Adaptive Traffic Signal Control System –
Strategies for Serving Different Multimodal Needs While Satisfying Institutional Requirements

Presentation Outline

- Project Background (Wilson Way Adaptive System)
- Technical/System Requirements Process
- Stakeholder Involvement
- Federal Requirements
- System Implementation Process

Project Background

- Stockton, CA
- Pop: ~300,000
- +280 signals
Project Background

- Wilson Way
- 10 signals (8 City, 2 Caltrans)
- 23,000-28,000 ADT
- 15.5% truck/bus volume
- Designated Truck Route
- Funded through Congestion Mitigation and Air Quality (CMAQ) improvement program funds
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Project Background

**Primary Project Goals/Objectives**
- Improve capacity, mobility, and safety through implementation of an adaptive signal system to better accommodate fluctuations in traffic, as well as bicycle and pedestrian movements along the corridor

**Secondary Goals/Objectives**
- Upgrade outdated traffic signal controllers and controller cabinets
- Implement new signal phasing and signal timing to better accommodate bicycle and pedestrian movements
- Expand Emergency Vehicle Pre-emption/Transit Signal Priority network to project intersections

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**Project Background**

<table>
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<tr>
<th>Intersection</th>
<th>Existing Signal</th>
<th>Recommended Signal</th>
<th>Capacity</th>
<th>Mobility</th>
<th>Safety</th>
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<td>3 P 180</td>
<td>6 P 260 180</td>
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**Federal Process**
1. Complete Preliminary Environmental Study (PES)
2. Request for authorization to proceed with preliminary engineering
3. Environmental clearance (NEPA), utility relocation, permits
4. System procurement, plans/specifications
5. Request for authorization to proceed with construction

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Project Background

Technical/System Requirements

Mandatory Requirements

- No pre-calculated sign timing plans
- Shall consist of commercial-of-the-shelf (COTS) software and hardware
- System deployed in at least 5 different jurisdictions
- In those 5 deployments, system should have been fully functional and in operation for at least 2 years

LESSON #1 – Involve Stakeholders EARLY in the system requirements process
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Technical/System Requirements

Restrictions at Caltrans Intersections

- System shall use current Caltrans traffic signal controller (Model 2070)
- System shall not modify current Caltrans firmware
- Added to list of Mandatory Requirements...

Technical/System Requirements

System Evaluation/Qualitative Assessment

- System compatibility
- Ease of use
- System and component reliability
- Remote monitoring/diagnostics
- Technical support
- Warranty
- Cost

Technical/System Requirements

Evaluated the following systems:

- SCATS
- SCOOT
- ACS Lite
- InSync
- OPAC
- RHODES
Stakeholder Involvement

- City of Stockton
- San Joaquin Regional Transit District
- Caltrans (Local Assistance, technical staff)

Next Steps

Federal Requirements

*Request for Authorization to Proceed with Construction*

- 12 forms/exhibits
- NEPA environmental clearance
- Caltrans encroachment permit
- Project plans and specifications
Federal Requirements

**LESSON #2 – Get formal by-off from FHWA on project risk level prior to completion of design (particularly for “ITS” projects)**

Federal Requirements

**Systems Engineering Documents**
- Concept of Operations
- Systems Engineering Management Plan (SEMP)
- System Requirements
- System Verification/Validation
- Subsystem Verification/Validation

System Implementation Process

*Putting it all together...*
- Civil construction/adaptive system procurement
- Communications system verification
- Adaptive system configuration prior to install
- Adaptive system testing and verification
- System turn-on
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Lessons Learned

• Early stakeholder involvement (talk details)
• Understand federal requirements and potential implications on project scope/schedule
• Set realistic goals/expectations (don’t be afraid to adjust as project progresses)
• Determine how involved staff will be in the procurement process, during configuration, testing, and install, as well as following system deployment

Questions?