Gettysburg Area Traffic Signal Enhancement and Intelligent Transportation Systems Deployment

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Agenda

- The Big Picture
- Background
- Project History/Goals
- System Elements
- Lessons Learned
- Schedule and Costs
- Benefits
- Other PennDOT Initiatives
The Big Picture

- Traffic Incidents: 25%
- Bad Weather: 15%
- Bottlenecks: 40%
- Poor Signal Timing: 5%
- Work Zones: 10%
- Special Events/Other: 5%

- 45 percent recurring
- 55 percent non-recurring

Think beyond recurring congestion
Think about operational solutions including a combination of:
- ITS elements
- Signal systems
- Interagency coordination


Gettysburg Area
Traffic Signal Enhancement and Intelligent Transportation Systems Deployment
The Big Picture

- Shared responsibility
- Corridor and regional operations
- Revise policy and procedures

Transportation Systems Operations Plan (TSOP)
- Statewide direction for transportation operations
- TSOP 08: Implementation of TAC Recommendations
- In early development of Statewide Traffic Signal Asset Management System (TSAMS)
- Integrated Corridor Management (ICM) pilot efforts
- Multi-jurisdictional traffic signal operations

Governor’s Transportation Funding and Reform Commission
- Modernizing 66% of all traffic signals (13,000) over ten years
- Installing real-time traffic information and management systems in major urban areas in ten years
Gettysburg Area
Traffic Signal Enhancement and
Intelligent Transportation Systems Deployment

**Background**

- **Historic significance**
  - Five buildings from the battle of 1863 remain on Lincoln Square
  - Lincoln Square has between 2,000 and 4,200 vehicles during peak hours

- **Increasing local demands**
  - Adams County is home to about 102,000 people
  - One of three fastest growing counties in state with nearly 20% growth per decade
  - Development activity on SR 30

- **Significant tourist demands**
  - 1.5 million people visit the area annually resulting in seasonal traffic demands
  - SR 30 volumes ADTs range from 16,000 to 23,000

- **Various modes**
  - Higher than expected truck demands
  - Motorcycle activity during summer season
  - 11,000 pedestrians crossing study intersections in tourist season
Project History/Goals

In 1998, 13 traffic signals within the Borough were updated and a closed-loop signal system was developed.

In 2001, Adams County Comprehensive Road Improvement Study (CRIS)
- Identified traffic signal enhancements and coordination within and surrounding the Borough of Gettysburg as a top priority.
- Promoted the use of Intelligent Transportation Systems (ITS) to improve safety and mobility.

In 2004, an ITS Earmark was obligated for project deployment.
Project History/Goals

- Reduce congestion and travel times
- Improve emergency response
- Enhance pedestrian safety
- Preserve the historic infrastructure
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<tr>
<th>System Elements</th>
<th>Considerations</th>
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| Multi-Jurisdictional Signal System (MJSS)                                     | - 26 signals  
- Gettysburg and Straban signals integrated  
- PennDOT operational oversight & control, if needed  
- MJSS agreement to be established that covers signal operations, stakeholder coordination and consideration of development  
- FHWA study concluded MJSS can reduce delay by 8 to 25 percent |
| New Signal Installations                                                      | - 4 new signals and 2 signals upgraded |
| Interconnection Upgrades                                                      | - Hardwire considered, but utility attachment fees were cost prohibitive  
- Install/ upgrade interconnection of 7 signals along SR 30 in Straban Township  
- Interconnect new signals  
- 900 MHz wireless radio interconnect for low bandwidth, but long range |
| Operational Upgrades                                                         | - New timing plans for all intersections  
- Special events timing plan  
- Other phasing adjustments to address congestion and pedestrian mobility |
| Lincoln Square Metering                                                       | - Use neighboring signals to “meter” traffic into Lincoln Square during congested conditions |
System Elements

Metering of Lincoln Square

- **No signals on the Square** – the goal is to preserve the historic infrastructure
- **Phase 1** - Better consider Square delays including parking and pedestrian activity in east-west and north-south progression
  - Nearly 1.5 minutes of delay due to Lincoln Square EB and WB
  - Nearly 1.1 minutes of delay due to Lincoln Square NB and SB
System Elements

Metering of Lincoln Square

- **Phase 2** - Utilize video detection on Square and signalized intersections approaching the Square to monitor traffic volumes/speeds and to adjust timings to limit Lincoln Square congestion
  - Video detection on Square required mounting on Hotel
    - 5.8 GHz wireless radio for shorter range, higher bandwidth and less interference from Hotel to street
    - Holiday detection scheme due to Christmas tree in Lincoln Square
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<tr>
<td>Emergency Preemption Systems</td>
<td>26 intersections&lt;br&gt; Considered GPS-based systems, but cost was a considering factor&lt;br&gt; FHWA study found that emergency preemption systems reduced response times by 16 to 23 percent</td>
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<td>Light Emitting Diode (LED)</td>
<td>26 intersections&lt;br&gt; Longer life than incandescent bulbs and gradual burnout&lt;br&gt; LED’s result in up to 40 percent energy savings</td>
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<td>Signals</td>
<td>17 intersections with high pedestrian activity&lt;br&gt; Improved pedestrian awareness of available time to cross&lt;br&gt; LED technology</td>
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<td>Countdown Pedestrian Indications</td>
<td>4 mid-block locations with high pedestrian activity&lt;br&gt; One replacement system that was damaged&lt;br&gt; Pedestrian push buttons&lt;br&gt; Considered pedestrian detection, but pedestrian paths are not well defined&lt;br&gt; Includes tactile curb ramps</td>
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| **CCTV**        | - Installed at 4 locations including US 15 & SR 30 interchange  
|                 | - Coordinated with proposed US 15 and SR 30 interchange project  
|                 | - Coordinated design specifications with Harrisburg ITS Deployment  
|                 | - 768K Frame Relay (point-to-point) selected to maximize bandwidth and limit communications costs (approx $200/month) |
| **DMS**         | - Installed at 3 locations: US 15 NB, US 15 SB & SR 30 WB  
|                 | - Center-mount  
|                 | - Smaller DMS utilized on SR 30 due to limited R/W and potential overhang issues – 1st arterial DMS  
|                 | - Coordinated design specifications with Harrisburg ITS Deployment  
|                 | - Dial-up to be utilized due to low bandwidth needs (<$40/month) |
| **District 8-0 TMC** (part of Harrisburg Area ITS Deployment) | - Needed to coordinate with ongoing ITS Deployment project in Harrisburg Area  
|                 | - Includes (nearly completed) District 8-0 TMC  
|                 | - 19 DMS  
|                 | - 40 CCTV  
|                 | - 11 HAR and 21 HAR signs |
System Elements

Signal Enhancement and CCTV (partial) Coverage Area

DMS Deployment

DMS Deployment
Lessons Learned

Institutional

- Involve/ update stakeholders
  - Involve municipal signal “owners”
  - Involve other stakeholders: EMAs, NPS, business, etc
- Start discussion regarding agreements early and involve legal
  - Hotel attachment agreement
    - Hotel very cooperative
  - Hotel/Shentel utility service agreement
    - Hotel and Shentel very cooperative
  - Multi-jurisdictional signal system agreement
    - Limited examples in PA
    - Defines signal system operations/ maintenance, stakeholder coordination and consideration of development
- Continue to reach out to utilities
  - Some utilities are slow to react to a “small” project
- Coordinate with “moving targets”
  - Development projects
  - US 15 and SR 30 interchange
  - Harrisburg ITS Deployment
Lessons Learned

Design

- Consider benefits and costs of using various technologies
- “Right-size” communications
  - Balance reliability and bandwidth versus costs
- Consider new technologies
  - Considered ACS Lite, but will not be included in this project. It may be considered in the future.
    - Cross-arterial progression is still being addressed
    - Multi-sonics controllers are not fully compatible
    - The system would require more detection
    - Unknown operations and maintenance
  - Considered GPS-based emergency vehicle pre-emption, but that was cost prohibitive.
Lessons Learned

Design

- Use tools available
  - District 8-0’s Incident Management van was used to evaluate CCTV locations
  - 15 of the signals had “new” controllers
- Verify reliability of wireless communications
  - Conduct a radio path study
- Be prepared to improvise
Schedule and Costs

- Cost – $2.3 million
- Final Design – 100% complete
- Construction
  - Letting in Fall 2007
  - Construction completed by Summer 2008
- Post-Construction
  - Evaluation of benefits
Benefits

This project does not include revolutionary technological approaches, but does illustrate an example of “transportation operations”

- **Technologies and institutional arrangements**
- Maximizing transportation system efficiency and improving safety
- Addressing recurring and non-recurring demands
- Considering freeway/arterial solutions
- Improving interagency communication and overcoming institutional barriers
- “Right-sizing” technologies (including communications) to maximize resources
- Working outside of our normal “engineering boundaries”

Anticipated Benefits
- Reduce Congestion
- Improve Emergency Response
- Improve Safety
- Reduce Energy Consumption
- Preserve Infrastructure
Other PennDOT Initiatives

Congested Corridor Improvement Program (CCIP)
- Resulted from PennDOT’s strategic planning process – Moving Pennsylvania Forward Update
- Consistent with PennPlan and Pennsylvania’s Highway Congestion Management Strategic Plan
- Projects result from nominations by planning partners
- Focus is on immediate- and short-term improvements
- Goal is a 20 percent reduction in peak hour travel time through:
  ✓ Minor signing and pavement marking improvements
  ✓ Signal timing modifications
  ✓ Minor intermodal enhancements
  ✓ Minor geometric improvements
Traffic Signal Enhancement Initiative (TSEI)

- Initiative to address congestion along key corridors throughout the Commonwealth
- “Partner with municipalities to identify traffic signals that need to be retimed, upgraded, or better integrated into an overall congestion management strategy”
- Goal is reduction in travel time and delay through:
  - Traffic signal timing and phasing modifications
  - Traffic signal system implementation/upgrades
  - Traffic signal equipment upgrades
- PennDOT Districts nominate key corridors