City of Lafayette

Advanced Transportation Management System (ATMS)

Active Traffic Signal Management
December 13th, 2011

Agency Case Studies
Fred Koning – Lafayette Traffic Foreman
Tom Vandenberg, PE, PTOE – BF&S Traffic Engineer
Greater Lafayette Map
Existing Traffic Signals
Existing and Future Signals

- Signals currently integrated into Lafayette ATMS = 65 signals
- Existing traffic signals currently under Lafayette jurisdiction = 85 signals
- Anticipated future signals under Greater Lafayette regional jurisdiction = 150 signals
Lafayette ATMS - Goals

Utilize existing staff to achieve the following goals:

1) **Signal Equipment Maintenance**  
   Need to be notified quickly with accurate information  
   - priority reports, detector failures, signal flash

2) **Signal Timing Optimization**  
   Need to be able to re-time signals with minimal effort  
   - minimal data collection, minimal field adjustments, special events

3) **Traffic Data Collection**  
   Need to be able to use signal equipment to collect traffic data  
   - for signal timings, overall transportation planning
Communication is provided by:
1. Radio modems at each traffic signal cabinet that transmit to the central radio modem receivers at the Columbia Park tower.
2. Fiber optic cable from the Columbia Park tower to the computer servers.
3. Fiber optic connection from computer server to the following workstation computers: Engineer's Office and Traffic Department.
4. VPN connection from the computer server to the following workstation computers: Butler, Fairman & Seufert and Purdue University.
Columbia Park Receiving Tower
Computer Servers
Lafayette Traffic Department

Before

After
Lafayette Traffic Department

After
Centracs® ATMS Software

http://www.econolite.com
Lafayette ATMS - Personnel

**Jenny Miller** – Lafayette City Engineer
System Administrator

**Fred Koning** – Lafayette Traffic Dept. Supervisor
System Operator (primary day to day user)
Traffic Signal Equipment Operations

**Andy Milam** – Lafayette IT Director
IT Equipment Operations

**Tom Vandenberg** – Butler, Fairman & Seufert, Inc.
Traffic Engineering Consultant

**Purdue University and LTAP**
Potential Research Projects
Funding and Contracts

To date: Integrated **65 signals** into the system of the **85 total Lafayette signals**

1) Veterans Memorial Pkwy (CR 350 S) roadway widening project, Signal installation project, Existing signals – integrated **10 signals**

2) Two ARRA (stimulus) FHWA project:
   a) **$750,000 budget**
   b) Upgrade signal equipment – new controllers and MMU’s, count detectors, radio modems and antennas
   c) Primary FHWA project – integrated **50 signals**, substantially completed July 2010
   d) Contingency FHWA project – integrated **5 signals**, completed August 2010

3) Energy Efficiency and Conservation Block Grant (EECBG) from DOE:
   a) **$350,000 budget**
   b) ATMS software, new computer servers, design engineering services, fiber optic to traffic department, large computer monitor
   c) ATMS Software
      - primary requirements installed end of November 2010
      - Performance Measures graphics underway
Lafayette ATMS - Lessons Learned

1) Funding  Small agencies have limited funding for traffic signals
2) Funding  Requirements of available funding may dictate design
3) Funding  Supplemental local funding may be needed for misc. items
4) Design  Multiple contracts/components presents challenges
5) Design  The system’s “plan” will constantly change
6) Design  “Signal Modernization” projects: unplanned equip. needs
7) Radio interconnect  Interference for long distances, unplanned interferences
8) Software  “Commercial- off- the- shelf” still requires upgrades, firmware
9) Software  Initial configuration of software requires effort/time
10) Operations  ???
Lafayette ATMS - Benefits

1) General
   Access controllers from central location

2) Equipment Maintenance
   Daily reports (e.g. detector status, flash, etc)

3) Equipment Maintenance
   Access controller logs to troubleshoot from office

4) Signal Timing Optimization
   Ability to coordinate 65 signals

5) Signal Timing Optimization
   Special event traffic, other timing plans

6) Signal Timing Optimization
   Performance measures will provide analysis tool

7) Traffic Data Collection
   Helps with signal optimization efforts

8) Traffic Data Collection
   General transportation planning
<table>
<thead>
<tr>
<th>Quarter</th>
<th>Event</th>
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<tbody>
<tr>
<td>1st qtr 2009</td>
<td>Planned system: “Downtown”, football traffic - 20 signals</td>
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<tr>
<td>2nd qtr 2009</td>
<td>Obtained ARRA funding from FHWA and DOE</td>
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<tr>
<td>2nd qtr 2009</td>
<td>Preliminary design and general radio survey performed</td>
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<tr>
<td>2nd qtr 2009</td>
<td>Performance Measures (PM) - LTAP, JTRP, Elkhart County</td>
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<tr>
<td>3rd qtr 2009</td>
<td>Planned system: 65 signals</td>
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<tr>
<td>4th qtr 2009</td>
<td>“Primary” FHWA contract letting – 50 signals</td>
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<tr>
<td>4th qtr 2009</td>
<td>PM - CR 350 S project and research</td>
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<tr>
<td>1st qtr 2010</td>
<td>“Contingency” FHWA contract letting – 5 signals</td>
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<tr>
<td>3rd qtr 2010</td>
<td>Both FHWA contracts substantially complete</td>
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<tr>
<td>3rd qtr 2010</td>
<td>Used demo software for 2010-2011 football season</td>
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<tr>
<td>3rd qtr 2010</td>
<td>“Software” contract letting – Centracs and PM</td>
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<tr>
<td>4rd qtr 2010</td>
<td>Centracs installed and configured, 1st iteration of PM</td>
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<tr>
<td>1st qtr 2011</td>
<td>Replaced radio with fiber – 10 signals</td>
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<tr>
<td>2nd qtr 2011</td>
<td>Traffic responsive for 2011-2012 football season</td>
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<tr>
<td>4th qtr 2011</td>
<td>Additional iterations of PM</td>
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Needs for System Implementation

1) Capital Funding and Operations Funding
   - **Capital** - Used DOE grants and ARRA funds, but no traditional sources (FHWA, TIF, etc)
   - **Operations** - No additional staff or budget is available for Lafayette ATMS signal system

2) Need a “turn-key” or “commercial-off-the-shelf” system
   - Need minimal City staff involvement for both installation and operations of the system.
   - System needs to work with existing traffic signal equipment, existing staff resources and available funding sources.
Summary
Active Traffic Signal Management
City of Lafayette

City of Lafayette = small agency
1) Traffic Signals = 85 existing, 150 future
2) Engineering Dept Staff = 4 engineers, traffic consultant
3) Traffic Dept Staff = Traffic foreman and 2 staff members
4) Minimal time and funds allocated to traffic signals
5) Active management tools need for equipment maintenance, signal timing optimization and traffic data collection

Active management tools currently used by the Lafayette ATMS:
1) Central signal system hardware and software
   - daily reports, traffic responsive, live data, historical database
2) Several performance measure add-ons
   - V/C ratios, % of vehicles arriving on green, etc
   - efficient management tool for assessing progress
Questions?

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