Being a Big Data Detective to Understand Dynamic Vissim Inputs

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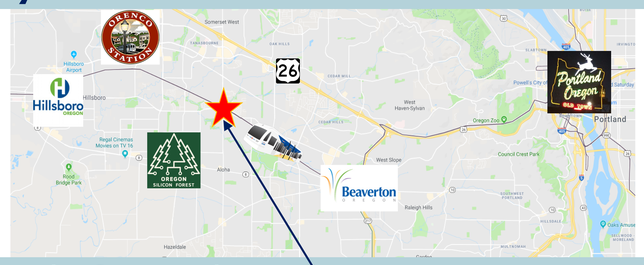
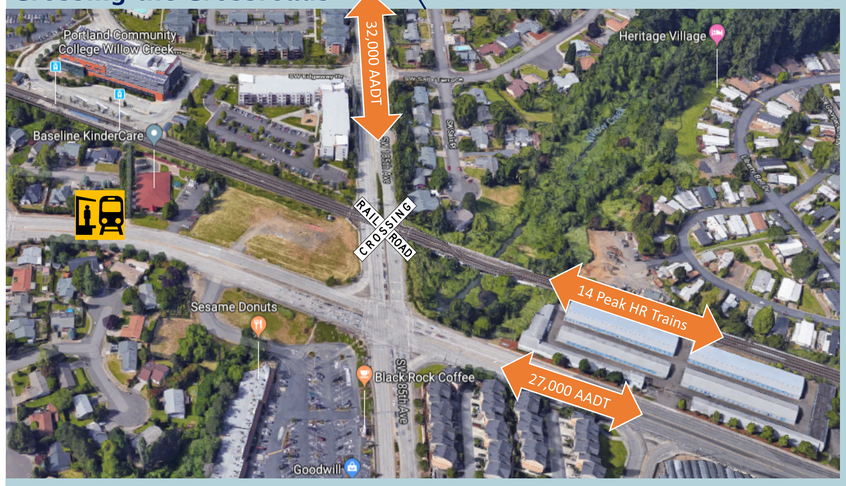
Study Area



Crossing the Crossroads



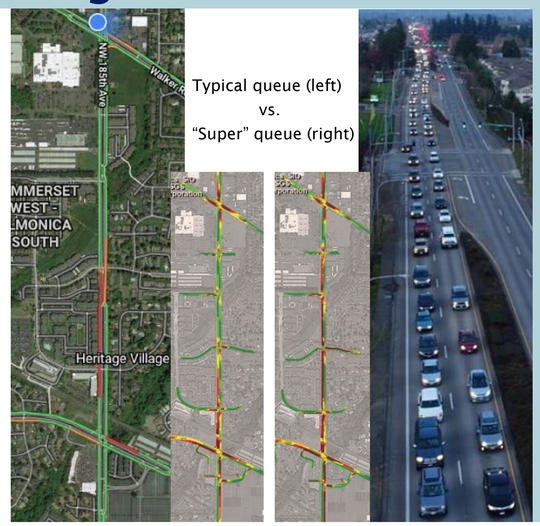
What's The Problem?

With increased LRT Frequency, how can we mitigate the impacts to traffic in the area?

- Widen intersection
- Rail/traffic signal solutions
- Grade separate Baseline Road
- Grade separate LRT

Modeling Challenges

- The corridor experiences dynamic day-to-day congestions.
- Typical calibration process validates the model to an average condition.
- A "super" queue condition is experienced on this corridor with increasing frequency.
- Typical data inputs gathered in the model calibration process does not replicate the "super queue" conditions.



Typical queue (left)
vs.
"Super" queue (right)

Exploring Data: What Causes the "Super" Queue?

Typical Calibration Process

- Data
  Traffic counts, peaking profile, LRT schedule, rail crossing order, signal timing with preemption sequence, field observations, queue lengths, Train design speed
- Calibration Inputs
  Input data, saturation flow rates, driver behavior, etc.
- Calibration Targets
  Volume GEH, queue lengths, travel time

Additional Data Sources

Traffic Signal Controller Log:
- Train arrival times and frequency
- Crossing duration

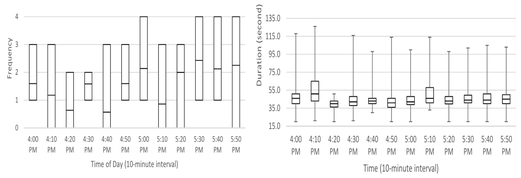
Light Rail Train GPS Breadcrumbs:
- Actual train speed near the rail crossing

Dynamic Inputs Discovered During Data Exploring

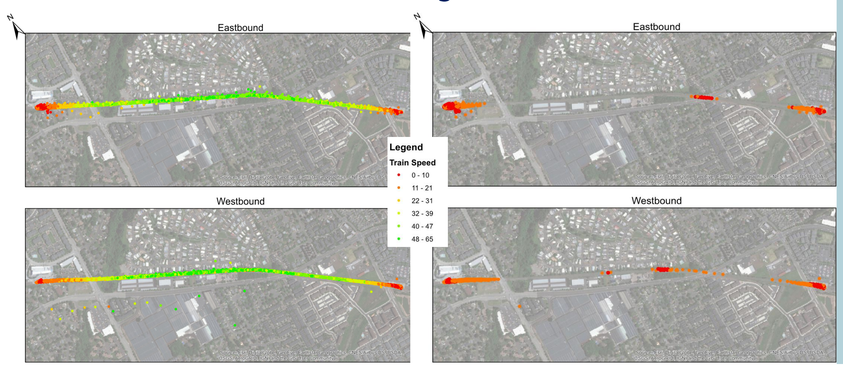
1. How long are the rail crossings *of all time periods*?

Category	Range	Observed Frequency
Common	< 60 seconds	
Moderately Long	61-90 seconds	~12 times a day
Significantly Long	91-120 seconds	4-5 times a day
Substantially Long	121-135 seconds	Once every 3-4 days
Extremely Long	>135 seconds	1-3 times a month

2. How frequent and how long are the crossings *during peak period*?

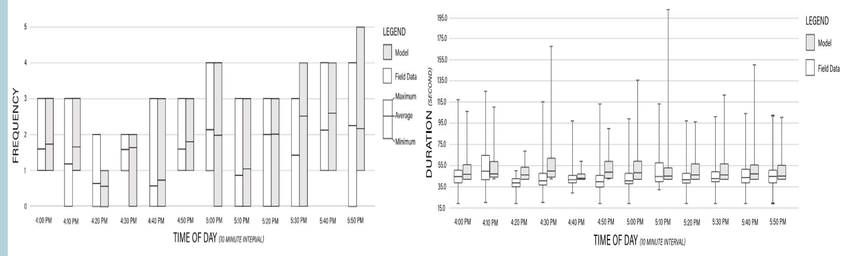


3. How fast are the trains traveling in the area?



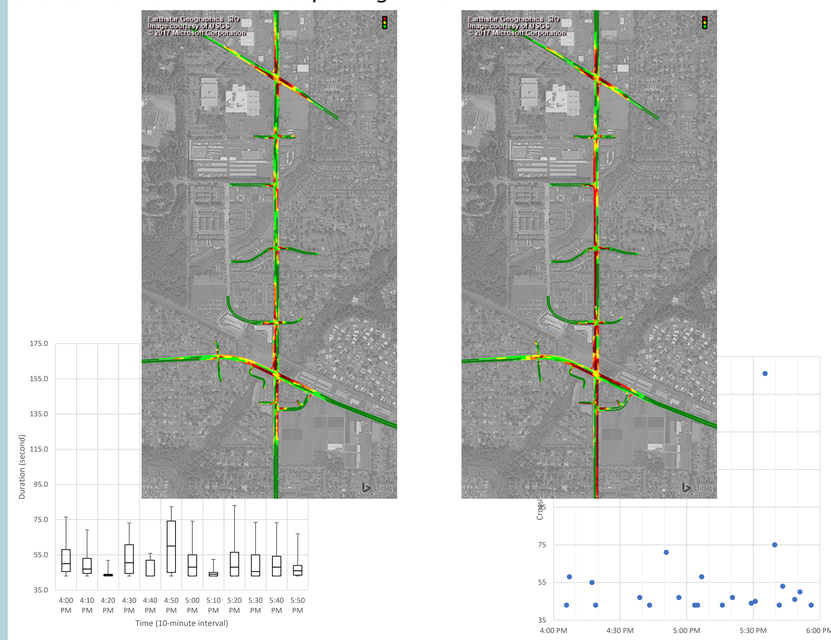
Vissim Validation Process

Vissim calibration was based on: 1) train schedule, 2) train arrival times data at stations, and 3) train speed data.
Vissim outputs were compared to field observed rail crossing events, including train crossing 1) frequency and 2) durations.



Vissim Analysis of Typical and "Super" Queue

With identical traffic demand, different train arrival patterns and train crossing events will result in various queuing levels.



Conclusions

When trying to simulate variable conditions, it is important to fully understand the factors that influence the congestion patterns.
The project team is working on further analysis to identify the most cost-efficient solution.

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