General

Emergency vehicle pre-emption may be considered if emergency vehicles are consistently having difficulty responding to calls due to the operation of traffic signals.

Emergency vehicle pre-emption systems at traffic control signals typically consist of a system for signal pre-emption interconnected with the signal controller. These differ from the adapted traffic control signals (also known as fire truck entrance signals) which can appear adjacent to fire halls, where fire trucks enter the roadway but full traffic control signals are not warranted.

Standard

Pre-emption of Department Traffic Signals

Typically the department discourages the implementation of emergency vehicle pre-emption at its traffic signals unless the municipality can demonstrate that the benefit of this pre-emption outweighs the potential maintenance/operational issues.

Examples of these maintenance and operational issues are as follows:

- More equipment makes the signal system more complex, which increases the chance of failure.
- The provision of pre-emption can lure emergency vehicle drivers into a false sense of security. If they believe that the signal will be turning green for them, they might not slow down and use sufficient caution when approaching the intersection.
- There is an element of commitment associated with emergency vehicle pre-emption systems. It is often unclear who is financially responsible for the necessary emergency vehicle equipment (activation system inside the emergency vehicle and/or at the emergency vehicle station), and who is responsible for maintaining the pre-emption equipment at the signal location.

The use of sirens, as described in the Traffic Safety Act, Use of Highway and Rules of the Road Regulation, is in most cases effective in clearing a path for emergency vehicles.

For an emergency vehicle pre-emption system to be considered at a department traffic signal, the municipality must submit a proposal to the nearest Alberta Transportation district office (a listing of which is available at the following link) demonstrating the need for the system.

http://www.transportation.alberta.ca/4450.htm

When evaluating a request for emergency vehicle pre-emption at a signal, the department will thoroughly evaluate whether it is in the best interests of all parties to implement emergency vehicle pre-emption and whether or not there would be an advantage. If the proposed pre-emption will be a part of a pre-emption system on a network of signals within a municipality,

stronger consideration may be given to allowing it.

If the department decides that it is in its best interests to implement emergency vehicle pre-emption, the appropriate signal controller equipment must be in place. NEMA TS2 controllers have a built-in capability for handling pre-emption timing/phasing schemes. TS1 controllers do not typically have pre-emption capabilities, but some TS1's can be outfitted with an external pre-emption handling system.

Emergency vehicle pre-emption will not be permitted simply as a means for the municipality to reduce the administration of traffic violations from emergency vehicles photographed by red light cameras when crossing an intersection.

If the department agrees to the proposed emergency vehicle pre-emption, the department and municipality will enter into a formal agreement outlining the installation, operation and maintenance responsibilities of each party. A typical Emergency Vehicle Traffic Signal Pre-emption Agreement is attached as reference.

The pre-emption transmitter/receiver, processing electronics and interfacing equipment must be independent of the traffic signal cabinet, and all costs associated with installation, operation and maintenance of the pre-emption system are the responsibility of the municipality. The municipality must also provide the department with details of the interconnection (a signal cabinet blueprint to show how the electronics and/or electrical circuits are interfaced into the cabinet, and updated intersection plan showing mounting locations of any receivers) and planned pre-emption timings. The appropriate signal clearance timings must be determined to ensure the safe clearance of the critical conflicting phases. The pre-emption phasing sequence needs to be supplied to the department and documented as part of the signal phasing plan for the intersection.

Technical Requirements:

Emergency vehicle pre-emption may contain the following design components:

- Pre-emption sensors, associated electronics, cabinet and wiring,
- Isolation relay inside the controller cabinet,
- Pre-emption indicating lights (optional).

Pre-emption sensors for emergency vehicles can be activated by a stroboscopic light; digital siren; GPS based radio emitting device or radio frequency device mounted on the emergency vehicles. Each of these mechanisms except for the GPS units has the receiver unit face the oncoming direction of traffic. Some of the vendor's units are bi-directional, which means one sensor can detect emergency vehicles approaching from both directions. The GPS based units use a single sensor at the intersection and radio transmitter and typically do not require any special aiming to suit the approach of oncoming emergency vehicles.

Pre-emption can similarly be activated by simple devices such as a pushbutton inside the fire station. These are often used for signals locally adjacent to the fire station, and normally allow traffic signals at the fire station entrance to remain on green until the emergency vehicles have left. They also activate special pre-emption phases which allow easier passage through nearby intersections.

The activation is similar to the action of a detector sensor amplifier and puts in a call

for the pre-emption phase to begin after suitable minimum interval times and clearance times have been met. In the case of centralized systems, once the initial call is made, a moving window form of pre-emption can be implemented at adjacent traffic signals.

Each vendor of pre-emption systems typically has a specific wiring/cabling requirement between the sensor unit and the associated detection/processing electronics. The designer must confirm the type of pre-emption system electronics and cabling requirements prior to detailing the cabling requirements on engineering drawings.

The transmitter/receiver, processing electronics and interfacing equipment shall be housed in a separate weatherproof and environmentally controlled auxiliary cabinet separate from the traffic signal cabinet.

Within the traffic signal cabinet, opto-isolators are required to provide protection from any stray or over-voltage conditions from the auxiliary cabinet making it into the signal controller and causing damage. The output from the opto-isolator is wired into the pre-emption input of the signal controller.

Fire Truck Entrance Signals

Where fire stations are located directly adjacent to provincial highways, fire trucks may experience difficulty exiting the fire station if highway traffic volumes are heavy.

In some cases, it may be desirable to install fire truck entrance signals to aid emergency vehicles in gaining access to the highway. This special type of traffic control signal can be requested in the same manner as emergency vehicle pre-emption. The municipality must send a proposal to the nearest Alberta Transportation district office outlining why they feel the signal is justified. A fire truck entrance must meet one of the following criteria in order to be considered:

- High traffic volumes;
- Restricted visibility;
- Collision history;
- High speed of approach traffic; or
- Excessive delays incurred by fire vehicles to enter the highway.

This type of signal will only be considered where there is a direct fire truck entrance.

A listing of Alberta Transportation district offices are provided at the following link: http://www.transportation.alberta.ca/4450.htm

If sufficient justification is provided, the department may approve the design and installation of a fire truck entrance signal. The installation of such signals must be in accordance with guidelines in Section B5.4 of the Manual of Uniform Traffic Control Devices for Canada.

All costs associated with the installation, operation, maintenance and future replacement of a fire truck entrance signal and its associated equipment are the responsibility of the proponent.

References to Standards

TAC Manual of Uniform Traffic Control Devices for Canada	Section B5.4
Traffic Safety Act, Use of Highway and Rules of the Road Regulation	Sections 63 and 65

Emergency Vehicle Traffic Signal Pre-emption Agreement

This is a binding agreement effective as of the _____day of _____, 20_____, between Alberta Transportation, and

_____

This agreement stipulates the terms and conditions for use of Emergency Vehicle Pre-Emption (EVP) systems at traffic control signals located at the intersection of _____

Alberta Transportation will permit the installation of traffic signal pre-emption equipment at locations where the traffic signal equipment is owned by the department if the need for EVP has been established and agreed by the Municipality and if the following conditions are agreed to:

1. The emergency vehicle emitters will only be used on emergency vehicles, and to use traffic signal pre-emption only under conditions of emergency response.
2. The Municipality will submit proposed signal timing design, pre-emption system design and equipment list to Alberta Transportation District Office for review and approval. All designs shall be stamped by professional engineer. The submission must be approved by Alberta Transportation prior to the start of installation work. In case of disagreement the design and equipment chosen by Alberta Transportation shall be used.
3. All pre-emption equipment that is used must be of a type which is acceptable to Alberta Transportation.
4. All components related to the pre-emption system other than the pre-emption detector shall be located in Alberta Transportation traffic signal controller cabinet.
5. Vehicle emitter shall be wired so that they are enabled only when emergency light bars on the vehicles are activated. A means shall be provided to automatically disable the emitters when the vehicle is parked.
6. The Municipality may select a contractor provided that the contractor is pre-qualified by Alberta Transportation for traffic signal work.
7. All costs to purchase, installation, maintenance, repair or replacing the pre-emption equipment shall be paid by the Municipality. Such costs will include the replacement or upgrading of any existing conduit, controller, or cabinets which are inadequate to accommodate the new pre-emption equipment, routine maintenance such as cleaning and aiming of receivers, and maintenance of the proper programming of the equipment.
8. Alberta Transportation does not have an approved equipment list, nor does it endorse or specify any particular brand or vendor. Alberta Transportation will approve equipment proposed for use by the Municipality on a case-by case basis. At this time, the department will approve equipment that has:
    - Proven reliability
    - A means of uniquely identifying and logging pre-emption calls by individual emergency vehicle
    - Sufficient precision and accuracy to minimize false pre-emption calls which are disruptive to normal operation of the traffic signal.
9. Upon completion of the work, the Municipality must arrange for the manufacturer's representative to be on-site with the contractor to inspect the final installation, and assist in

testing, fine-tuning and programming of the pre-emption unit. The manufacturer must provide a letter to Alberta Transportation certifying that the pre-emption unit and the vehicle emitters have been installed in accordance with the manufacturer's recommendation and with Alberta Transportation's requirements.

10. All requests for the installation of pre-emption equipment with Alberta Transportation traffic control signals are to be directed to Alberta Transportation District Office for approval.
11. Municipalities are to be advised not to install pre-emption equipment on Alberta Transportation traffic control signals until all agreements and negotiations are finalized.

Approved:

_____ _____

Name: Date
Title:

_____ _____

Name: Date
Title: