The Use of ITS Technologies in Collision Response & Investigations

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ITE Annual Meeting - Western District
June 25th, 2019
Collision Primary Cause

94% Erroneous Driver Behavior >>>>>>>> 99% Erroneous Human Behavior

Vehicle Malfunction

Engineering Design Solutions
Traffic Operations
Primary Goal
Moving Traffic Efficiently & Safely
Bellevue’s 20-year collision History

PM peak hour
vs
Noon to 7pm

10% traffic increase
generates a
50% spike in collisions

Also see:
“Exploring the level of Service and Traffic Safety Relationship at Signalized Intersections”

(By Ana M. Almonte & Mohamad A. Abdel-Aty, ITE Journal - June 2010)
Safety Vs Efficiency

If we sacrifice efficiency:
  → More delay
  → Aggressive behavior
  → More collisions

- Overly conservative assumptions may lead to unsafe designs → Moderation is best.
ITS Technologies

Camera Systems

- Axis Q6000-E MkII quad camera
- Axis Q6128-E Pan-Tilt-Zoom camera

Adaptive Traffic Signal System - SCATS

- SCATS Access
- SCATS 6
- TCS 142
- City of Bellevue, Washington
After communication detection is the most critical part for any adaptive system to properly work.

SCATS calculations are based on “Space Time” relationship between vehicles.

Degree of Saturation (DS)

DS is a measure of the effectiveness of the green time for a particular lane.
Degree of Saturation

Bellevue programmed SCATS to look at Max detector DS in lane group

Green times are assigned based on Average DS in the last 3 cycles for all voting stages.
So, what would SCATS do during lane closures?

1. If the NB LT lane is closed, phase is simply skipped.

2. If one of the two NB thru lanes is closed, the other lane will have more volume & votes for more time.

In most cases, SCATS will properly react
In some cases the Engineer must intervene and reprogram parameters
NORCOM (911) Notifications

Priority Call for BLVDP in Progress: CFS #290 TA at RICHARDS RD / SE EASTGATE WAY
Short Term Solutions
Signal phasing/timing tweaks
Collisions May Cause Congestion, frustration, distraction, Illegal behaviors, and the potential for secondary collisions with pedestrians, bicyclists, and drivers
Long Term Solutions

Adaptive Flashing Yellow Arrow with Ped Minus

Education
Police Investigations

- No camera at the intersection
- From the traffic camera footage of a nearby intersection, we can’t see the signal indications.
- But we see that the collision happened at about 2:07:51pm.
- From the traffic signal history file, the collision happened during the westbound signal phase Stage “C” which ended at 14:07:55pm.
- The time stamps of both systems are based on an atomic clock and are synched within a second.
- It appears that the Northbound (NB) vehicle bluntly ran the red light. The NB light was red for over 70 seconds prior to the collision.
- Police Traffic Unit is now viewing camera footage while an officer is dispatched or during the investigation.
For Every Action there are Unintended Consequences

City re-purposed the intersection to accommodate bicycles
Protecting pedestrians via the Flashing Yellow Arrow with Ped Minus Phasing is no longer a viable option
Long Term Solutions

1. Ped Only Phase
2. Flashing Yellow Arrow with Ped Minus Phasing
3. Ped Jump
Vision Zero
Smart Mobility Plan & the Future of Connected & Autonomous Vehicles

Thank You

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- June 25th, 2019