

Motorist Delay at Highway- Rail Grade Crossings

April 15, 2019



Motorist Delay at Grade Crossings

Purpose of analyses
Methodology
Results
Next Steps

Purpose of analyses

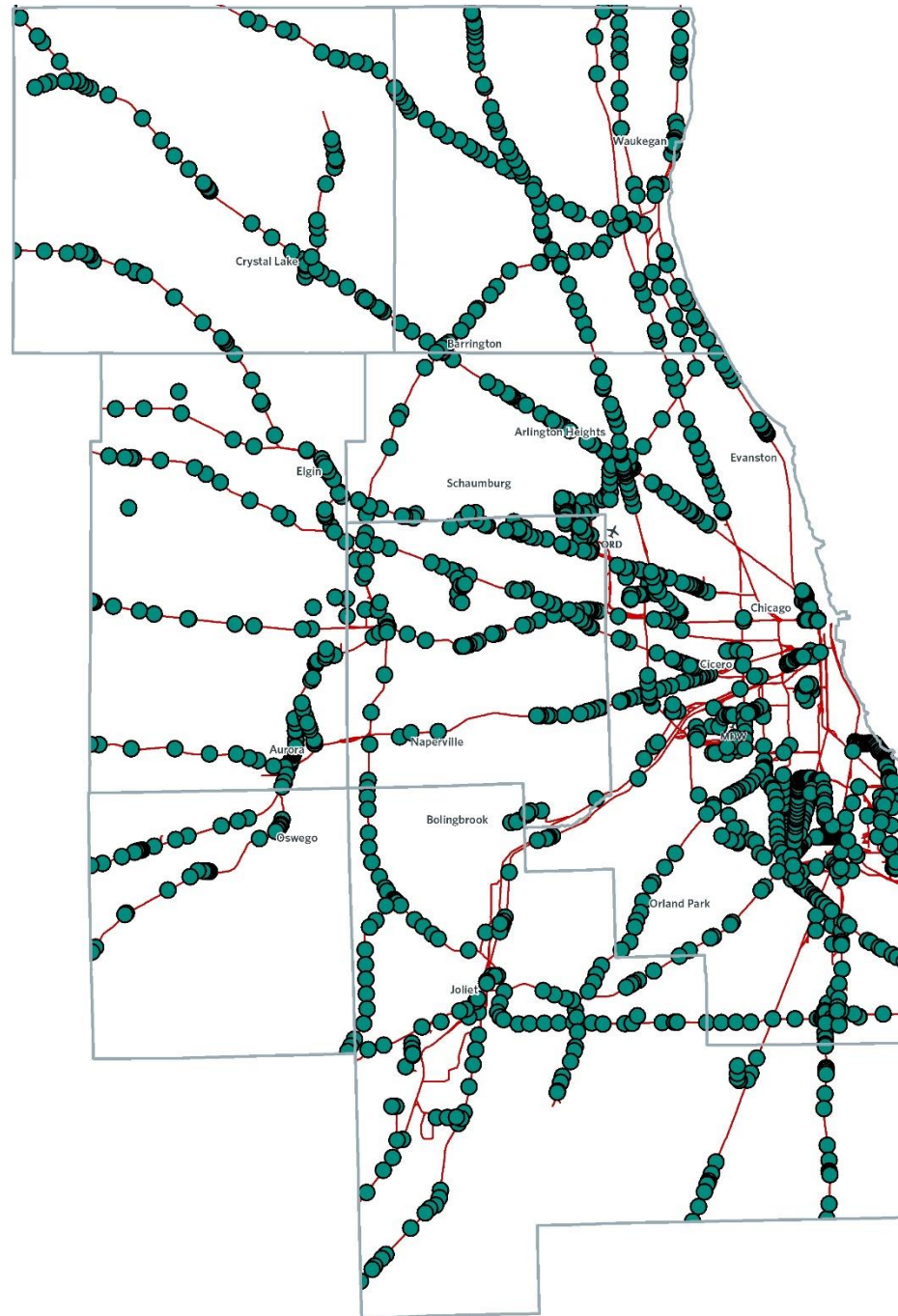


Highway-Rail Grade Crossings

- Grade Crossings
- Railroads

Sources: ICC, FRA, CMAP

There are 1,646 highway-rail grade crossings in the 7-county Chicago region.



Regional Indicator

Indicator:
Motorist delay at highway-rail
grade crossings

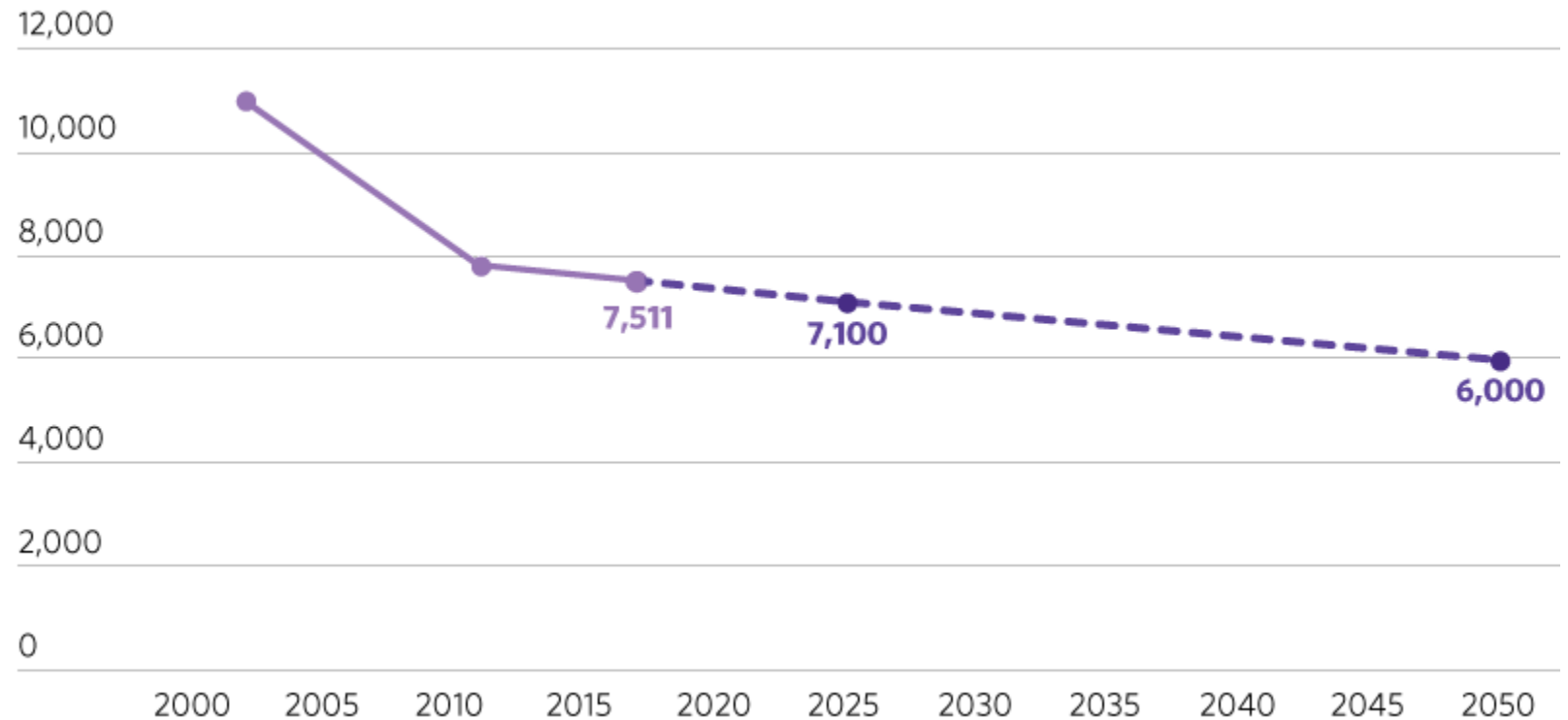
Key:

 Actual

 Target

Source: CMAP analysis of Illinois
Commerce Commission data

Hours of Delay per Weekday



How to Reduce Crossing Delay

Improve rail-system performance (speed up trains).

- CREATE Program
- Additional track (e.g., UP West Line), sidings, and crossovers
- Terminal improvements (reduce switching and dead-heads)

Consolidate problematic crossings

Reroute highway traffic to better-performing crossings

Grade separations

Grade Separation Prioritization

Based on:

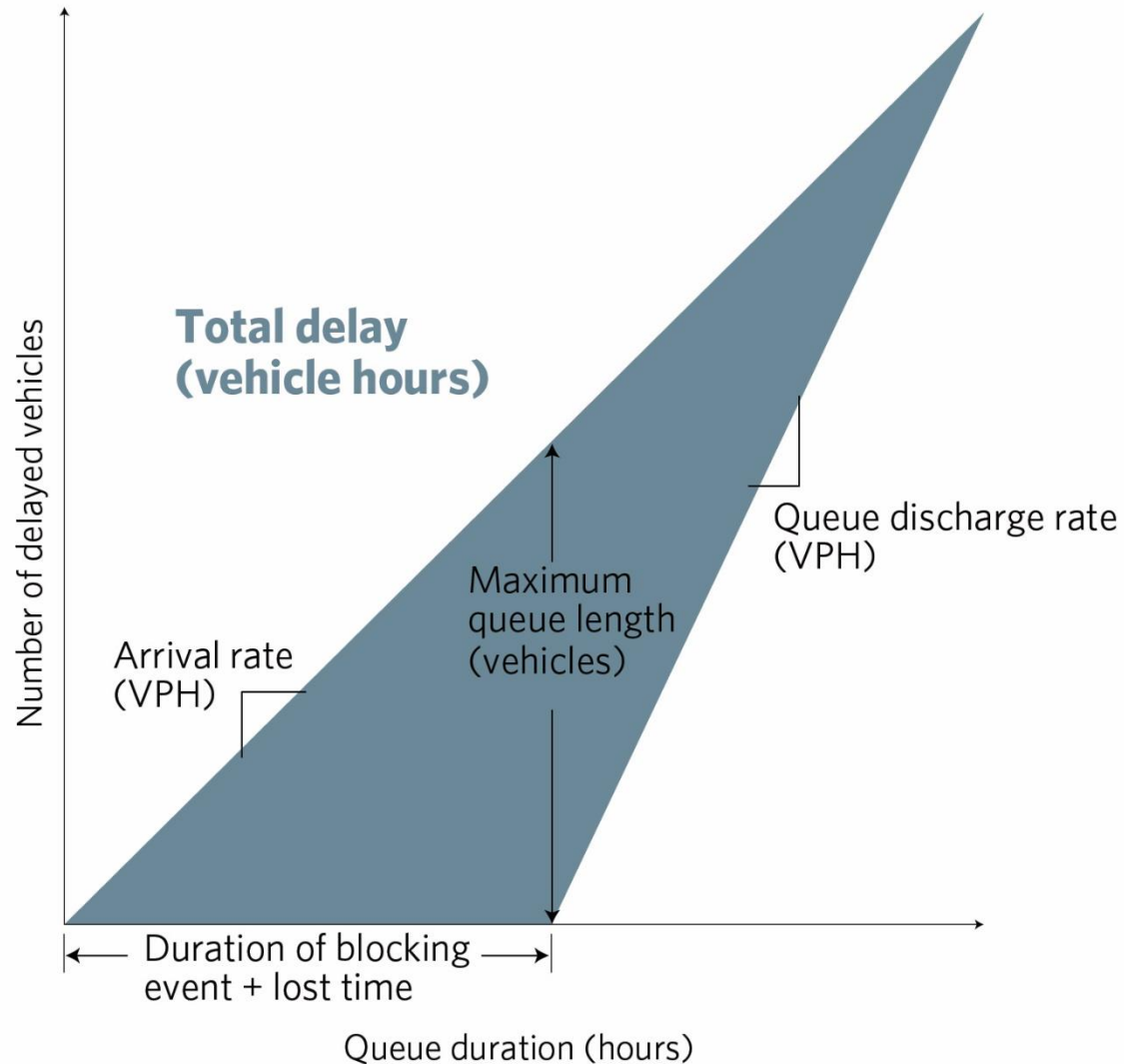
- **estimate of crossing delay**
- estimate of crash risk
- truck exposure
- transit impact
- initial analysis of likely impacts
- status of project development

Methodology

Estimating grade crossing delay

Note: VPH means "vehicles per hour."

Source: Chicago Metropolitan Agency for Planning analysis of Okitsu, Louie, and Lo, "Simulation-Free Railroad Grade Crossing Delay Analyses," 2010.



Estimate of Crossing Delay

CMAP has used ICC estimates, which are based on:

- number of trains per day (Metra, Amtrak, and freight)
- speed of trains (based on timetable speeds)
- proximity to yards and transit stations
- AADT

Known Issues

- Neither trains nor highway traffic are distributed evenly throughout the day
- Delay extends beyond the time the gate comes up
- Trains are not traveling at timetable speeds
- Delay occurs without the presence of trains (James Powell)
- Delay is compounded, the longer the gate is closed

Data Collection

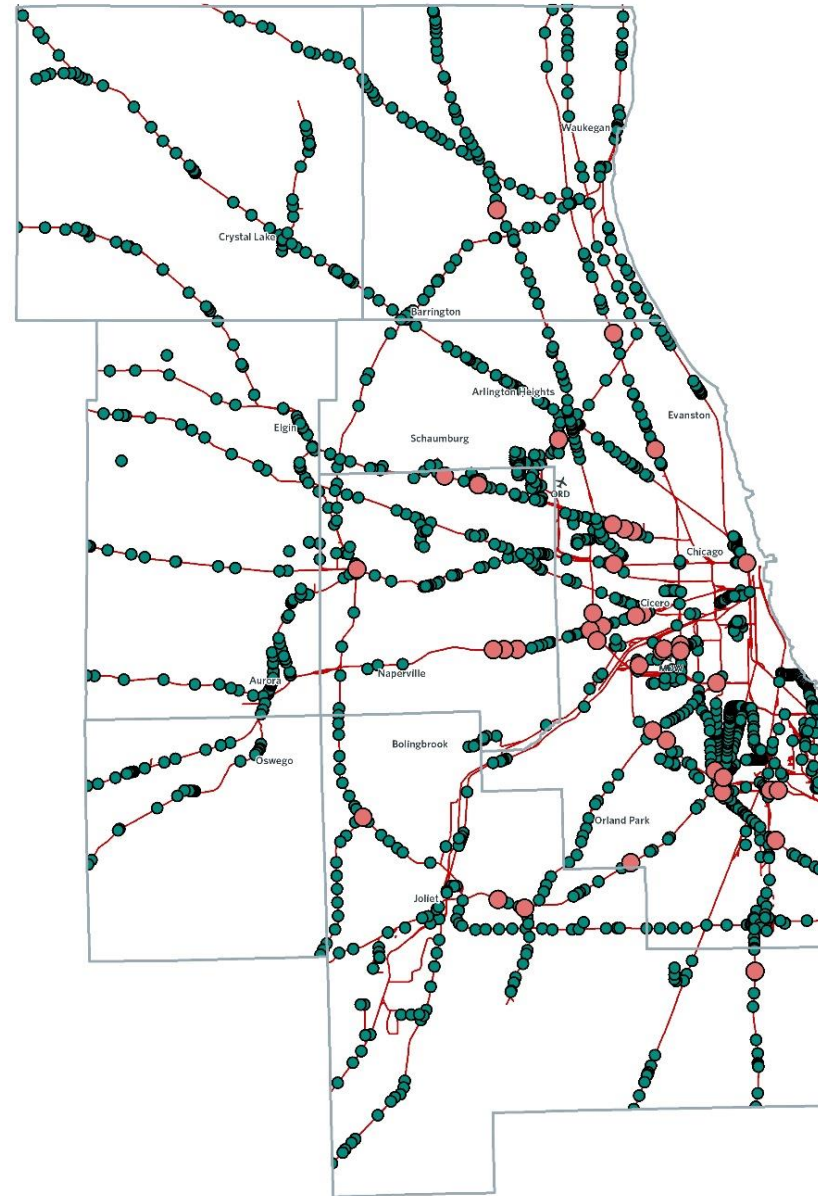
- Duration of gate-down interval
- Duration of queue clearance interval
- Number of vehicles queued
- Saturation flow rates (less useful than hoped)
- 8-hour data collection periods

Highway-Rail Grade Crossings

- Grade Crossings
- Data Collection Sites
- Railroads

Sources: ICC, FRA, CMAP

Data was collected over two summers at 40 sites, primarily by summer interns.



Analysis

- Delay by time of day, with traffic and trains distributed throughout the day
- Based on average delay and AADT (conservative for an estimate of weekday delay)
- Adjusted estimated number of daily freight trains where field data wasn't close to prior estimates. This had a big impact (most of the adjustments were down).

Results

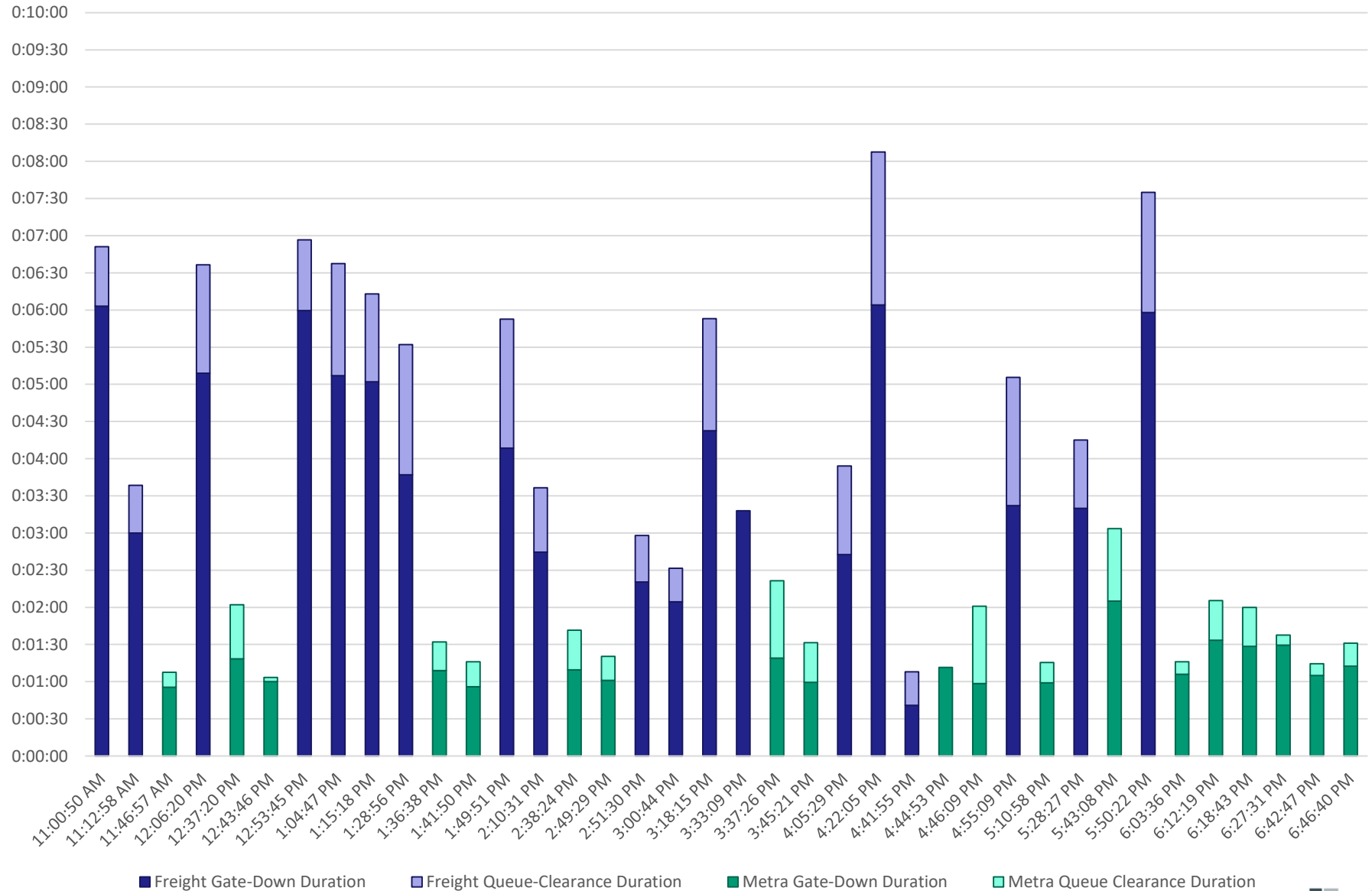


Crossings 174973G, 260541T - Washington St. UP/CN (West Chicago)
 Gate-Down and Queue-Clearance Durations by Type (Minutes, 2017)

Freight trains are slower than expected.

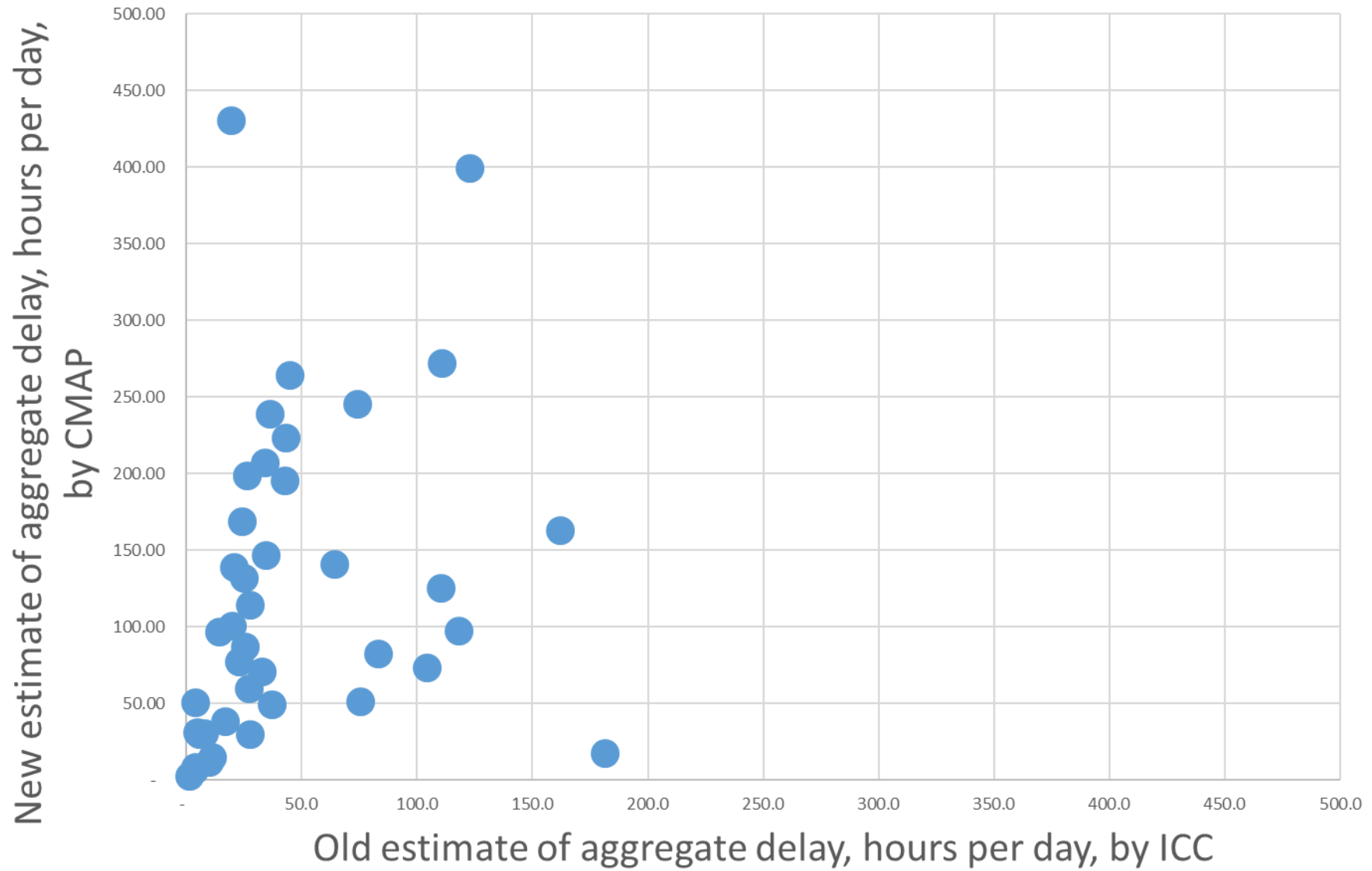
Queue-clearance times are substantial.

At this crossing, ICC-estimated average gate-down times were 1:00 for Metra trains and 2:24 for freight trains.



■ Freight Gate-Down Duration ■ Freight Queue-Clearance Duration ■ Metra Gate-Down Duration ■ Metra Queue Clearance Duration

Daily Grade Crossing Delay: Comparison of New Results to Old Results, by Crossing



Results: Motorist Delay per Crossing

Average of Old Estimates of Delay

46 hours
per
weekday

Range 2 - 182

Average of New Estimates of Delay

120 hours
per
weekday

Range 2 - 430

Percent Change

↑ 160%

Next Steps

- Generalize using queue discharge rates from the study sample.
- Consult stakeholders regarding the estimated number of daily freight trains. This has a big impact on the estimates, and still needs to be improved.
- Investigate automated data collection
 - Array of Things pilot
 - Event recorders for non-interconnected railroad cabinets
 - Positive train control data
- Use truck probe GPS data to estimate non-occurrence delay.



www.cmap.illinois.gov/onto2050

Tom Murtha

312.386.8649

tmurtha@cmap.illinois.gov