Small but Mighty
Ingredients for Efficiencies in Small Communities
Henry Ford

He saw a big problem - and wanted to fix it with a reliable horseless carriage

Common Myth #1: Ford did NOT invent the car

Common Myth #2: Ford did NOT invent the assembly line
June 4th, 1896
58 Bagley Avenue, Detroit, Michigan

“The Quadricycle”

2018…

1,000,000,000+ Liters of Gasoline & Diesel

$1,000,000,000s spent in Infrastructure in America alone over the past century

95,000,000 Cars coming off assembly lines globally every single year
# Traffic Management Problems in Smaller Cities

Key Themes I’ve Heard From Smaller City/County Agencies:

<table>
<thead>
<tr>
<th>Small teams / Lack of staff</th>
<th>Managing field technicians/contractors</th>
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<tbody>
<tr>
<td>Lack of time</td>
<td>At around 50 signals, difficulty “keeping tabs” on infrastructure</td>
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<td>At 20-50 signals, congestion appears in pockets</td>
<td>IT complexity to connect and secure signal network</td>
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<td>Too busy “treading water” to improving traffic performance</td>
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Small Detail: Budget
Building blocks of modern traffic operations

- V2I and the Connected City
  - V2I
  - TSP/EVP
  - Data API

- Performance Measures and Analytics
  - Data Logger
  - ATSPM Software
  - Continuous Counts

- Detection and Continuous Counts
  - Vehicle Detection
  - Travel Time Probe
  - Pedestrian Detection

- Traffic Management
  - Comms
  - Device Gateway
  - CMS System
Small City Problems
The Key Questions “How do I solve this?”

Technical Logistics: “Is this even possible?”

- Need Communications
- Need Modern Controllers
- Need Intensive Data Security
- Need Support from IT Department
- Need Implementation Consulting
- How do I use older technology with newer technology?
- I have to solve it all to even try this out

Who’s going to pay for & manage all of this?
Small Cities are dealing with...

- Limited Budgets
- Tight IT Restrictions
- Investments need to prove their worth immediately
- Limited Time

This leads to an even bigger problem…
Missed Opportunities

Smaller cities are spending their resources putting out ‘fires’ and keeping the lights on; instead of improvement & evolution.
Change happens

The industry as a whole is moving towards…

- ATSPMs/Continuous performance measurement to improve traffic
- Dynamic traffic control algorithms
- Data-driven safety improvements

Intersections need to produce actionable data, and communication & detection is a key component in all of the above.
Is there a solution?
Small Cities Can Do It Better

“While I don’t think smaller cities or towns should approach the Internet of Things or “smart cities” any differently than big cities, in practice their size will give them an advantage over their larger brethren.”

Adrian McEwan, Author - Designing the Internet of Things
SMALL CITY **ADVANTAGE**

- Quicker results
- Smaller projects
- Lower Overall Costs
- More Autonomy
- Solution can grow with city
- Can leapfrog by starting at a blank slate
Miovision Solutions

**Signal Communications**
Monitor and manage your traffic signals remotely.

**Traffic Studies**
Portable and permanent traffic data collection for engineers and planners.

**Traffic Project Analysis**
Complete Traffic Impact Assessments and retiming projects quickly and easily.

**Signal Maintenance**
Find and rank issues, solve them, validate the fix, and communicate results internally.

**Traffic Operations**
Improve mobility and enhance performance of your network with data (ATSPMs).

**Multimodal Detection**
Use advanced traffic AI for presence detection and advanced analytics.
Many Problems : 1 Solution?
Minimize hardware investments, maximize problem solving

Miovision SmartLink
Remote access to everything in your cabinet via secure wireless communication.

Miovision SmartView 360
Captures an entire intersection from a single camera. Generates video for monitoring, detection, and analytics.

Miovision SmartSense
Roadside video analysis to produce vehicle detection, traffic counts, and event alerts.

Miovision TrafficLink Portal
Cloud-based software suite for traffic operations. A full open data API to integrate into all your systems.
CITY OBJECTIVES

SMARTER INTERSECTIONS SMARTER CITY
We develop to align with what all agencies are ultimately trying to solve for:

- Optimize Road Capacity
- Create a Safer City
- Reduce Emissions
- Improve Traffic Flow
- Make an Impact
- Keep it Easy
INGREDIENTS FOR EFFICIENCIES IN SMALL CITIES
THE ANATOMY OF SMART INTERSECTIONS

1. CONNECTED
   Enable remote diagnostics & monitoring

2. COST EFFICIENT
   Generate operational and capital savings

3. INTELLIGENT
   Analyze traffic data to reduce congestion and optimize flow of goods

4. COMPATIBLE
   Integrate seamlessly with existing infrastructure

5. OPEN & INTEGRATED
   Make traffic data securely available to all stakeholders

6. FUTURE PROOF
   Provide a hub for future smart city innovations
TRAFFIC MANAGEMENT
IN SMALLER CITIES

- Compatible technology, avoid any "rip and replace"
- Secure LTE cellular
- Fully managed service
- Cloud-based monitoring software
- Alerts & Visibility to issues
- Video monitoring and video-based traffic studies
- Travel time monitoring
- Signal performance measures & easy to use ATSPMs
Small City Impacts
Food for thought
Cost Efficiency Barriers

- Small teams / lack of staff
  lack of time

- At around 50 signals, congestion appearing in pockets

- Too busy “treading water” to improving traffic performance

- Managing maintenance
  staff/contractors

- At around 50 signals, difficulty “keeping tabs” on infrastructure

- IT complexity to connect and secure signal network
A major consideration in software purchase decisions is critically the human element and resources of the system.
Do you know what’s happening at your intersections without having to ship over a tech just to see if your lights are on flash or if you have faulty wires?

How much windshield time are false calls taking without having to get the local PD or Fire department involved?
SOLVING EQUIPMENT ISSUES IN A FRACTION OF THE TIME

**Region of Waterloo (Ontario)**
A small maintenance team has made solving infrastructure issues challenging.

Complex detector problems were often being unsolved for months.

**Scenario:**
Heavily utilized industrial park with an auto manufacturer

**Complaints:**
High volumes of customer complaints related to detector not performing at minor street

Technicians performed site visits multiple time, tested intersection equipment, but no issues were identified.
SOLVING EQUIPMENT ISSUES IN A FRACTION OF THE TIME

Investigation:
Installed TrafficLink units along corridor.

Within days, TrafficLink generated a malfunction log that detailed the intermittent failure of a specific loop detector.

Malfunctions log cross-referenced with complaints timeline.

Resolution:
Technician was able to immediately locate a malfunctioning detector

Within 2 hours of the TrafficLink analysis being generated, the team had diagnosed the issue, implemented an interim fix and generated a work-order.

Smarter tools can be used to offset the limitations of a small maintenance team.

“I checked the road loop and found worn thru loop wire in the center run.

When any 2 of the 4 center wires short out it can would short out one side of the loop causing a dead zone.

This type of failure would have been difficult to find without the Miovision analysis reports”

- City Technician
Intelligent

How do you give your city engineers, academic or engineering firm partners the right kind of data and enable a continuous feedback loop to make sure you’re really providing a measurable difference to your citizens?
USING PERFORMANCE MEASURES TO DIAGNOSE TRAFFIC ISSUES

Northampton, MA
State operated rural signals.

Isolated, suburban, semi-actuated intersection near an elementary school and middle school.

Scenario:
Heavy complaints from parents about minor-street delays at school AM drop-off and PM pick-ups.

Challenge:
Staff shortage made it challenging to diagnose and solve issue through traditional observation.
USING PERFORMANCE MEASURES TO DIAGNOSE TRAFFIC ISSUES

Identifying root of complaints using Occupancy Ratio analysis.

**EB**
swath of split failures between 3:10 PM to 3:50 PM

**WB**
consistent split failures between 7:20AM to 8:30AM
Developing a solution using data analysis results.

**Move from a single timing pattern**
Add two new patterns for AM and PM peaks
Use existing plan as base point

**New AM Timing Plan**
Run between 7:00 AM and 9:00 AM
Allocate more green time to minor movements

**New PM Timing Plan**
Run between 2:30 PM and 4:00 PM
Allocate more green time to minor movements
Reduce minimum green time on WB LT
USING PERFORMANCE MEASURES TO DIAGNOSE TRAFFIC ISSUES

Instant verification of the solution’s impact.

**EB**
Reduction in split failures during PM

**WB**
Fewer split failures during AM
City was able to quickly optimize this intersection by leveraging data from their existing infrastructure—rather than kicking off a bigger data collection and retiming effort.

**Identify Issues**

TrafficLink tools quantified the when/where/what

Used data to validate citizen complaints

**Design Solution**

Agency identified minor changes that could result in major improvements

**Monitor Changes**

Compare data before and after timing changes

Performance measures can be used to solve traffic issue more quickly and efficiently
Compatibility & Open Data

Both goes hand in hand; but generally the first refers to hardware and the latter refers to Software.

Are you able to consolidate easily crossreference your data across systems/agencies/partners?

Small cities need to be able to do this very easily.
An evolution in traffic signal management

Traditional / Reactive

Start

Trigger

• Complaints
• 3–5 year retiming

Design

• Collect data
• Design

Implement

• Install
• Fine tune
• Evaluate

Stop

Model a lot and measure a little

Continuous / Proactive

Data Trigger

Identify Performance Measures

Citizen Impact

Measure

Action

Analysis

What gets measured gets done

Source: FHWA
SIGNAL RETIMINGS AND QUANTIFYING IMPACT

Virginia State DOT (Multiple small cities across the state)

Team aware that corridors require re-timing and coordination, but signals on key corridors being “installed and forgotten”.

Obstacles:
Lack resources to do regular traffic studies
Lack tools to easily re-time and co-ordinate
Lack ability to measure impact.

End Result:
Corridors not being optimized as frequently as required.
Lack of insight into whether re-timings produce good ROI.
Lack of data to backup funding requests.
TRAFFICLINK 4ise SOLUTION

1. **Identify**
   Tools to easily visualize where traffic patterns have changed.

2. **Study**
   Generate on-demand video-based traffic studies with a single click.

3. **Update**
   Remote signal connectivity to easily deploy plan changes.

4. **Measure**
   Performance measures to quantify the impact of changes.
TrafficLink Travel Time Trend Analysis used to automatically identify shifts in traffic since last re-timing.

Priority dashboards used to highlight hidden trends for users.
Traffic Study:

With the click of a button, City can request video-based traffic study at any time from our SmartView 360 Camera.

Turning movement counts with classification, including bike and pedestrian.

Cost, complexity, and time to generate required traffic studies greatly reduced.
UPDATE

Remotely deploy timing plans

Secure communications integrate to existing CMS/ATMS, as well as TrafficLink web portal.
**Measurable Results:**
City can instantly verify the impact of changes and calculate the ROI. Using this to drive funding requests for additional project investments.

Smarter tools can allow agencies to more regularly and effectively re-time and coordinate signals.
Future-Proof

Small City investments need to last; but technology moves very quickly with minimal costs.

How do you adapt?

Partner with a vendor who recognizes solving problems relies on partnerships with other forward thinking organizations.
Miovision TrafficLink

More than just detection - a full suite of solutions from a single camera

- **Vehicle detection**: Improve traffic control with full actuation
- **Complete streets**: Build complete streets strategies by understanding pedestrian patterns
- **Traffic classification**: Better planning with counts and classifications of vehicle types
- **Continuous Counts**: Optimize engineering work with automated turning movement studies
- **Event detection**: A smart city platform that can detect parking violations, safety hazards, traffic incidents, and more.
Lack of actionable data is the biggest barrier to improving safety. We are working to close that gap.

Predictive Safety Analytics:

- Identifies compliance hazards
- Profiles intersection traffic risks
- Near miss analysis
Pedestrian Compliance

**Spatial Compliance**
- Pedestrian Heatmap, Jaywalker %, etc.

**Phase Compliance**
- Walking on *Walk* and *FDWSignal* vs. *Don’t Walk*

![Graph showing time vs. pedestrian behavior]
Predictive Safety Analytics

‘Red Zone’ Occupancy or Anonymized Red Light Running Data

Vehicles within the ‘Red Zone’ is generally okay when traffic is moving through it.

However safety concerns can arise from two conditions:

Vehicles remaining within the ‘red zone’ during yellow or red can cause potential conflicts.
Near-Miss Analysis

Aka. near-miss analysis, this data describes when, where, and how critical near-misses between vehicles, pedestrians, and bikes occur, and how often they occur.

Miovision is currently working with our research team and third-party partners to work toward a conflict analysis solution.

This deeper analysis could be more targeted and prioritized if utilizing the other safety metrics first.
Smart Intersection Countermeasures

Connected Vehicle Alerts

Personal Safety Messages via DSRC
Leveraging Video Analytics technology, warn connected vehicles about the presence and location of vulnerable road-users within a crosswalk, around the corner, or in an intersection.

Roadside Alerts via DSRC
Warn connected vehicle drivers of potential hazards, poor road conditions, public safety issues, or infrastructure malfunctions via Roadside Alerts.
Small Cities Are Mighty

Invest in technology that will allow you to solve multiple problems simultaneously.
Thank You