Opportunities and Challenges of Digital Data Applications in Transportation Project Delivery and Management

Introduction

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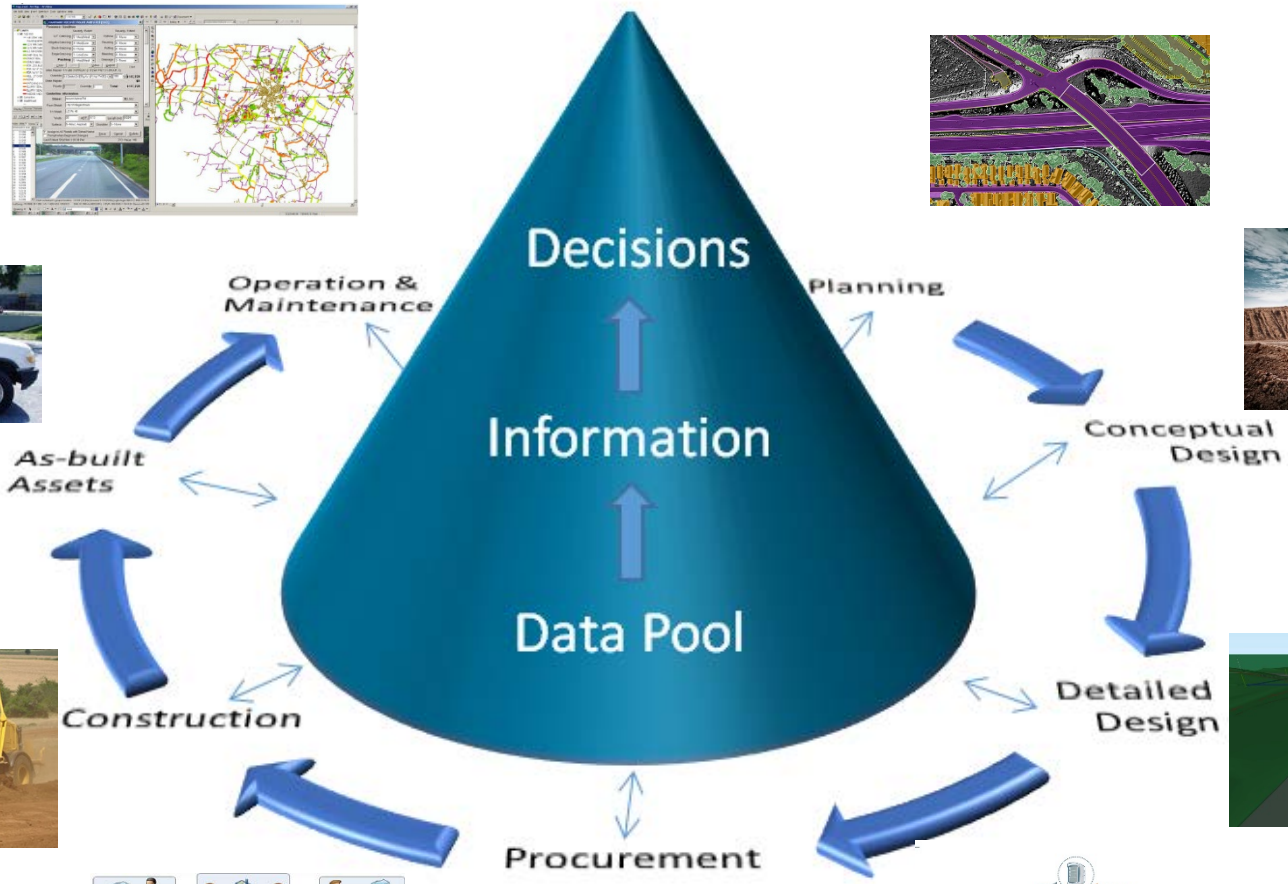
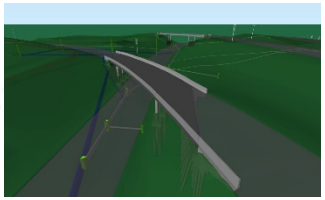
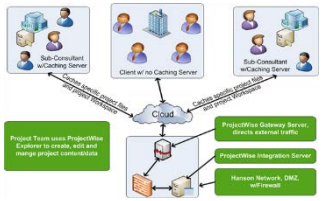
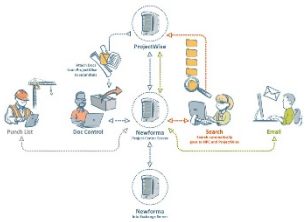
Digital Project Delivery









Speakers

Title: ***Transitioning from traditional to digital project delivery – a DOT's and Consultants perspective***

Speakers: David Brown, Parsons, and Eric Kahlig, Ohio Department of Transportation

Title: ***Transparent highway Agencies Using digital Data***

Speaker: Stan Burns, Integrated Inventory (former asset management director of Utah DOT)

Title: ***Making Big Transportation Data Useful***

Speaker: Jesse Coleman, City of Toronto, Canada

Opportunities and Challenges of Digital Data Applications in Transportation Project Delivery and Management

Abstract:

Title: *Opportunities and Challenges of Digital Data Applications in Transportation Project Delivery and Management*
The delivery of transportation infrastructure by state and local agencies is quickly transitioning to the digital age. Long gone are the days of doing design plans in ink on sheets of mylar, similarly construction field offices cannot function without Wi-Fi and a high-speed internet connection. The digital revolution presents a host of opportunities to improve the efficiency of communications within the delivery team as well as tighter control of budget and schedule. This revolution also has a tendency of raising the awareness of antiquated processes and policies that were developed to accommodate the limitations of the analog environment. This presentation will cover the perspective of a SHA as the agency transitions to digital as well as a consultant who is always looking for a better, faster, more efficient way to deliver project scope that is safe, effective and compliant to requirements. Topics covered will include determining what data is really needed, how best to collect data, and what analysis of the data can provide project management with the best information for decision making.

Opportunities and Challenges of Digital Data Applications in Transportation Project Delivery and Management

Flow:

- (2 min) Introduction and brief summary of our experiences with digital data applications
  - David
  - Eric
- (7 min) Status of ODOT's transition to digital project delivery processes
  - AASHTO-Ware products (software)
  - Digital data collection hardware
  - Consultant/contractor participation on projects
  - What has worked well, what has not been as successful
- (7 min) Parsons' use of digital data to deliver projects – consultant's perspective
  - To lead or to follow? Pushing innovation or do what has always been done?
  - Working with SHA's VS working with construction contractors
  - It's about the data, not the document.
  - The power of data analysis, not just collecting lots of data.
- (4 min) What is next?
  - SHA perspective
  - Consultant's perspective

Introduction - Speakers

Eric Kahlig, PE – Ohio DOT

- 21 years with Department
- Administrator - Alternative Project Delivery
  - eConstruction Initiative
  - Innovative Contracting

ODOT Transition - Iterative Steps

- Usage of Home-grown database – DOS based CMS –1992
  - Continued paperwork – payment driven reason
- Advertisement / Distribution of Plan Sets / Electronic Bidding – 2004

Ohio DOT Transition to Digital Project Delivery

- SiteManager by AashtoWare – 2011
  - Continued paperwork
- Mandate of all documentation to be stored electronically - 2014
  - Scanned data or created Digital Data
- EDC eConstruction Initiative - 2015

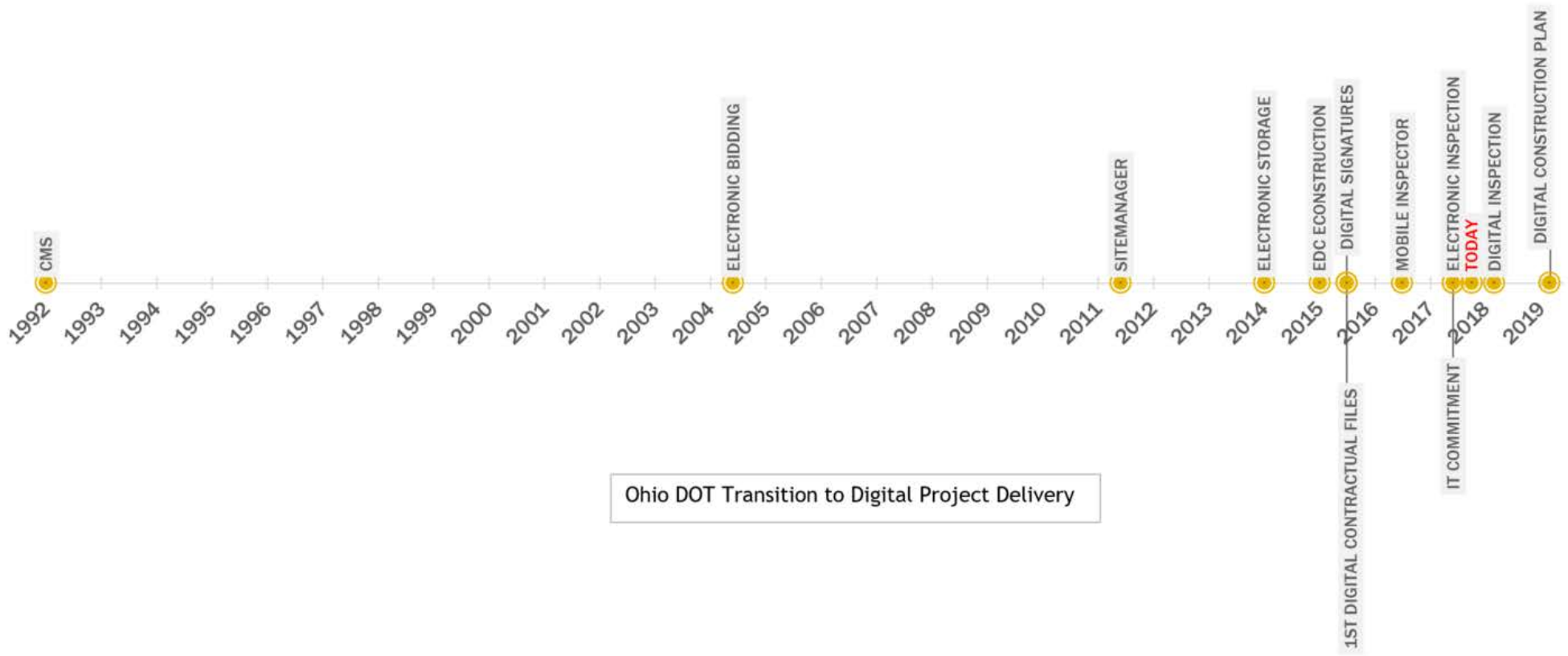
Ohio DOT Transition to Digital Project Delivery

- **Acceptance of Digital Signatures – 2015**
  - Digital Project Records / Change Orders
- **Digital Information – Contractual July 2015**
  - 3D Pilot Project – Grades/X-sections
- **Full use of Mobile Inspector – July 2016**
  - No other project record by Inspector
  - Grass Roots expansion

Ohio DOT Transition to Digital Project Delivery

- Full commitment from IT: Complete Mobile Workforce – June 2017
- Electronic Only Quality / Performance Documentation – June 2017
  - Electronic Documentation – automated storage

Ohio DOT Transition to Digital Project Delivery



- Recent Drivers
  - Feasibility
  - Necessity

Commitments / Decisions to Date

- Use it if we have it
- Support / Expand the inclusion of Consultants and Contractors into the Systems
  - Virtual Desktops
  - Inclusion into systems
- Agnostic Approach: Comfort Level = Usage Level

Biggest Hurdle: Acknowledging the benefits

- Efficiency
- Equivalency
- Acceptance

- Philosophy to Digital Delivery
  - Try it until you Break It
  - Leadership by Example by Leadership

Ohio DOT Transition to Digital Project Delivery

- Next Steps
  - Fully Digital Inspection Database – not just electronic
  - Fully Digital Plan

Introduction - Speakers

David Brown, PE – Parsons

- 16 years with firm, 35+ years as Engineer
- Currently VP Performance Improvement
- First fully digital project in 2008

To Lead or to Follow?

What is the consultant’s reward VS cost for going to digital project delivery.

Similar situation as transition from ink and mylar for plan sheets to CAD workstations.

Working for DOT or for Contractor?

DOT – “We have to do it this way because the FHWA require it.”

Contractor – “Will it save us time and money in getting the work done? It will! Then let’s go.”

It is about the Data – not the Document!

PDF version of a ‘form’ isn’t digital.

Collected digital data can be analyzed and published in any format necessary.

Need to actively think digital.

The power of Data analysis!

Trending performance.

Risk based prioritizing.

Graphical presentation.

What is next?

Agency perspective

Consultant’s perspective

Questions? Want to know more?

David Brown, PE

Performance Improvement

Parsons

303-434-7408

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Eric Kahlig, PE

Administrator – Alternative Project Delivery
ODOT Division of Construction Management
Ohio DOT

614.387.2604

Eric.kahlig@dot.ohio.gov

Transparent Highway Agencies

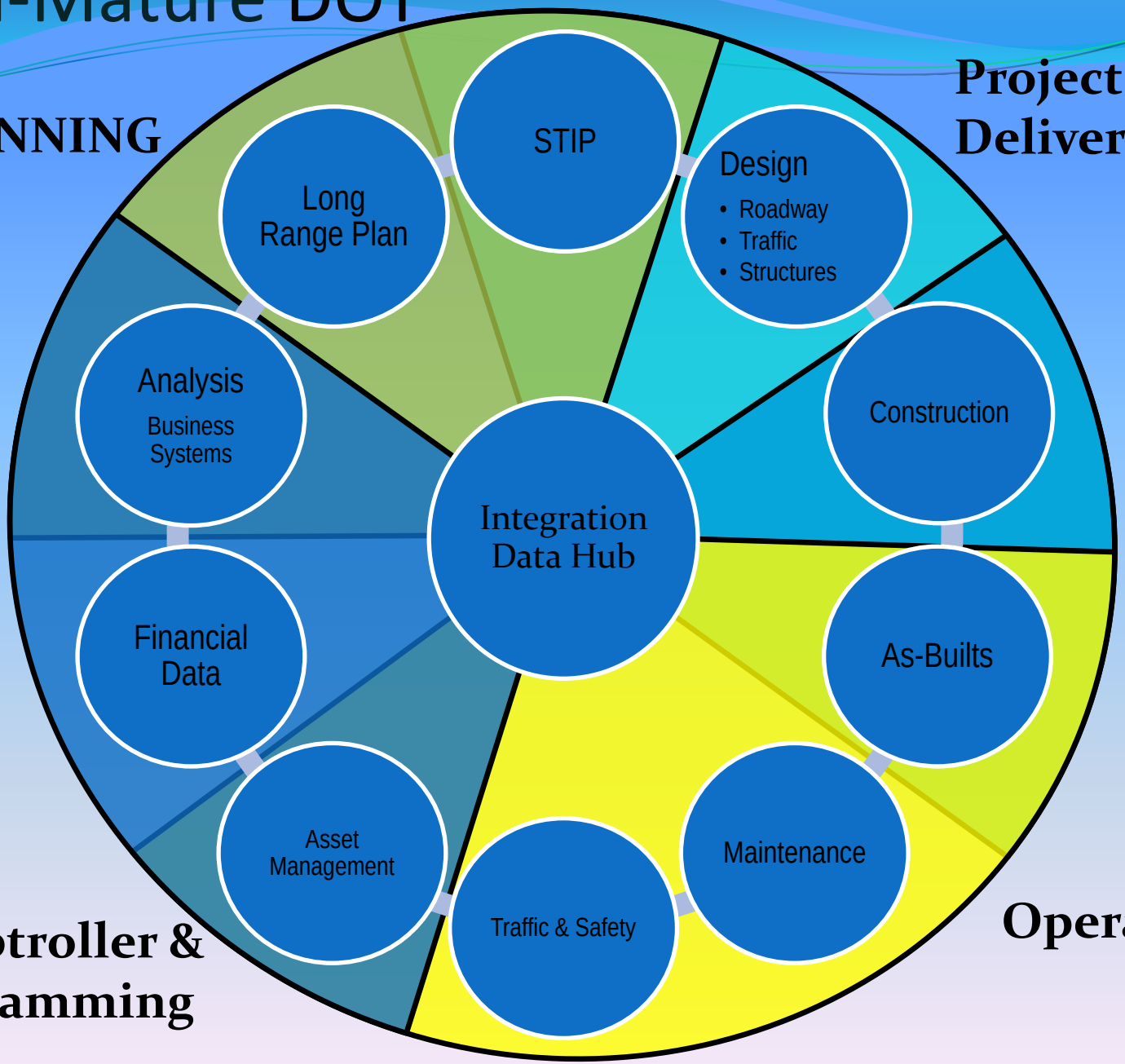
Collect, Organize, Analyze, Save

Stan Burns
sburns.integratedinventory@gmail.com
801 633 6221

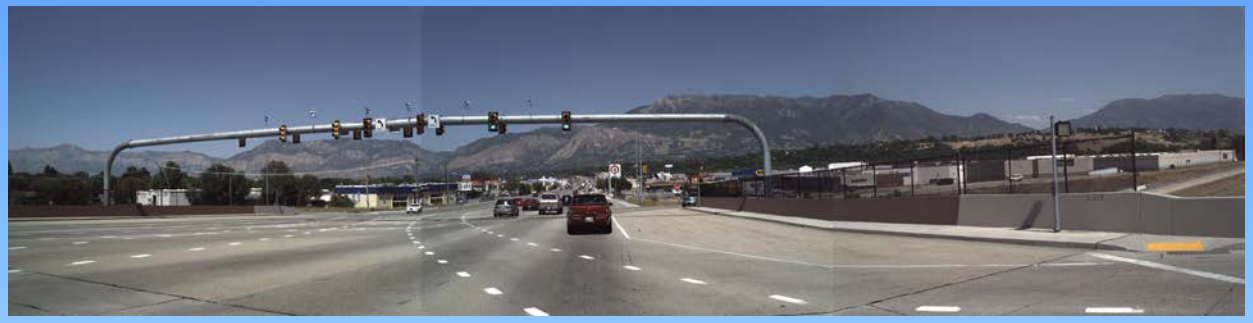
Transparent Agency:

Can Demonstrate and Measure where to Allocate the First & Last Dollar

Data-Mature DOT



“Collect Once for Everyone”



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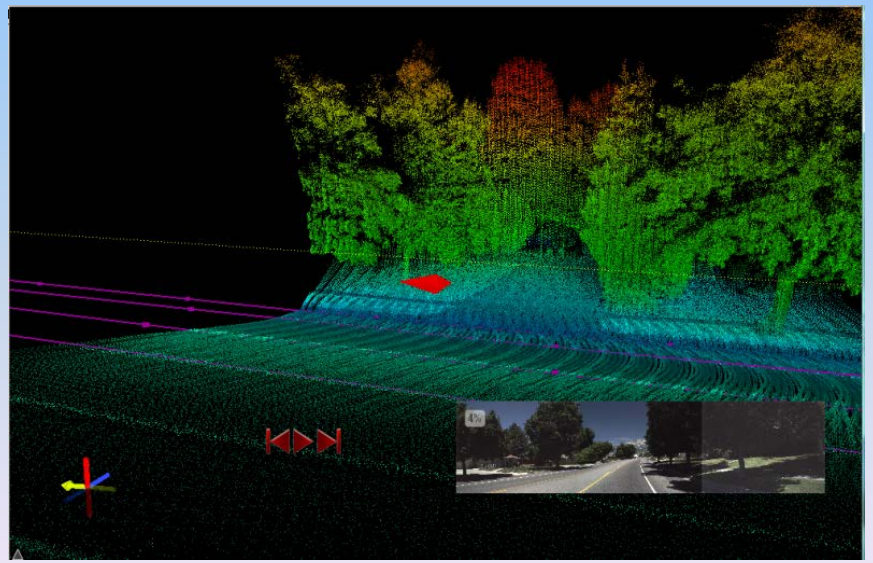


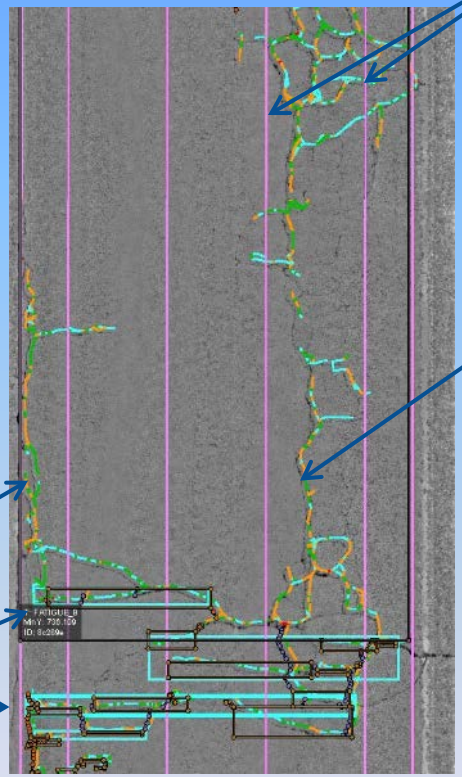
LiDAR – Geospatial Location of Features

- Maintenance
- Traffic & Safety
- Structures
- GIS
- IT
- Motor Carriers
- Preconstruction
- ROW
- Regions
- Programming

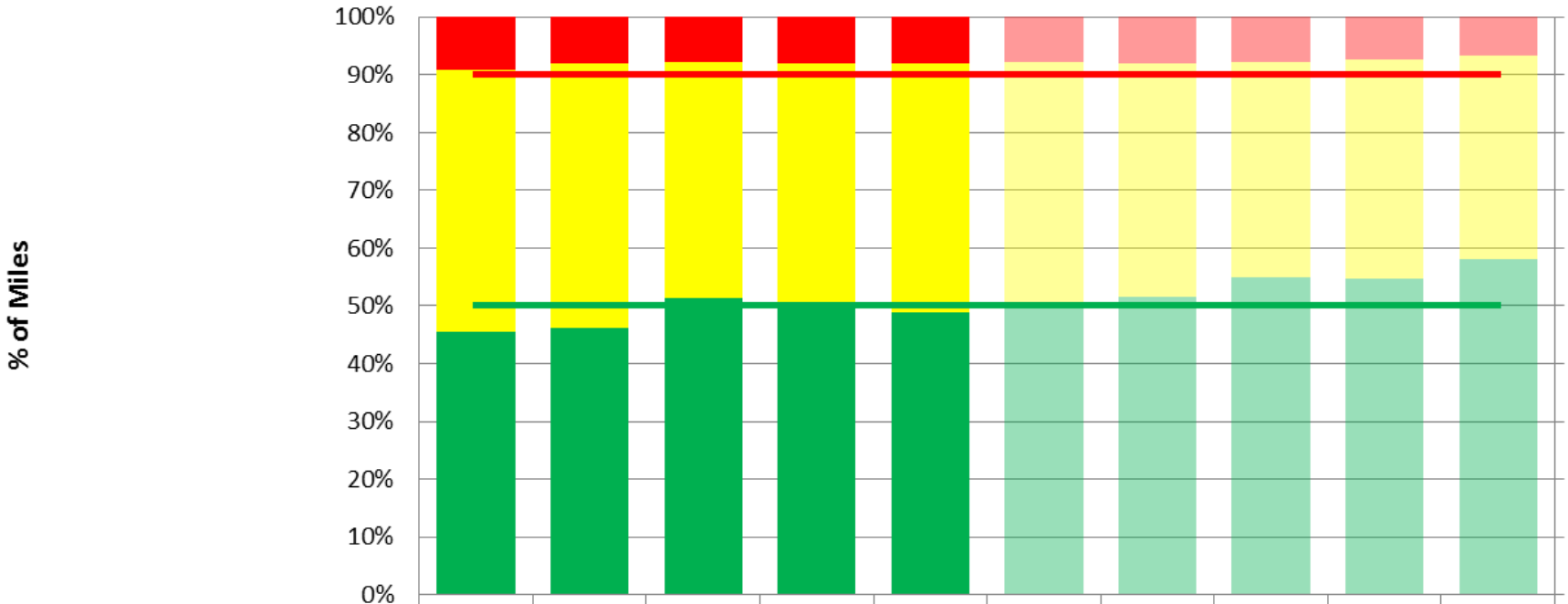
- Entire state highway system
- Both directions

Automated Pavement Distress

- Highway Speeds
- Data Extraction and Processing
- Turn Key Operation

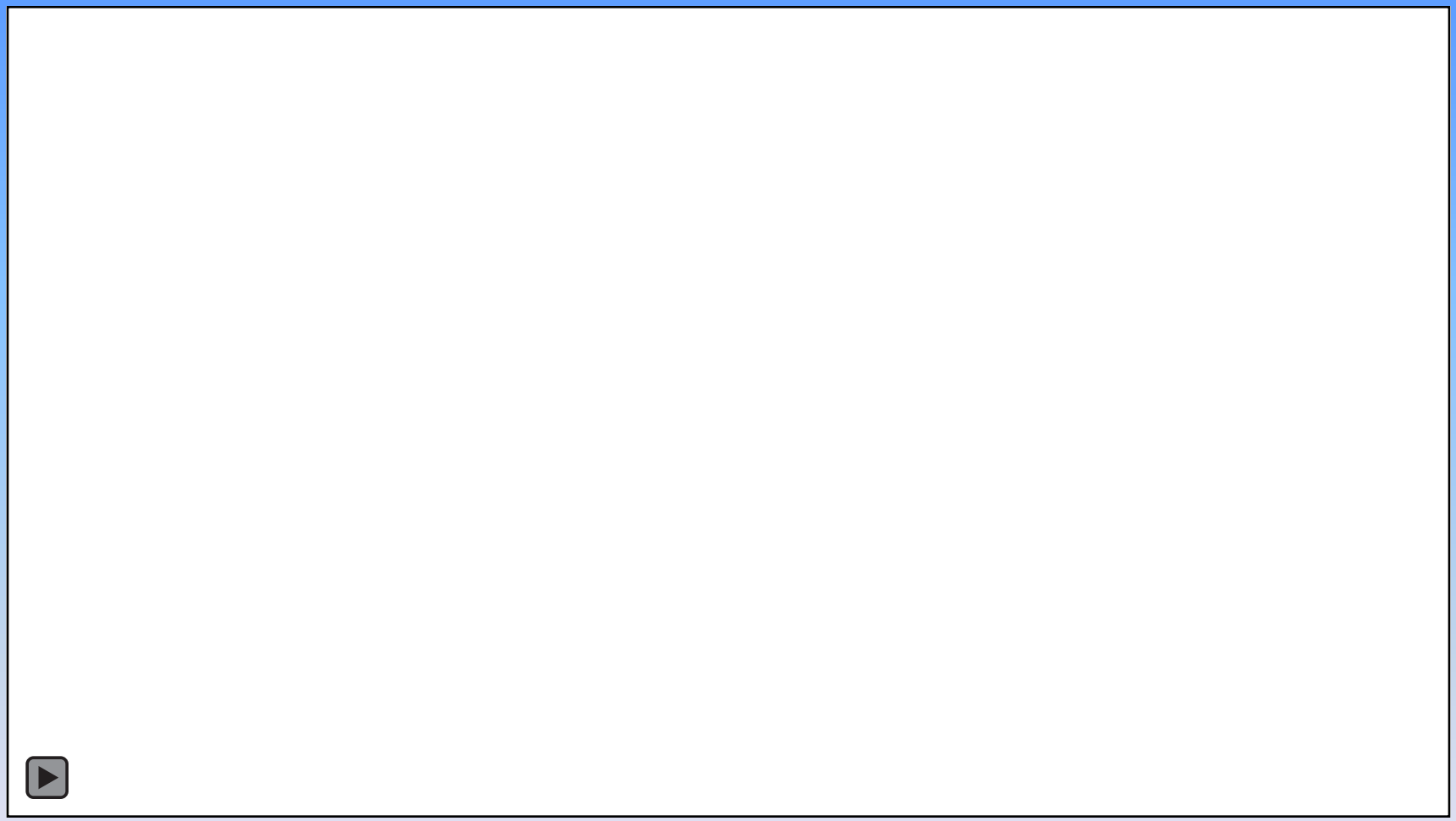


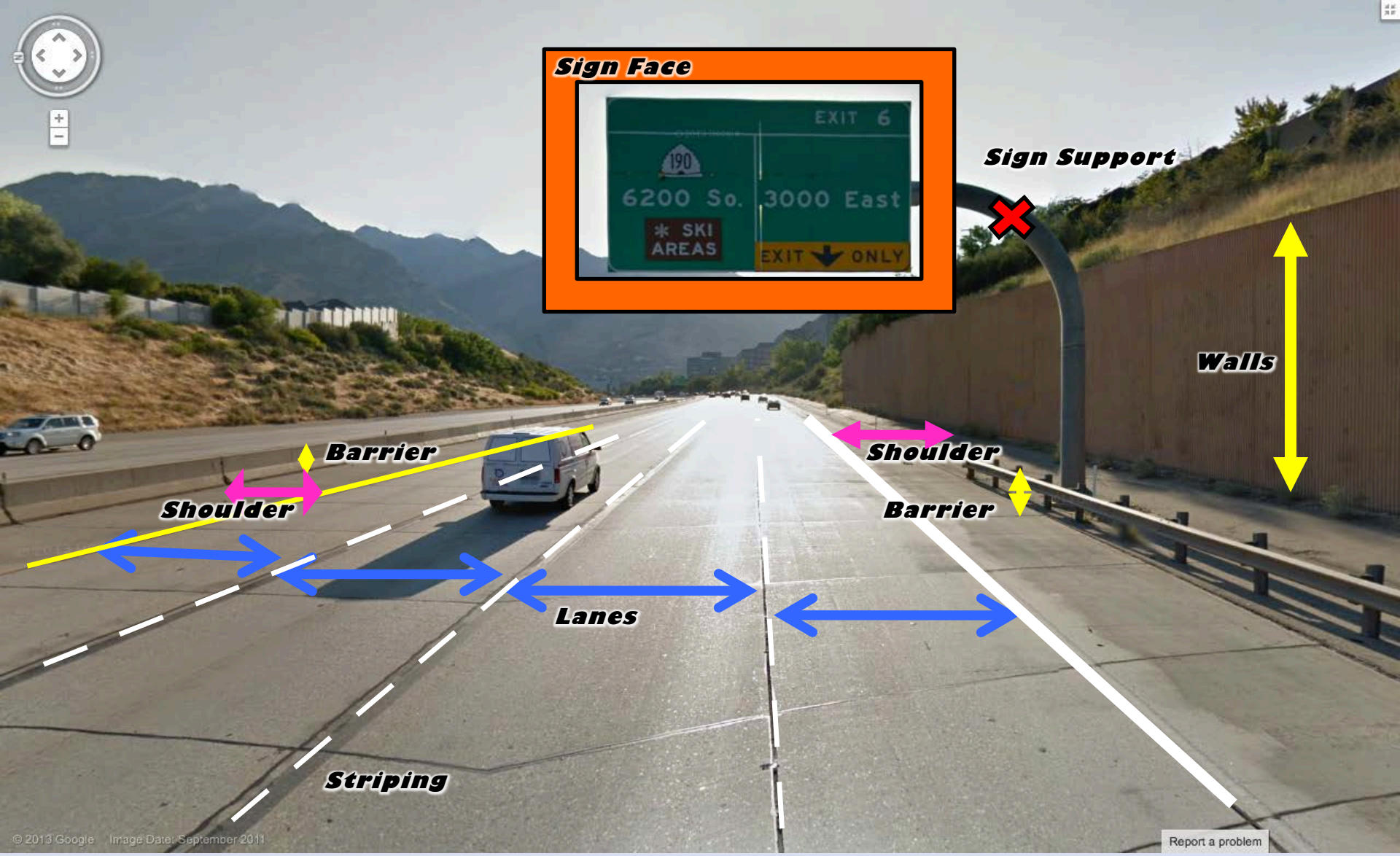
High Volume Pavement Condition



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Poor: IRI > 170 in/mi	9%	8%	8%	8%	8%	8%	8%	8%	7%	7%
Fair: IRI 95 to 170 in/mi	45%	46%	41%	42%	43%	42%	40%	37%	38%	35%
Good: IRI < 95 in/mi	46%	46%	51%	50%	49%	50%	52%	55%	55%	58%
Long Range Goal: < 10 % Poor										
Long Range Goal: > 50 % Good										

Feature Extraction




Sign Face
EXIT 6
190
6200 So.
3000 East
* SKI AREAS
EXIT ONLY
Sign Support
Walls
Barrier
Shoulder
Shoulder
Barrier
Lanes
Striping
© 2013 Google
Image Date: September 2011
Report a problem

Organized Information
Know Everything About a Section of Road

UDOT Keeping Utah Moving

DATA PORTAL

Search our Catalog

Search ...

Search

Download Data

Request a Layer

FAQ / Training

GIS User Group

Sites of Interest

- UDOT Open Data
- AGRC

Featured Applications

Signal Performance Metrics

Linear Bench

UPlan UDOT Map Center

UDOT Data News

New 6" Statewide Aerial Imagery from Google

In collaboration with other state agencies, UDOT has recently acquired access to 6" imagery for the state of Utah through Google. An initial draft of the imagery has been released for us to review. To access this data, please email Corey Unger (coreyunger@utah.gov)

New Open Data Guide

Please see a copy of the Open Data Guide for a detailed list of layers. Click Data Assessment Form links for more information about each layer.

Project Design & Asset Query App and Safety App

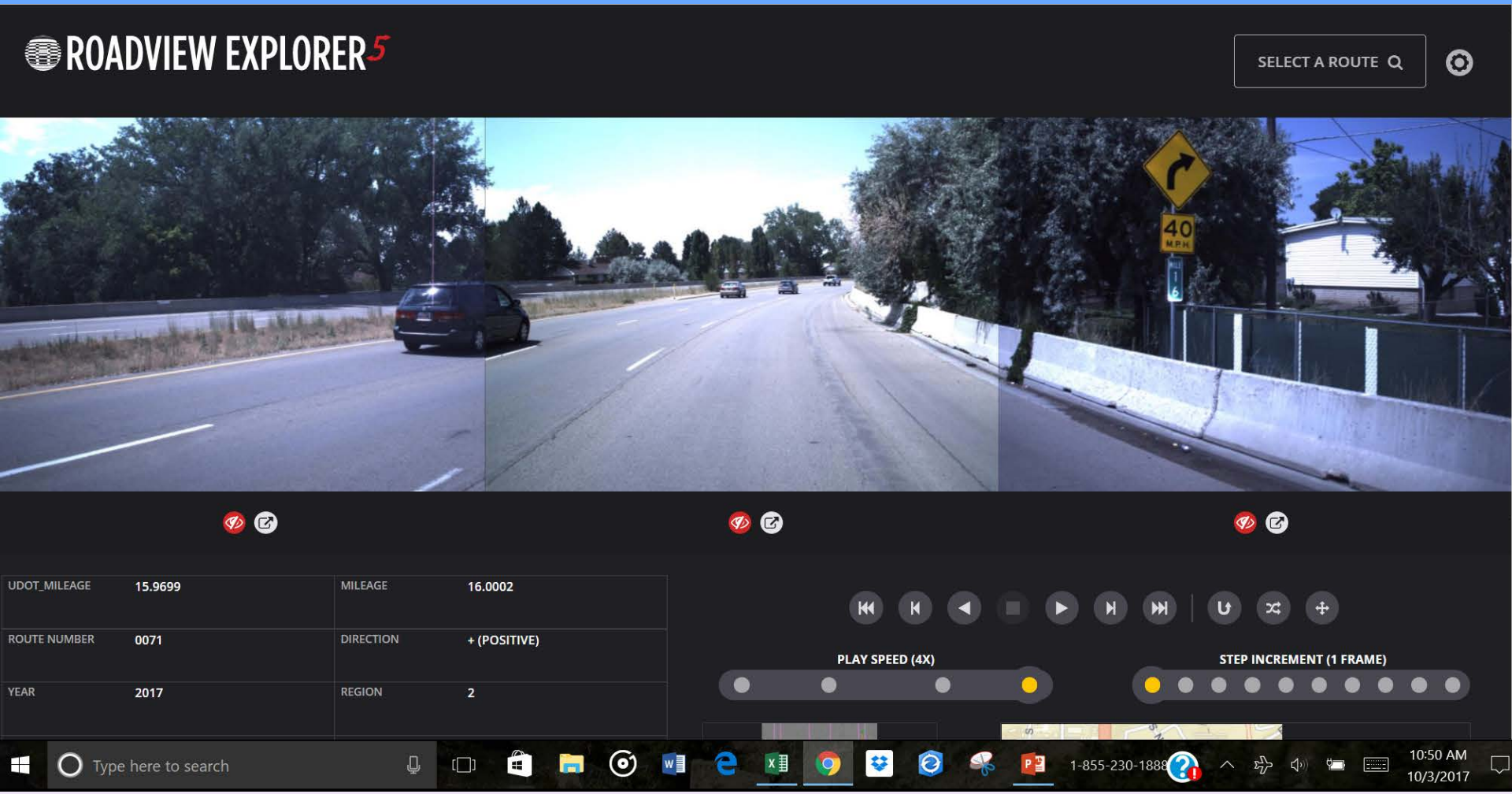
Welcome ...

This portal provides spatial and non-spatial UDOT data.

Go to the Download section to download enterprise data in a variety of formats including:

- ESRI shapefile
- KML (used by Google Earth and Google Maps)

Straight- Line Diagram



- Inventory Fencepost to Fencepost
- Pavement Distress
- Environmental Data
- Past and Future Projects
- All Crashes

Safety Program to Replace Texas Turndowns

- Solution – Business Apps
  - Location
  - Speed Limits
  - Clear Zone

Design and Safety Applications

SR 190 *

Save | Share | Download | Save as | More

Roadway | Signs | Barriers | End Sections | Utilities | Costs | Details | Overview

SR190

Route: 0190P, 5 - 15

PIN: 15345

Project Number: STP 190 (232)

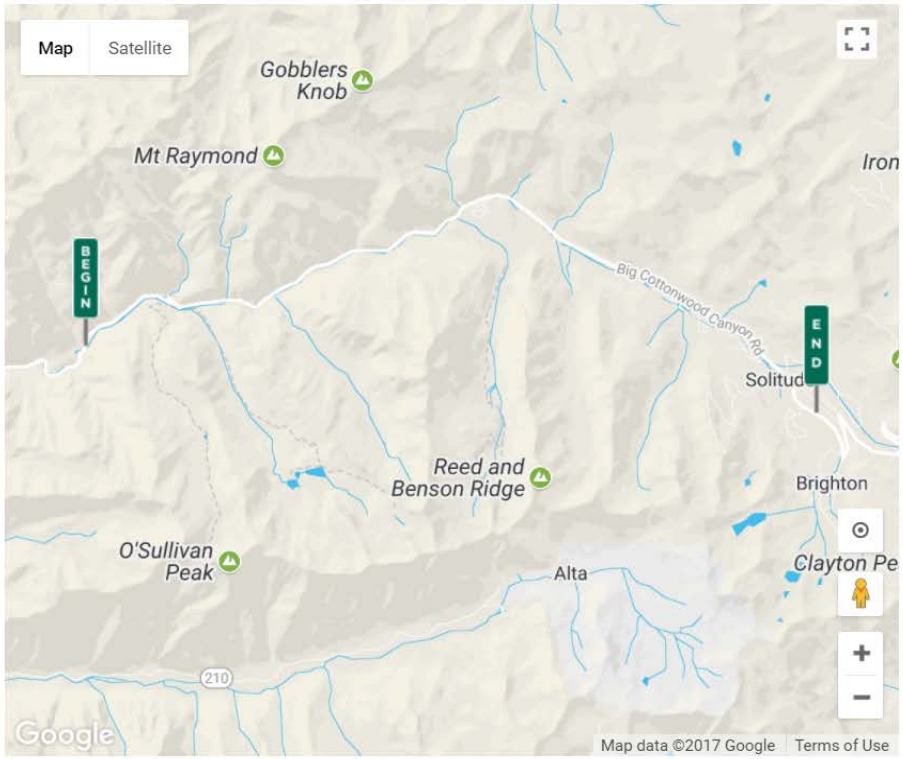
Year: 2017

Engineering Defaults: Region 2

Print Overview

Safety Report

Roadway	Qty	$3,182,072
Rumble Strips	0 ft	$0
Rotomilling	2 in	$900,164
Soft Spot Repair	0%	$0
Manholes	6	$4,656
Valves	8	$3,969
Catch Basins	0	$0
Monuments	0	$0
Emulsified Asphalt CSS-1	375 ton	$192,967
HMA - 3/4 Inch	21,575 ton	$1,895,975



Benefits

- Single Source of Truth
- Breaking down “Silos”
- Savings - Time & Efficiency
- Staff Safety – Less Time in Traffic
- Public Trust – Decisions based on Engineering Experience but also Information

Thanks
Stan Burns 801 633 6221
Sburns.integratedinventory@gmail.com

Big Data Innovation Team

Making Big Transportation Data Useful

Jesse Coleman, Big Data Innovation Team Lead, City of Toronto

TRB Webinar: Opportunities and Challenges of Digital Data Applications in Transportation Project Delivery and Management

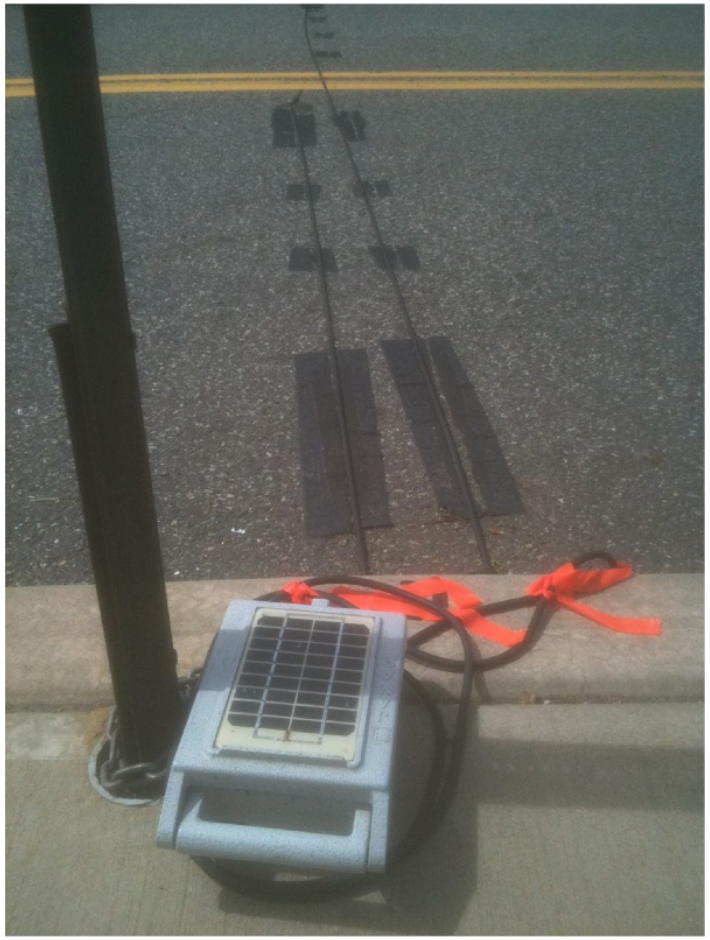
AGENDA

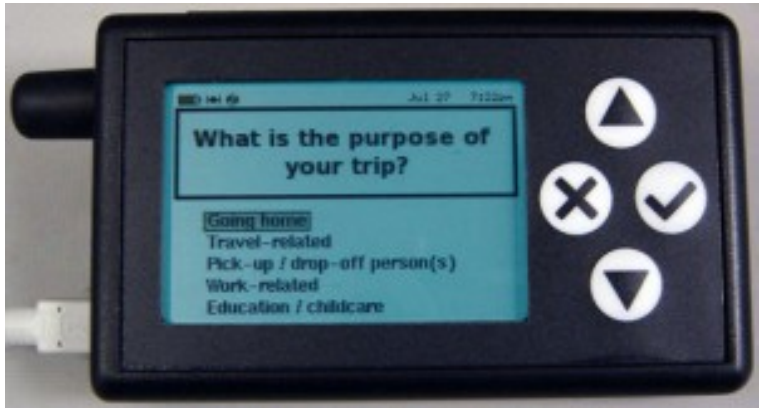
- Why is Big Data Important?
- Big Data Innovation Team
- Current Project
- Next Steps

TORONTO

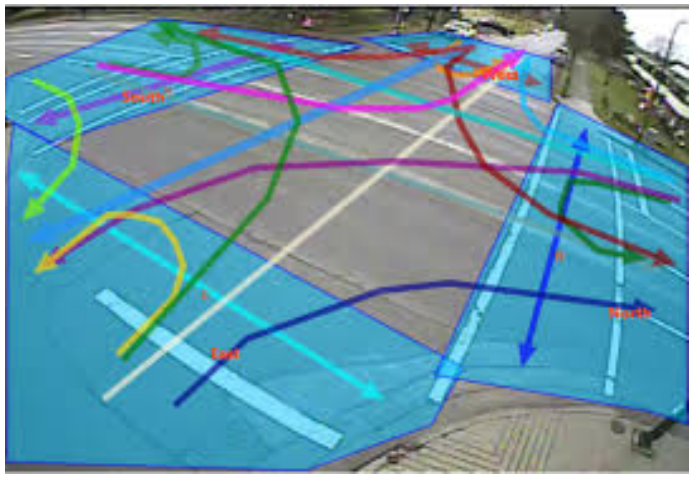
WHY IS BIG DATA IMPORTANT?

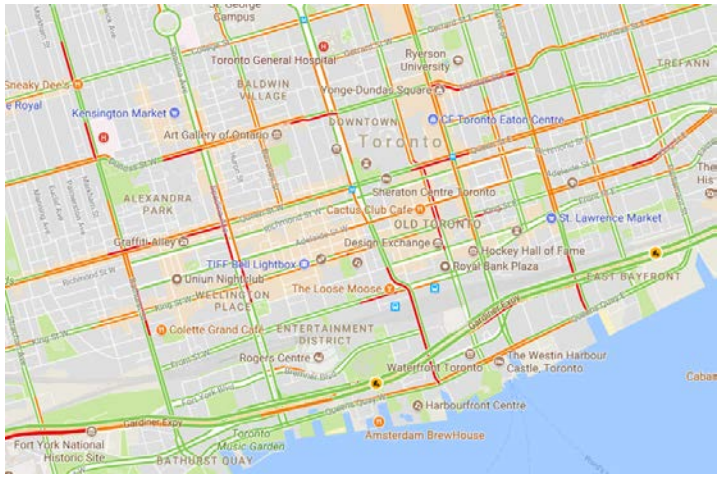
PAST TRANSPORTATION/TRAFFIC DATA COLLECTION

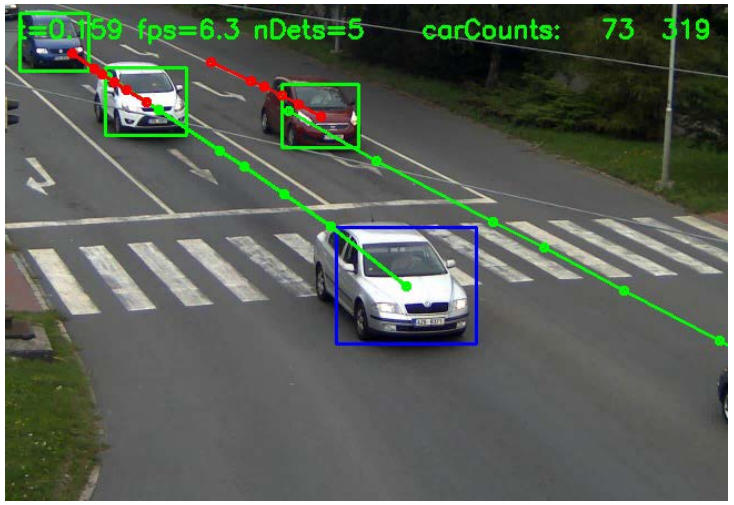


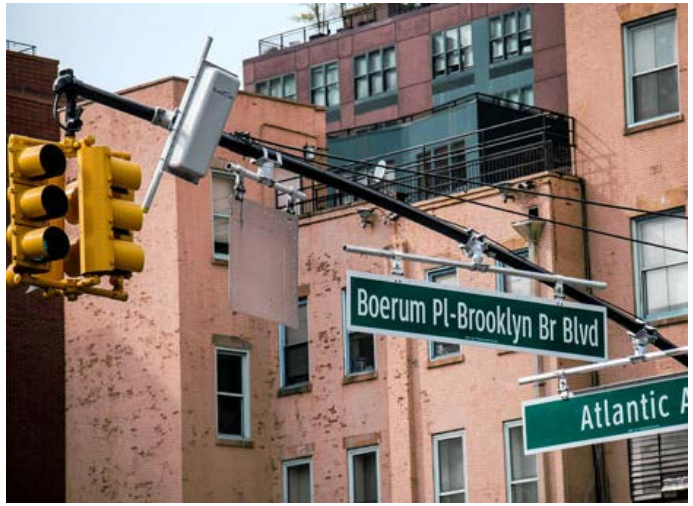


WHAT HAS CHANGED?







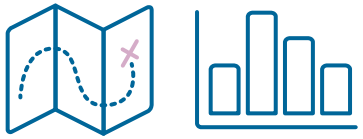


WHY IS TORONTO FOCUSED ON BIG DATA?

1 Opportunity with growing amount of probe data across all modes

2 Historical reliance on models and small samples of (infrequent) data

3 Current methods don't reflect the day-to-day variation in conditions



4 Challenges in evaluating the impact of policies / programs / projects

BIG DATA INNOVATION TEAM

TORONTO'S BIG DATA INNOVATION TEAM

- Within Transportation Services Division
- Transportation Services is responsible for building and maintaining the City's transportation infrastructure
- Eventual composition: 4 FTE + 2 interns
- Sits within Traffic Management Centre
- Unique group among peer cities

INTEGRATION OF SKILL SETS

Statistics / Data Analysis

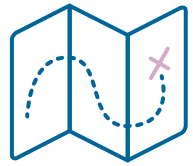
Computer Science

Design & Visualization

Database / Data Management

Transportation

Cartography / GIS



TORONTO

HOW WE THINK WE CAN USE BIG DATA

1. **Describing:** Understanding how the system is performing.

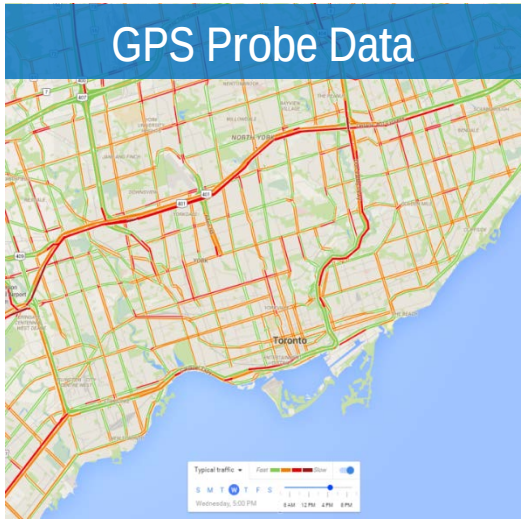
4. **Predicting:** Shorter-term predictions based on incidents, weather etc.

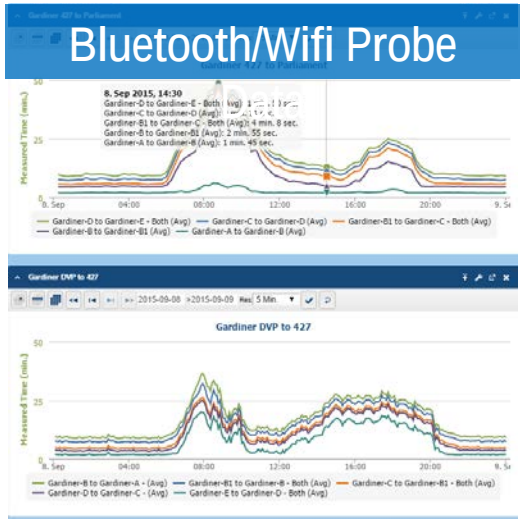
2. **Evaluating:** Assess the impact of a policy / program / project

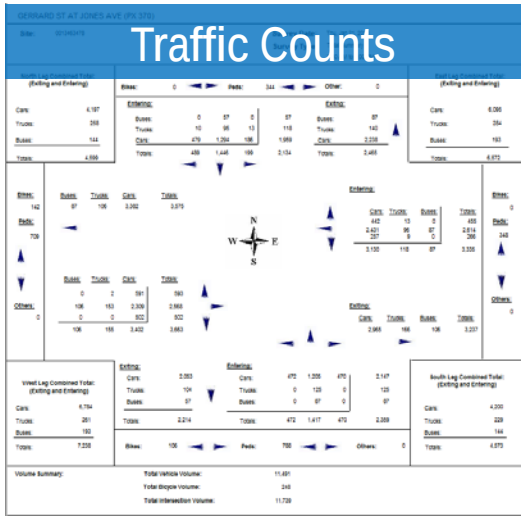
5. **Planning:** Smarter prioritization of policies and investments

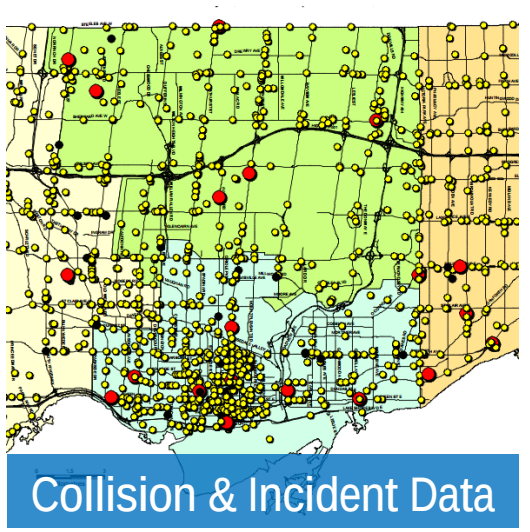
3. **Operational:** Identifying and responding to issues in real-time

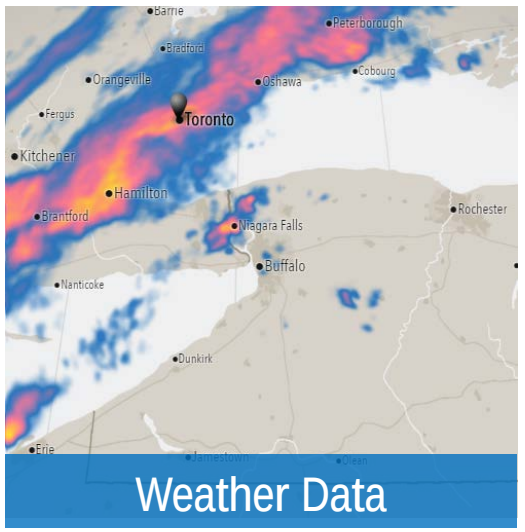
WHAT ARE SOME OF OUR DATA SOURCES?











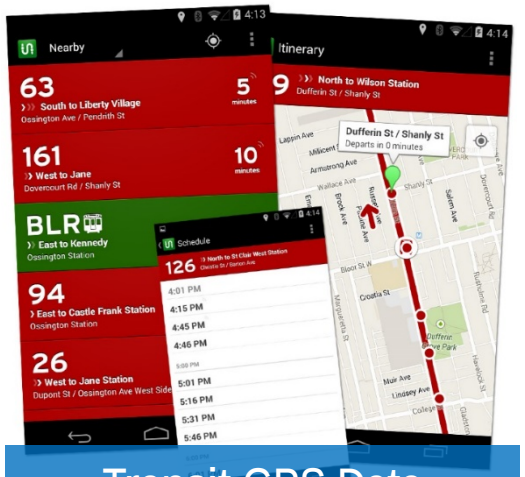
WHAT ARE SOME OF OUR POTENTIAL DATA SOURCES?

Cycling App Data

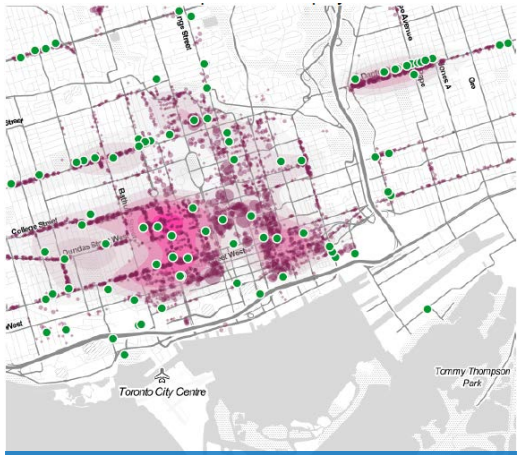
Bike Share Toronto Data

Special Events

Transit GPS Data



Parking Authority Data



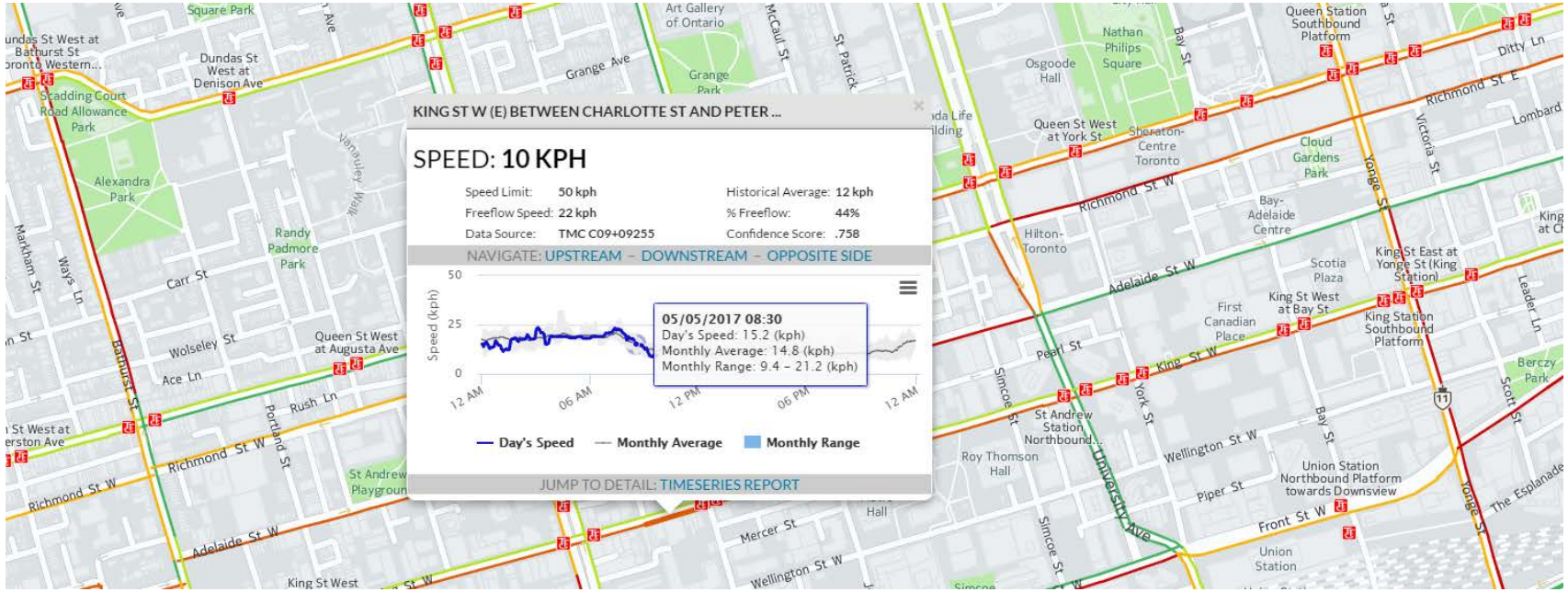
PRESTO

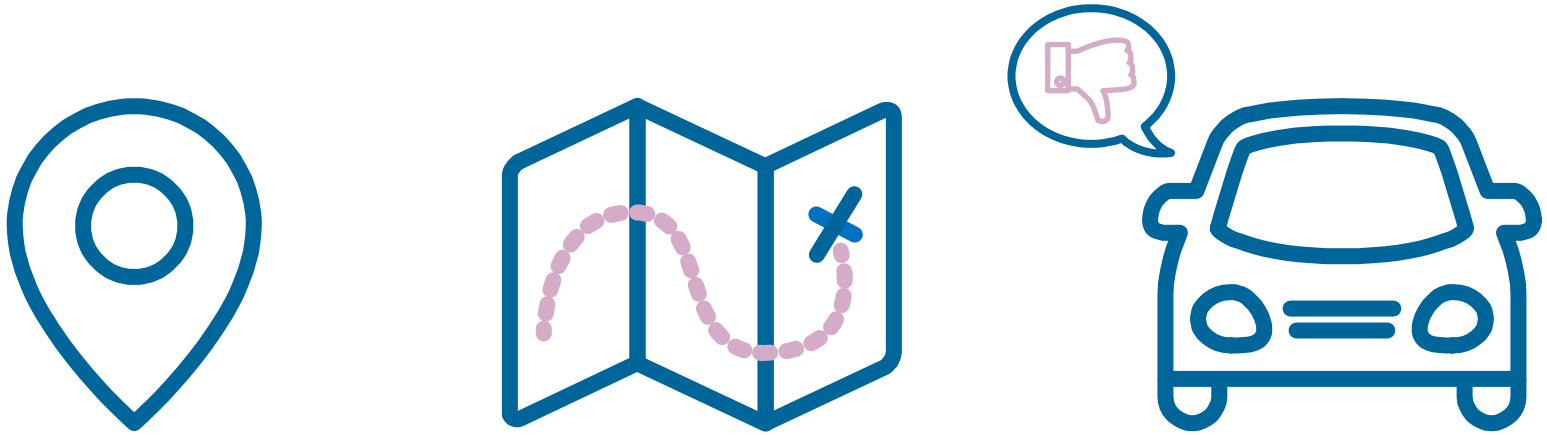
DEVELOPING CONGESTION MONITORING TOOLS

What drives congestion frustration in Toronto:
Is it travel times or a lack of reliability?

GPS PROBE DATA – TRAFFIC SPEEDS

- Real-time and historical disaggregate speed data across the city
- Contract with HERE starting in April 2017
- Facilitates better congestion monitoring, more comprehensive before/after studies, etc.

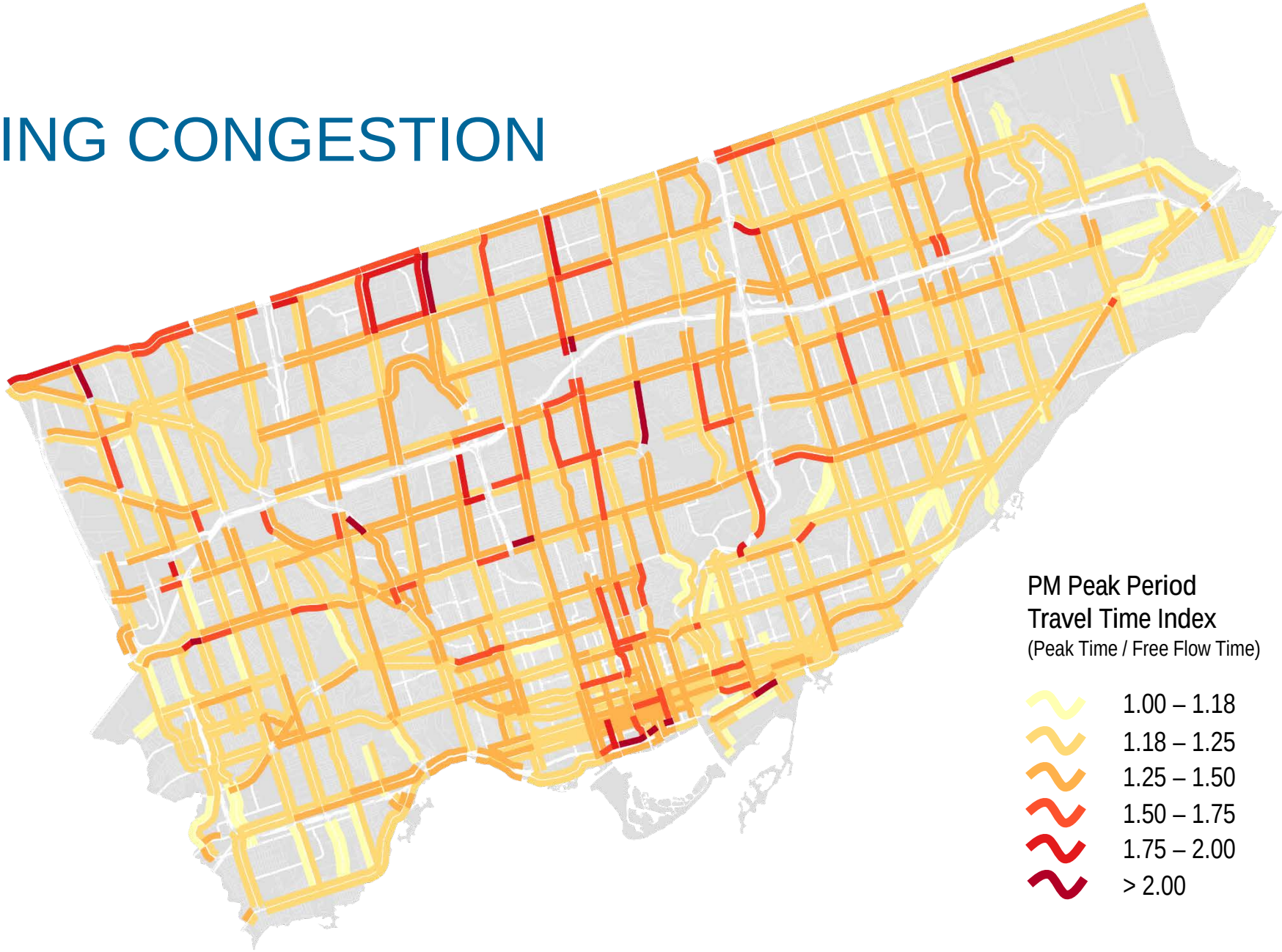




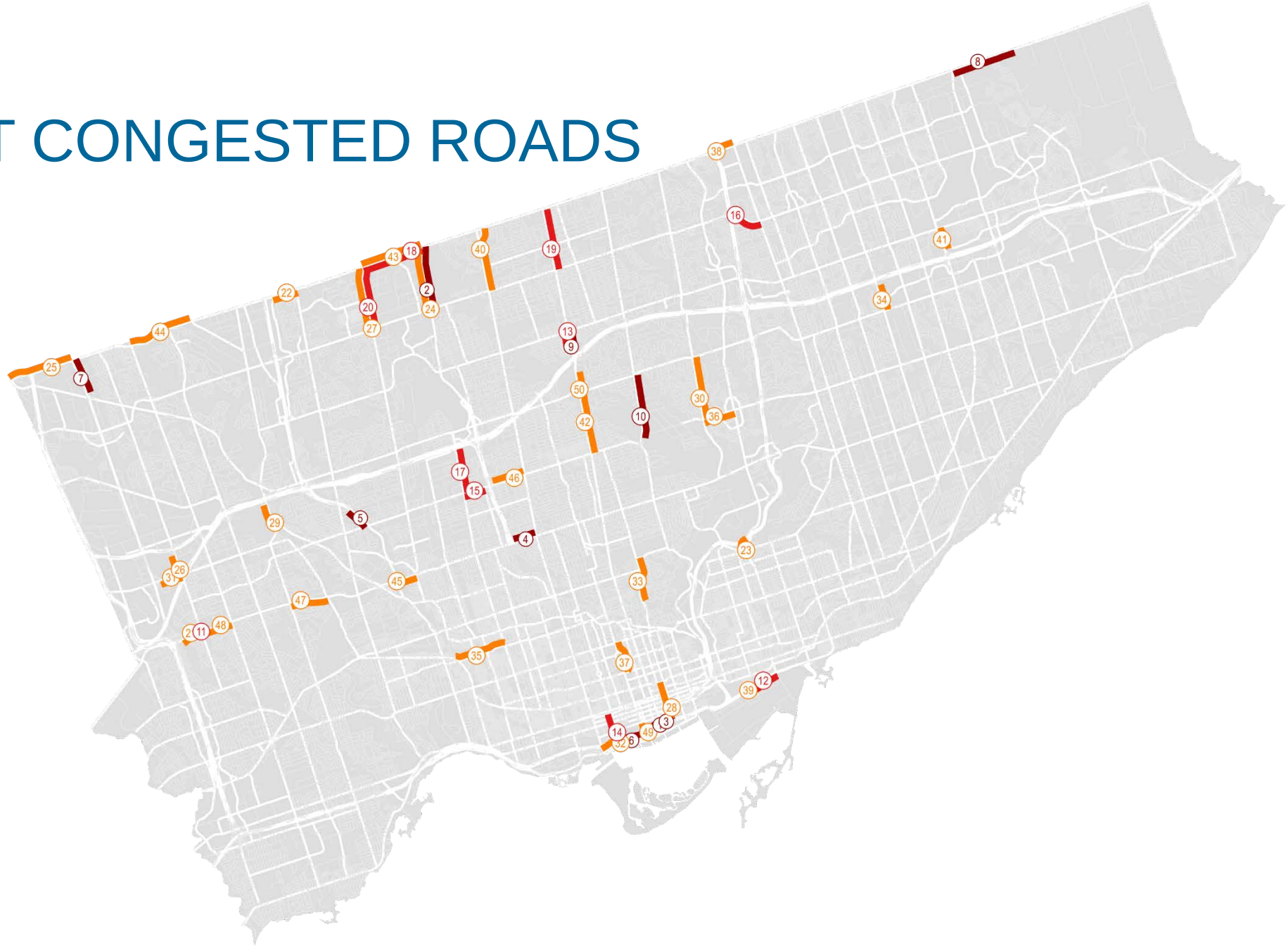
What arterial roads in Toronto are the most congested?

And what roads are the least reliable?

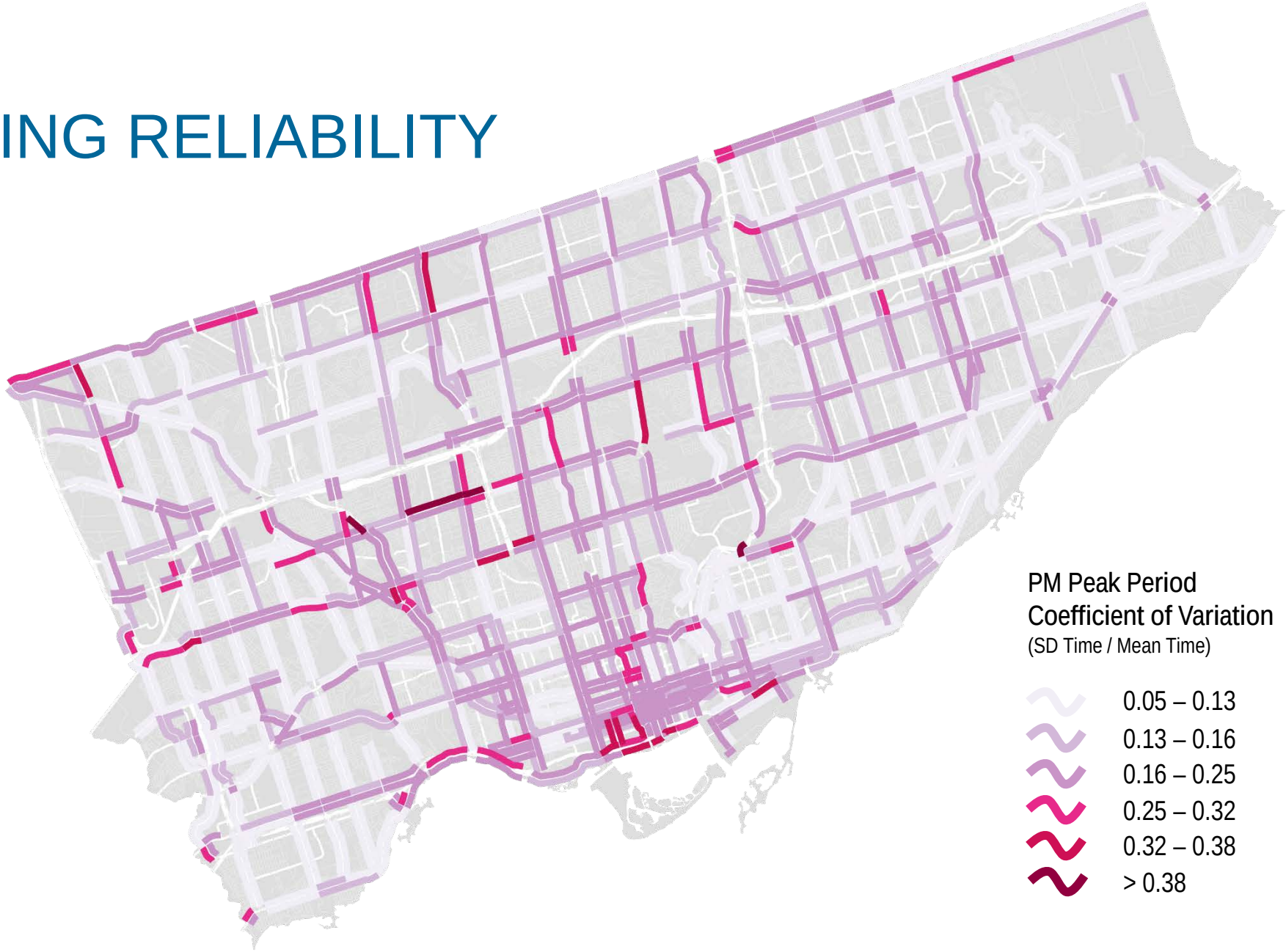
MAPPING CONGESTION



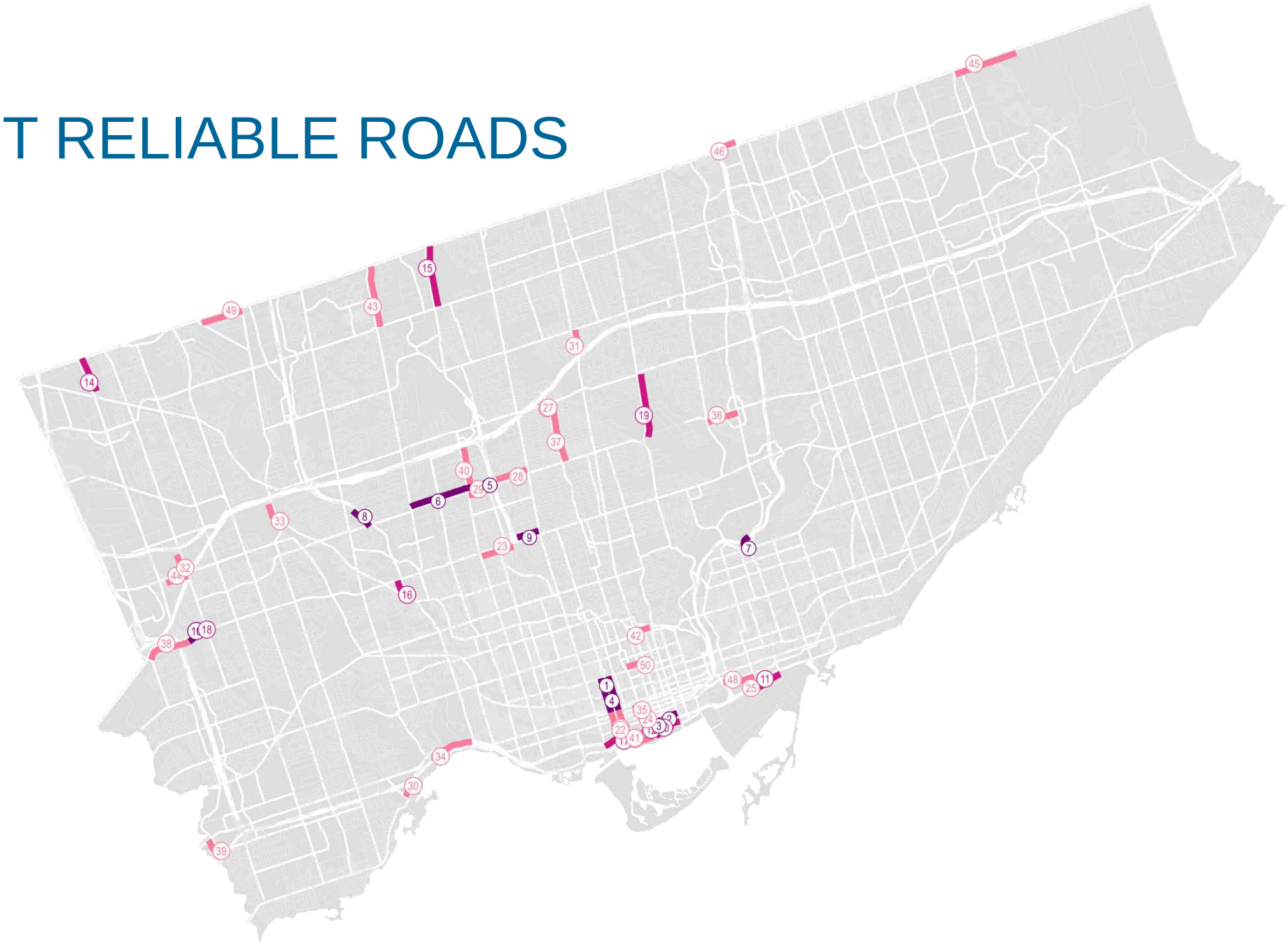
MOST CONGESTED ROADS



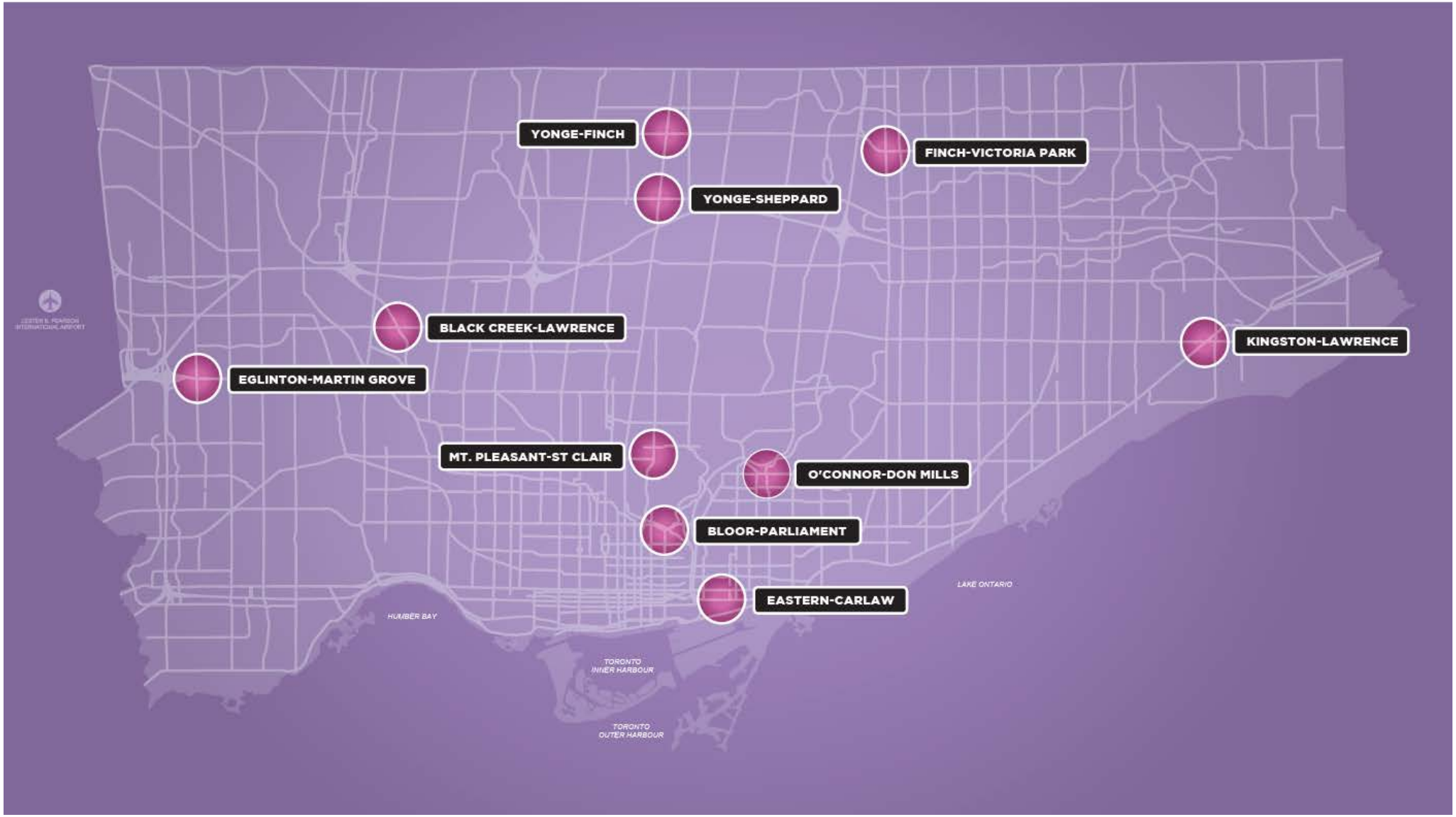
MAPPING RELIABILITY



LEAST RELIABLE ROADS



TOP 10 CONGESTION HOTSPOTS



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John Tory reveals plan to ease congestion in 10 Toronto 'hotspots'

The city will study problematic intersections to come up with ways to get traffic moving

CBC News Posted: Jan 06, 2016 12:58 PM ET | Last Updated: Jan 06, 2016 8:01 PM ET

The city is planning to tackle the problem of congestion in 10 "hotspots" in Toronto. (City of Toronto)

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The city is planning to take new measures to alleviate traffic congestion in Toronto, Mayor John Tory announced on Wednesday.

The plan is made up of a series of initiatives, including identifying "hotspot" intersections, upgrading the city's traffic signal system and developing a road safety plan to reduce traffic fatalities.

"We have to keep people moving," Tory said at a downtown news conference. "But we also have to keep them safe."

One of the measures being introduced within the first six months of 2016, Tory says, are signals that will respond to traffic volume at 20 intersections across the city.

WHAT'S NEXT?

NEXT STEPS

- Working with University of Toronto to improve traffic volume data collection
- Building analytics for Vision Zero

- Building an internal analytical culture
- Develop a network of practitioners and share best practices
- Continue development of data warehousing tools
- Developing and automating standardized methodologies for common problems & requests
- Show tangible impacts from this work:
  - Congestion monitoring dashboards
  - Before/after analyses for on-going projects

Big Data Innovation Team

Making Big Transportation Data Useful

Jesse Coleman, Big Data Innovation Team Lead, City of Toronto

TRB Webinar: Opportunities and Challenges of Digital Data Applications in Transportation Project Delivery and Management