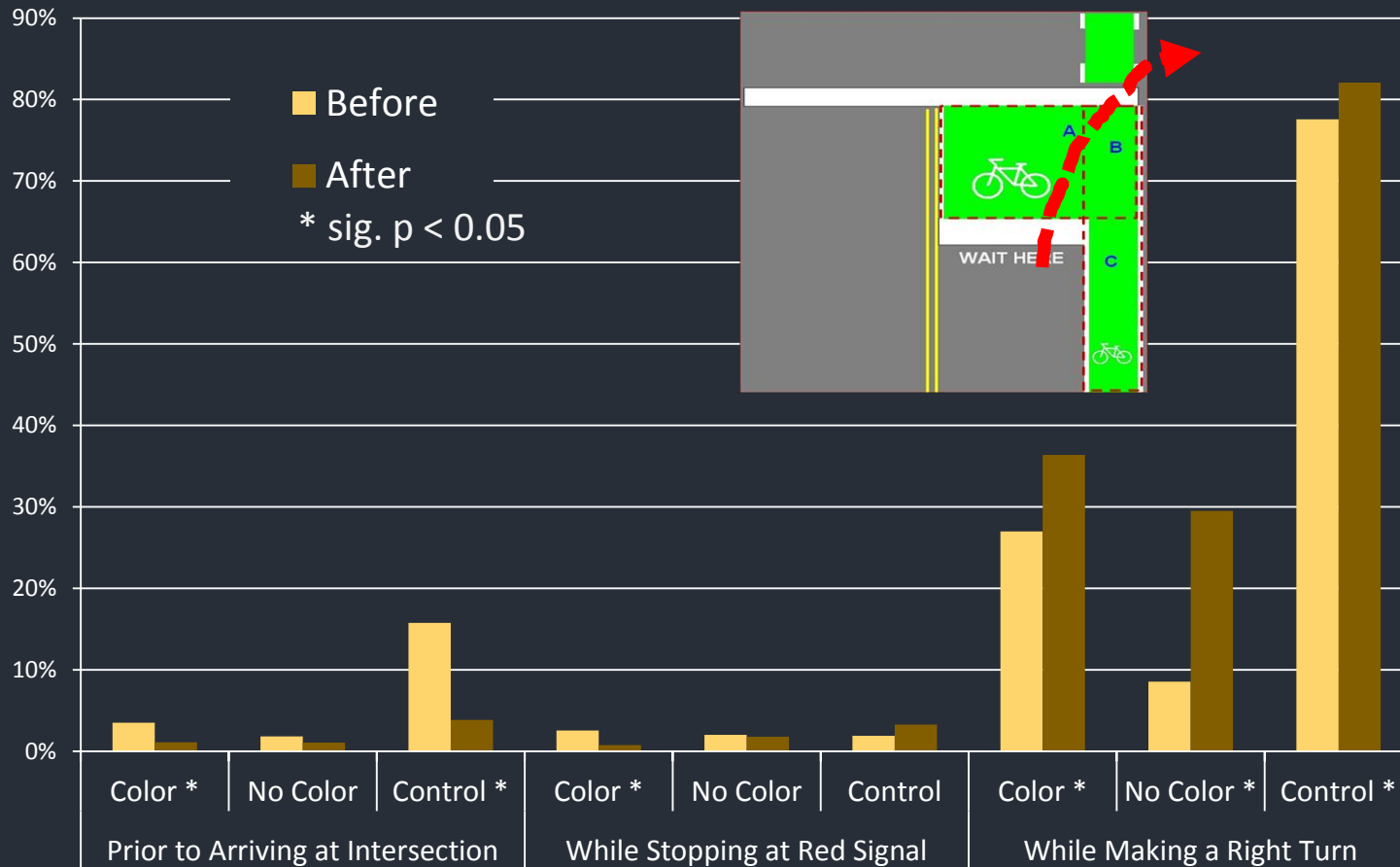
Cyclist Encroachment in Crosswalk

% of cyclists arriving on red signal encroaching in the crosswalk



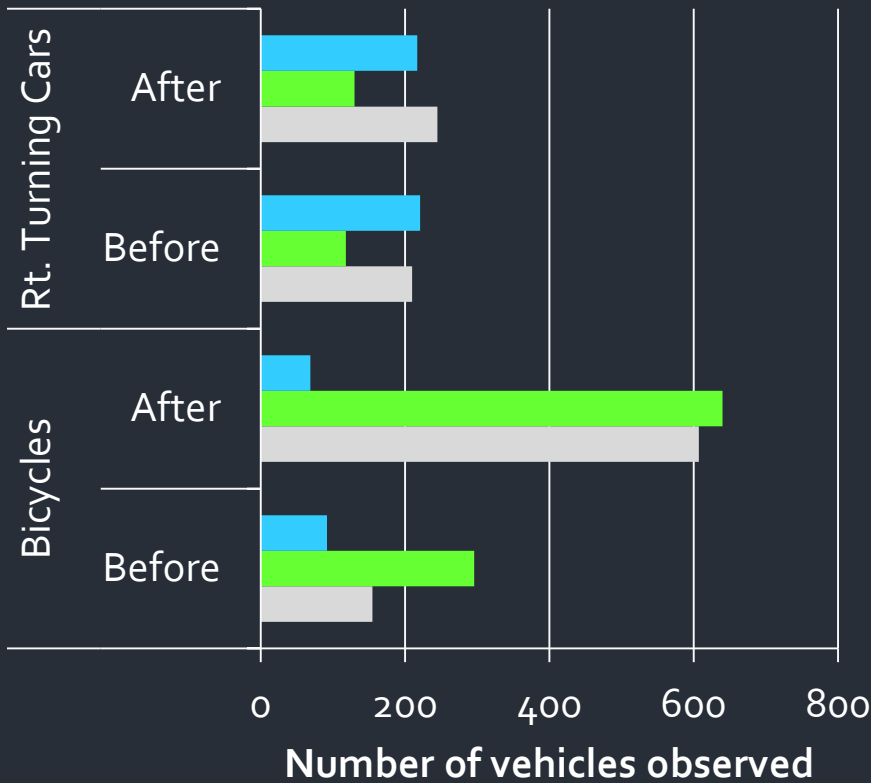
Motorist Encroachment in Bike Lane

% of right-turning motor vehicles encroaching in the bike lane

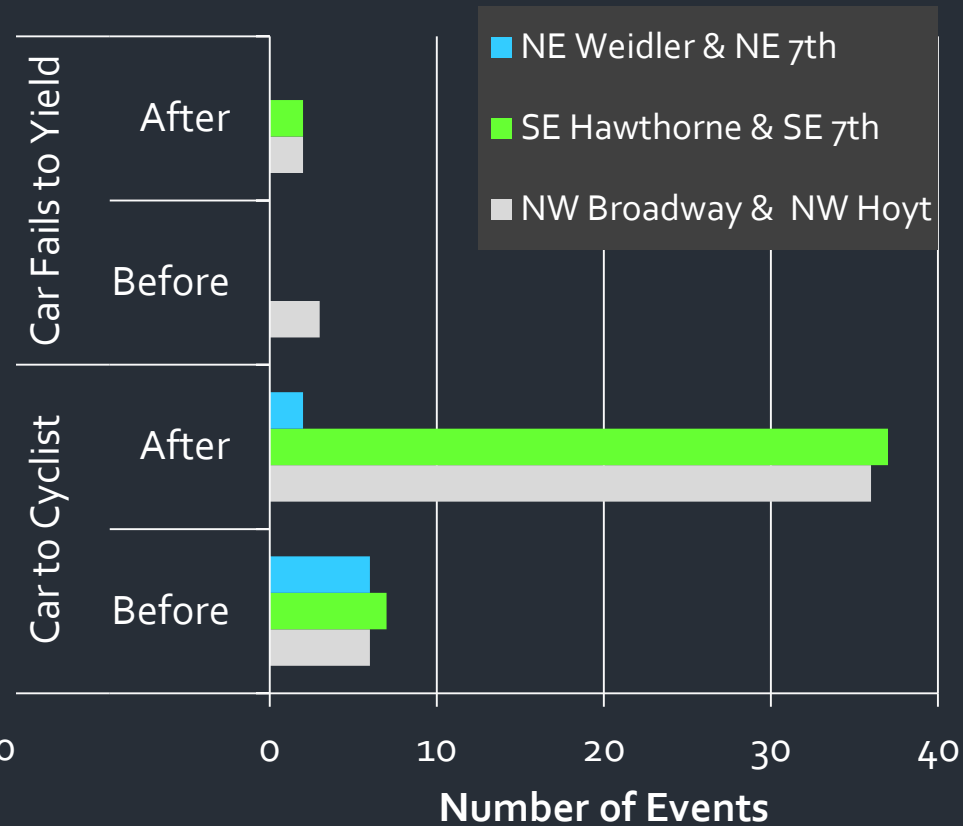


Yielding Behavior

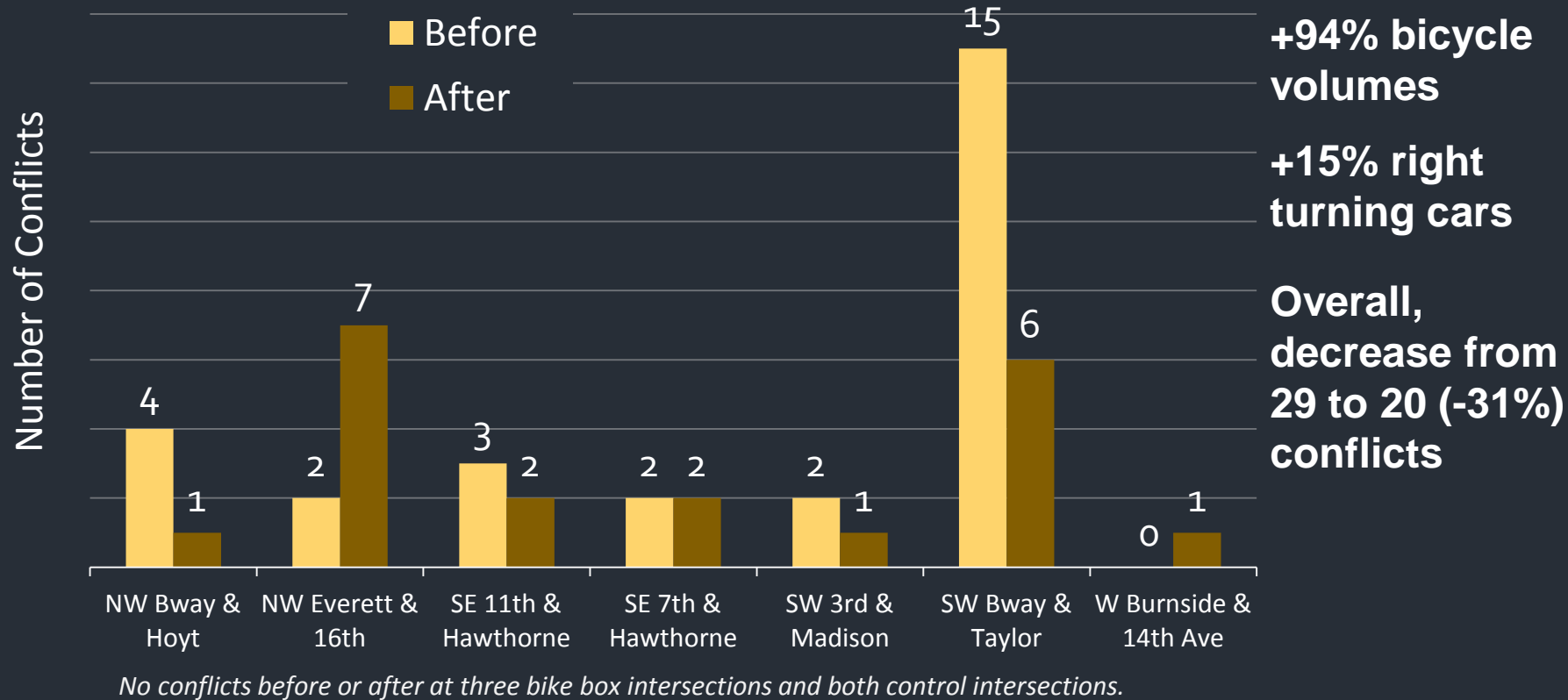
Counts



Yielding Events



Conflicts between motor vehicles and bicycles



Motorist Survey

Do you think the bike box has made driving safer or more dangerous at the intersections?

	All motorists	Motorists who are not cyclists
A lot safer	16%	13%
A little safer	36%	29%
No difference	18%	17%
A little more dangerous	9%	11%
A lot more dangerous	3%	4%
Don't know	18%	27%
n	717	219

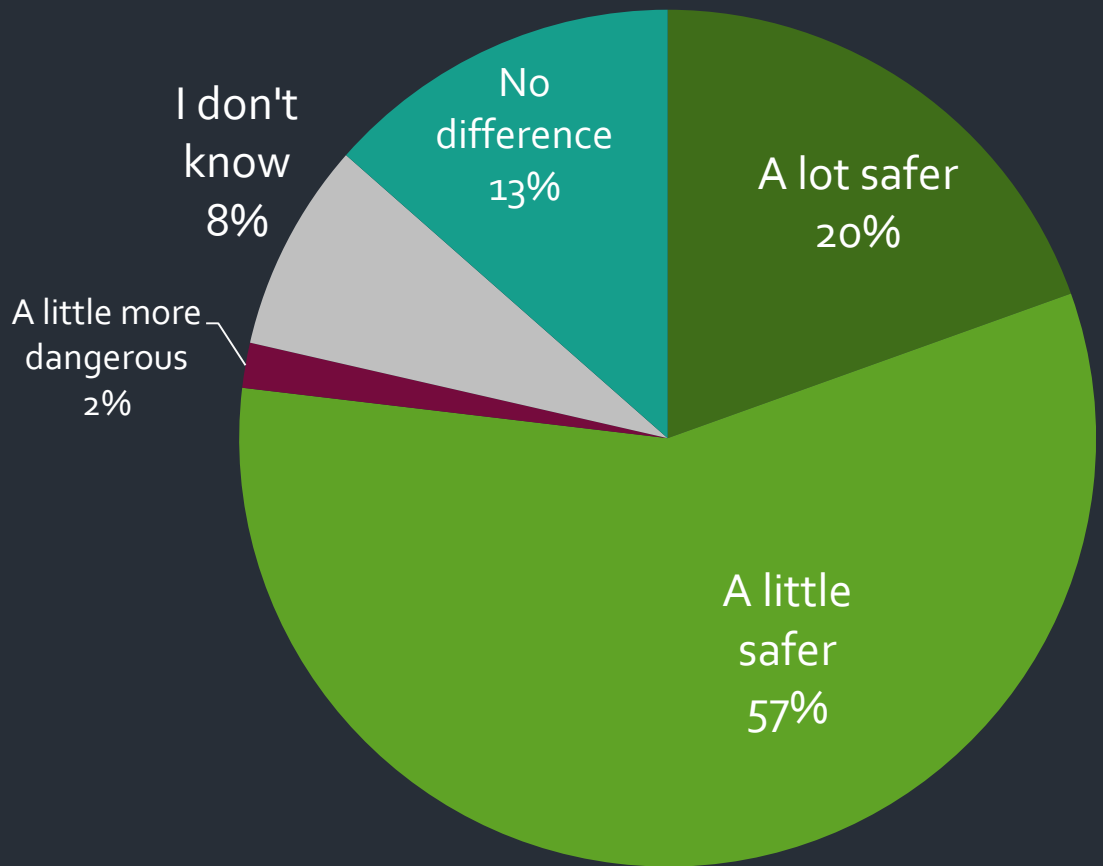
42%

Motorist Survey

- Of the motorists who are not cyclists...
 - 41% think the bike boxes make driving less convenient at the intersections
 - 33% feel more comfortable driving through the intersections (16% less comfortable)
 - 52% think the bike boxes make drivers more aware of bicyclists generally
 - 38% think the City should install more boxes
11% think the City should remove some or all

Bicyclist Survey

Do you think the bike box has made the intersection safer for you as a cyclist?





Does Color Matter?



Video Observation

- Two of the three non-color locations have far fewer cyclists and motor vehicles
- Higher level of total motor vehicle encroachment in colored boxes
 - *Also had higher level of encroachment before boxes*
- Higher rate of cyclists using box as intended in colored boxes

Motorist Survey

As a driver, do you think one of the pavement marking designs is better than the other?



6%



89%



Conclusions

- Findings that support bike boxes
 - Compliance and understanding is high
 - Pedestrians are benefitting from reduced crosswalk encroachment
 - Conflicts fell
 - Yielding behavior increased
 - Improved perceptions of safety
- Unclear findings
 - Increase in bike lane encroachment
 - Benefits of color



Phase 2

- Longer video collection at 14 locations.
- Includes view of signal indications to look at conflicts and arrival patterns on green.

Acknowledgements

- City of Portland
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 - Nathan McNeil
 - Bob Kellett
 - Will Farley
- OTREC

Questions?

- Christopher Monsere
- monsere@pdx.edu

- Find the full report:
 - <http://otrec.us/project/227>
- *Accident Analysis & Prevention* article online