Infrastructure Renewal

ASSET INVENTORY

Renewal projects focus on maximizing the effective utility of existing capital assets. Prioritizing renewal projects is achieved through a customized assessment methodology - the *Risk-based Infrastructure Management System (RIMS)* - which was developed by the City's Infrastructure & Funding Strategies section, formerly the Office of Infrastructure. Investing in renewal starts with a comprehensive understanding of the nature, scope and state of all assets that are owned by the City.

Infrastructure & Funding Strategies produces an annual overview of the inventory and state and condition of city infrastructure. The Figure 1 illustrates the broad range of assets that are managed by the City of Edmonton. The grouping of assets is hierarchical with four broad categories, or portfolios, that demonstrate primary Functional areas. This is further broken down into more detailed groups with close to 200 sub-assets in total.

Portfolio	Group	Description
Transportation	Road Right-of-Way	includes roads (arterials, collectors, local; and curb and gutter), sidewalks, and auxiliary structures (such as gates, streetscapes and others) and bridges.
	Traffic Control and Street Lighting	includes traffic signals, signs, markings, street lighting and parking meters.
	Transit Facilities and Equipment	includes Light Rail Transit (LRT) system facilities and equipment (including cars), transit centres, and bus equipment.
Environment and Safety	Drainage	includes sanitary, storm and combined sewers (including manholes, catchbasins), and service connections.
	Waste Management Facilities	includes operation and administration facilities, transfer stations and public facilities, processing facilities and operating landfills and appurtenances.
	Police	includes police equipment, police vehicles and specialized equipment, communications and IT.
	Fire Rescue	includes specialized emergency equipment, communication equipment, on board fire equipment and Station Alerting system.
Social Infrastructure	Community Infrastructure	includes all recreation equipment, golf courses and cemeteries. The group does not include buildings.
	Parks	includes horticulture, trails, hard surfaces, playgrounds, sportsfields, park infrastructure and parks.
	Housing	includes non-profit housing, community housing and senior lodges/cabins.
	Library	includes library network, contents and materials.
Corporate Infrastructure	Buildings	includes civic offices, public works, operation facilities (e.g. yards) all major recreational facilities and amenities, police, libraries, and emergency response buildings.
	Fleet	includes municipal city vehicles, transit fleet and shop equipment.
	Technology Equipment	includes business application systems, servers, data storage and back-up, personal computers, networks and communication equipment.

Figure 1: Description of Infrastructure

The City of Edmonton, as of year-end 2012, had a total asset replacement value of $39.6 billion as seen in Figure 2 below, more than double the $18.2 million value reported in the 2003 infrastructure inventory report. 40 per cent, or $16 billion, is currently attributed to the Drainage portfolio followed by 31 per cent ($12.4 billion) of assets under Road Right-of-Way.

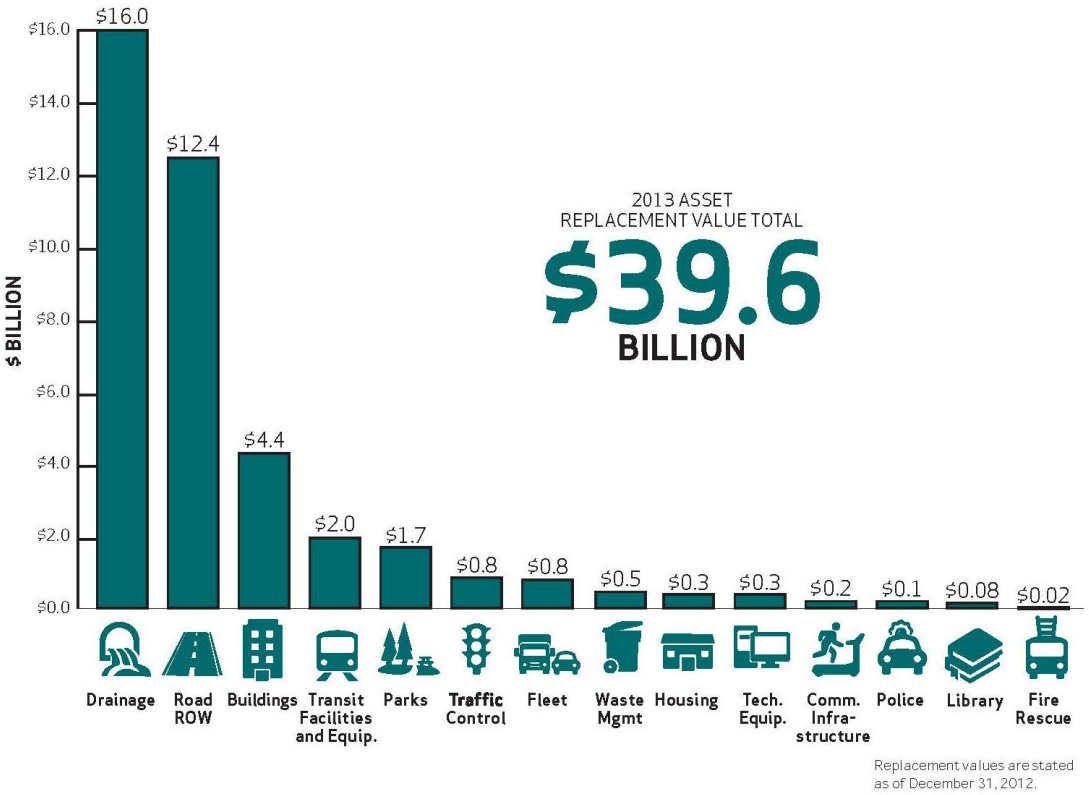

Figure 2: Asset Replacement Value

The physical condition of an asset is the condition of the physical infrastructure judged by an assessment of the asset at a certain time. This assessment can be projected over time to yield a high-level overview of the deterioration of each asset type. Over the past ten years, the physical condition of the city-wide assets in good and very good condition has increased from 58 to 64 per cent. Much of this can be attributed to the addition of new assets, which would increase the overall average of the physical condition. However, the percentage of assets in poor and very poor condition has ranged from 15 per cent in 2003 to 10 percent in 2008 to its current value of 14 per cent for all City assets, and 18 percent for tax supported assets.

DETERMINING RENEWAL NEEDS

As a conscientious owner of a multi-billion dollar inventory of municipal assets, the City must make decisions in terms of when and how to maintain, repair, renew, and replace key assets in a cost-effective manner. Existing priorities compete. Some investments may be only incrementally addressed or delayed altogether. This is despite a clear understanding that proper maintenance can

accrue key benefits of asset life extension, and long-term reduction of repair or replacement expenditures.

RIMS assists in quantifying the rehabilitation needs of the City's assets, optimizing the allocation of renewal funds across the corporation. Doing so means prioritizing across more than $19.7 billion (not including utility-based assets) worth of infrastructure assets and directing limited capital dollars to the highest priorities.

The following subsections describe the optimal renewal targets, recommended overall funding of renewal, and analysis comparing the recommended renewal funding to reduced amounts.

Renewal Targets

RIMS has evolved over the last decade into a dynamic analytical tool designed to predict the optimal funding for the renewal of existing infrastructure. This model requires quality, reliable information provided by those responsible for the management of the asset. For example, Transportation, as the owner of assets contained in the Road Right-of-Way, Traffic Control and Streetlighting and Transit Facilities and Equipment groups, is responsible to provide detailed information for those assets.

The model uses an asset's current physical condition, its target physical condition, renewal investment options/costs, and expected lifecycle deterioration curve to model the affect of different investment options and their timings throughout the life of the asset. Ideally, the physical condition of any asset will fall within an acceptable tolerance range or standard. This amount of tolerance, or physical condition outside which it is too deteriorated to be acceptable is different for every asset. All assets exist within the City to help provide a service; this service could be for recreation, transportation, and protection. The physical standard to which we hold our assets is dependent on the type of service the asset is providing, the risk it exposes the City to if it fails, and the optimal combination of investment and performance to maximize the life of the asset at a minimized cost.

RIMS uses 3 measures, each with its own target, to assess an asset category's physical performance to determine required investment.

1. Average Condition Index - A value from 1 to 5 that represents the average condition of a category of assets. Ranges from 1 being Very Poor (F) to 5 being Very Good (A).
2. % of Assets in D&F Condition – The % of a category of assets that are assessed at either a Poor (D) or Very Poor (F) physical condition
3. % of Assets in F Condition - Similar to 3, except it is only the % of a category of assets that are assessed at Very Poor (F) physical condition

Table 1 illustrates some of these measures and shows the ranges of tolerances

used by RIMS. Each asset category is assigned a level of importance rank, High, Medium High etc., and this represents the target physical condition of the asset within the model.

Importance Level	Average Condition Index	% of Assets in D&F	% of Assets in F	Examples
High	3.50	1%	0%	River Bridges, LRT Braking System
Medium-High	3.00	5%	2%	Hoists
Medium	2.75	10%	5%	Local Roads
Medium-Low	2.50	20%	7%	Bus Stops
Low	2.25	40%	10%	Alleys, Decorative Winter Lights

Table 1: Levels of Importance

Recommended Renewal Budget

RIMS was applied to tax supported City infrastructure assets and modeled over a 30-year period to predict the optimal funding to maintain City assets in a good state of repair. The model was set to determine the annual investment required to bring all City assets to their target physical performance levels in 17 years (20 years starting at the 2012-2014 capital cycle). The RIMS model recommended an annual reinvestment of $466 million (2013 dollars) from 2015-2018 and an average annual reinvestment of $607 million (2013 dollars) from 2019 to 2024.

Of the $466 million total allocation, Transportation related assets (excluding buses) require the highest renewal investment at an average of $234 million per year over the first four years, increasing to $387 million per year for the remaining six years. The next largest annual renewal need over the 2015 – 2018 time frame was found to be $78 million per year for Building assets followed by $73 million per year for Fleet assets (including buses). Figure 3 depicts tax supported renewal investment requirements in 2013 dollars during the 2015 – 2024 Capital Investment Agenda time span by asset sub category.

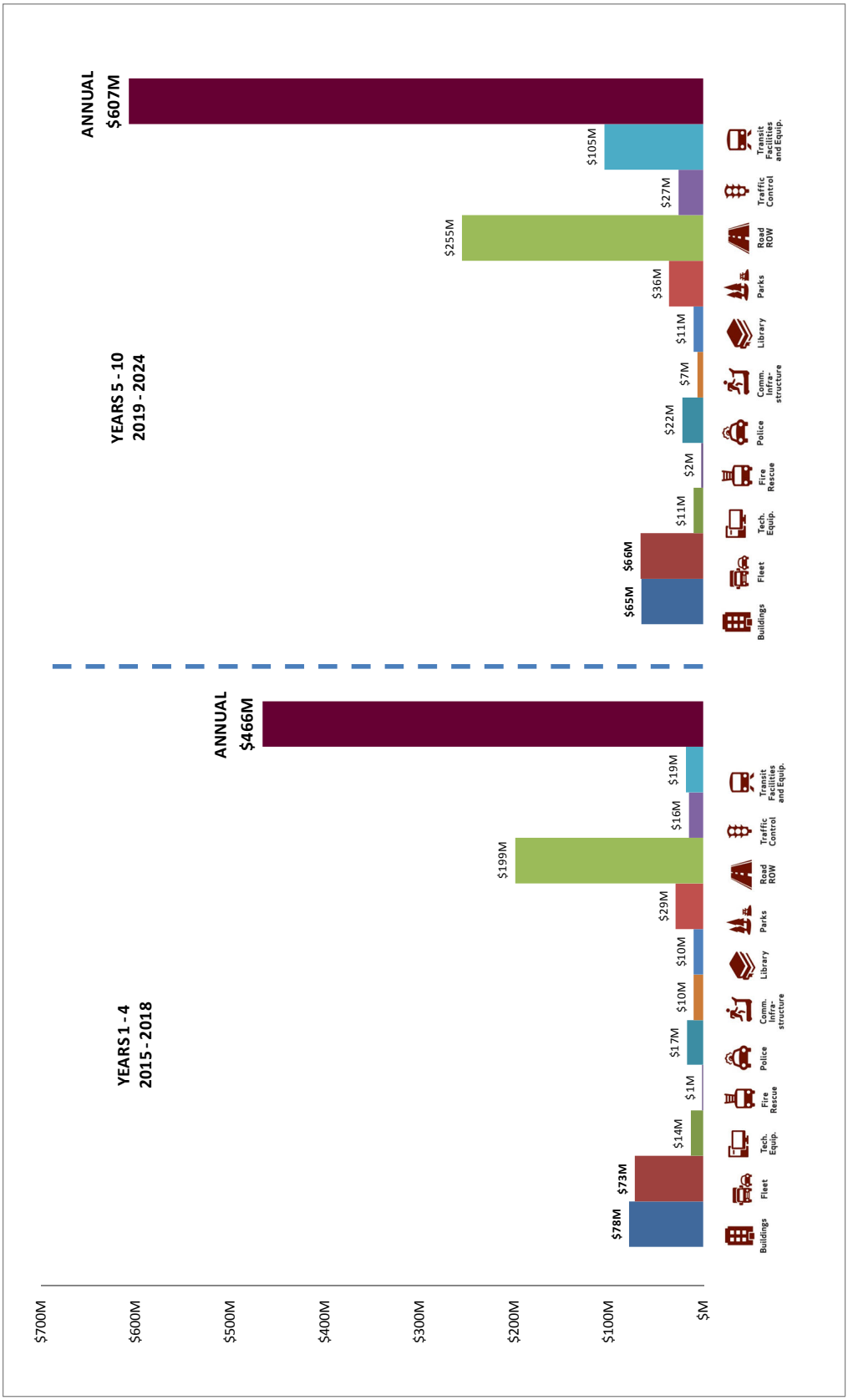

Figure 3: Recommended Average Annual Renewal Budget (2015 – 2024)

Impact of Reallocating Renewal Dollars

The preceding section discussed the optimal annual renewal investment required to bring tax supported city infrastructure into an acceptable physical condition and keep it there. Modeling was performed to determine the impact of investing less than the recommended budget and the resulting affect on the percentage of city assets in Poor (D) and Very Poor (D&F) condition. Generally, the longer the required renewal of municipal assets is deferred, the more deterioration impacts are felt and the more expensive it becomes to bring these assets back to an acceptable condition.

To demonstrate the impact of reallocating renewal dollars, two scenarios were modeled for tax supported assets. In addition to the $466 million annual recommended renewal budget; a budget reduction of $50 million (8%) and a budget reduction of $150 million (23%) were considered. Figure 4 is formatted to align with the 2015 – 2018 Capital Budget (Years 1 to 4) and Years 5 to 10 (2019 – 2024) to give a complete picture of the next ten years. An additional 10 years are also depicted to show the progression of assets in D&F to their target condition in 17 years, and their maintenance at that level afterwards.

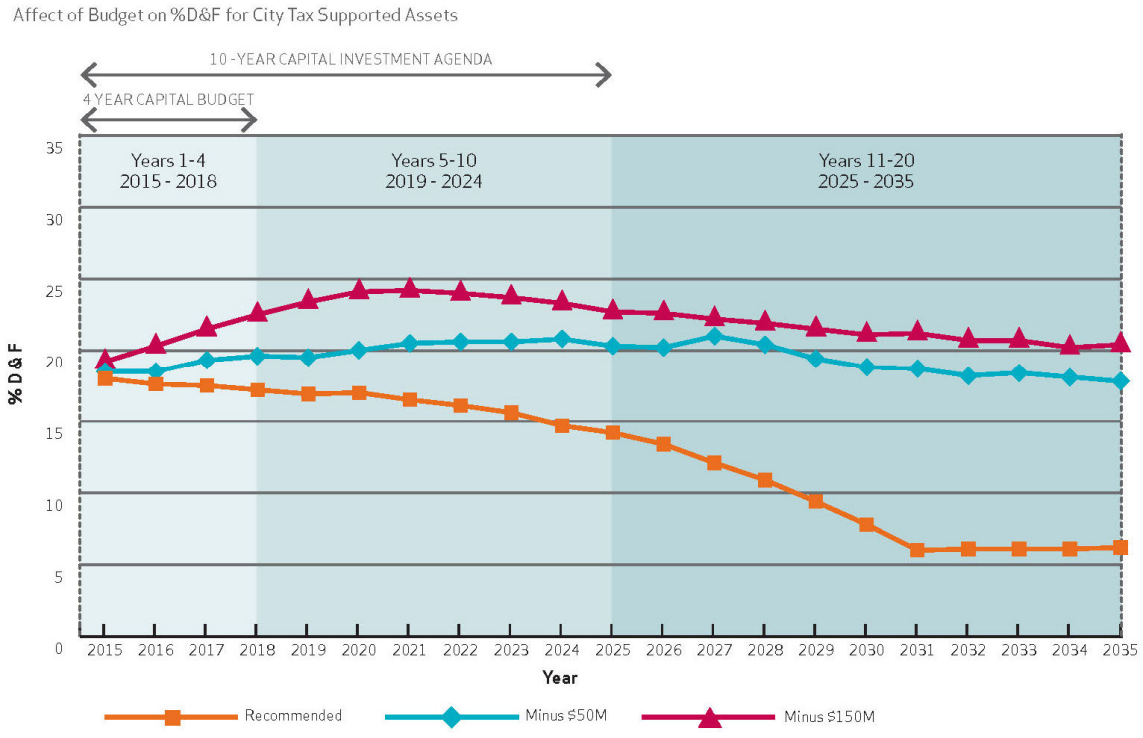

Figure 4: Affect of Budget on %D&F for City Tax Supported Assets

Figure 4 illustrates the long term impact of meeting or failing to meet recommended investment levels. The recommended $466 annual renewal budget would decrease the percentage of city assets in D&F condition at Year 10

with a much more significant decrease at Year 20. Both budget reduction scenarios show that there is virtually no decrease in the amount of poor and very poor assets over the 20-year period. This is an indicator of the efficiency of proper maintenance at the right time. Effective renewal extends the life of the assets and allows them to perform as they are intended – saving the City money over the long-term.

This high level overview provides a platform to demonstrate how decisions made today will dictate the state and condition of our infrastructure assets into the future. Knowing the overall performance of our city assets, and understanding the consequences of foregoing reinvestment, provides information for decision-makers to make informed and strategic decisions.