

OFFICE OF
THE CITY AUDITOR

REPORT

Arterial Roadway Assessment Audit

MAY 27, 2022

Report Summary

BACKGROUND

Arterial roadways serve as major transportation routes between different parts of the city. Their primary function is to deliver a high volume of traffic from collector roads to freeways or expressways, and between urban centres at the highest level of service possible. The Development Services Branch (Branch) administers the arterial roadway assessments (ARA) program and oversees the funding and construction of new arterial roadways.

Under the ARA program, developers pay for and construct the arterial roads. Developers within a specific area served by the arterial roads (a catchment) share the construction costs proportionately, depending on how many hectares of land they are developing. Administration determines the catchment areas, calculates the assessments, and collects and disperses funds. They also set the cost per hectare for each catchment, which is approved by development industry members and Administration staff on the ARA Steering Committee. In this system there is no financial risk to the City as it is not building or paying to build the roads identified in the Arterials Roads for Development Bylaw.

Land developers have constructed over \$91 million in arterial roads in the city since 2016.

AUDIT OBJECTIVES & SCOPE¹

To determine if the Branch:

- Developed guiding documents that are clear and understandable
- Administered the arterial roadway assessments program to meet program goals

We focused on administration of residential catchments and not industrial or commercial catchments.

¹ We conducted this engagement in conformance with the Institute of Internal Auditors' *International Standards for the Professional Practice of Internal Auditing*.

WHAT WE FOUND

Most stakeholders are aware of and understand the guiding documents to manage ARAs and their roles and responsibilities. As well, financial processes related to collecting, dispersing, and tracking developer funds are accurate and complete. Developers are building arterial roads prior to completing the development in a catchment.

However, several important ARA administration processes in the guiding documents are not clear or are not aligned to current practice. The guiding documents are not clear on when a developer should add additional lanes. The current practice for the number of lanes developers initially build and the inclusion of contingency costs in the cost estimate are not consistent with what is described in the guiding documents.

We also found that the Branch has not documented the detailed calculations to determine the ARA cost per hectare. This includes not documenting the rationale for how the Branch estimates the costs per metre of certain roadway types and why engineering, administration, and contingency costs are included in the ARA cost per hectare calculation twice. As well, the calculation reviews performed by Branch staff did not identify or prevent some significant errors.

RECOMMENDATIONS

Recommendation 1

We recommend that the Development Services Branch update arterial roadway assessment guidance documents.

Recommendation 2

We recommend that the Development Services Branch document the methodology for and enhance reviews of the arterial roadway assessment calculations.

WHY THIS IS IMPORTANT

Clarity in how the ARA program is administered and how the ARA cost per hectare is calculated can help reduce stakeholder uncertainty and enhance the accuracy and consistency of calculations. This will ensure fairness and transparency between developers.

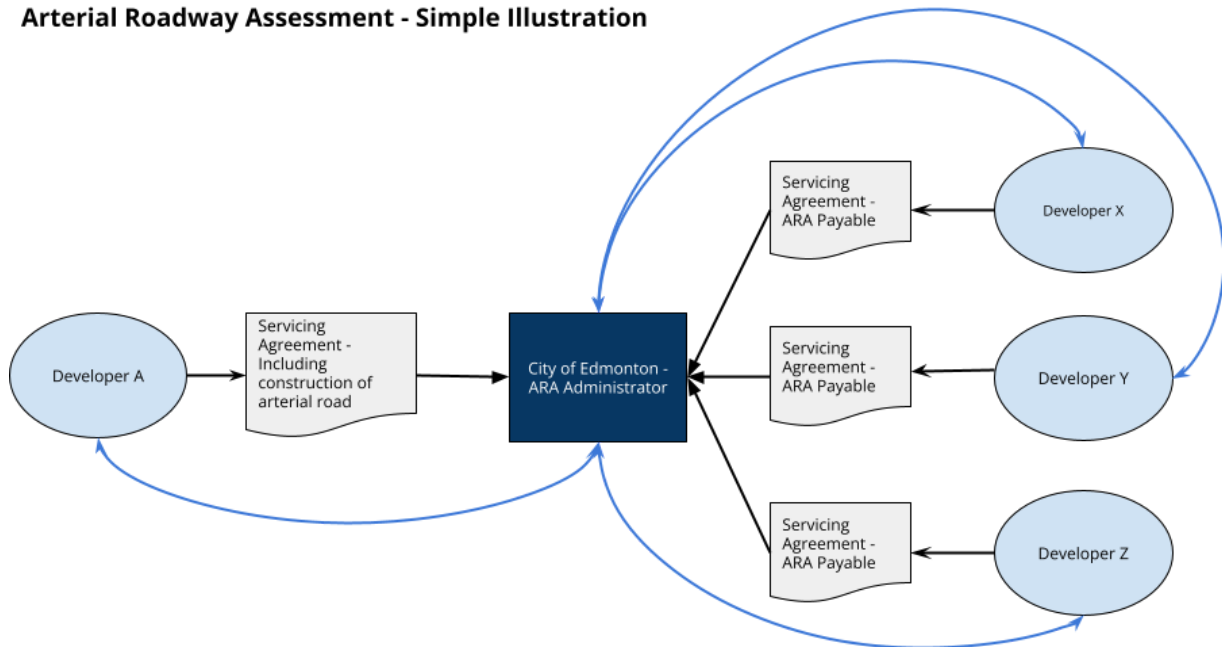
ARA Program Details

ARA PROGRAM

The City uses the arterial roadway assessments (ARA) program to oversee the funding and construction of new arterial roadways. The Development Services Branch (Branch) administers this program.

The ARA program is designed so that new land developers in specific areas of the City, known as catchments, pay for their proportionate share of the new arterial roadways in that catchment. Developers are also responsible for building those roadways. Below is a simplified illustration of the process:

Arterial Roadway Assessment - Simple Illustration



Simple Illustration

- Developer "A" enters into a servicing agreement with the City, which requires the developer to construct an arterial road in a catchment.
- The City administers the ARA. This includes determining the ARA rate for the catchment, calculating ARA payable and over-expenditure balances. It also collects and disperses funds to developers.
- Subsequent developers (X, Y, & Z) within the catchment will be responsible to pay for their share of the construction of the arterial road through the ARA assessed in their servicing agreement.
 - The ARA assessed is based upon multiple factors including assessable area, arterial road construction costs, and over-expenditures (costs already paid by developer A to build arterial roads).
 - The ARA assessed allows for cost sharing for the construction of the arterial road and ensures that funds are collected and reimbursed to those developers (e.g., developer A) that front-ended the cost of the arterial road (those with over-expenditures).

The ARA program is based on a combination of cost estimates and actual costs. The cost estimates can change over time. As catchments progress through their lifecycle and developers build arterial roads, the actual costs of road building become known. The determination of the ARA cost per hectare becomes more accurate as more of the cost per hectare is based on actual costs instead of estimated costs.

Edmonton currently has 20 residential catchments defined for ARA purposes. At the beginning of 2021, these 20 catchments included 6,445 hectares of land for future development and approximately 125 kilometres of arterial roadway still to be built.

GUIDING DOCUMENTS

City Policy and Procedure *C507 - Arterial Roads for Development* provides direction around how the Branch administers ARAs. It sets requirements such as:

- How to calculate the ARA cost per hectare
- Developer reimbursement when they pay more than their proportionate share of costs (known as an over-expenditure)
- Responsibility for building arterial roads
- Allocation of costs between catchments

City Bylaw *14380 - Arterial Roads for Development* provides additional detail such as:

- Allowable ARA costs, for both cost estimation and submission of actual costs
- The timing of when developers are to build arterial roads
- The purpose of the ARA administration fee that the Branch charges

**ARA STEERING AND
WORKING COMMITTEES**

The ARA Steering and Working committees assist in guiding the ARA program. Each of them is made up of members from both the Administration and the development community. The ARA Steering Committee has oversight over the ARA Working Committee.

These committees are in place to:

- Provide input into potential changes to and review roles within the ARA program
- Review high level methodology around calculations, associated administrative processes, and approve per hectare cost estimates
- Review and approve construction cost estimations to set ARA costs per hectare
- Assist in determining the staging and phasing of road construction

Recommendation 1: Guidance Documents

RECOMMENDATION 1

We recommend that the Development Services Branch update arterial roadway assessment guidance documents.

KEY FINDINGS

Most developers are aware of and understand the guiding documents to manage ARAs, as well as their roles and responsibilities.

However, we identified areas of the guiding documents, which are important to the administration of ARAs, that are not clear or are not aligned to current practice:

- The guiding documents are not clear on when a developer should add additional lanes.
- The Branch allows developers to initially build fewer lanes than is required by the guiding documents.
- The Branch includes contingency costs in the estimation of construction costs. This is not mentioned in the guiding documents.

WIDENING OF ARTERIAL ROADWAYS

The guiding documents do not specify when developers should construct additional lanes on arterial roadways. As well, some of the stakeholders we surveyed felt that there was not enough clarity in the guiding documents around when they should be widening arterial roadways.

Due to the lack of specific guidance, the Branch's transportation engineers use their professional judgment when deciding when developers should widen arterial roadways. Transportation engineers generally use a traffic volume threshold of 15,000 vehicles per day as a starting point for when they need to consider widening. However, other factors can influence exactly when the requirement to widen is made. This lack of clarity leads to inconsistency and confusion amongst developers,

which is something we heard from Administration and directly from developers.

INITIAL CONSTRUCTION

Per the guiding documents, the minimum number of lanes developers are required to initially build is four or five. The Branch can only make exceptions to this if:

- There is insufficient right of way available, or
- The roadway is bisecting an existing and future catchment and the traffic volumes only require two or three lanes.

In practice, the Branch allows developers to initially build arterial roadways with only two or three lanes, even if the exceptions are not met. Our discussions with management indicated that requiring developers to initially build four or five lanes would not be practical from a development perspective, as it would require significantly more funding and would also increase the City's road maintenance costs.

CONTINGENCY COSTS

The Branch incorporates a 10 percent contingency into the estimated construction costs when calculating the ARA cost per hectare. This is practical from a conservative estimating perspective (actual construction costs are unknown, so building in a contingency is appropriate). However, the guiding documents do not mention inclusion of contingency amounts when estimating the cost to construct. The guiding documents do specifically mention the inclusion of other estimates, such as engineering and administration costs.

WHY THIS IS IMPORTANT

Uncertainty around when developers should be widening arterial roads leads to frustration from the development community. As well, the lack of clarity around how many lanes developers should initially build and the inclusion of contingency costs leads to a lack of understanding from the development community.

RECOMMENDATION 1
MANAGEMENT RESPONSE

Update the arterial roadway assessment guidance documents.

**Responsible Party**

Branch Manager, Development Services



Accepted by Management

Management Response

In order to comply with this recommendation, Administration will:

- Document the criteria for triggering additional lanes.
- Amend the guiding documents to clarify criteria for initial construction requirements, and to provide information for staging of arterial roads.
- Provide for contingency in cost estimates.

**Implementation Date**

March 31, 2023

Recommendation 2: Methodology for Performing and Reviewing ARA Calculations

RECOMMENDATION 2

We recommend that the Development Services Branch document the methodology for and review the arterial roadway assessment calculations.

KEY FINDINGS

Financial processes related to collecting, dispersing, and tracking developer funds are accurate and complete. Also, developers are building arterial roads prior to completing the development in a catchment.

However, the Branch has not documented the detailed calculations to determine the ARA cost per hectare. The rationale for how the Branch estimates certain costs per metre of roadway type and why engineering, administration, and contingency costs are included in the ARA cost per hectare calculation twice are not consistent or clear.

We also found that there is evidence of Branch staff performing reviews on calculations, however they did not identify or prevent some significant errors in the calculation of ARA cost per hectare. We identified errors in formulas, incorrect unit costs, and lengths of road missing from the calculation.

CALCULATION METHODOLOGY

Administration calculates the ARA cost per hectare using a series of spreadsheets. The Branch has not documented the methodology for performing the calculations, including the rationale and assumptions used in the calculations. For example, it has not documented the rationale for the costs Administration uses to estimate construction costs.

Per Metre Construction Costs

One of the first steps in calculating the ARA cost per hectare is to estimate the remaining construction costs. Administration obtains the amount of each type of roadway left to build in the catchment and multiplies them by an estimated cost per metre of roadway construction.

Cost per metre of roadway construction varies depending on the road already in place and what type of road the Branch requires the developer to build. For example, going from undeveloped land to a four-lane urban divided arterial road has a different cost than going from a two-lane urban road to a four-lane urban divided arterial road.

The Branch has not documented the rationale for how it estimates the cost per metre for building some different types of roads. The methodology the Branch uses for these calculations has been in place for at least 10 to 15 years.

Costs for some of the road types are built on detailed calculations, which include amounts for things such as excavation, subgrade, curb & gutter, and landscaping. When the Branch calculates the final per metre construction cost, they also apply an amount for engineering, administration, and contingency costs. However, the method of estimating costs for some of the types of roads is not clear. For example:

- Undeveloped land to five-lane urban undivided arterial road type is calculated using the costs to go from undeveloped land to a four-lane urban divided arterial less the cost of the curb and gutter line item.
- Undeveloped land to five-lane rural undivided arterial road is calculated using the cost to go from undeveloped land to a two-lane urban divided arterial less the curb and gutter amount, then add the cost to go from a three-lane rural road to a five-lane rural undivided road.

Engineering, Administration, and Contingency Costs

The Branch discusses, potentially adjusts, and then ultimately agrees upon the per metre construction costs with the ARA Steering Committee. This committee is made up of City of Edmonton staff and representatives from an industry group representing the land development community. The Branch and committee review the cost estimates annually.

Once the estimated per metre construction costs are determined, which already include a component for engineering, administration and contingency, the Branch multiplies the length of each remaining road type in a catchment by the corresponding per metre cost. It then applies engineering, administration, and contingency amounts to the construction costs, and includes land costs. Additional cost components such as creek crossings, intersections, signal lights, and temporary transitions are also part of the calculation.

There is no documented methodology to explain the rationale for including engineering, administration, and contingency costs in both the cost per metre and again in the total estimated costs of construction.

If engineering, administration, and contingency costs were overestimated, the ARA cost per hectare should come down over time (as the catchment would accumulate more payments earlier in its lifecycle). An evaluation of ARA costs per hectare over the past five years, for catchments in varying stages of their lifecycle, did not indicate decreasing costs per hectare. This suggests that the estimated construction costs are reflective of the actual construction costs. There are other factors that impact the accuracy of the total cost estimate. These include land values, construction cost inflation, financing rates, etc.

REVIEW OF ARA CALCULATIONS

Senior development engineers outside of the ARA team perform reviews of the ARA cost per hectare calculations. However, we found a number of errors in those calculations. Performing more detailed reviews will prevent these types of errors in the calculation of the ARA cost per hectare.

Examples of the errors we found include:

- Total over-expenditures for one catchment not being factored into the ARA cost per hectare for the year. This reduced the cost per hectare by \$6,388.
- Inconsistent contingency amount was applied to a road segment. This increased the cost per hectare by \$1,144 in the sample we reviewed.
- Incorrect per metre construction cost leading to underestimated construction costs. This reduced the cost per hectare by \$22,821 in the sample we reviewed.
- Missed lengths of road leading to underestimated construction costs. This reduced the cost per hectare by \$808 in the sample we reviewed.

As catchments progress through their life, more of the ARA cost per hectare is based on actual costs submitted, as opposed to estimated costs. This means that the impact of inaccurate cost estimates would be more significant earlier in the life of a catchment.

WHY THIS IS IMPORTANT

Documenting the methodology for calculating the ARA cost per hectare will:

- Reduce inconsistency in calculations
- Support the accuracy of cost estimations used to determine ARA amounts paid by developers

More stringent review will help to catch errors in these calculations, and prevent developers from paying an incorrect amount.

**RECOMMENDATION 2
MANAGEMENT RESPONSE**

Document the methodology for and enhance reviews of the arterial roadway assessment calculations.

**Responsible Party**

Branch Manager, Development Services



Accepted by Management

Management Response

To comply with this recommendation Administration will:

- Document how construction costs per metre are calculated.
- Document how ARA costs per hectare are calculated, including rationale and assumptions.
- Develop and implement guidelines for more rigorous reviews of ARA costs per hectare calculations.

Administration will update and revise the guiding documents to provide clarity and transparency for stakeholders, including clarifying the application of engineering, administration and contingency costs.

Administration has corrected all errors and oversights that were identified in the rate calculations during the audit and the 2022 ARA rates have been approved by the ARA Steering Committee.

**Implementation Date**

March 31, 2023

ACKNOWLEDGEMENT

We would like to thank the staff and management of the Development Services Branch for their cooperation during the audit, as well as the external stakeholders that helped to inform our work through interviews and survey responses.