

## REAL TIME TRAFFIC MONITORING REVIEW

### Recommendation

That the October 31, 2023, City Operations report CO01784, be received for information.

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|---|--|---|------------------|
| <b>Requested Action</b>   | Information only   |   |                  |
| <b>ConnectEdmonton's Guiding Principle</b>                                | <b>ConnectEdmonton Strategic Goals</b>   |   |                  |
| <b>CONNECTED</b><br>This unifies our work to achieve our strategic goals. | <b>Urban Places</b>  |   |                  |
| <b>City Plan Values</b>   | ACCESS   |   |                  |
| <b>City Plan Big City Move(s)</b>   | A rebuildable city   | <b>Relationship to Council's Strategic Priorities</b> | Mobility Network |
| <b>Corporate Business Plan</b>  | Serving Edmontonians   |   |                  |
| <b>Council Policy, Program or Project Relationships</b>                   | <ul style="list-style-type: none"> <li>• Policy C544 - Active Transportation Policy</li> <li>• Complete Streets Design and Construction Standards</li> <li>• Edmonton Main Streets Guideline</li> <li>• The Bike Plan and The Bike Plan Implementation Guide</li> <li>• Smart Transportation Action Plan</li> </ul>  |   |                  |
| <b>Related Council Discussions</b>  | <ul style="list-style-type: none"> <li>• May 2, 2018, City Operations report CR_5602, Pedestrian Activated Traffic Signals</li> <li>• June 5, 2018, City Operations report CR_5728, Smart Traffic Signals</li> <li>• September 11, 2018, City Operations report CR_6169, Smart Traffic Signal Pilot Corridors</li> <li>• December 1, 2020, City Operations report CR_6429, Smart Traffic Signal Pilot Results</li> </ul> |   |                  |

### Previous Council/Committee Action

At the February 22/24, 2023, City Council meeting, the following motion was passed:

That Administration complete a review of other jurisdictions to identify what is required to have real-time or close to real-time traffic volume measurement and to implement traffic dependent

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signals across Edmonton to improve traffic flow for all modes of transportation. This report is to include:

1. Cost differences for different types of traffic signals and traffic equipment;
2. Ways to incorporate this work with other transportation network projects;
3. The ability of reducing or eliminating pedestrian buttons as part of improving traffic movement for everyone; and adding audio signals; and
4. Identify changes to design practices that would be required to formally define signal prioritization to include all modes of transportation.

### Executive Summary

- Traffic signals enable Edmontonians to move safely and efficiently through intersections, ensuring residents can connect to and access spaces, services, facilities and mobility networks regardless of how they travel.
- The Traffic Signals Program builds on the strategic goals outlined in ConnectEdmonton and the Safe Mobility Strategy and supports increased active travel and transit use in Edmonton.
- Administration conducted a jurisdictional review of traffic control signals in cities with similar or larger population sizes. Compared to Edmonton, all cities that responded used a similar combination of technology to detect and collect data about different modes of transportation in different contexts.
- Administration will be conducting a comprehensive review of the Traffic Signals Program over the next year to determine how the City can deliver a transparent, programmed approach.

## REPORT

The City designs and programs traffic signals to safely and efficiently move pedestrians, micromobility users (bicycles, e-bikes, e-scooters, etc.), transit and vehicles through intersections while balancing user needs.

Traffic signals may operate individually or as part of a connected network of signals, such as along an arterial roadway. Where signals operate as a connected network, Administration coordinates signal timing to optimize traffic flow through the surrounding mobility network, rather than prioritizing individual locations. The City coordinates some green lights to support efficient flow for the busiest traffic directions, particularly during peak times, which reduces vehicle emissions and increases transit travel time reliability.

### City of Edmonton Traffic Signals Program

The City of Edmonton programs and operates approximately 1,900 traffic control devices, including more than 1,100 traffic signals as follows:

- amber pedestrian crossing lights
- rapid flashing beacons
- green/yellow/red traffic signals

When determining which traffic controls are appropriate for an intersection, the City's traffic engineers consider a variety of factors, such as real or estimated volumes for all modes of transportation, the size and design of the intersection, safety data and the features of the

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surrounding neighbourhood. Different types of traffic signals, traffic equipment and their costs are outlined in Attachment 1.

### Fixed-Time Signals

At intersections where there is a higher concentration of people walking, driving or using micromobility, such as the majority of downtown locations, traffic engineers program signals on a schedule to change automatically. That type of operation is referred to as a “fixed-time” signal, as the lights are timed to ensure safe crossing for all movements in the intersection. The timing schedule can vary to accommodate peak, off-peak and nighttime traffic. Approximately 30 per cent of Edmonton’s traffic signals are fixed-time signals.

### Actuated Signals

Actuated signals are typically used at locations where there are more people travelling in one direction compared to another; for example, at an intersection between a major road and a residential road. Engineers prioritize the direction of heavier traffic flow (including pedestrian, micromobility and vehicular) to ensure users are moving through the mobility network as efficiently as possible. Approximately 70 per cent of the City’s traffic signals are actuated, which means they detect the presence of pedestrians, micromobility users and/or vehicles and make adjustments to signal timing to optimize traffic flow.

- Pedestrians are detected by a button to initiate a crossing at the next safe point in the signal cycle. The time for the traffic signal to change depends on when in the signal cycle the button is pressed.
- Micromobility users are detected either by push buttons, video cameras or inductive loops. The time for the signal to change depends on when in the signal cycle the detection occurs.
- Vehicles are detected through video cameras or inductive loops embedded in pavement. When a vehicle is detected, a traffic signal change occurs at the next safe point in the signal cycle. The time for the signal to change depends on when in the signal cycle the detection occurs.

Fully-actuated signals detect traffic in all directions of travel through an intersection, while semi-actuated signals have detection in only certain directions or lanes. The majority of the City’s actuated signals (approximately 99 per cent) are semi-actuated.

### Accessible (Audible) Pedestrian Signals

The City includes accessible signals in new and renewal signal projects where there may be higher pedestrian activity (e.g. near hospitals, recreation centres, shopping centres or transit centres) and at intersections with non-standard geometry, which are roads intersecting at irregular or unusual angles. The City also installs accessible signals based on requests from residents in coordination with the Canadian National Institution for the Blind. Administration receives and completes approximately 10 requests per year. Accessible signals are present at approximately 18 per cent of the City’s traffic signals.

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### Pedestrian Crosswalk Devices

The City uses other pedestrian crossing devices, such as rapid flashing beacons and overhead amber flashing crosswalks, at intersections or crossings that do not have traffic signals. These crossings require activation (e.g. buttons) but there is no wait time between when the user presses the button and when the signal activates. Administration installs these devices in alignment with the Safe Mobility Strategy.

### Jurisdictional Review

Administration conducted a jurisdictional review of traffic control signals in cities with similar or larger population sizes compared to Edmonton, see Attachment 2. In general, the approach taken in Edmonton is similar to that of the respondents. Key takeaways include:

- All cities use a combination of technology, similar to Edmonton's, to detect and collect data about different modes of transportation in different contexts.
- Almost all cities use a combination of fixed-time signals (which operate on a schedule) and semi-actuated signals (with detection in only certain directions or lanes).
- Calgary is trialling adaptive traffic control technology, which is similar to Edmonton's fully-actuated traffic signals. Adaptive signals have greater flexibility to respond to sudden and significant changes in traffic volumes or patterns in specific circumstances (e.g. on a large freeway where traffic incidents are unpredictable).
- Most cities include accessible (audible) pedestrian signals in all new traffic signal projects.
- Push buttons are the most common method of pedestrian detection in cities.
- Some cities are using alternative methods of pedestrian detection, such as video cameras or radar sensors, in addition to using push buttons.

### Initial Assessment of the Current Traffic Signals Program

The City's current Traffic Signals Program includes the ongoing operations and maintenance of existing traffic signals, and the development of new signals through other roadway infrastructure projects (e.g. drafting and design, project and construction management, inspections and commissioning of infrastructure). Major categories of work include modifications, rehabilitation and upgrades to signals, design and implementation of new signals and traffic control devices, preventative maintenance and issues response. Administration designs and operates new traffic signals and traffic signal upgrades according to the City's Complete Streets Design and Construction Standards, which outline modal priorities (walking, wheeling, cycling, transit, driving, goods movement) based on corridors.

Administration conducted an initial assessment of the current Traffic Signals Program, see Attachment 3. Key findings include:

- Since 2013, Edmonton has grown in geographic size (12 per cent), intersection network inventory (nine per cent) and traffic control device inventory (46 per cent).
- The number of traffic signal projects to be completed in 2023 is 120 per cent higher than in 2013.
- From 2013 to 2022, the Traffic Signals program did not experience any growth in staff resources. In 2023, personnel grew by 15 per cent.

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- Administration performed scheduled timing assessments on all traffic signals on a four-year cycle until 2016. Due to resourcing, Administration now prioritizes timing assessments and changes for areas of the city experiencing growth, in coordination with major roadway projects, in conjunction with temporary changes in the roadway network (e.g. construction detours), policy and bylaw changes and based on the feedback shared by the public.
- The City incorporates new traffic signals or traffic signal upgrades (e.g. rapid flashing beacon to full green/yellow/red signal) with other capital transportation network projects, such as arterial renewal, neighbourhood renewal, developer funded projects, safe crossings projects or other roadway infrastructure improvement projects. There is currently no separate capital funding for new full traffic signals.

Administration will be conducting a comprehensive review over the next year to determine how the City can make adjustments to best deliver a transparent, effective, programmed approach to the Traffic Signals program that accommodates all users and aligns with The City Plan, The Bike Plan and the Safe Mobility Strategy. The review will include:

- Updated guidelines and prioritization criteria related to the installation of new or upgraded traffic signals in alignment with The City Plan, the Bike Plan, the Safe Mobility Strategy and other roadway network guidelines.
- Proposed options for service enhancements, such as increasing proactive assessments, data collection and analysis and transportation systems technology.
- Budget and resource requirements for service enhancements.

### Reducing Pedestrian Buttons

Administration uses pedestrian-actuated signals to provide real-time detection in areas where fixed-time signals are not used. Replacing pedestrian buttons with video or thermal detection is costly, less accurate and would not reduce wait times as compared to buttons. Replacing pedestrian buttons with fixed-time signals can negatively impact traffic movement, especially for micromobility users, vehicles and transit during peak travel times.

Administration has converted existing push button-activated signals in some high pedestrian areas to fixed-time signals with automatic pedestrian phases. As part of the Traffic Signals program review, Administration will identify additional locations that could increase equitable opportunities for all user groups to move through an intersection.

### Adding Accessible (Audible) Signals

As part of the upcoming review, Administration will work with stakeholders regarding the inclusion of audible signals in all new traffic signals to improve safety, accessibility and equitable use of the roadway network by all users. This is consistent with practices outlined by other municipalities in the jurisdictional scan. It is also in alignment with the recommendation by the Canadian National Institute for the Blind<sup>1</sup> that all intersections with traffic control signals be augmented with accessible pedestrian signals. Adding accessible signals will increase the required budget for all new signal projects.

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<sup>1</sup>CNIB Foundation Clearing our Path 2.0: [clearingourpath.ca/index.php/design-needs/exterior-design-elements/street-crossings/accessible-pedestrian-signals/](http://clearingourpath.ca/index.php/design-needs/exterior-design-elements/street-crossings/accessible-pedestrian-signals/)

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### **Budget/Financial Implications**

Changes to the Traffic Signals program may require an adjustment to the program budget. Administration will present options for service enhancements, including financial implications, as part of the program review.

### **Community Insight**

Traffic signal design for new or redeveloped infrastructure is informed by the results of public engagement related to those projects, such as during the neighbourhood renewal process.

### **GBA+**

The City designs and operates the traffic signal system to ensure pedestrian, micromobility, transit and vehicle traffic moves safely and efficiently through the roadway network while balancing the needs of all users. Administration prioritizes signals along modal priority networks to support active modes of transit, promote transit use and reduce traffic congestion and idling in alignment with Edmonton's goal of climate resilience.

The Traffic Signals program review will include a GBA+ lens to identify improvements that can be made to the program and the signals network to improve equity for all users and enhance safety, particularly for vulnerable road users. This supports the Safe Mobility Strategy 2021-2025, which is designed to achieve Vision Zero - the City's target to have zero traffic-related serious injuries and fatalities - through safe and livable streets by 2032, and The City Plan target of increasing trips to 50 per cent by transit and active transportation.

### **Attachments**

1. Traffic Signal Technology
2. Jurisdictional Scan
3. Traffic Signals Program Initial Assessment