Development Of An ITS Maintenance Guide

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Tollway ITS History Up To 2016

More than 1,050 CCTV cameras

45 DMS

48 PCMS + contractor message signs

250 MVDS

486 vehicles with AVL

16 RWIS sites

Five WIM sites

Three ramp queue detection systems

Travel times – I-PASS, RTMS, Sensys and Bluetooth generated

Integrated to regional ATIS – gateway

E-mail alerts to media and trucking industry
SmartRoad
Travel safe • Travel smart

- Park-n-Rides & routes debuting in 2017
- Makes additional connections at transit facility
- Stops at new Park-n-Ride Station
- Stops at existing Park-n-Ride
- New and Expanded Pace Routes
ITS Devices 2016 To 2017

CCTV
• Additional 90 cameras

DMS
• Increased from 45 to 54

MVDS
• Increased from approximately 250 to 355

WIM
• Increased from five to seven

Lane control signs (ATM)
• Approximately 375 new signs added
Communications Network 2016 To 2017

54 IPDCs added

29 new ATM gantries
• New Cisco switches
• IP relays
• IPDC equipment
• Generators

In addition to existing fiber backbone and new power

Frequent access to power and communications
ITS Maintenance Staff

**Tollway**
- ITS deployment engineer
- Network engineer
- ITS inventory manager
- 2 ITS technicians (new contract adds one contractor)

**ITS network and maintenance administration contract**
- Provides oversight of ITS field device maintenance contract
- Additional three staff to support ITS maintenance

**ITS field device maintenance contract**
- Field repairs

**Traffic Operations Center**
- Increased staff from four to eight
Need To Create ITS Maintenance Guidelines

Already had existing manuals and requirements documents
Already performing ITS maintenance systemwide
Adding significantly more devices and new ATM system

NEED to put all assumptions and requirements into writing and clarify processes

NEED to develop formal workflow decision matrix
Process To Create ITS Maintenance Guide

Stakeholder input

Lessons learned

Assumptions/decisions

Criticality

Workflow
Stakeholders

Many subgroups within Tollway

Most Tollway, some consultants or contractors

Include Legal and other administrative stakeholders
Industry Lessons Learned

Contacted
• Washington State DOT
• Virginia DOT
• Minnesota DOT
• Wisconsin DOT
• Caltrans
• City of Toronto

Main Lessons Learned
• Need for spare parts inventory
• Lane closures weekly
• Mix of contracted and internal staff
• Mix of priorities and operations
• Pros/cons of outsourcing
• Many stress-preventive maintenance
Key Issues

LCS are the only devices that require a lane closure overnight

DMS may require a shoulder closure or an outside lane closure, which is allowed off-peak

Warranty issues with LCS for the first 12 months
Preliminary Decisions

Based on stakeholder interviews and internal committee discussions

• ITS technicians over the long-term getting new trucks with buckets; will be able to pre-position at maintenance yards
• ITS deployment engineer is the critical decision-maker for Tollway on maintenance items and issues
• One panel out on an LCS is minimum for repair ticket
• Tollway maintenance staff will provide lane closures (expect when covered by a contract)
Four Levels Of Criticality

Emergency
• 4-hour on-site response
• Repaired 7 days a week, 365 days a year

Critical
• 24-hour response time Monday through Friday

Standard
• 72-hour response time Monday through Friday

Preventive
• Repair next time you are at the site for other reasons
Criticality By Device

Addressed each type of device and expected failures

Devices that can achieve emergency critical level under certain conditions

• LCS
• DMS in SmartRoad corridor
• CCTV that view LCS

Most devices go to standard
Workflow

Critical Tollway staff is the ITS deployment engineer

Several decision points where the repair can be queued

Other related workflows for warranty equipment and standard repairs
Summary

ITS Maintenance Guidelines assembled in a relatively short time

Used lessons learned from agencies that include other ATM systems

Addressed some issues identified by stakeholders

Key decisions had to be made by critical staff

Final guide is in line with or exceeds most others within the industry
THANK YOU