



# **NORTHERN REGION OPERATIONS**

# **SIGNAL OPERATIONS – FAIRFAX COUNTY**

Ling Li, P.E. Operations Engineering Manager Northern Region Operations (NRO)

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# **Presentation Overview**

- NRO Transportation Operations Center (TOC) Overview
- Traffic Signal Operations Overview
- Signal Operations Center (SOC) Overview
  - Non-recurring Congestion management
- Signal Timing Optimization Program
  - Recurring Congestion management
- Inter-jurisdictional Signal Coordination
  - NOVA localities and MWCOG
- Traffic Signal Technology Deployments

### **Transportation Operations Center**

McConnell Public Safety & Transportation Operations Center (MPSTOC) – Located in Fairfax County



- County of Fairfax Department of Public Safety Communications (DPSC or 9-1-1 Center)
- County of Fairfax Office of Emergency Management (OEM)
- VDOT Transportation Operations Center (TOC)
- Virginia State Police (VSP) Division 7 Communications Center
- County of Fairfax Police Department Forensic Facility

### **Transportation Operations Center**

### The right people with the right tools at the right place at the right time



VDOT TOC: 24/7/365 VDOT Signal Operations Center: 5AM to 9PM Weekday, 9:30AM to 6PM Weekend, and 24-Hour Emergency **VDOT Situation Room: Emergency and Weather Events** 

Operations Floor: 12,000sq ft. Partner Supervisors in the center Resource Sharing: video wall and CAD

#### **Fire Dispatch**



Police

**VDOT /VSP** 

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# **Traffic Signal Operations**

#### Total Number of Signals: 1449

- Fairfax County: 901
- Loudoun County: 212
- Prince William County: 336





# **Signal Operations Center (SOC)**

Real-Time Traffic Signal Management (Non-recurring congestion caused by traffic incidents, special events, work zones, and major weather events)

- Coordinating with freeway management center (TOC)
- Incident notification from TOC and traffic alerts from localities
- Monitor detour routes
- Adjust signal timing in real-time
- Dispatch signal technicians

### **Operation Hours:**

- Weekday: 5:00 am to 9:00 pm Two work shifts
- Weekend: 9:30 am to 6:00 pm One work shift
- Special and Weather Events: 24 hour – 2 shifts



# **Signal Operations Center (SOC)**

### Signal System Health Management via Central Signal System (CSS - MIST)

 Signal Control Device Monitoring: Signal on Flashing, Detector Failures, Signal Preemption, Communication Status, Pedestrian Activities

# Transportation Applications and Tools for

### **Arterial Traffic Management:**

- CSS: all traffic signals are connected to CSS and can be monitored/adjusted from SOC
- CCTV Cameras and Portable CCTV at Critical Intersections
- Traffic Monitoring Sensors: Traffic Volume and Comparison of Traffic Flows
- Regional Integrated Transportation Information System (RITIS)
- Google Maps and WAZE



### **Signal Timing Optimization Program**

- Goals include reducing recurring congestion, improving mobility while enhancing safety
- An evolving process spanning more than 18 years
- Completed the 5<sup>th</sup> round of optimization in March, 2019
- Currently working on the 6<sup>th</sup> round of optimization
- All traffic signals are grouped into 21 networks
- Develop 8 Timing Plans: Weekday (AM, Midday, PM, Off-Peak) Weekend (AM, PM, Saturday Peak and Sunday Peak) based on different traffic patterns
- Special Event Timing Plans: Thanksgiving/Christmas/New Years Holiday season plans; 4<sup>th</sup> of July plans; school plans; and major construction detour plans
- Incident detour timing plans for major corridors

# **Signal Timing Optimization Process**

- Data Collection
- Data Analysis
- Network Setup
- Optimization
- Simulation

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- Implementation & Fine Tuning
- Evaluation & Recommendation





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# **Signal Timing Optimization Program**

### **Signal Timing Optimization Benefits**

- Economic Benefits Based on the 5<sup>th</sup> Round of Optimization
- Stop, Delay and Fuel Consumption
- Benefit to Cost Ratio 48:1
- Overall Annual Savings \$109.5 M (includes 75.5 M in Fairfax county)
- Environmental Benefits
- Annual Emission Reductions of 638.53 metric tons (includes 416.82 metric tons in Fairfax county)
- Travel Times and Level of Service Improvements
- Update of Pedestrian and Vehicular Clearance times based on latest VDOT guidelines
- Indirect Benefits: Digital Library of signal networks used by VDOT, Counties, and consultant engineers for traffic studies. Accelerate project schedules while reducing project costs
- Operational and Geometric Recommendations

# Signal Timing Optimization Program

### Signal Timing Constraints:

- Over-Saturated Conditions (Image Below)
- Emergency Vehicle Preemption
- Signal Timing Plan Transition
- Early Green Time Release
- Pedestrian Timing Requirements
- Heavy Traffic Volume on Side Street
- Bi-Directional Traffic
- Lane Reduction (Bottleneck)
- Detector Failure
- Work Zone and Incidents





# **Inter-jurisdictional Signal Coordination**

### **NOVA Localities:**

Arlington County, City of Alexandria, City of Fairfax, Fairfax County DOT, City of Falls Church, Town of Vienna, Town of Herndon, Town of Leesburg, Town of Purcellville, City of Manassas, City of Manassas Park, and Fort Belvoir

- Signal timing coordination at jurisdiction boundaries
- Sharing signal operations experience
- New technology deployments

### Washington Metropolitan Council of Government (WMCOG):

National Capital Region – Transportation Planning Broad

System Performance, Operations, and Technology Subcommittee (SPOTS)

Traffic Signal Subcommittee:

- Sharing signal operations best practices, such as signal timing optimization, performance measures, incident management, and major special event management for the region, etc.
- Future technology for transportation

# **Traffic Signal Technologies Development**

### **VDOT Statewide Central Signal System**

- New CSS has been selected
- Planning & Design Phase
- Customization for Initial Deployment
- Implementation 2020

### Automated Traffic Signal Performance Measures (ATSPM)

- Test corridor Route 50 from Route 28 to Fair Ridge Drive (14 Signals)
- Monitor signal performance and improve signal timing efficiency

### Intelligent Transportation System (ITS) and Connected and Automated Vehicles (CAV) Technology

- ITS Devices (CCTV, DMS, Ramp Metering, traffic sensors, etc.)
- Coordinating with Fairfax County DOT on the automated shuttle pilot project (Fairfax County/Dominion)
- VDOT shares traffic signal data via statewide data portal

# **Traffic Signal Technologies Development (continued)**

#### **Traffic Signal Equipment Enhancement**

- Advanced traffic signal controller and firmware: completed installation in 2018
- Enhanced capabilities for pedestrian, bicycle, and transit vehicles: Leading Pedestrian Interval (LPI) and Transit Signal Priority (TSP)
- Flashing Yellow Arrow (FYA)

### **Network Communication and Security**

- All ITS devices (signal controller, video detectors, CCTV) meet Federal and State Cyber Security requirements
- Data storage in cloud

### **Regional Major Project Coordination**

- WMATA Blue/Yellow Lines Platform Repair Summer 2019
- WMATA Orange/Silver Lines Station Shutdown Summer 2020
- I-395 Express Lanes opening Sunday, 11/17/19
- I-66 Outside Beltway Construction
- Richmond Highway Bus Rapid Transit (BRT)

# Questions

Ling Li, P.E. Operations Engineering Manager Ling.Li@vdot.Virginia.gov 571-350-2020 (O) 571-437-6694 (C) Ta-Cheng Hsu, P.E. Signal Operations Manager <u>Ta-cheng.Hsu@vdot.Virginia.gov</u> 703-259-3357 (O) 571-437-6726 (C)

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