Clark County Traffic Signals

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Where we were

- 10 years ago
  - Unmaintainable system
  - No budget for maintenance
  - Few staff
  - No communications to most signals
  - No way to know how the system was working

Where we are

- New signal equipment
  - 104 signals
  - Miles of fiber optic interconnect
  - Fully routed Ethernet communications network
  - Server based applications
    - Field alarms
    - Logs
    - Email alerts
  - Surveillance cameras at most intersections

Where are we going

- Performance Measures
  - Travel Time
  - Arrival on green
  - Others
- Provide info to public
  - SPAT data
  - Web.now
  - Performance measures

Vehicle Detection

Washington State Law requires:

RCW 47.36.25 – Detection of Motorcycles and Bicycles

(3)(a) If at least a substantial portion of detection equipment at an existing vehicle-activated traffic control signal on an arterial or bicycle route is scheduled to be replaced or upgraded, **the replaced or upgraded detection equipment must routinely and reliably detect motorcycles and bicycles**. For purposes of this subsection (3)(a), "substantial portion" means that the proposed replacement or upgrade will cost more than twenty percent of the cost of full replacement or upgraded detection equipment that would routinely and reliably detect motorcycles and bicycles.

(b) If at least a substantial portion of detection equipment at an existing vehicle-activated traffic control signal on a public road or highway that is not an arterial or bicycle route is scheduled to be replaced or upgraded, **the replaced or upgraded detection equipment must routinely and reliably detect motorcycles and bicycles**. For purposes of this subsection (3)(b), "substantial portion" means that the proposed replacement or upgrade will cost more than fifty percent of the cost of full replacement or upgraded detection equipment that would routinely and reliably detect motorcycles and bicycles.

(4) All vehicle-activated traffic control signals that are design complete and put in operation after July 26, 2009**, must be designed and operated, when in use, to routinely and reliably detect motorcycles and bicycles, including the detection of bicycles in bicycle lanes that cross an intersection**.

Vehicle Detection

- So what are we doing about it
  - 8 years ago, County changed induction loop design to better detect motorcycles and bicycles
  - Used video detection, with mixed results
  - Experimented with Sensys Bicycle Microradar, with poor results

Vehicle Detection

- So what are we doing about it?
  - All new signals get radar stopbar and advance detection
  - Existing signals are being upgraded as fast as possible on County projects
    - Signal optimizations
    - Pavement overlays
    - Curb ramp replacements
    - Maintenance upgrades

Vehicle Detection

Vehicle Detection

Vehicle Detection

- So what are we doing about it?
  - Radar Stopbar installed at:
    - 51 intersections by Jan 2016
    - 17 additional intersections by Dec 2016
    - More in 2017
  - Radar Advanced installed at:
    - 58 intersections by Jan 2016
    - 14 additional intersections by Dec 2016
    - More in 2017

Vehicle Detection

- Why Radar?
  - Detects all vehicles
    - Bicycle
    - Motorcycle
    - Car
    - Truck
    - Bus
  - Few of the issues with video
    - Occlusion
    - Glare

Vehicle Detection

- Why Radar?
    - Nonintrusive to pavement
        - Detection works with damaged pavement
        - Adjust on the fly
        - Requires no additional investment for:
            - Overlays
            - Utility cuts
            - Restriping of lanes
        - We can replace as necessary
            - We have no equipment to cut in loops
            - New loops take months to get installed

Vehicle Detection

- Why Radar? - Example
  - NE Hwy 99 from NE 63rd St to NE 78th St
    - 2013 – Many existing induction failed in pavement
    - 2014 – County upgrades signal equipment including radar detection
    - 2015 – Developer builds MAJ Place at NE 72nd St
    - 2016 – CRWWD installed a sewer line
    - 2017 – County plans to build walkway on west side of Hwy 99
    - 2017 – County plans to overlay Hwy 99
  - Every one of these actions would require cutting in new induction loops in pavement.

Vehicle Detection

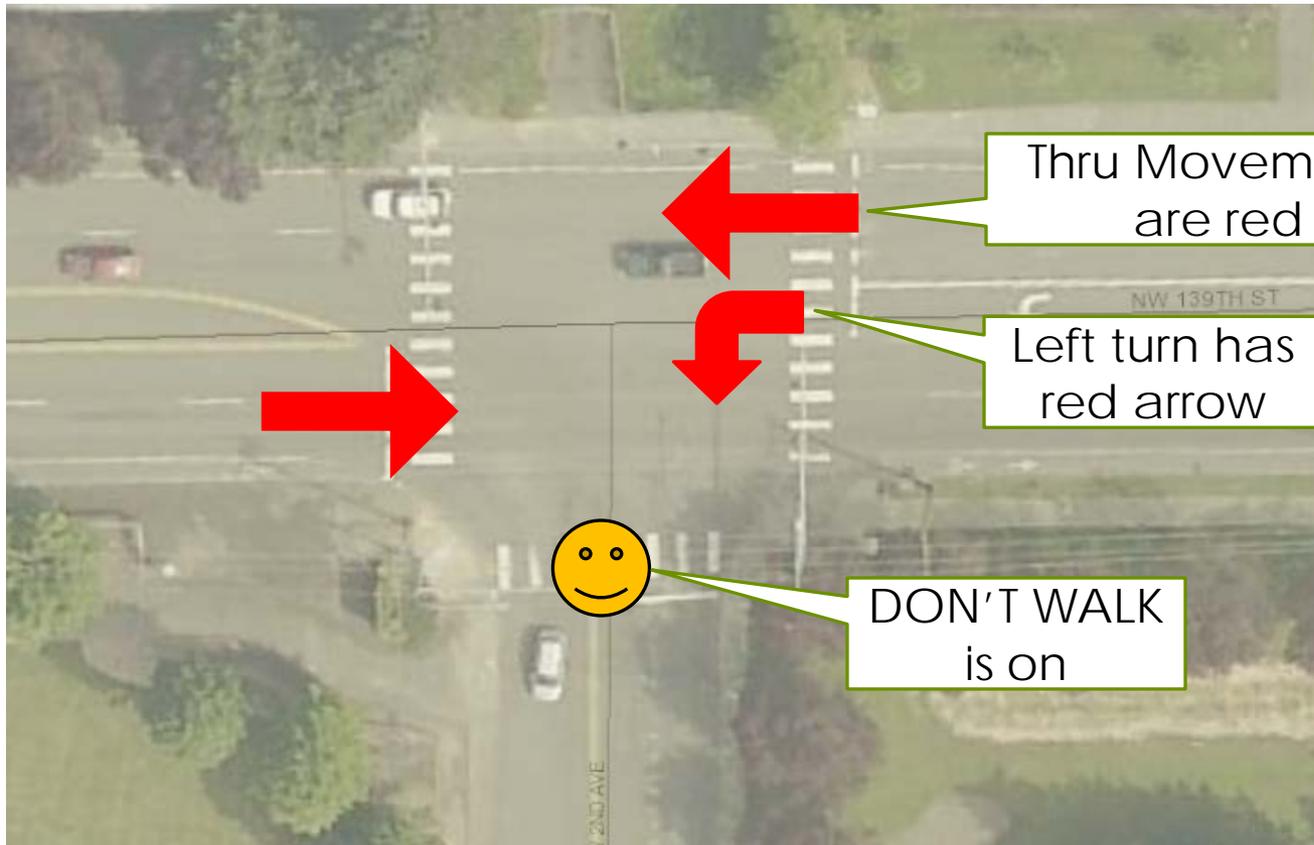- Short video of radar stopbar detection

Flashing Yellow Arrow

- 28 intersections by Jan 2016
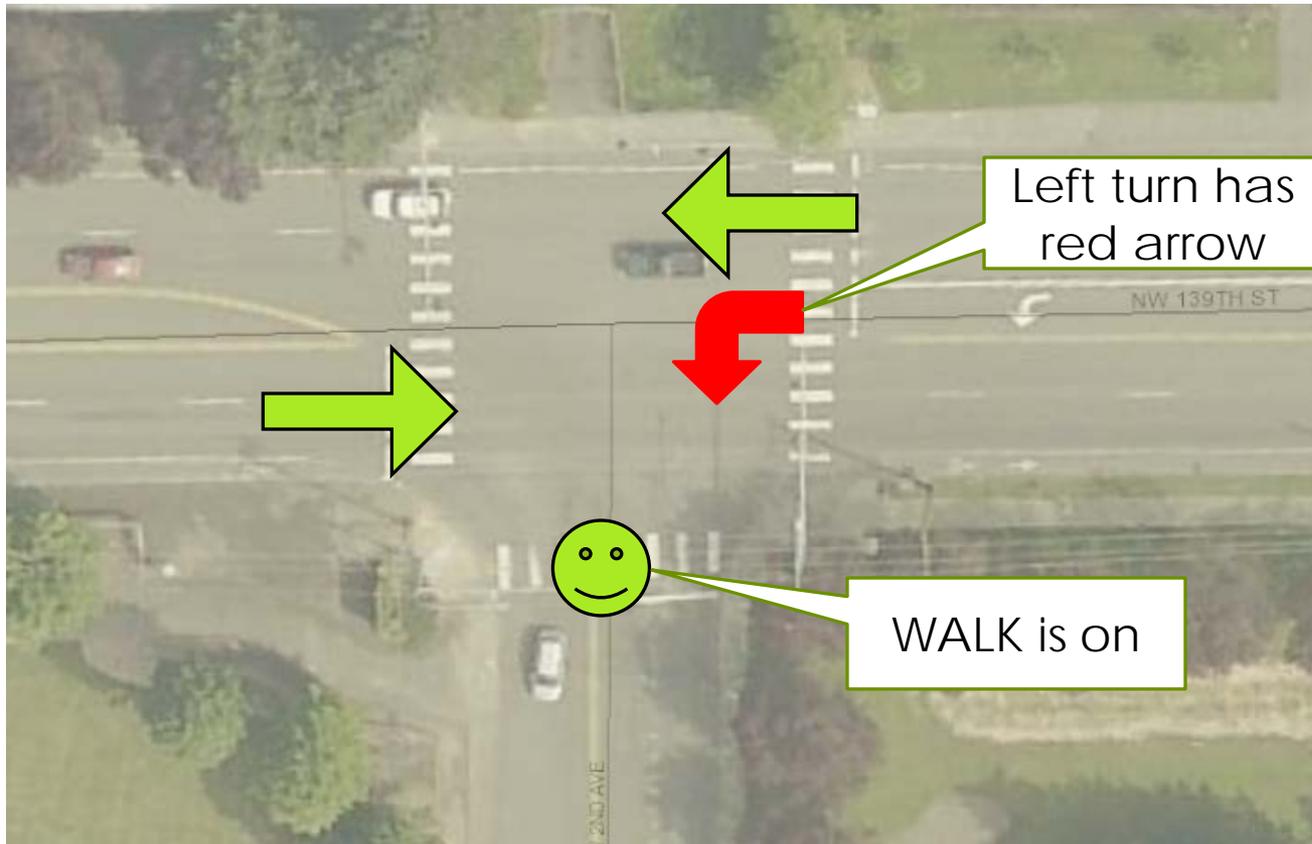- 16 additional intersections by Dec 2016
- More in 2017

Flashing Yellow Arrow

- Why Flashing Yellow Arrow?
- Improved safety for many signals
  - Inhibit FYA against WALK and FDW
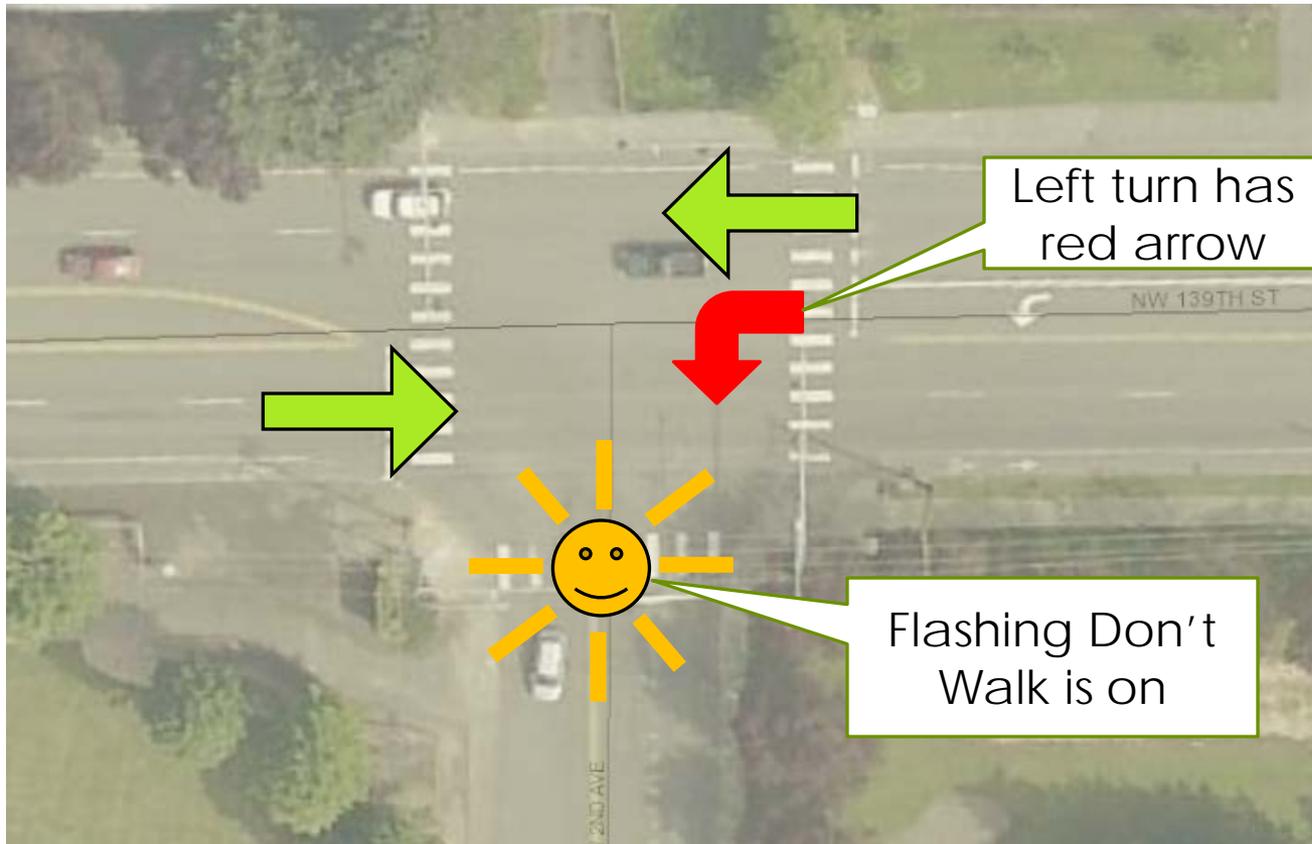 - Inhibit FYA by time of day
  - Inhibit FYA with oncoming cars
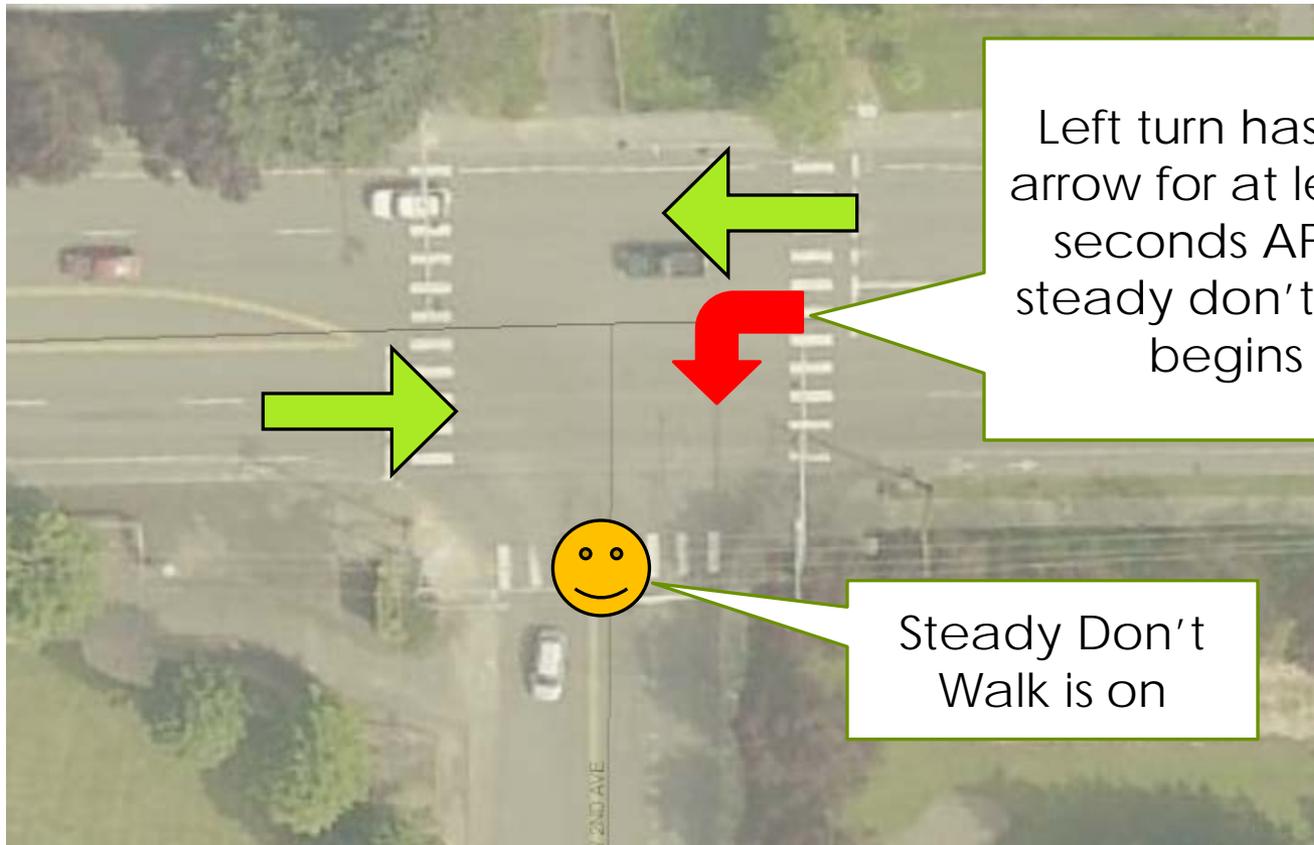
Flashing Yellow Arrow

Flashing Yellow Arrow

Left turn has red arrow

WALK is on

Flashing Yellow Arrow

Left turn has red arrow

Flashing Don't Walk is on

Flashing Yellow Arrow

Left turn has red arrow for at least 5 seconds AFTER steady don't walk begins

Steady Don't Walk is on

Flashing Yellow Arrow

Flashing Yellow Arrow begins

Steady Don't Walk is on

Battery Backup

- Dark Signals Defined by State Law

RCW 46.61.183. Non-functioning signal lights.

Except when directed to proceed by a flagger, police officer, or firefighter, the driver of a vehicle approaching an intersection controlled by a traffic signal that is temporarily without power on all approaches or is not displaying a green, red, or yellow indication to the approach the vehicle is on, **shall consider the intersection to be an all-way stop**. After stopping, the driver shall yield the right-of-way, in accordance with RCW 46.6.181(1) and 46.61.185.

Battery Backup

- Dark Signals Defined by State Law
  - Many drivers don't follow the law
  - No protection for pedestrians
  - Can be a "free for all"

Battery Backup

- 104 County Signals
  - 61 with Battery Backup as of Jan 2016
  - 16 additional with BBS by Dec 2016
  - Remainder to be installed after 2017

Battery Backup

Accessible Pedestrian Signals

- Not *required* by State or Federal Law
  - We feel it is a very good idea
  - Installed programmatically to provide:
    - Consistent operation
    - Improved safety
    - Part of ADA Transition Plan for County

Accessible Pedestrian Signals

Accessible Pedestrian Signals

- 104 County Signals
  - 57 with APS by Jan 2016
  - 23 additional by Dec 2016
  - Remainder included in 2017-2018 budget

Where are we going from here?

- Adaptive Signals
- Establish practices for a variety of things:
  - Leading pedestrian intervals
- Establish performance measures
  - Travel Time
  - Quality of Service
  - Arrival on green
  - Pedestrian delay
- Measure, evaluate and report

Where are we going from here?

- Connected Vehicle
  - Infrastructure to Vehicle next year
    - Central port of Signal Phasing and Timing (SPAT) Data
      - Provide raw data as JSON feed
      - Enlighten, Audi, BMW, others
      - Create new data definition for use of JSON feed
  - Vehicle to Infrastructure in the near future
    - SPAT data from 900 Mhz radios at signals
    - Vehicles, bicycles and pedestrians broadcasting information to signals