Preparing Downtown San Rafael for the SMART Commuter Rail System

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Kwasi Akwabi, P.E. (Kimley-Horn)
Kevin Aguigui, C.E., E.E., T.E., CSEP (Kimley-Horn)
Presentation Overview

- Background
  - SMART Network
  - Project Scope
  - Project Elements
- Process
  - Design
  - Operations
  - Testing
- Lessons Learned
Project Elements

• 17 existing traffic signals (11 City, 6 Caltrans)
• 3 new queue cutter signals
• Fiber optic and copper interconnect
• Wireless backhaul (with repeater site)
• Econolite Centracs System
• Econolite Cobalt controllers
• Econolite Type OL cabinets
• 7 CCTV cameras
• 4 DMS

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What is a Queue Cutter?
Project Scope

**Traffic Engineering**
- VISSIM Analysis
- Alternatives Analysis
- Traffic Signal Timing/Preemption

**Traffic Signal Modifications**
- Controller & Cabinet Upgrades
- Electrical Service Upgrades
- Pedestrian Countdown retrofits
- Railroad Preemption

**Traveler Information**
- DMS and CCTV cameras

**Traffic Signal Interconnect**
- Fiber optic and wireless interconnect
- New traffic signal system

**Civil Design**
- Curb Ramps
- Sidewalk Widening
- Drainage Improvements

**Environmental Services**
- PES Form and APE Map
- CEQA/NEPA Technical Studies
- Extended Phase I
- Local Assistance Coordination
- CEQA/NEPA Approvals

**Approvals/Permits**
- Caltrans Encroachment Permit
- CPUC GO 88-B (two sets)

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Process

PRELIMINARY ENGINEERING

TRAFFIC ENGINEERING AND ANALYSIS
ENVIRONMENTAL CLEARANCE (CEQA/NEPA)

DETAILED DESIGN

CITY COORDINATION
CALTRANS PERMIT
CPUC APPROVALS

CONSTRUCTION

INTEGRATION TESTING
FIELD TESTING
ACCEPTANCE TESTING
ECONOLITE COORDINATION

SMART COORDINATION
Existing City signal
Existing Caltrans signal (operated by City)
New City signal – Queue Cutter
Existing Caltrans signal (operated by City)
Existing City signal
Existing Caltrans signal (operated by City)
New City signal – Queue Cutter
P CCTV Camera
Dynamic Message Sign
Queue Cutter Design Issues

- Pole placement – conflicts with railroad signals
- Near side head placement
- Trees/Foliage
- Closely spaced signals
- Utilize peer-to-peer communications for preemption
- Video detection for queue cutting – use loops instead
Queue Cutting

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Railroad Preemption

• Quad gates (for quiet zone)
• 12-wire interconnect for queue cutters
• Four circuits total:
  - Advanced preemption
  - Simultaneous preemption
  - Gate Down (cancels track clearance)
  - Health circuit
• Preempt circuits are supervised
• Peer-to-Peer for preempt calls to adjacent signals (controller logic)
CPUC Approval

- Preemption calculations (LADOT method)
- Nine different sets of calculations
- CPUC required the most stringent values

- Field and office review meetings
- Two sets of GO 88-B applications – SMART and City
Communications System Design Issues

• Fiber optic to wireless backhaul
• Radio repeater installations
• Fiber to copper interfaces
• All IP network
• Testbed
Bench Testing

- All controllers, switches and radios
- Central-to-Field
- Peer-to-Peer
- Redundancy/Failover
Lessons Learned

• Determine what permits, agreement and approvals will be required from the beginning - Caltrans, CPUC, railroad operator, etc.
• Streamline the procurement and minimize the number of contracts if possible
• Plan out the entire system – communications, traffic signals, preemption (operations and circuits), service
• Conduct bench testing of the controllers and cabinets with the preemption circuits – don’t want to be re-wiring in the field
• Plan up front to be behind. Delays are typical - environmental clearance, construction, approvals, testing and re-testing
Lessons Learned

• Determine sharing of infrastructure early in the process – conduits, railroad cantilevers

• Work very closely with regulatory agencies like CPUC. Meet with them in person if need be

• Be prepared to conduct a lot of testing during several different stages

• Pay attention to stage construction – night construction, business impacts

• Use proven technologies

• Document, document, document!

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Thank You!