

Bike Routes - Assessment of Community Needs, Safety, and Underused Bike Lanes

Recommendation:

That the October 15, 2014, Transportation Services report CR_1033, be received for information.

Report Summary

This report summarizes the assessment of bike routes along 106 Street, 40 Avenue, and 95 Avenue including an operational assessment, safety review, alternate routes review, and upgraded route options. The results of the technical assessment show the routes are operating well and as designed. The assessment identified operation and safety enhancements for the routes which will be implemented in 2015 following design and pending budget approval. A concept plan for an upgraded route along 106 Street north of 51 Avenue will be completed, including public consultation, and implemented as part of Neighbourhood Renewal and Community Traffic Management Plans. Concept plans for upgraded designs of 95 Avenue, 40 Avenue, and the remainder of 106 Street would be completed in conjunction with capital funding for road reconstruction.

Previous Council/Committee Action

At the February 5, 2014, Transportation Committee meeting, the following motion was passed:

That Administration provide the following report to Transportation Committee by the end of September 2014:

- An assessment of the selected routes (106 Street, 40 Avenue, and 95 Avenue), that provides options to better meet the needs of both neighbourhoods and cyclists, including:
 - a. options and costs for alternative routes, including consideration of external factors such as scheduled neighbourhood renewal
 - b. options to address safety and operational concerns for both motorists and cyclists
- An assessment of other routes in the city that have been underused, including recommendations and costs for improved routes.

Report

Background

Since 2009, 65 km of on-street bike routes have been constructed in Edmonton bringing the total network of on-street routes to 71 km in addition to the over 300 km of off-street shared-use paths. The construction of these routes has caused changes to the way space is allocated on the streets. In response, Transportation Committee directed Transportation Services to complete an assessment of three recently constructed bike routes: 106 Street from Saskatchewan Drive to 29 Avenue; 40 Avenue from 119 Street to 106 Street; and 95 Avenue from 142 Street to 189 Street including 142 Street from 95 Avenue to MacKinnon Ravine and 189 Street from 87 Avenue to 95 Avenue. Information pertaining to the performance of the routes (safety, operational impacts, usage) and potential alternate routes was sought.

The City of Edmonton has been monitoring the performance of the bicycle network on an on-going basis including: conducting bicycle volume counts and motor vehicle speed and volume surveys on bicycle routes; assessing motor vehicle-bicycle conflicts and behaviour; and reviewing intersection signal timings and operations. Administration has also conducted additional surveys, including focus groups, to gain an understanding of local cycling and driving characteristics. The assessment prepared in response to Committee's motion builds off the monitoring program.

The information presented below summarizes the findings of the assessment. A number of departments, branches, and sections within the City of Edmonton have contributed to this work including Transportation Planning (Sustainable Transportation, Transportation Monitoring, Facility and Capital Planning), Transportation Operations (Traffic Engineering, Roadway Maintenance, Office of Traffic Safety), Edmonton Transit, Drainage Services, and outside agency, the University of Alberta's Chair for Road Safety.

Safety Review

An In-Service Road Safety Review was completed by an independent third-party consulting team that has not had previous involvement in Edmonton's bicycle transportation program.

An In-Service Road Safety Review is an in-depth engineering study of an existing road using road safety principles with the purpose of identifying cost-effective countermeasures that would improve road safety and operations for all road users.

The study included:

- review of collision data
- geometric review of the facility design
- review of stakeholder and public input and human factors
- review of traffic operations

- identification of elements which may negatively impact safety and suggestion of corrective measures

City-Wide Findings

From a city-wide basis, the addition of on-street bicycle routes has not negatively impacted the safety of cyclists. Since 2009, 65 km of on-street bike routes have been added. In this time, motor vehicle-bicycle collisions have dropped by 25%. Of the top ten causes of motor vehicle-bicycle collisions (representing 90% of all motor vehicle-bicycle collisions), almost 60% are caused by motorist error or violation while 30% are identified as being caused by cyclist error or violation. The greatest concentration of cycling collisions is located in the downtown core of the city where there are no exclusive on-street bicycle facilities. Based on the time of day of motor vehicle-bicycle collisions, the study recommends placing more focus on the safety of commuting bicycle routes to improve the safety of cyclists.

106 Street, 40 Avenue, and 95 Avenue Findings

The safety review indicated that all three corridors are performing well. The review indicated that all routes are designed in accordance with the Transportation Association of Canada Manual for Uniform Traffic Control Devices for Canada, Transportation Association of Canada Bikeway Traffic Control Guidelines for Canada, and the National Association of City Transportation Officials Urban Bikeway Design Guide. However, the review did identify opportunities to enhance the safety and operation of the corridors for all road users.

The corridor enhancement opportunities with the most significant improvements on design and operation can be summarized as follows.

1. Locations where vehicles cross bike lanes (e.g. intersections, accesses, driveways) need improvements to markings and signage to highlight these areas. Transportation Services will develop guidelines to apply green pavement markings and signage and implement the necessary changes. Research and findings from other jurisdictions show that this type of marking can improve safety.
2. Delineation of right-turn lanes and the end of parking lanes were identified as something that could be improved to better define where the right-turn bay started. Implementation of these changes will be completed in conjunction with enhancement 1 (above).
3. Roadway condition of the on-street bike routes and the need to prioritize maintenance of bike routes was identified as an issue. If lanes are impassable or not cleared of debris or snow, cyclists will ride in the vehicle lanes, reducing safety and traffic flow. Prioritizing roadway maintenance activities based on the existence of a bike route is not currently included in the process used by the City of Edmonton.

In addition to the above, location specific recommendations worth noting include:

1. Improved geometric design for the intersection of 95 Avenue and 163 Street to reduce vehicle encroachment into the westbound bicycle lane.
2. Suggestions for revisiting the permissive dual left-turn operation at 95 Avenue and 170 Street to change this to a protected phase.
3. Improved design for the intersection of 40 Avenue and 111 Street to improve the eastbound right-turn and dual left-turn bays design.
4. Improved design for the intersection of 40 Avenue and 106 Street to improve the safety and comfort for westbound through cyclists.
5. A review of the design of 106 Street north of 51 Avenue to improve and manage motor vehicle traffic volumes and speeds. A concept plan will be prepared for this street and will be implemented in conjunction with a number of other programs including the Queen Alexandra Neighbourhood Renewal, Strathcona Neighbourhood Renewal, and Pleasantview Community Traffic Management Plan.

The results of the In-Service Road Safety Review indicate the bike routes are consistent with national design guidelines and are operating safely. The removal of the 106 Street, 40 Avenue, and 95 Avenue bike routes based on road safety considerations would not be consistent with the findings of the Safety Review. The costs to implement safety enhancements, and the operational improvements discussed below, for the 106 Street, 40 Avenue, and 95 Avenue routes are estimated at the cost of \$1 to \$2 million depending on the final design of the enhancements. The safety enhancements and operational improvements could be implemented in 2015 if Profile CM-66-2600 submitted for Council consideration in the 2015 - 2018 Capital Budget is approved for funding.

Operational Review

The Operational Review was completed by Transportation Services. The review assessed the operational performance of 106 Street, 40 Avenue, and 95 Avenue before and after bike routes were constructed. The review included a number of tools to assess the operational performance of the corridors:

- Intersection turning movement surveys
- Intersection delay surveys
- Intersection queue reach surveys
- Right-turn on red violation surveys
- School site pick-up/drop-off observations
- Analysis of level of service
- Analysis of volume-to-capacity ratio
- Analysis of delay

The operational review identified the following.

- The signal timing for three intersections (40 Avenue and 119 Street, 95 Avenue and 163 Street, and 106 Street and 38 Avenue) will be adjusted to improve traffic flow.
- A new traffic signal is pending installation at 95 Avenue and 165 Street. Conditions pre-dating the bike route construction warranted this traffic signal.
- Operational issues reported at 106 Street and 34 Avenue and 40 Avenue and 111 Street were found to be consistent with the operations prior to the bike route construction and caused by traffic signal network coordination constraints and LRT operations, respectively. (Geometric improvements were identified as part of the Safety Review for the 40 Avenue and 111 Street intersection.)
- Enforcement of the no right-turn on red restriction at 40 Avenue and 106 Street is required and will be a part of the positive enforcement campaign being planned by Transportation Services, Edmonton Police Service, and Campus Protective Services for 2015.

The results of the Operational Review indicate the addition of on-street bike routes to 106 Street, 40 Avenue, and 95 Avenue have had no major operational issues. These corridors were found to operate within acceptable and typical operational levels with minor changes in motor vehicle level of service or delay. The findings of the Operational Review confirmed the routes are operating as designed and as expected with some specific improvements noted.

Usage Review

A review of the bicycle volumes was completed by Transportation Services for the corridors under review to compare usage before and after the construction of the bike routes. The findings of the Usage Review are taken from the annual bicycle monitoring program which includes collecting data along bicycle routes throughout Edmonton. The following highlights some of the findings of the Usage Review:

- About 300 to 400 bikes per day are traveling along 106 Street at 76 Avenue and is an increase of 80% to 90% since 2011.
- About 80 to 90 bikes per day along 40 Avenue west of 106 Street which is a 240% increase in the number of bikes before the installation of bike lanes.
- 130 to 150 bikes per day along 106 Street north and south of 40 Avenue which is a 120% increase in the number of bikes before the installation of bike lanes.
- About 170 bikes per day along 106 Street north and south of 51 Avenue which is about a 50% increase before the installation of bike lanes.
- About 50 bikes per day along 40 Avenue west of 111 Street shows an increase of 60% to 100% depending on location.
- About 50 to 80 bikes per day along 95 Avenue which is a 133% increase in the number of bikes as compared to before the installation of bike lanes.

The findings of the Usage Review show increases along the routes since the bike routes have been constructed. As more of the bicycle network is constructed, a connected network of routes is established, and more people become aware of the bike

routes, bicycle volumes are anticipated to continue to increase. For example, the 106 Street bike route at 76 Avenue has the highest use of the locations surveyed and is a route that has been operating for three years and intersects with the 76 Avenue bike route as compared to the 95 Avenue route which has been operating for less than one year and has limited connections currently to other bike routes.

Alternate Routes Assessment

Alternate routes to the routes constructed on 106 Street, 40 Avenue, and 95 Avenue were evaluated using quantitative criteria for three general categories: connectivity, safety, and cost. Alternate routes were identified that would serve similar origins and destinations as the existing routes which meant they were located within three blocks of the existing routes where possible.

Two alternate routes were identified for each corridor. 105 Street and 108 Street were identified as possible alternatives for 106 Street, 92 Avenue and 97 Avenue were identified as alternatives for 95 Avenue, and 43 Avenue and 37 Avenue as alternatives for 40 Avenue. See Attachment 1 for a map of the alternate routes.

The Alternate Routes Assessment evaluation found that the constructed routes along 106 Street, 40 Avenue, and 95 Avenue ranked higher than the alternate routes in terms of connectivity, safety, and cost. The constructed routes are the most direct and least circuitous. 106 Street and 95 Avenue have fewer conflicts than the alternate routes. 40 Avenue was found to be similar to the alternates in terms of safety.

If 106 Street were removed and replaced with 108 Street or 105 Street, the cost would be approximately \$2.5 million. Removing 95 Avenue and replacing it with 92 Avenue or 97 Avenue would cost approximately \$1 million. The cost to remove 40 Avenue and replace it with 37 Avenue or 43 Avenue would be approximately \$0.5 million to \$1 million.

Upgraded Routes Assessment

Due to the results of the Alternate Routes Assessment, Administration reviewed opportunities to provide upgraded designs for the existing corridors. The upgraded designs are intended to increase the comfort for cyclists using the route and improve motor vehicle travel.

The design philosophy used was that protected bike lanes or shared-use paths would be preferred where traffic volumes and speeds are higher. Where traffic volumes are lower, slower, and more local in nature, bicycle boulevards would be a preferred option.

High level design options were identified that may be possible. However, a concept planning process, including consultation with the communities, would be required to provide greater detail to the planning, operational assessment, and design of possible options as well as refined cost estimates. In addition, some of the design options may

require changes to snow clearing and street sweeping equipment or procedures.

Protected bike lanes for 95 Avenue with a segment of bicycle boulevard between 142 Street and 146 Street could cost \$8 million. Additional motor vehicle lanes might be possible but could require removal of some trees and landscaping and the possible need for property easements. Other options would limit impacts to trees and property by constructing raised protected bike lanes to a sidewalk level grade in the location of the current road level bike lanes.

Protected bike lanes along 106 Street south of 76 Avenue and the creation of a bicycle boulevard north of 76 Avenue were considered. This option would likely impact boulevard trees between 53 Avenue and 56 Avenue and would require the removal of all on-street parking between 56 Avenue and 76 Avenue. The cost to upgrade the 106 Street route could be \$10 million. More detailed consideration of design options for this route north of 51 Avenue through the development of a concept plan will be completed in coordination with the Pleasantview Community Traffic Management Plan and Queen Alexandra Neighbourhood Renewal. This process may find other design options for 106 Street north of 51 Avenue which may also reduce the cost.

Protected bike lanes along 40 Avenue are possible and would be fairly straightforward to implement by switching the location of the bike lanes and parking lanes (similar to what could be done to 106 Street between 34 Avenue and 40 Avenue). The projected cost is \$2 million.

Study Limitations

The review of transportation system changes, including the construction of bike routes, is difficult to assess when the changes are very recent. Ideally, a post-implementation study period of three to five years is required to compare the before and after performance of a transportation facility. This is particularly relevant to the review of facility usage and collision data. Therefore, the conclusions in the bike route assessments are based more on evaluation of geometric design and intersection operations as they relate to safety and performance. On-going monitoring of the City's bike network, including the assessed routes, will be conducted as part of the annual bicycle monitoring program.

Conclusions

Based on the above findings, 106 Street, 40 Avenue, and 95 Avenue will be enhanced based on the recommendations from the In-Service Road Safety Review and Operational Review. The construction of the safety and operational improvements identified will be dependent on the outcome of the 2015 - 2018 Capital Budget. The design and implementation work would be undertaken through the Active Transportation Profile CM-66-2600. The development of necessary guidelines could be carried out

within existing Transportation Operating resources. The capital cost of these enhancements will be \$1 to \$2 million depending on the final design.

A concept plan of an upgraded route along 106 Street will be completed for the segment north and including 51 Avenue to be incorporated in the Queen Alexandra Neighbourhood Renewal. The upgrades to 106 Street, in conjunction with the collector street reconstruction, could possibly be funded by the Complete Streets Capital Program pending budget approval and ensuring the scope of projects funded through this program includes collector streets in addition to arterials.

Concept plans for upgraded routes along 95 Avenue, 40 Avenue, and 106 Street south of 51 Avenue could also be completed. There are no current or proposed funding packages to upgrade 95 Avenue and 106 Street south of 51 Avenue. Funding for an upgraded 40 Avenue route may be possible if the Active Transportation Capital Program is approved.

Next Steps – Assessment of other routes

Assessment of other existing on-street bike routes will be completed as part of the annual bicycle monitoring program. The assessments will include application of the findings from the evaluation and review of 106 Street, 40 Avenue, and 95 Avenue to identify improvements. The assessment of bike routes is maturing both in terms of data collection and monitoring as well as evaluation. The process to complete the assessment of bike routes will be completed on a rotating annual basis consistent with the approach used for evaluating the operation of roadways.

Policy

- Active Transportation Policy C544

Corporate Outcomes

- Edmontonians use public transit and active modes of transportation.
- Edmontonians use facilities and services that promote healthy living.

Budget/Financial Implications

Capital Profile CM-66-2600 (Active Transportation) has been submitted for Council's consideration as part of the 2015 - 2018 Capital Budget process.

Attachment

1. Alternate Routes Assessment

Others Reviewing this Report

- L. Rosen, Chief Financial Officer and Treasurer