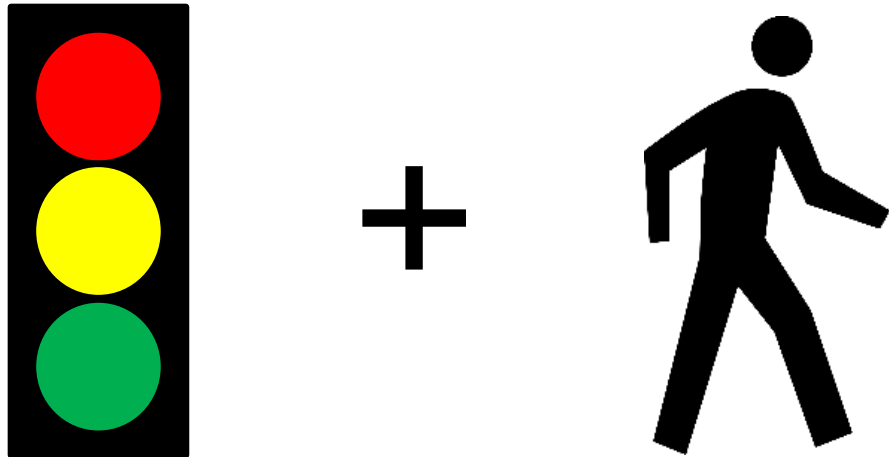


# Pedestrian traffic signal push button data: validation as a measure of walking activity



Ferdousy Runa  
8 April 2020

# Motivation

- Manual counts
  - Time consuming
  - Infeasible over long time periods

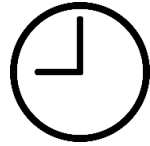


Image: <https://www.cascade.org/blog/2014/11/2014-statewide-bikeped-counts>

- Instrumented counts
  - Expensive
  - Infeasible across multiple locations

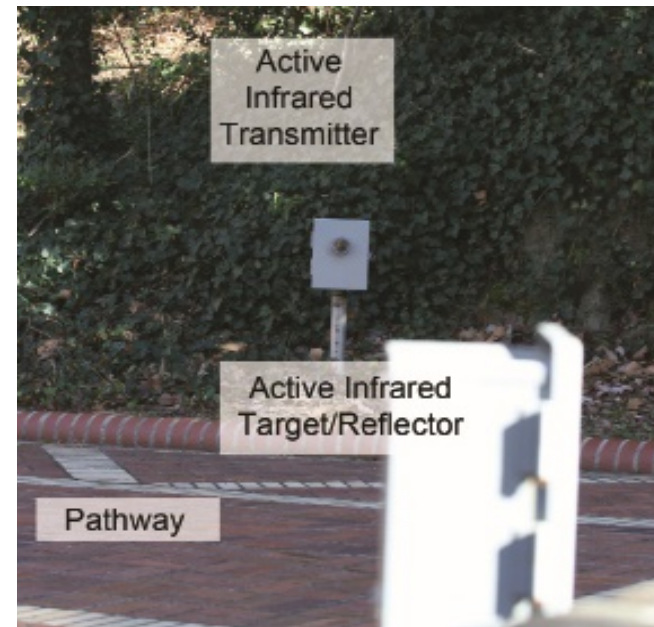


Image: <https://www.fhwa.dot.gov/policyinformation/tmguides/>

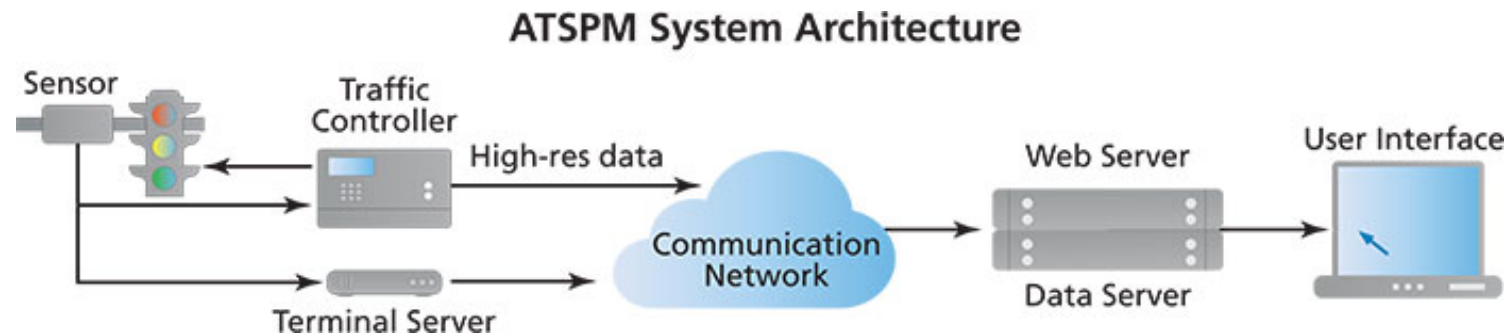


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# Opportunity

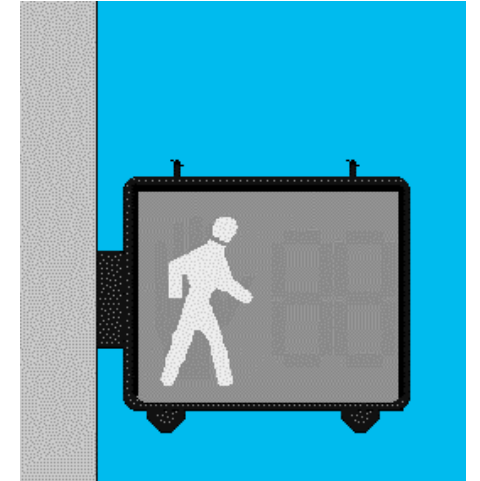
- ∞ High-resolution traffic signal controller data
  - ∞ Automated Traffic Signal Performance Measures (ATSPM)



# Pedestrian-related event codes

## ☞ Active Phase/Pedestrian Events

- ☞ 0 Phase On
- ☞ 21 Pedestrian Begin Walk
- ☞ 22 Pedestrian Begin Clearance
- ☞ 23 Pedestrian Begin Solid Don't Walk

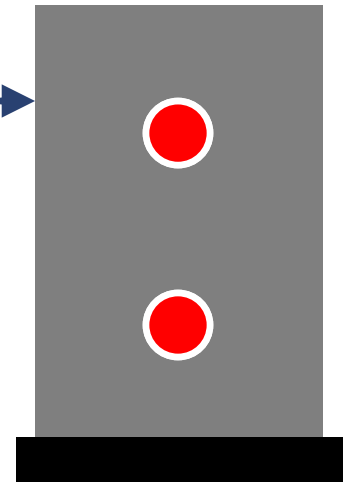


## ☞ Detector Events

- ☞ 90 PedDetector On
- ☞ 89 PedDetector Off

## ☞ Phase Control Events

- ☞ 45 Pedestrian Call Registered





# Data Collection

*in progress*

## Video recording

- ~90 signals (randomly selected)
- January – December 2019
- +48 hours per intersection
- ~10,900 hours of video

## Video watched & QA/QC

- 61 signalized intersections
- ~+5,200 hours of video
- 44,155 pedestrians counted



# Validation – Method

*in progress*

## ☞ Data analysis

### ☞ Regression models

#### ☞ Video Counts ~ Signal Counts

☞ For each hour of data

#### ☞ Considering

☞ Crosswalk or phase

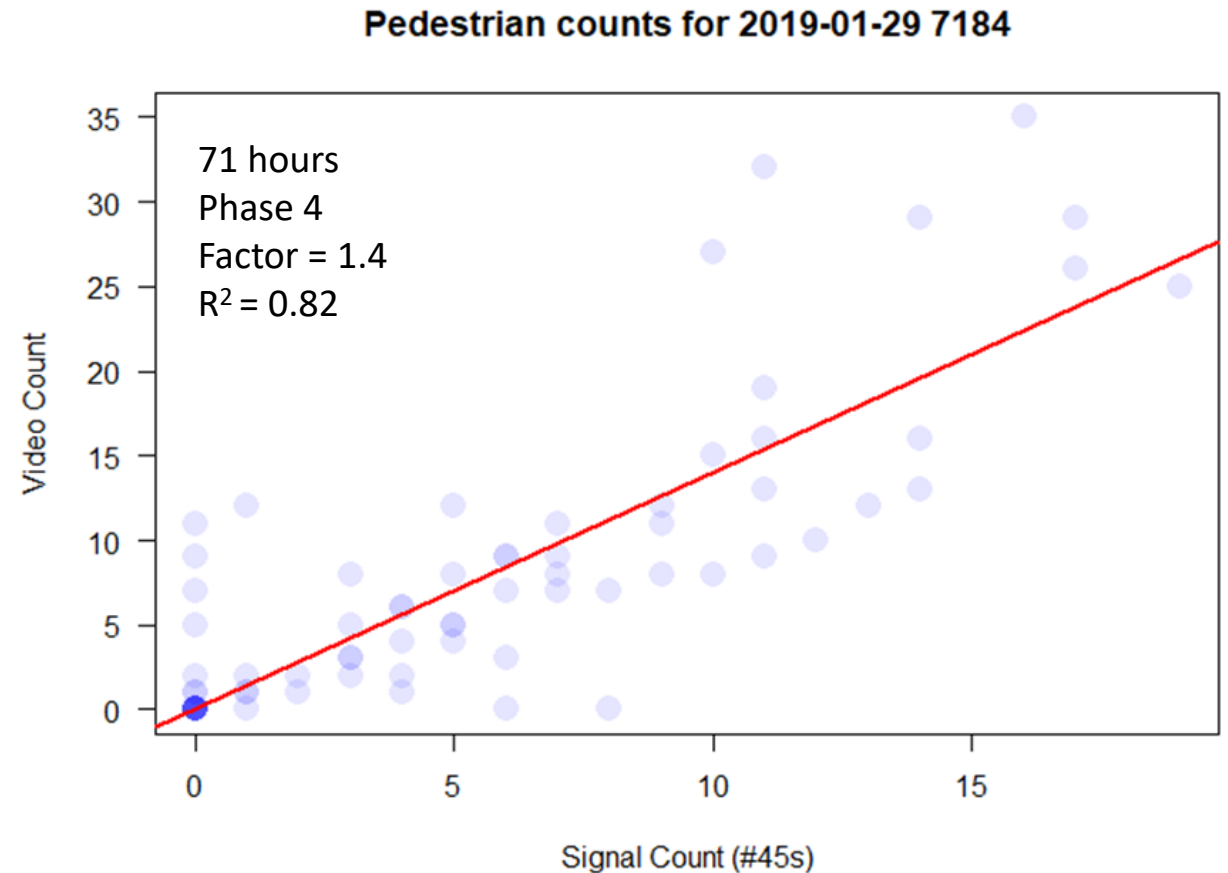
☞ Time of day (day vs. night)

☞ Day of week (weekday vs. end)

## ☞ Outcomes

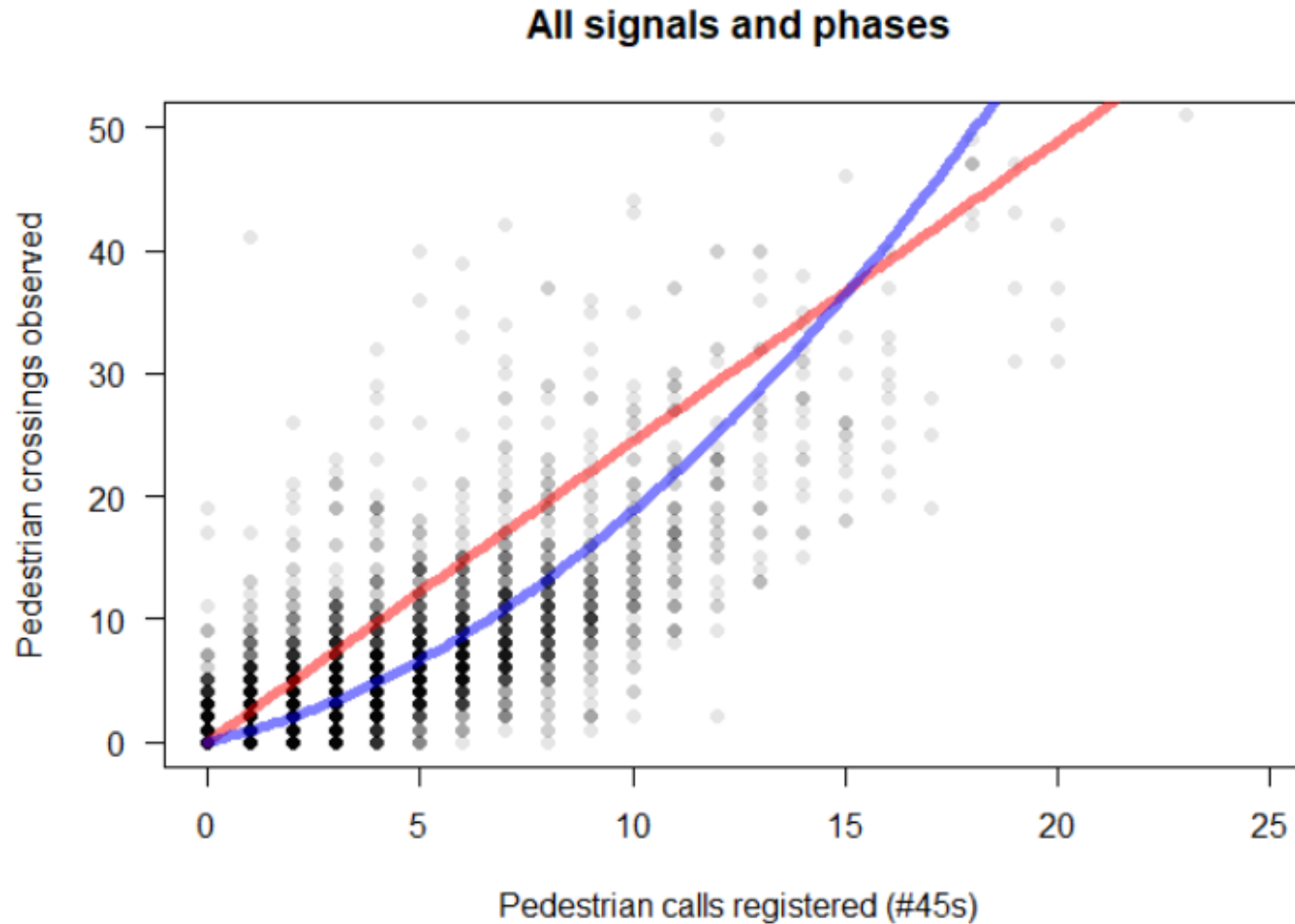
☞ Factor / slope / coefficient

☞ Goodness-of-fit ( $R^2$ )



# Validation – Results

preliminary



∞  $N = 9,274$

∞ *Linear*

∞  $\beta = 2.44$

∞  $R^2 = 0.64$

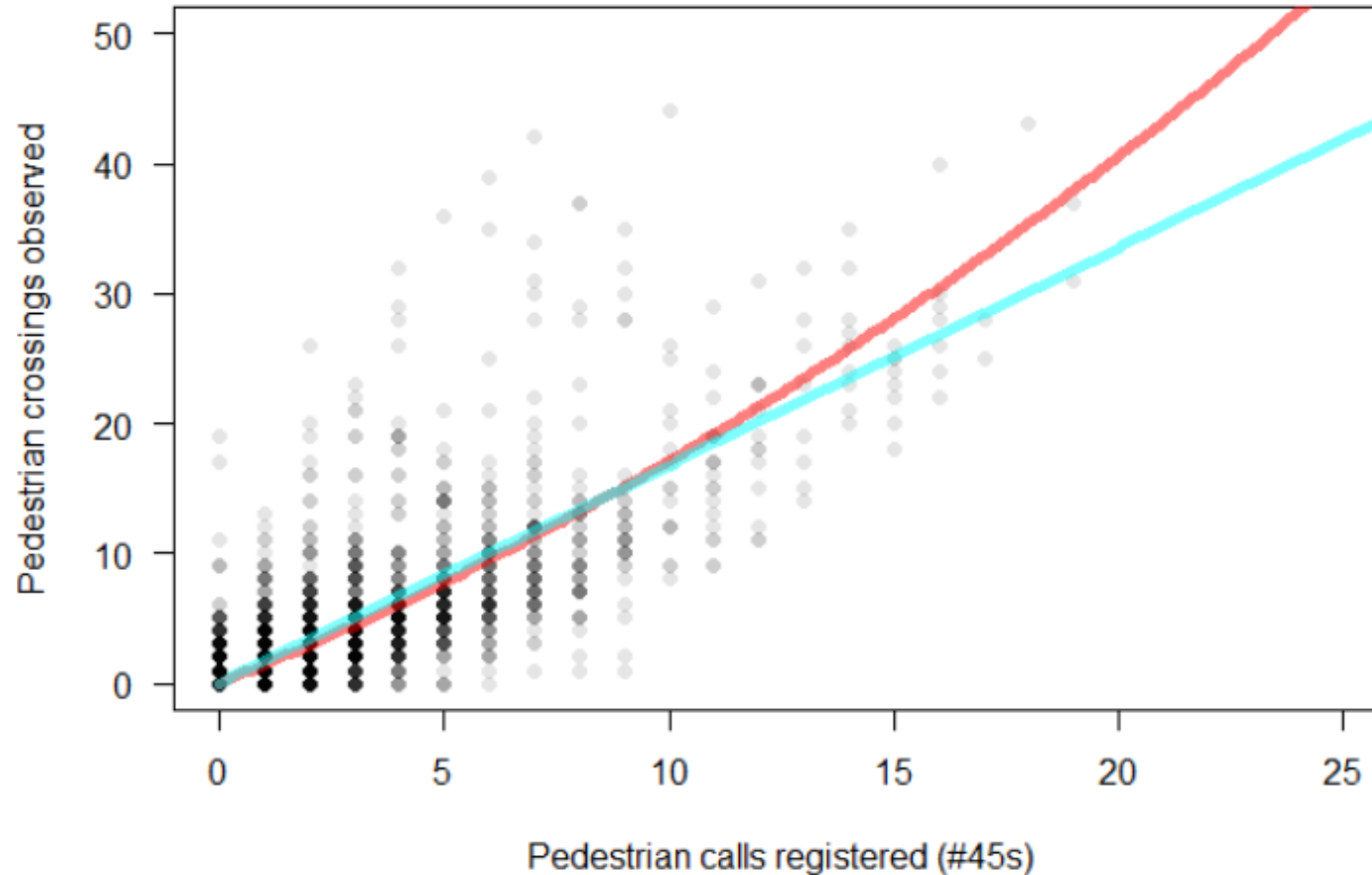
∞ *Quadratic*

∞  $R^2 = 0.80$

# Results – Phases 2 & 6

*preliminary*

All signals, phases 2 & 6

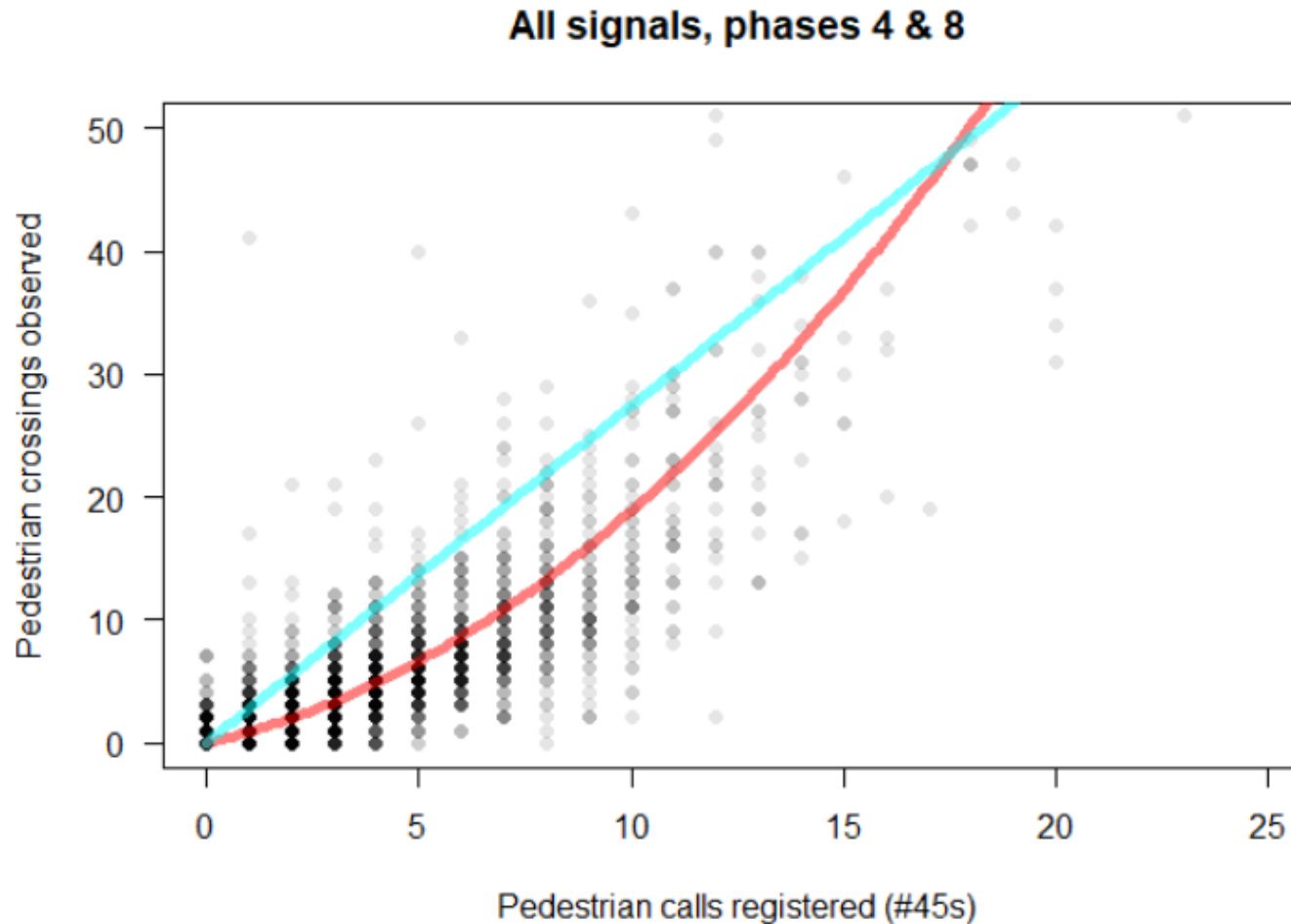


- ⌘ Crossing of side streets
- ⌘  $R^2 = 0.63, \beta = 1.68$   
 $R^2 = 0.64$  (quadratic)



# Results – Phases 4 & 8

preliminary

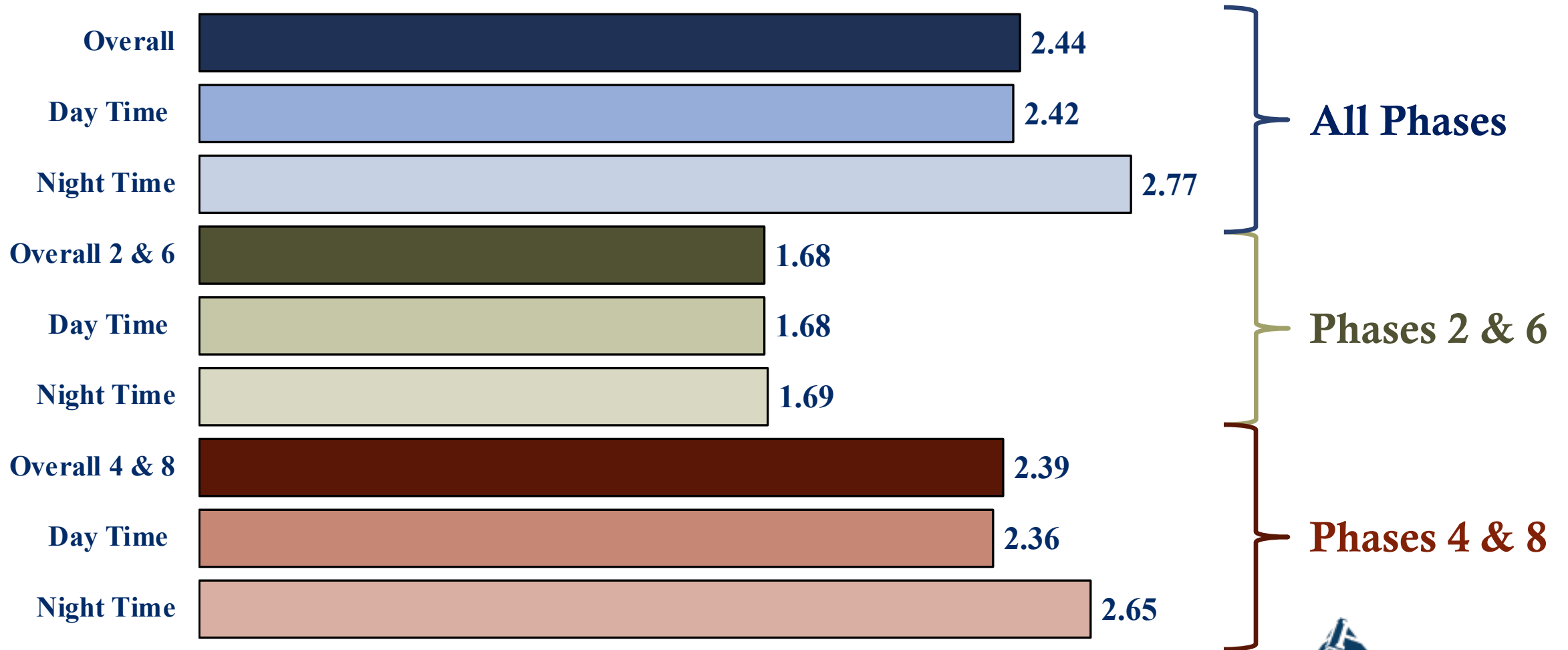


∞ Crossing of main streets

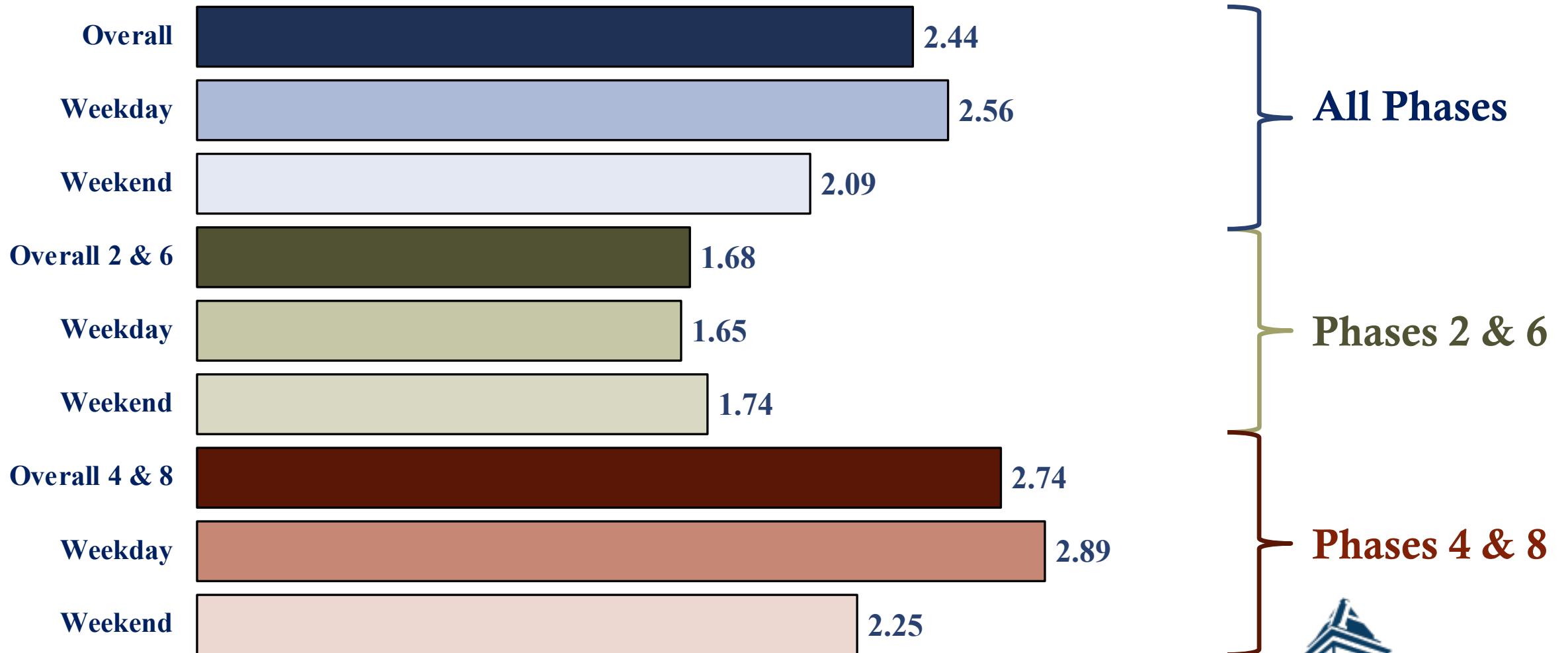
∞  $R^2 = 0.67, \beta = 2.74$

$R^2 = 0.83$  (quadratic)

# Day vs. night (# 45s)



# Weekday vs. weekend (# 45s)



# Importance & implications

## ❧ Importance

- ❧ Improved data analytics: Getting more information out of ATSPM
- ❧ Reducing the data gap: Improving understanding of walking & pedestrian travel
- ❧ New planning metrics for enhancing safety, health, & quality of life

## ❧ Implications

- ❧ Transportation agencies can use pedestrian signal data to help:
  - ❧ Make pedestrian travel monitoring more robust
  - ❧ Improve multimodal transportation planning
  - ❧ Conduct traffic safety & health impact analyses

# Questions?

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