TRAFFIC SIGNAL CO-ORDINATION
-SPECIFIC ISSUE RESOLVE-

Region of Peel
Traffic and Transportation Engineering Department

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Region of Peel - Public Works
Who are we?

Lake Ontario
Region of Peel - Public Works

FACTS!

- Region of Peel - an urban / rural land use mix – Town of Caledon, City of Brampton and the City of Mississauga
- 1482 lane kilometres (921 lane miles)
- 122, 499 hectares (302,708 acres) located west of Toronto, Ontario, Canada along the north shore of Lake Ontario
Region of Peel - Public Works
FACTS!

• 1,054,000 existing population – 1,388,000 million 2021 population

• Region of Peel currently has jurisdiction of 367 of more than 1000 area Traffic Signals
Signal Optimization - Main Objectives

Optimized traffic signal timing plans are designed to:

- Progress traffic
- Reduce overall vehicle delay
- Reduce travel time
- Reduce fuel consumption
- Reduce vehicle emissions
- Reduce neighbourhood infiltration
- Reduce road congestion lowering driver frustration
Signal Timing Adjustments That are Made to Minimize Delay and Travel Time

• Scheduled program of reviewing arterial roads
• Investigating specific concerns brought forward by various sources
• React to specific traffic pattern changes (i.e., construction, etc.)
Tools Used in Peel – Traffic Signal Coordination

- Time Space Diagram Software– TSDWIN
- Synchro Version 5 Software
- 3 Traffic Signal Control Systems
  - T2000C/Fastracs (Mississauga)
  - ARIES (Bolton)
  - ACTRA (Brampton)
Outsourced Studies and Reports
Traffic Signal Coordination

• Fortran Traffic Systems Inc.
  - Scheduled Traffic Signal Network Review

• Ontario Traffic Inc.
  - ‘Before’ and ‘After’ Speed & Delay Studies
Providing Traffic Signal Coordination

- Providing two-way coordination is desirable however, not always recognized by the motoring public.

- Show-case good coordination as much as possible through various media

- Best means to show-case is to deliver results

- Continuous optimization maintenance program is essential
Develop a Philosophy for Traffic Signal Coordination

- Identification of traffic signal network boundaries
- Intersection cross coordination limitations
- Overall system operational modes
Traffic Signal Operation – Semi-Actuated Control

Semi Actuated Traffic Signal Operation:

Advantages

• Minimizes vehicle delay time for main street vehicles

• Provides optimum green time for main street vehicles

• If traffic is light on side street, the green signal may return to main street early

Disadvantage

• Possible lengthy delays to side street vehicles (depends on vehicle’s time of arrival and length of cycle)

• Causes Motorist to perceive that the signals along a roadway are not co-ordinated
Traffic Signal Operation – Semi-Actuated Control

Most Regional Signals function in a semi-actuated operation

• Semi-actuated operation uses detection equipment that responds to either vehicles or pedestrians on side street

• Should there be no demand on the side street the signals would rest in a main street green and pedestrian walk display
Factors Which Affect Traffic Signal Coordination

Damaged Vehicle/Pedestrian Detection Equipment:

- Emergency timings are implemented affecting signal co-ordination
- The damaged component will cause the traffic signals to cycle which will greatly affect coordination

Traffic Signal Pre-emption Equipment:

- Pre-emption routes along most arterial roads
Specific Issue to be Resolved…
When a Signalized Intersection Can’t Operate Online

- Dealing with highly congested intersections requiring a cycle length above any approaching signal network maximum (Typically 140 seconds)

- These intersections are usually found to be two high volume arterial roads (control sites for network)

- High traffic volumes at these usually generated by nearby highway ramps, shopping plazas, malls etc.
Specific Issue to be Resolved…
When a Signalized Intersection Can’t Operate Online

• The network cycle length is not long enough to provide an individual intersection with enough green time to satisfy all phases. (HCM says control intersection over capacity)

• Control intersection is then assigned to operate under both fully actuated and Local Control (offline) during high capacity periods

• This combined mode of operation best services the control intersection at the same time provides high volume movement for all other associated signal networks
Specific Issue to be Resolved…
When a Signalized Intersection Can’t Operate Online

• Once the traffic volume again drops below intersection capacity, the signal should switch back to coordinated control (online) which will provide overall improved signal network travel times

• Conclusion, Best roadway efficiency can be provided by operating at the higher required cycle length and under both Fully Actuated and Local Control modes at a signalized intersection requiring a cycle length greater than 140 seconds