

DB₄IoT

Tracking Down ITS Data Errors

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**Let's start with a Simple Question:
How long does it take my bus to run this route?**



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The answer is not so simple because of . . . traffic

Traffic is affected by:

Day Type

Time of Day

Construction

Accidents

Holidays

Events

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To get detailed information on run times we often put riders on buses to time a route.

The Drawbacks:
Expensive
Time Consuming
Is the data representative?
You can't go back in time

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**We already collect detailed information on run times
in our CAD/AVL systems.**

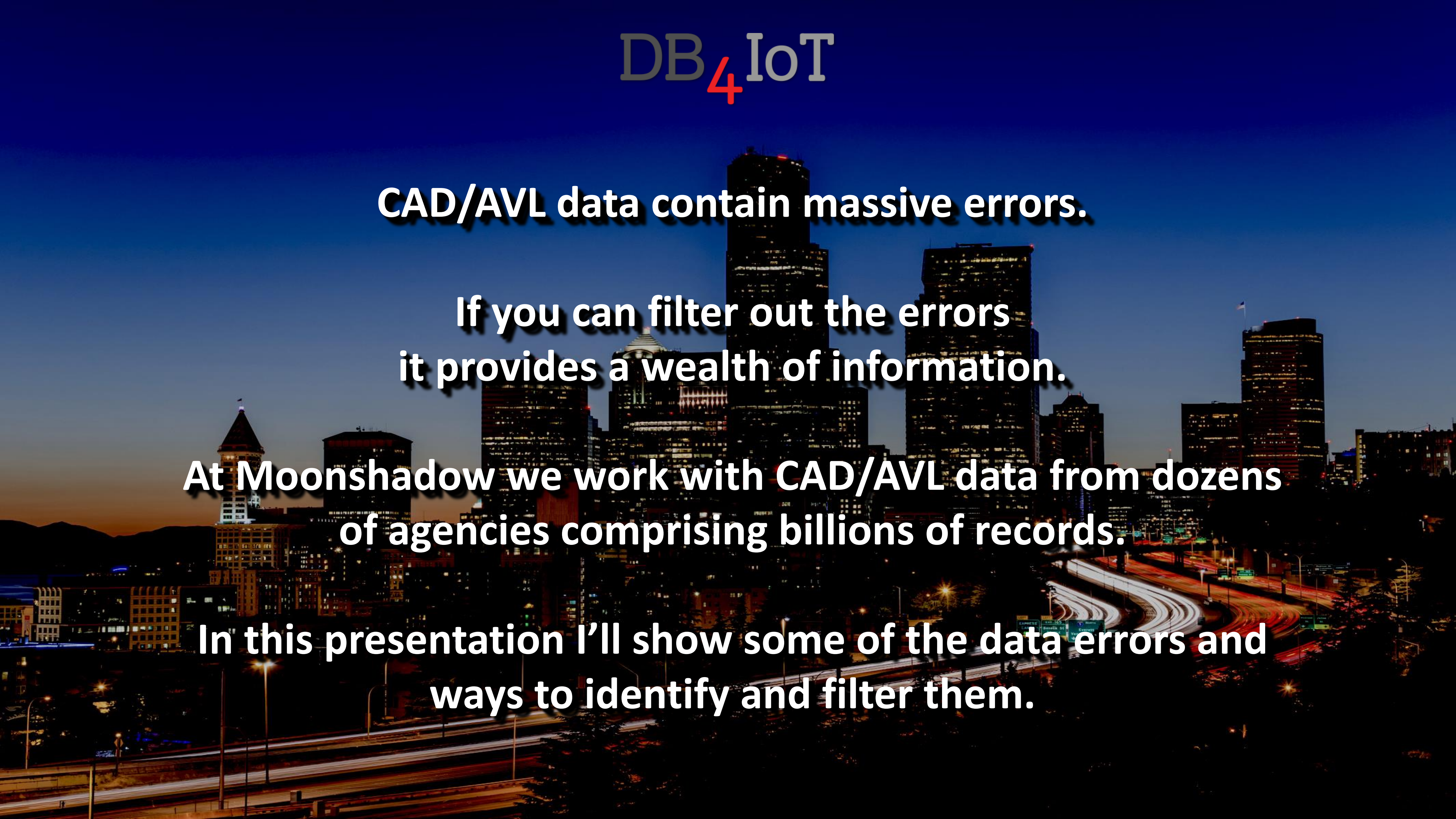
The data is free

The data is representative

You can go back in time

You can do before, during and after comparisons

But . . .

A nighttime photograph of a city skyline, likely Denver, Colorado, featuring several illuminated skyscrapers and a multi-lane highway in the foreground with light trails from traffic. The sky is a deep blue, and the city lights are warm and vibrant.

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CAD/AVL data contain massive errors.

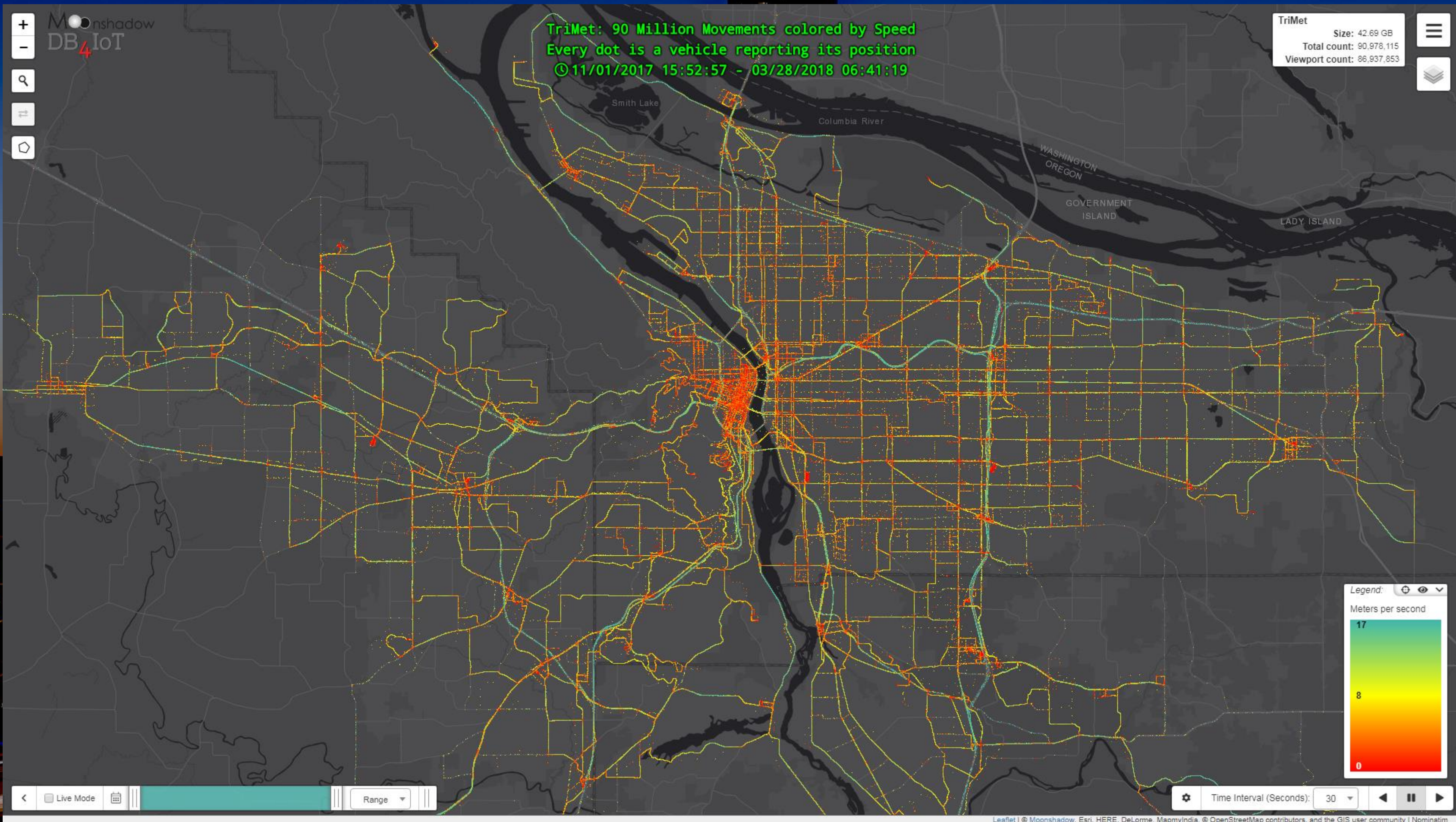
**If you can filter out the errors
it provides a wealth of information.**

**At Moonshadow we work with CAD/AVL data from dozens
of agencies comprising billions of records.**

**In this presentation I'll show some of the data errors and
ways to identify and filter them.**

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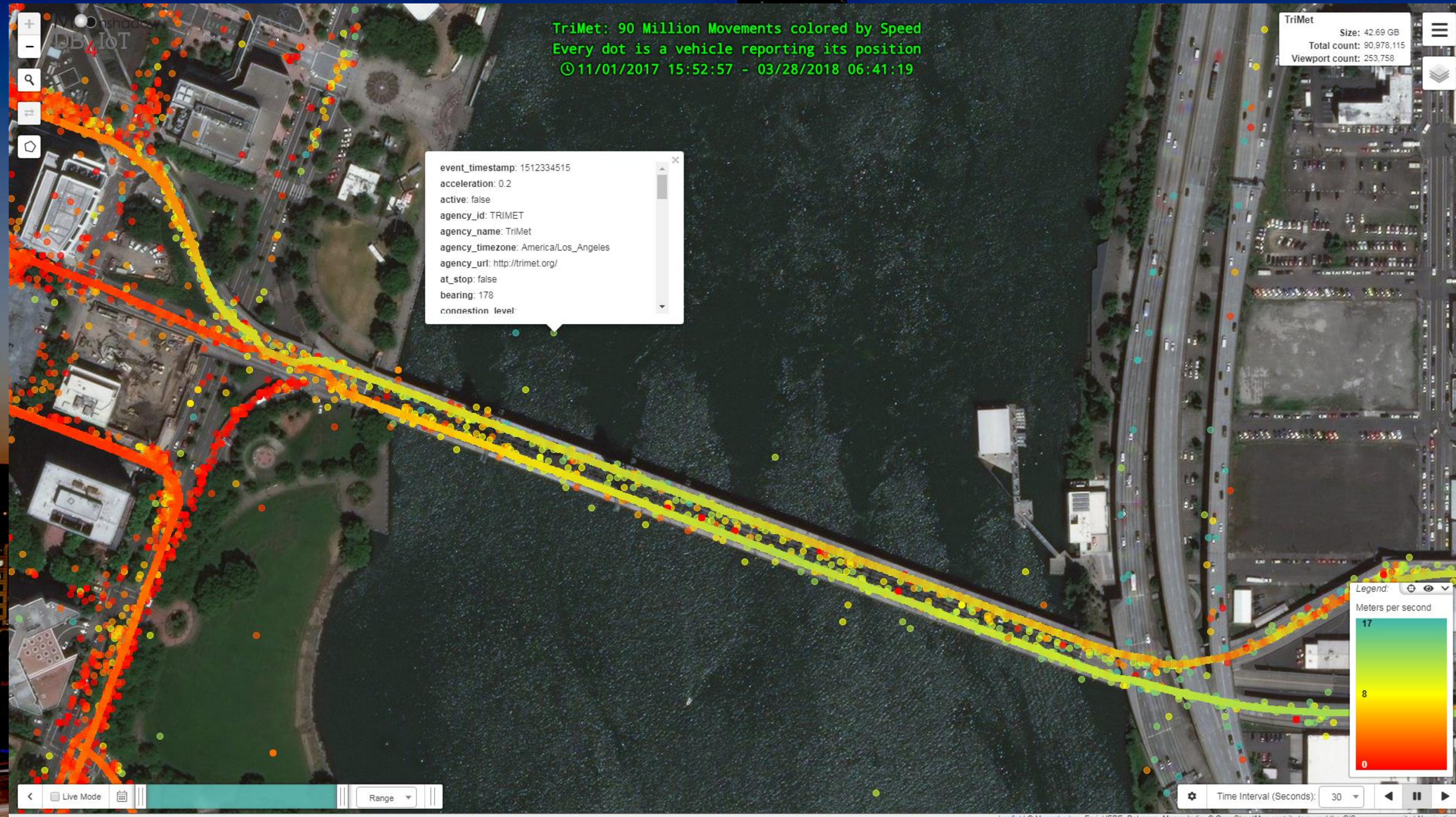
What does CAD/AVL data look like?

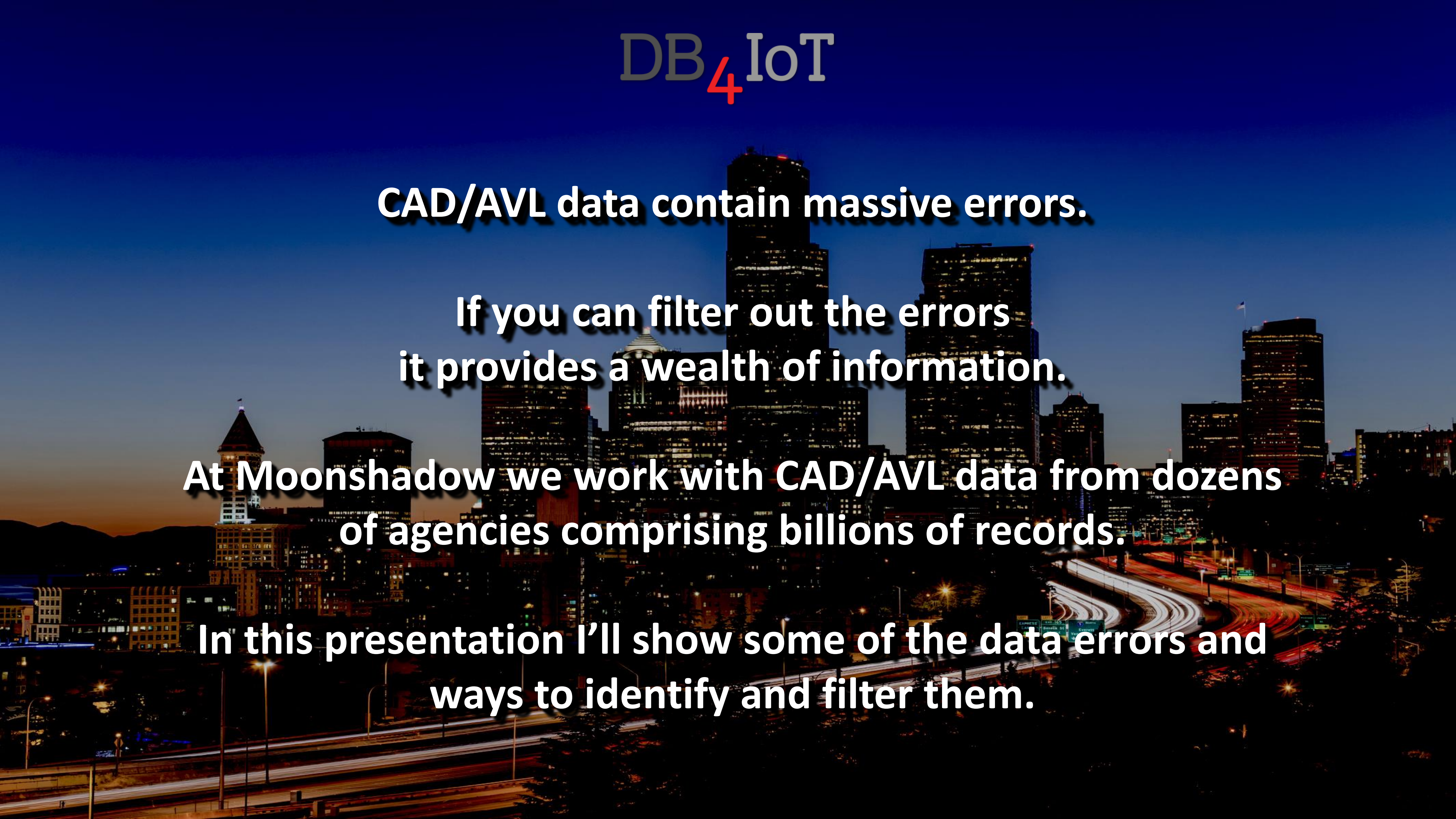


Every dot is a vehicle reporting its position



GPS Errors: TriMet buses in the Willamette River





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GPS Errors:

Unless you correct GPS errors
You can't use the GPS data for distance
Therefore you can't use the data for speed
You can still use the data for travel times

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TriMet corrects GPS Errors in their GTFS vehicle position feeds

TriMet corrects GPS errors in their GTFS Real Time Vehicle Position feeds:
Vehicles are projected onto the route
Use the Active Flag in Route Analyst GTFS
© 11/01/2017 15:52:57 - 03/28/2018 06:41:19

TriMet
Size: 42.69 GB
Total count: 89,176,084
Viewport count: 162,046

Route Analyst Gtfs
eimar.boesjes

Map Views
Markers
Marker Limit: 500
Warning! Increasing might degrade browser performance.

Color By:
Meters per second

Marker Type:
Circle

Dot Size:
4

Heat Map

Filter Tools
Saved Filters
Saved Shapes

Filters (1) [Reset Colors] [Reset Filters] [Clear Filters]

Filterable Columns
Active
[x] Include unknown
[x] Include undefined

	Record counts	Time Weighted counts
[x] True	89,176,084 100%	3,728,237... 100%
[] False	0 0.00%	0 0.00%
[] Un...	0 0.00%	0 0.00%

Version: Ep: 0.7.46 / Ts: 0.6.20 / Cl: 0.04.05

Time Interval (Seconds): 30

Legend
Meters per second
17
8
0

Erroneous records can be filtered out with distance to shape



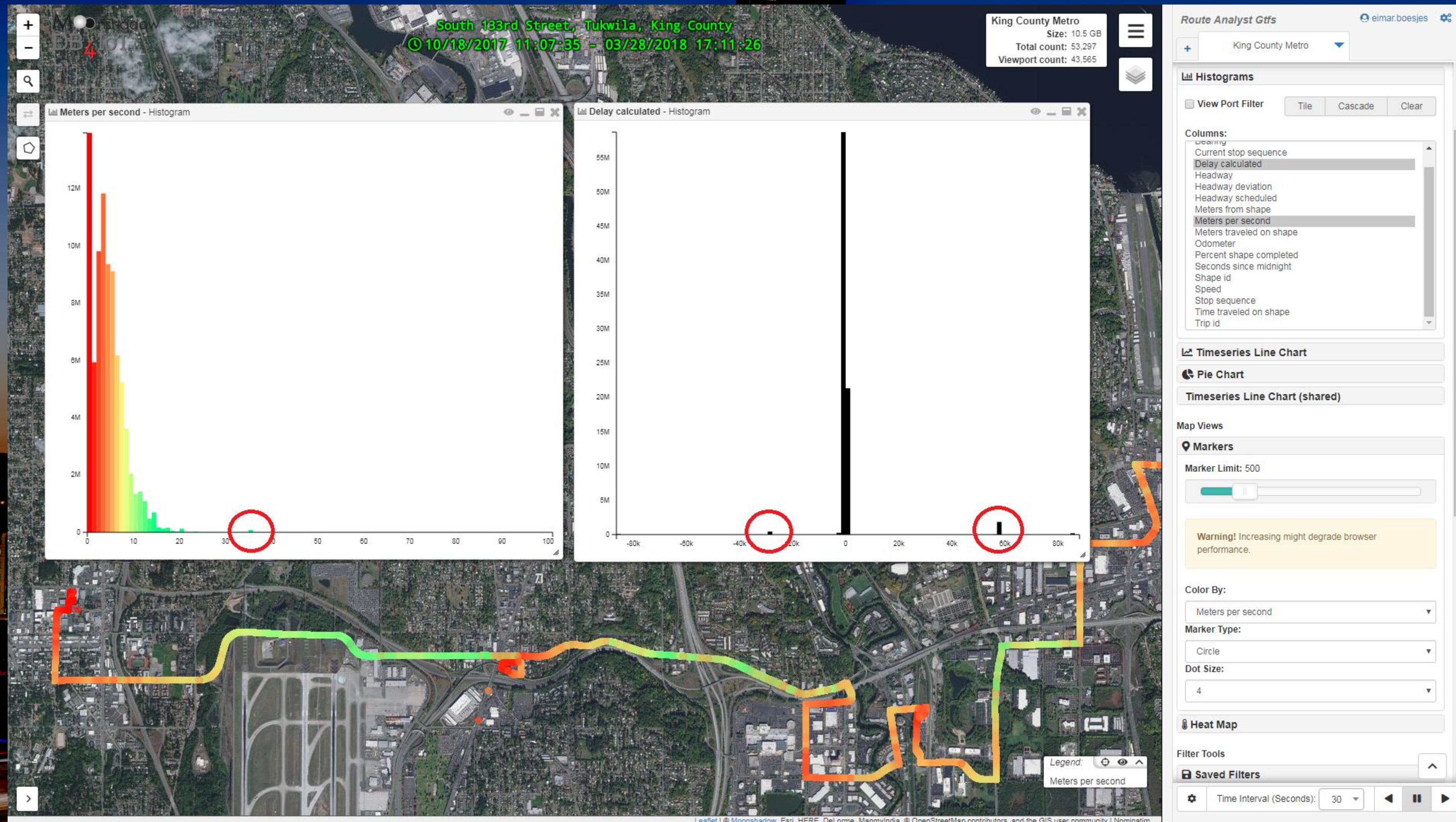
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Route Logging is started too early
As a result the start time is not zero



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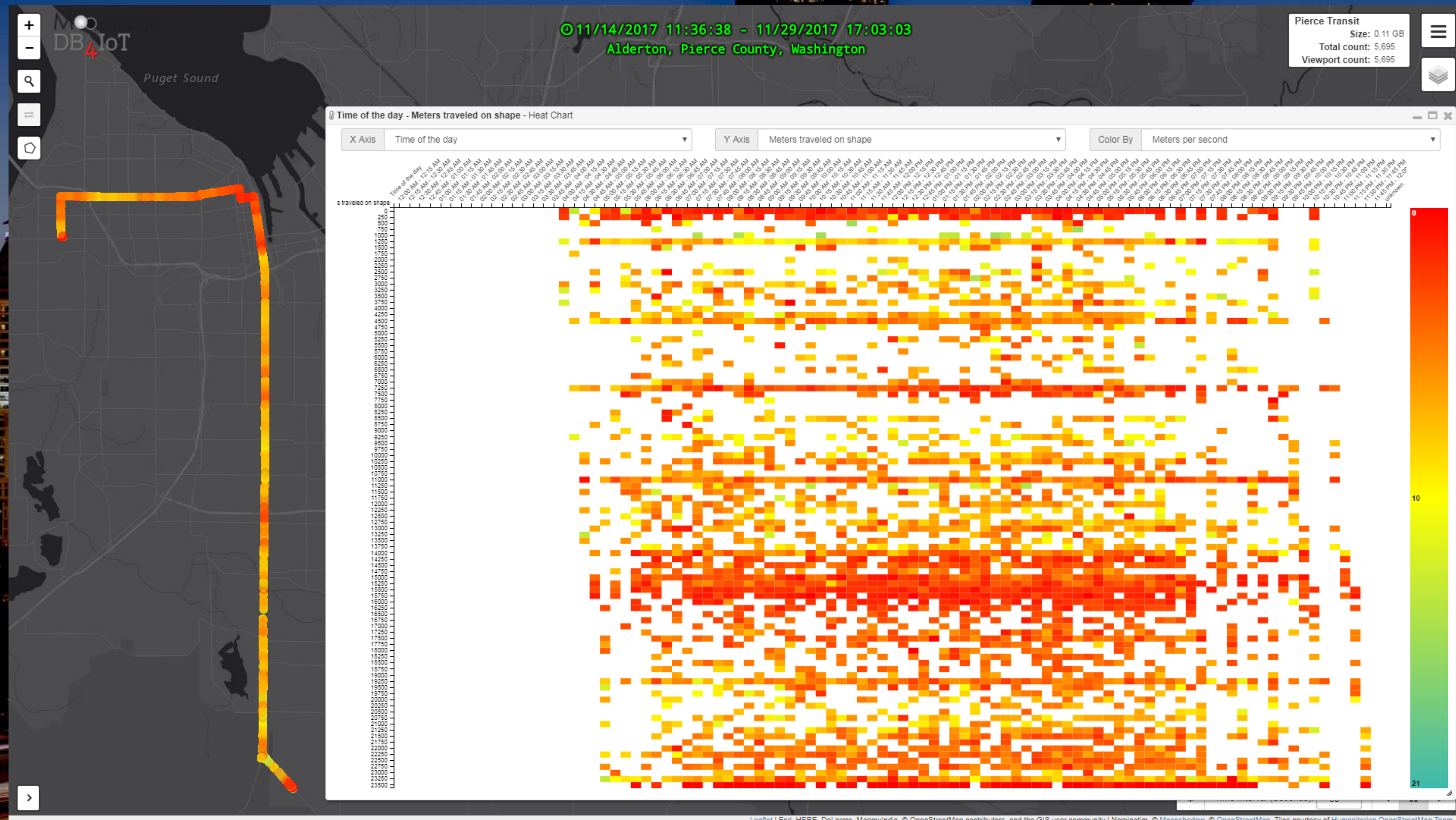
Histograms show outliers to filter out



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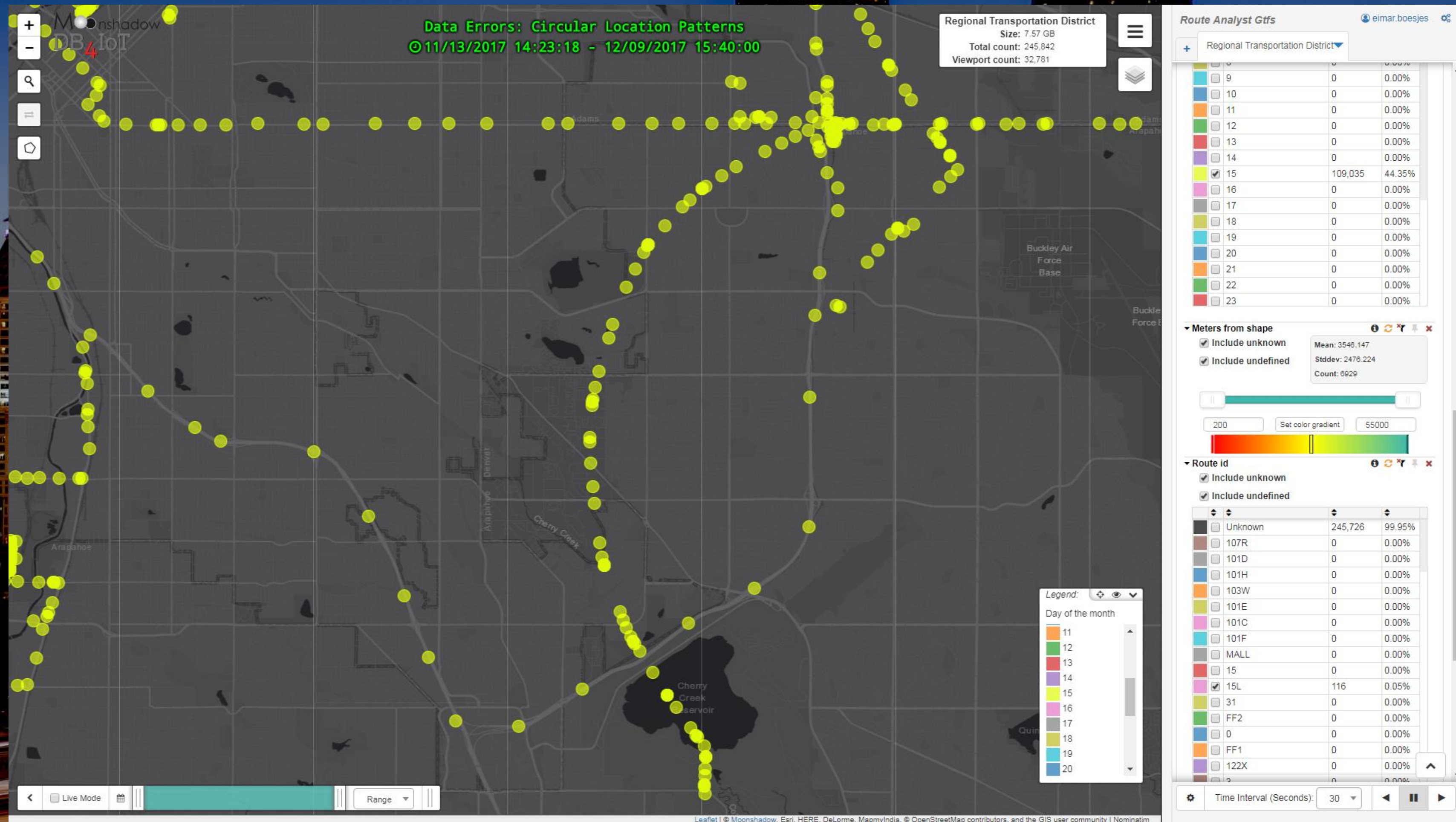
White Space = No Data

CAD/AVL Systems don't report 30 seconds after service stops

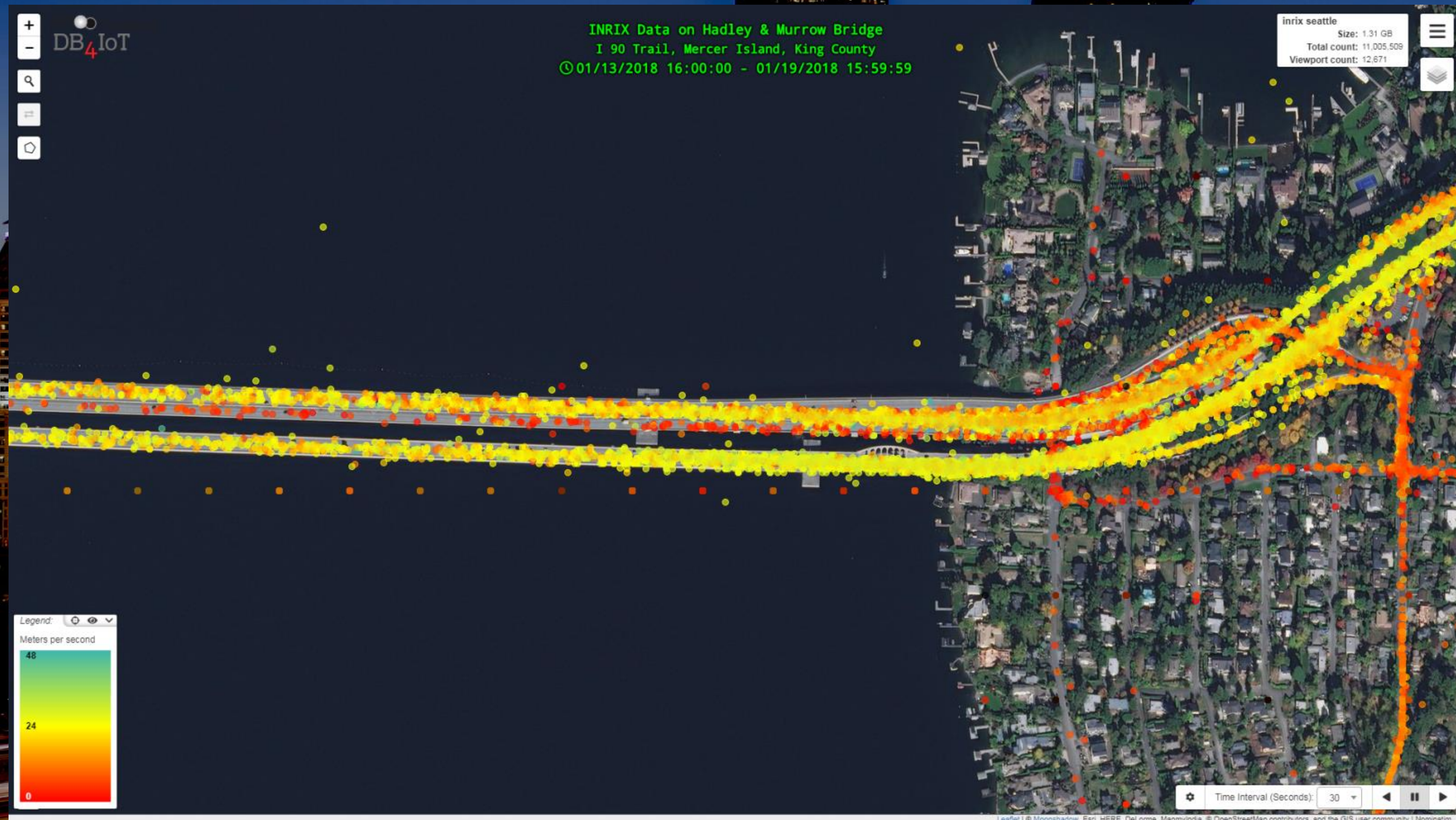


Data Errors: Circular Patterns

Patterns become clear only when the data is mapped

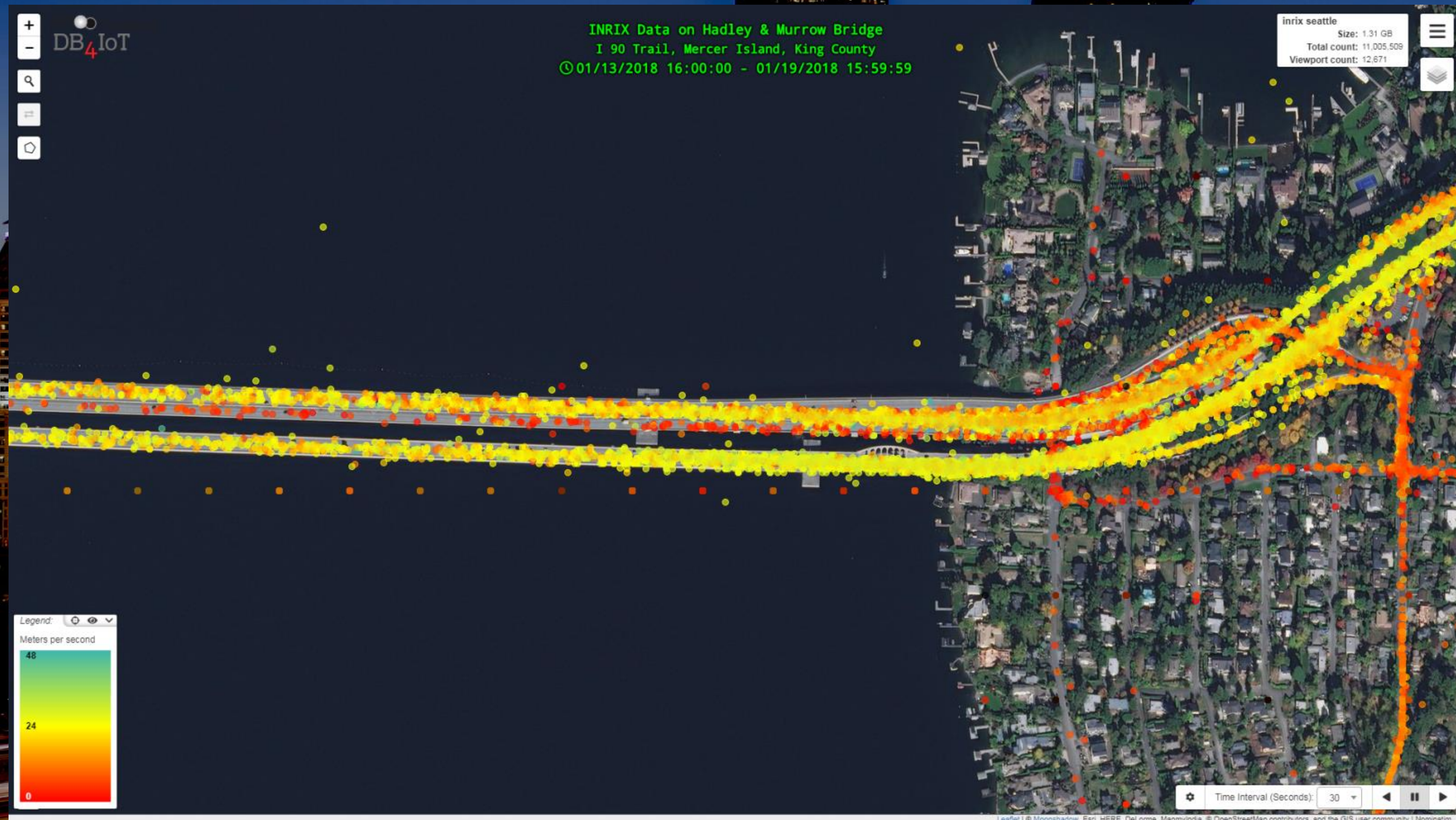


INRIX Data shows traffic is slow on the Westbound left lane Are these data errors?



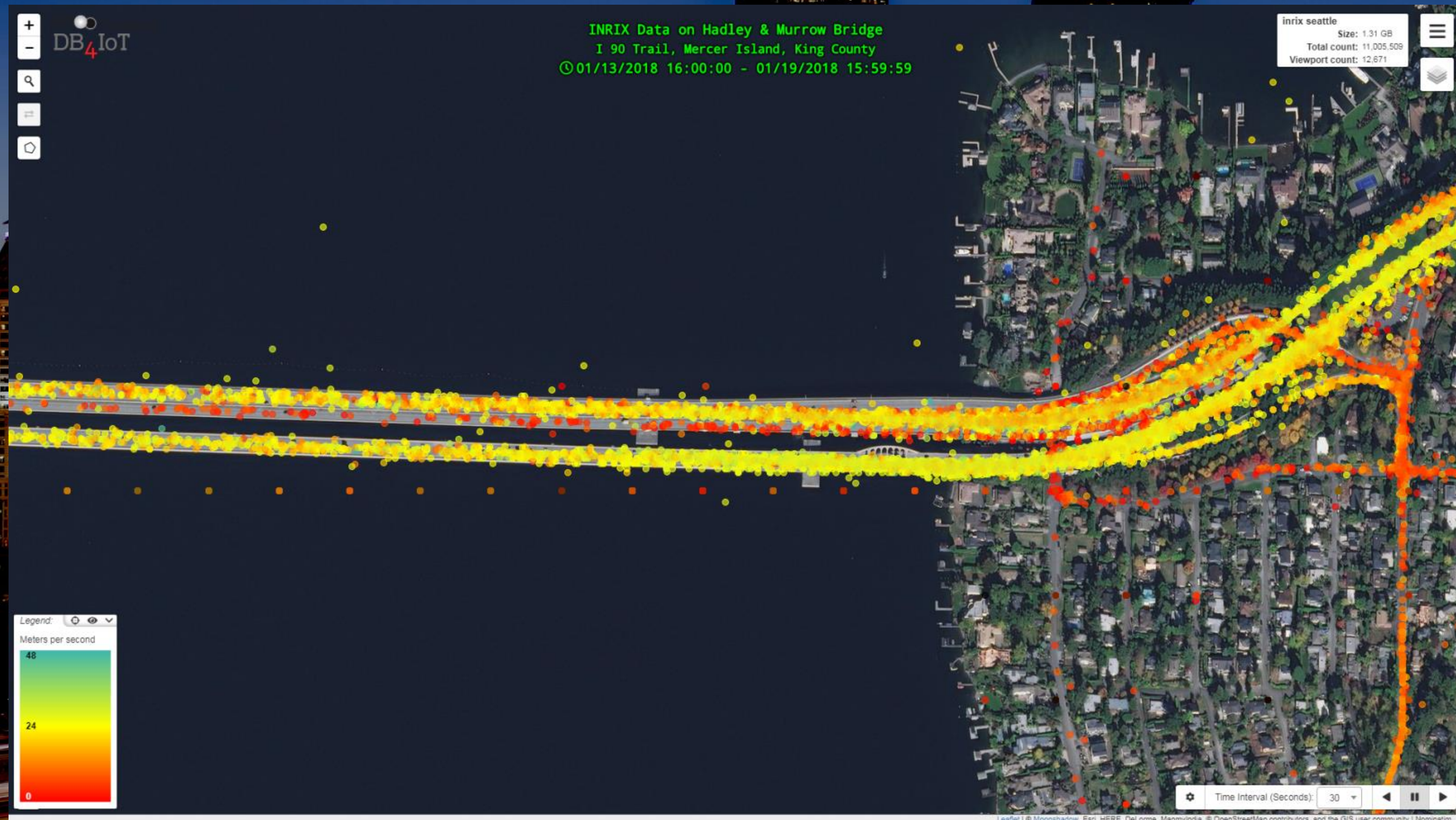
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The Westbound left lane is under construction and we're seeing construction traffic.



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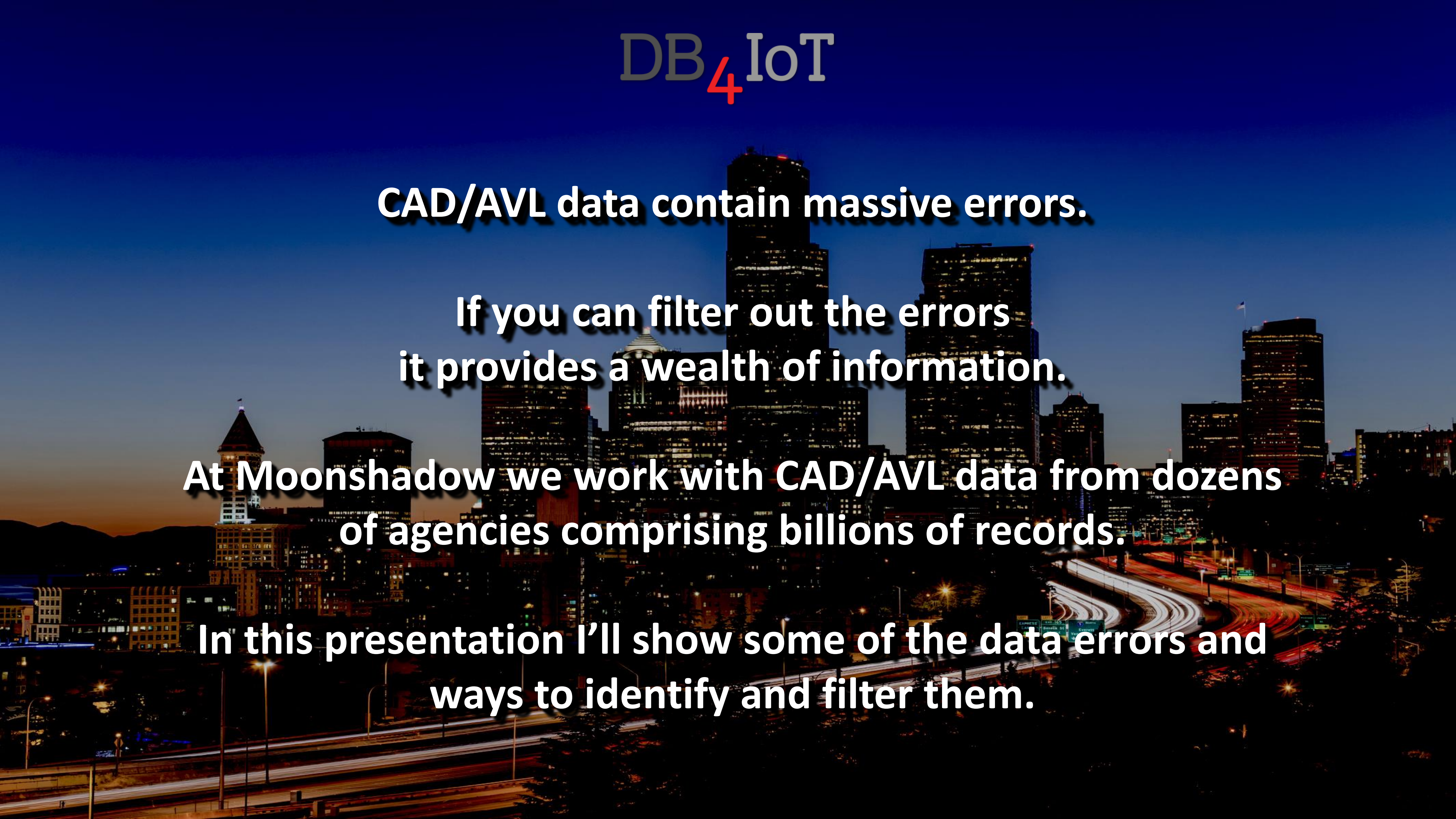
When analyzing data
always know the local situation



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**We started with a Simple Question:
How long does it take my bus to run this route?**





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We know how long it takes to run a route:

**At any time of the day
on weekdays or weekends
before, during and after construction.**

**We can see when and where delays are incurred,
buses are speeding to catch up
or traffic is slowing down service.**

CAD/AVL Data can provide a wealth of information

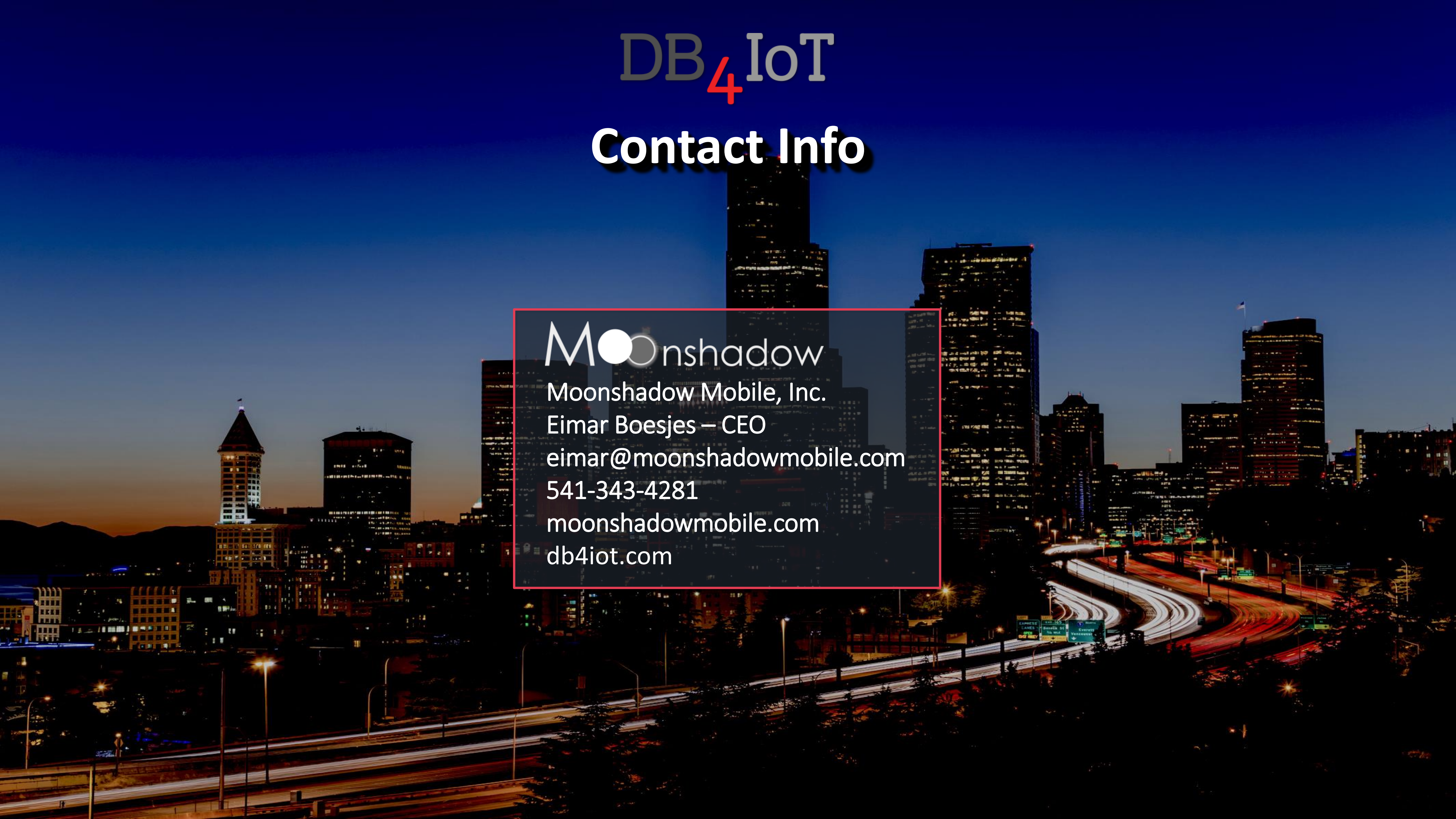
**However,
Drawing conclusions from CAD/AVL data requires:**

Public transit expertise

Big data expertise

Knowledge of the local situation

Data visualization to identify errors



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Contact Info

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