ROADSYS, LLC

Making Mixed Mode Traffic Data Collection Easier

You Can't Fix What You Can't Measure

- **Improving transportation networks is impossible without accurate and timely data**
  - Multiple inter-related mobility modes need to be categorized and classified to plan efficiently - particularly on the approach to and at crossings and intersections
  - Traditional siloed and survey-base data collection techniques are inadequate, uncovering useful insights difficult - especially across multiple mobility modes
  - Traffic, safety, cyclist, pedestrian and transit engineering departments only have fractured and incomplete data to work with – affecting project quality and grants
  - The results:
    - Insufficient data to plan effectively – assessing changes over time
    - Misallocation of resources
    - Wasted infrastructure investments
    - Avoidable safety mishaps
    - Services not available where they are needed the most
    - Inability to quantify the benefits
    - Excessive congestion and pollution
    - Inability to demonstrate beneifts

- The quality of citizen services provided can be improved by integrated monitoring, classifying and counting of cyclists, pedestrians, and vehicles

Counting Mixed Traffic Across Multiple Modes

- **Traditional short-term survey-based and/or single-threaded (e.g. signal timing studies or public transit ridership) do not provide a complete picture for improving the flow of vehicles, cyclists and pedestrians – pen and paper are no longer viable**
  - Typically does not classify or cut across multiple modes efficiently
  - Snapshot manual measurements are prone to error and do not mirror 7x24x365 reality – outcomes are extrapolated
  - Impossible to identify hidden impacts and relationships of modes on each other - potential benefits of cross-mode counting and classification not realized
  - Inaccurate reports/predictions lead to misallocated resources – planning, funding, construction, labor, investement
  - Managing and consolidating disparate data sets viewed as a challenge
  - Intersection video may enable signal actuation but is not a complete solution for cycle/peds counting, monitoring and safety
  - Proprietary mode-specific solutions are expensive and incomplete
  - Accurate planning of sidewalks, cycle paths and roadway together is complicated without consistent demand data on their use and exceptions (e.g. cycle outside of path in road)
  - Access to adequate power has been a restriction in deploying agile counting systems

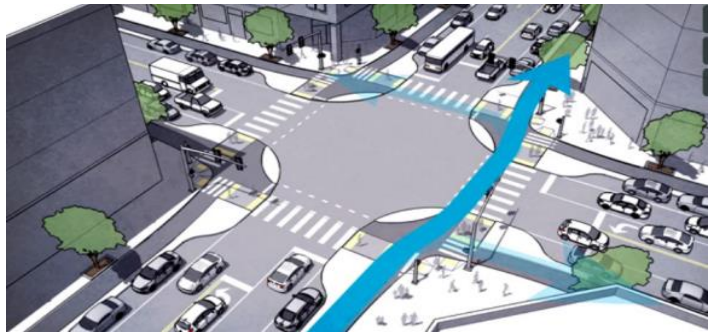
Classifying What You Are Measuring

- **Each mobility mode has particular hard-to-measure characteristics that matter and need to be connected**
  - Counts
  - Demand
  - Vehicle Class
  - Time of Day
  - Weather
  - Direction
  - Speed
  - Gap
  - Headway
  - Volume
  - Weight
  - Air Quality
  - Occupancy
  - Cluster Detection
  - Intersection Activity
  - Scheduled and Unscheduled Events
  - Road Condition
  - Travel Time

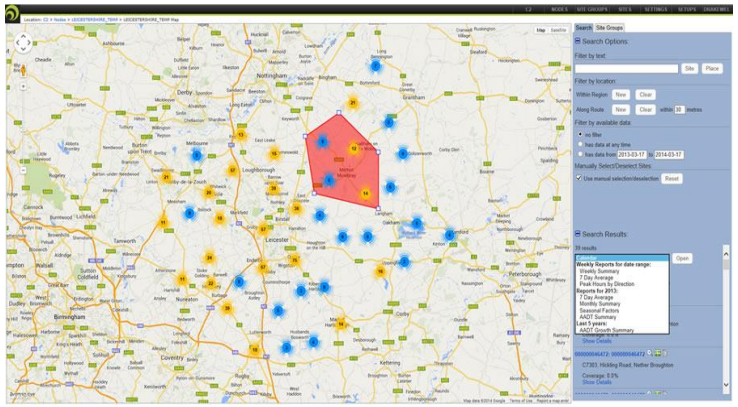


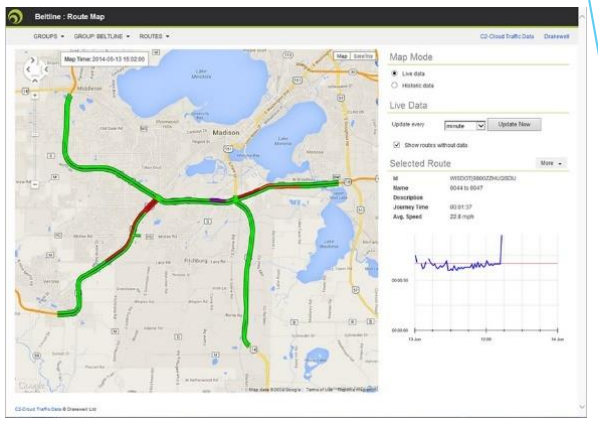

Designing Better & Safer Transportation Networks

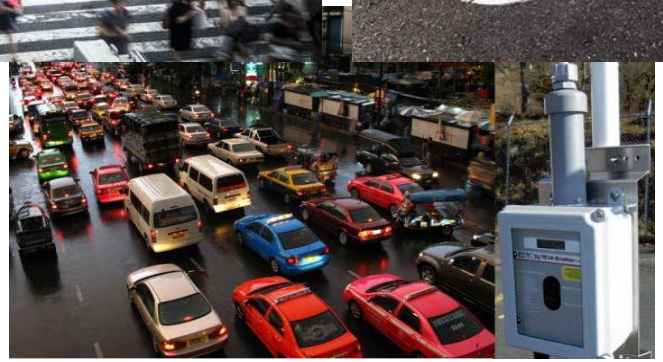
- **Lack of data inhibits a solid basis for planning, safety, project development, performance measurement, funding requests and more**
  - Simultaneous counting and correlation of vehicles, cycles and pedestrians is needed to develop better infrastructure and prioritize investments
  - Intersection actuation / green-light priority / managing turns for open flow coordination
  - Requesting funding / validating project impact and value
  - Placing safety and services for bikes and peds where they are needed the most
  - Affordable Care Act and FAST Act grant compliance, planning and certification
  - Real-time monitoring across all modes – with exception triggers
  - Recognizing approaching cyclist and peds conditions
  - Quantifying the benefits of biking and walking through effective data collection and analysis



Best Practice Monitoring, Classification and Counting





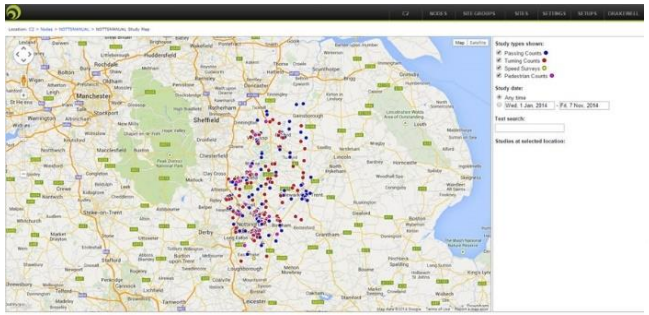


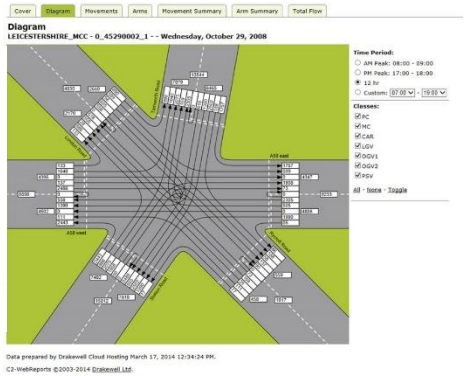
The High Cost of Not Getting This Right

- **Collecting intersection, pedestrian, cyclists, freight and transit ridership data separately leaves out opportunity for gaining insight from how they actually interact**
  - Congestion, traffic and safety are all impacted – affecting how each mode is perceived and used
  - Miscounts, incorrect inferences and misclassifications – lack of quality and data management defeats the purpose of infrastructure planning and prioritization
  - Direct impact on economic development and investment
  - Liability and insurance costs associated with safety incidents
  - Integration of single threaded solutions expensive – unfeasible to deploy at scale
  - Easily validated performance measures are missed or misstated – lost funding opportunities

A Better Way to Collect Active Transportation Data

- Low power requirement / real-time data transmission → **low operating cost**
- Detection and classification of cyclists in dedicated or mixed-traffic lanes → **flexible, signal actuation**
- Pedestrian detection and monitoring → **planning**
- Vehicle classification and weigh-in-motion → **integrated counting**
- Event monitoring and incident detection → **safety and planning**





An Integrated Offering for Real-Time Monitoring

- Weigh-in-Motion
- Event Monitoring
- Vehicle Classification
- Traffic Counting

- Cycle Counting

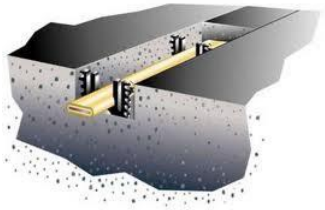
- Wireless Monitoring, Low Power Solar

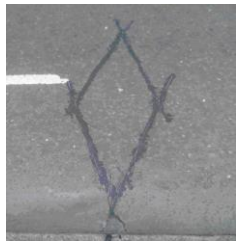
- Bluetooth Journey Time Monitoring

- Overhead Pedestrian Thermal Sensors

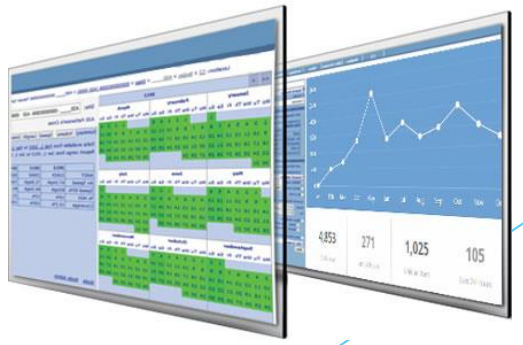
- Air Quality Monitoring

- Piezo Polymer, Inductive Loop and Pyroelectric Sensors



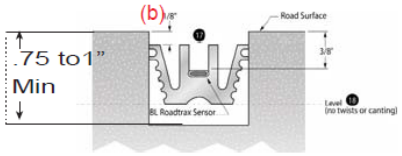


- Cloud-based Real-Time Active Transportation Data Analysis Software



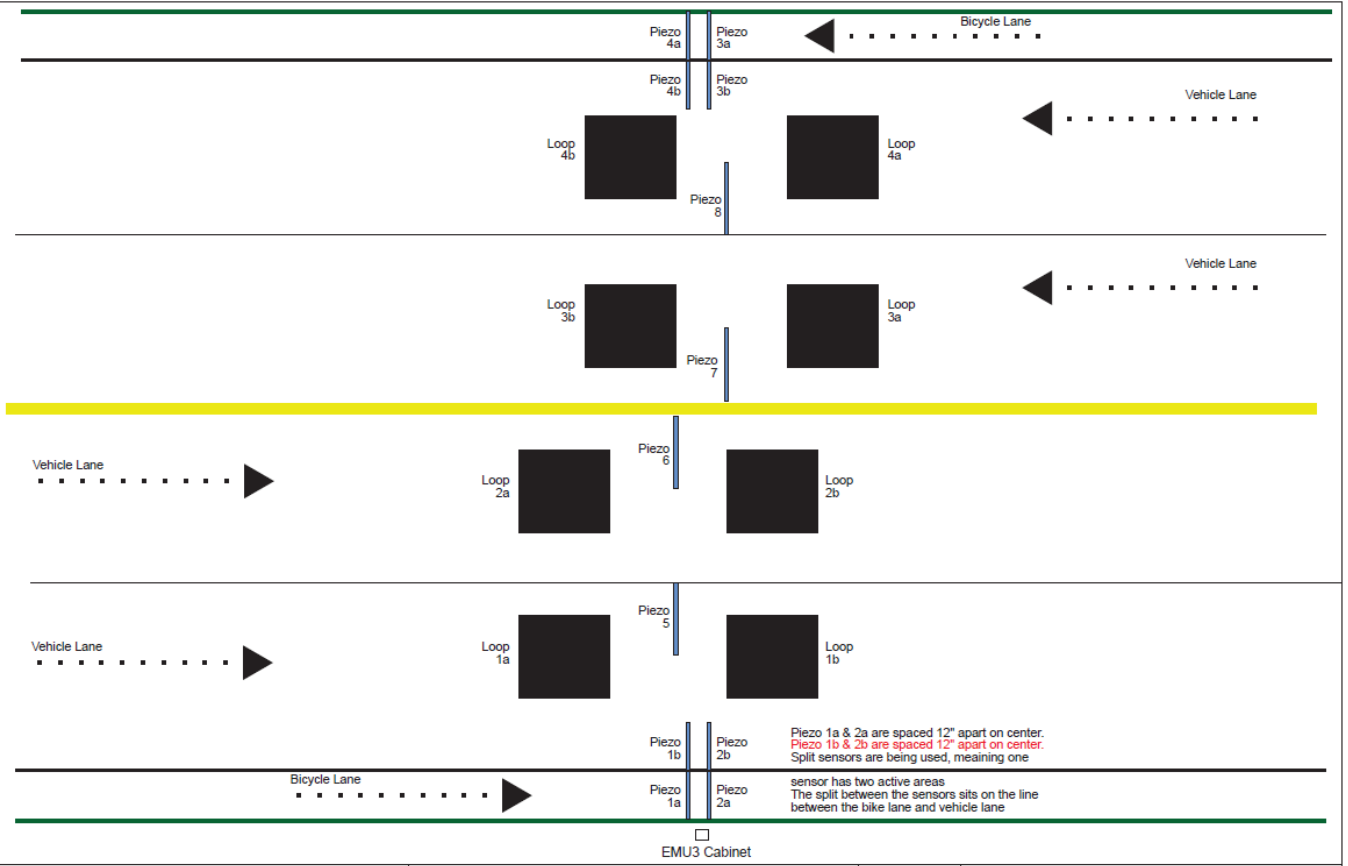
It all comes together like this …

Notes:
a) This represents the length of the piezo perpendicular to the lane
b) This represents the slot dimensions with a side view
c) The depth of the lead in slot can be 1"
d) Sensor placements and sizes are highly dependent upon the site inspection and are subject to change



168"
(a) to
36"

(c)
Leadin
Slot
1/4" wide



Roadsys, LLC 334 East Lake Rd #125 Palm Harbor, FL 34685	Project: TDC Mixed Traffic EMU3 Installation	Location: Bike Lanes and Traffic Lanes	Drawing No. 10092015-01 Checked By J Schmidt — Sheet 1 Drawn By J Schmidt — Issue 1 Date October 9, 2015 — Scale NTS

Case Study – Glasgow City Council

GLASGOW CITY COUNCIL CYCLE PRIORITY SCHEME

Government bodies look to reduce the numbers of vulnerable road users killed and seriously injured on our roads while challenged by wider legislation to reduce transport's environmental footprint. This has led to an increasing recognition of the need to detect and protect vulnerable road users in multimodal traffic environments, presenting unique challenges and opportunities to ITS providers.

In Glasgow in-road piezo-electric sensors are installed approximately 25m (75ft) upstream from the junction. The detection equipment is installed inside the traffic controller cabinet and integrates with the controllers' phasings. As cyclists approach the junction the detection at the in-road sensors triggers an output that generates a "call" based on the direction-specific detection and provides a phase for cyclists to pass safely through the junction, removing the risk of vehicle / cycle conflict.

The system obviates the need to get involved in traffic signal programming and simplifies installation/integration. The customer further benefits from the count and classification information of all activity along the route which is of benefit to the authority's cycle team.

Case Study – Valley Forge National Historic Park

VALLEY FORGE PEDESTRIAN AND CYCLE MONITORING SYSTEMS

Valley Forge has established a comprehensive and expanding bicycle and pedestrian program.

In 2015 VHB in coordination with the National Park Service (NPS) initiated a cyclical bicycle and pedestrian monitoring program. Bicycle and pedestrian counters were placed at selected locations throughout the park on different types of bicycle and pedestrian facilities.

These permanent systems provide year around data for planning and safety and provide practical transportation solutions that keep this nation's historic, sacred, and beautiful places easy to get to and explore.

Contact Details / References of Interest

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