FAST-TRAC and Other Innovations at the Road Commission for Oakland County

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AGENDA

ABOUT RCOC

FAST-TRAC

Comms/Detection

Other Initiatives

Connected Vehicles
ABOUT RCOC

The Road Commission for Oakland County (RCOC) is the largest county road agency in the State of Michigan.

- 1,000,000+ Residents in Oakland County
- 90,000 Signs
- 2700 Miles of County Road
- 1800 Traffic Signals
SAFETY STORY

- Oakland County’s roads are among the safest in the world for an area our size and population
- In 1978, “Safety” became our top priority

Fatality Rates (per 100 million vehicle miles of travel)

<table>
<thead>
<tr>
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<th>1967</th>
<th>2015</th>
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<tbody>
<tr>
<td>Oakland County</td>
<td>6.8</td>
<td>0.53</td>
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<tr>
<td>Michigan</td>
<td>6.5</td>
<td>0.98</td>
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<tr>
<td>USA</td>
<td>5.7</td>
<td>1.11</td>
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OAKLAND COUNTY TOTAL TRAFFIC FATALITIES

1967: 206 Fatalities

2015: 67 Fatalities
Faster And Safer Travel - Through Traffic Routing & Advanced Controls
GROWTH OF FAST-TRAC

- Started in June 1992 with 28 intersections under SCATS and Autoscope control
- Currently over 750 Intersections are using SCATS technology
- SCATS is in 40 communities….and growing
FAST-TRAC’S FIRSTS

- First Suburban Adaptive Traffic Control System in the USA
- First Test of Video Processing for Adaptive Traffic Control in the World
- First Local Unit of Government to Initiate an ITS Project of this Scope
- First Traffic Web Site to Include Freeway and Arterial Information
  (http://www2.rcocweb.org/TrafficWeb)
SCATS SIGNAL SYSTEM
SYDNEY COORDINATED ADAPTIVE TRAFFIC SYSTEM
SCATS HARDWARE STRUCTURE

Management Computer

Regional Computer

FAST-TRAC Controller

Autoscope
SCATS INTERFACE
Wanted a system that was cutting edge with real-time signal plan generation

In 1989 only 2 systems existed

SCATS fit better with the local conditions

- 8 Phase signals
- Poor Spacing
- Corridors/Grids/Lakes
- Changing Traffic Patterns
ADVANTAGES OF SCATS TRAFFIC SIGNALS

- Adaptive
  - Adjust signal timings in real-time based on actual volumes
  - Skips phases with no demand
  - End phases early
- Continuous Signal Timing Updates
- Central Monitoring of System from TOC
BENEFITS

ACCIDENT SEVERITY ANALYSIS

BEFORE

9%

AFTER

4%

Possibly Injured
Non-Incapacitating
Incapacitating
BENEFITS
TRAVEL TIME IMPROVEMENTS
(NB ORCHARD LAKE RD)

AM Peak - 20%
Off-Peak - 32%
PM Peak - 7%
COMMUNICATIONS

“Any Adaptive System is useless without reliable Communications “

Recently updated from old copper (analog) phone lines to wireless communications

- Updated over 750 SCATS Signals
- Second phase - communications to fixed time signals

Additional benefit is of Upgrade is CCTV Installations

- Over 100 CCTV cameras by the end of FY 2018
COMMUNICATION BENEFITS

- Significant cost savings (operations, staff time)
- Upgrade supports future growth
- A public-private-partnership with AT&T
- Improved SCATS efficiencies
- Improve the visibility of the arterial system
- Flexibility to install/add new devices as needed
“Any Adaptive System is useless without effective detection”

Overhead Cameras – over 2000 deployed

- Autoscope
- FLIR (thermal)

Surface Detection

- Sensys detection system (pucks)
- Traditional (traffic loops)
OVERHEAD
VEHICLE DETECTION
ADVANTAGES OF OVERHEAD DETECTION

- Able to Maintain 365 Days Per Year
- Usually No Lane Closures Needed for Maintenance
- Difficult to Maintain Loops
- Safer for Motorists and our Crews
SCATS EVENT MANAGER

- Palace of Auburn Hills had 8 plans controlled 12 intersections and over 200 events each year.
- Suburban Collection in Novi has one intersection.
- Pontiac Silverdome had over 200 plans that controlled 23 intersections and 12 lane-use signs.
- MDOT/RCOC ICM Project to control 46 intersections (I-75 in Troy).
TOC INTEGRATION WITH MDOT

- Inter-tie to MDOT’s SEMTOC (SE Michigan Transportation Operations Center)
- Data sharing from MDOT
  - Speed and volume
  - Incidents
  - Construction
  - Freeway video
- Transportation Information Management System (TIMS)
- Metro Traffic reported from TOC
OTHER INITIATIVES

HAWK

RRFB

ROUNDABOUTS
AVL Tracking System
THE FUTURE OF THE TRANSPORTATION INDUSTRY

CONNECTED VEHICLE INSTALLATIONS IN OAKLAND COUNTY
PARADIGM SHIFT FOR ROADWAY SAFETY

- Moving from passive safety to active safety

- Connected Vehicle Technology allows us to move from minimizing the extent of the injury after the crash to preventing the crash in the first place

- Ability of cars talking to other cars and the infrastructure
CONNECTED VEHICLE TECHNOLOGY
POTENTIAL APPLICATIONS

- Work Zone Management
- Traveler Information
- Weather Sensing
- Intersection Collision Avoidance
  - also
  - In-Vehicle Signing
  - Emergency Vehicle Alerts
  - Curve Warnings
  - Slippery Pavement Alerts
  - Over 100 other applications
WHAT IF WE HAD CONNECTED VEHICLE TECHNOLOGY

I-75 in Grayling

100-car I-75 pileup
Kills 1, injures 40

Squall blinds drivers at exit near Frederic

I-96 in Muskegon

I-96 in Williamston
Michigan’s Advantages as CV Center

- Home to Big Three and Auto Suppliers (OEMs)
- History of ITS leadership (FAST-TRAC)
- RCOC is a partner with MDOT and FHWA
DAIMLER CHRYSLER (DCX) HQ INSTALLATION (2005)

- Installation of wireless network on six traffic signals around HQ, Telegraph at Maple & Telegraph at 12 Mile
- Joint project between RCOC, MDOT, DCX and Ottawa Wireless
- Chrysler instrumented “fast-feedback” cars to communicate data across the wireless network
- Intent: Retrieve real-time probe and diagnostic data from vehicles
- RCOC/MDOT received “probe vehicle” information
COOPERATIVE INTERSECTION COLLISION AVOIDANCE SYSTEM (CICAS) (2006)

- Implemented field trials that demonstrated improved intersection safety by alerting vehicles that were about to run a stop sign or traffic signal
- Oakland County test intersections
  12 Mile & Farmington Rd and 10 Mile & Orchard Lake
- Other field trials were in Virginia and California
Ongoing effort led by MDOT

Evaluate the use of Connected Vehicle data for public-sector purposes

- Responding to safety concerns
- Managing traffic
- Managing transportation assets

Answer the questions “How can public agencies use Connected Vehicle?” and “What data is useful?”
NATIONAL CONNECTED VEHICLE PROOF OF CONCEPT (POC) (2007)

- Joint project with MDOT and FHWA
- First large-scale demonstration in the entire U.S.
- Located in the southwest portion of Oakland County (Novi/Farmington Hills)
- 55 RoadSide Equipment (RSE) units installed at 43 traffic signals
- Covered about 45 square miles
- Successfully proved that data could be shared between infrastructure and vehicles in a timely, accurate and useful manner
- Project is ongoing with RCOC helping to maintain
MDOT TELEGRAPH EXPANSION PROJECT (2010)

- 22 RSEs in Southfield
- Send SPaT information
- Open test bed
- Ongoing project
CONNECTED VEHICLE DEPLOYMENT EFFORTS

- Ford Lincoln (2005) Wi-Fi
- Motorola DSRC (2006) VtoV and VtoI
- Taiwan SPaT Demo (2011) Cellular and DSRC
  Adjust car speed to get a green signal
- USDOT Safety Pilot (2011) Ann Arbor
- ITS World Congress (2014)
- RCOC CV Committee Involvement
  - Pooled Fund
  - AASHTO CV Working Group
  - ITE CV and Autonomous Task Force
  - CV Coalition
CONNECTED VEHICLE DEPLOYMENT EFFORTS CONT’D

Current CV Collaborations with MDOT

- Auburn Hills SPaT Project
- 3M Sign Applications
- Potential to equip RCOC fleet for CV applications

OCCV Task Force

- Testing various technologies with OCCV taskforce, MDOT and multiple private entities
ITS AMERICA 2018 IN DETROIT

Annual ITS event June 4 to 7, 2018