


THE WAY WE FINANCE

TAC 2014
Past - Present - Future
Asset Management: Back to the Future

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Office of Infrastructure and Funding Strategy
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TRANSFORMING | EDMONTON

BRINGING OUR CITY VISION TO LIFE



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Financial Services & Utilities



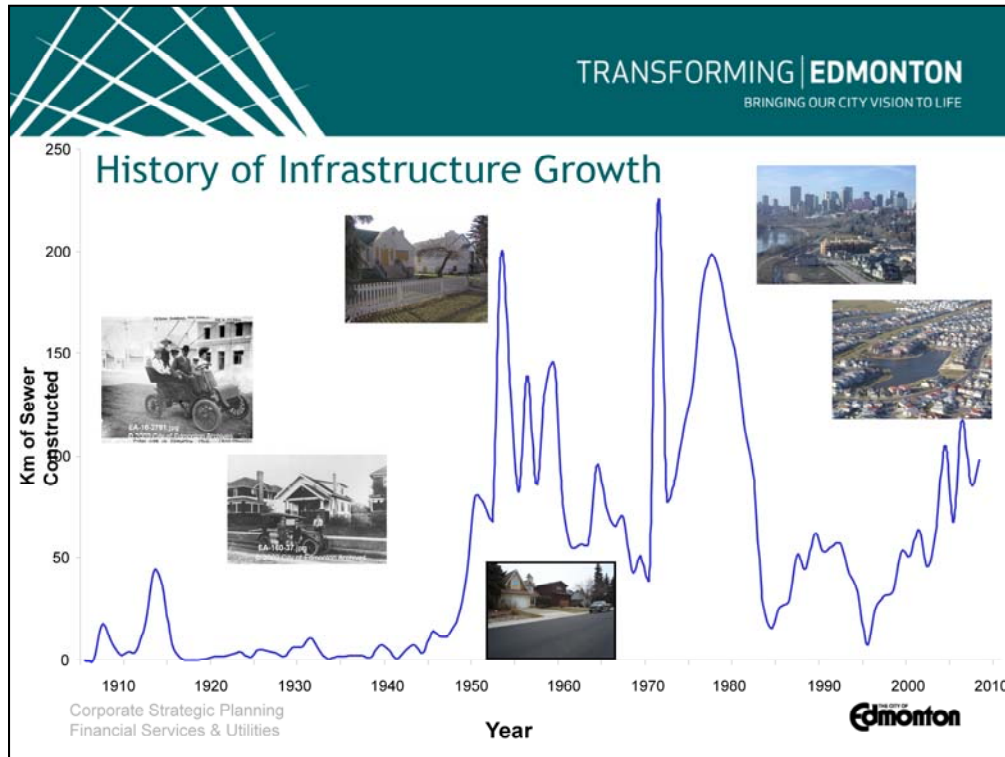
This photo was taken in 1930 and if you direct your attention to the MacDonald Hotel on the bottom right hand side, you will see just how much the downtown core has grown.

Edmonton has experienced significant growth over the last 100 years and it is time we look at how we are going to keep our existing assets at an acceptable level of performance and plan for future infrastructure stewardship.



The first photo is a 2001 aerial shot of an area of land located in West Edmonton.

The second aerial photo was taken in 2012 and is now known as the Windermere Neighbourhood. Over the last ten years there has been considerable development of lands outside of Anthony Henday Drive which in turn contributes to the City's responsibility to provide infrastructure and services to the people living in these neighbourhoods.



For the past hundred years, Edmonton has experienced significant changes; boom/bust cycles, environmental issues, funding issues, land use planning and changes in urban design.

The first boom in Edmonton was right after the First World War.

The 70s saw significant development in the City.

In the 80s when the interest rate was hovering around 20% and the price of oil dropped off, so did the development. During that period of time, the City adopted a DMFP. All City expenditures had to be pay-as-you-go and no borrowing was allowed.

The 90's saw the economic recovery in Alberta but at the same time, fiscal constraint was the focus. There were a lot of cut backs of government services including a cut of grants to municipalities. So, Edmonton experienced both a shortage of municipal money because of the DMFP and the reduction of grants from the province. This was the time that some of the infrastructure constructed during the booms were coming to the end of their expected life and Edmonton was recovering, which needed investment in both aging infrastructure and increasing development.

The importance of the needs to address the long term issues of infrastructure investment was recognized. In 1998, the City developed its first long range capital plan to look at the infrastructure investment needs for the next 10 years. There was a gap between the capital needs and the resources available.

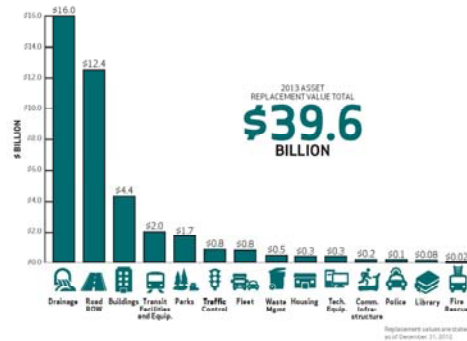
Maximize the Use of Existing Infrastructure



One example on how we can maximize the use of existing infrastructure, such as roads and sewers, is the TOD plan of the Stadium Station.

Annual Infrastructure Inventory*

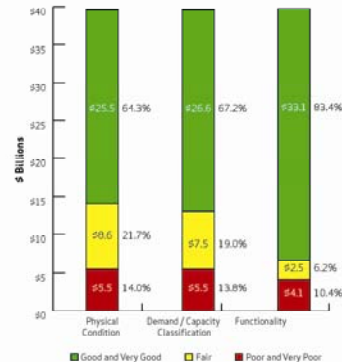
What Do We Own & What Is It Worth?



* As of December 31, 2012

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What Is The Condition Of Our Infrastructure?



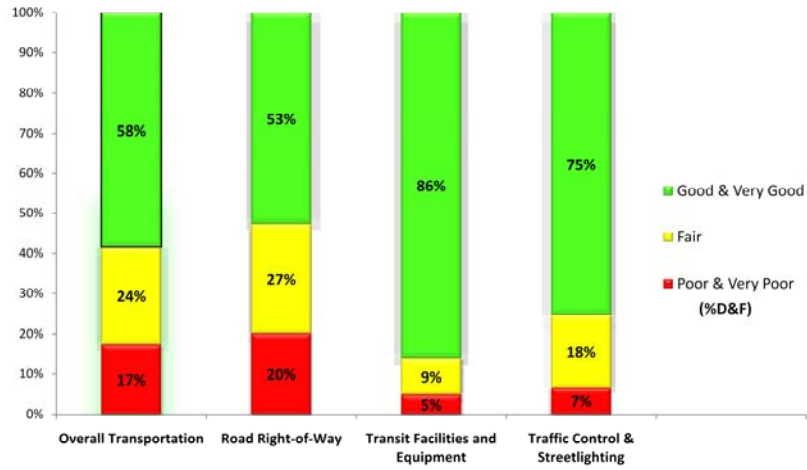
- As of year-end 2012 - total asset replacement value of \$39.6 billion, more than double the \$18.2 billion value reported in the 2003 infrastructure inventory report.
- 40%, or \$16 billion, is currently attributed to the Drainage portfolio followed by 31% (\$12.4 billion) of assets under Road Right-of-Way .
- Industry experts recommend that 2% to 4% of the asset replacement value should be reinvested annually into the assets - approx. \$800 thousand to \$1.6 million per year.
- Council's allocation to renewal of \$420 million annually in the 2012-2014 Capital Budget is equivalent to only 1.1% of the total asset replacement value. This is nearly half of the 2% that was allocated in the 2009-2011 Capital Budget.
- Physical condition of an asset - the condition of the physical infrastructure that allows it to meet the intended service level.
- 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%. 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% in 2003 to 10% in 2008 to its current value of 14%

Transportation Inventory

Infrastructure Element	Quantity	Unit of Measure	Average Age	Expected Asset Life	Physical Condition		Demand / Capacity		Functionality		Replacement Value (millions)
			(Note 1) (Years)	(Note 1) (Years)	(Note 2) A•B / C / D•F (%)(Note 3)		(Note 2) A•B / C / D•F (%)(Note 3)		(Note 2) A•B / C / D•F (%)(Note 3)		
Transportation	333,303		35	30	58 / 24 / 17		71 / 17 / 11		91 / 2 / 7		\$15,234
Road Right-of-Way											
Roads	4,853	CL-km	39	20	50 / 28 / 22		70 / 18 / 12		94 / 0 / 6		\$9,837.7
Sidewalks	5,093	km	34	30	66 / 21 / 13		100 / 0 / 0		91 / 0 / 9		\$1,441.5
Auxiliary Structures	26,058	varies	0	0	77 / 0 / 23		N/A		N/A		\$35.8
Bridges	158	#	45	60	57 / 28 / 15		36 / 38 / 27		83 / 0 / 17		\$1,053.8
Road Right-of-Way Total	36,162		40	25	53 / 27 / 20		71 / 17 / 12		92 / 0 / 8		\$12,368.8
Traffic Control & Street Lighting											
Streetlighting	89,983	each	11	77	74 / 18 / 8		35 / 38 / 27		74 / 18 / 8		\$621.8
Traffic Signals	6,092	each	12	81	83 / 15 / 2		35 / 38 / 27		83 / 15 / 2		\$147.4
Parking Meters	3,053	each	8	10	4 / 96 / 0		35 / 38 / 27		4 / 96 / 0		\$3.8
Traffic Signs	149,295	each	15	67	70 / 20 / 10		35 / 38 / 27		70 / 20 / 10		\$42.1
Specialized Traffic Equipment	39,928	each	10	20	75 / 25 / 0		50 / 50 / 0		75 / 25 / 0		\$1.5
Traffic Control & Streetlighting Total	288,351		10	75	75 / 18 / 7		35 / 38 / 27		75 / 18 / 7		\$816.5
Transit Facilities and Equipment											
LRT Major Facilities	15	each	24	92	94 / 3 / 4		99 / 1 / 1		92 / 6 / 3		\$468.9
LRT Fleet	90	each	14	35	80 / 13 / 7		73 / 27 / 0		92 / 6 / 2		\$406.5
LRT Line	118	varies	19	66	93 / 5 / 2		95 / 2 / 3		92 / 8 / 0		\$825.4
LRT Equipment	98	each	22	30	78 / 8 / 14		79 / 18 / 4		73 / 13 / 14		\$37.3
Bus Facilities	7,040	each	12	25	72 / 15 / 13		75 / 12 / 13		72 / 15 / 13		\$187.6
Fare Collection	1,127	each	6	14	97 / 3 / 0		100 / 0 / 0		97 / 3 / 0		\$12.3
Transit Communications	28	varies	19	29	49 / 47 / 4		92 / 7 / 2		29 / 64 / 7		\$103.3
Bus Equipment	274	each	8	9	N/A		N/A		N/A		\$77
Transit Facilities & Equipment Total	8,790		20	60	86 / 9 / 5		89 / 8 / 3		87 / 10 / 3		\$2,049.1



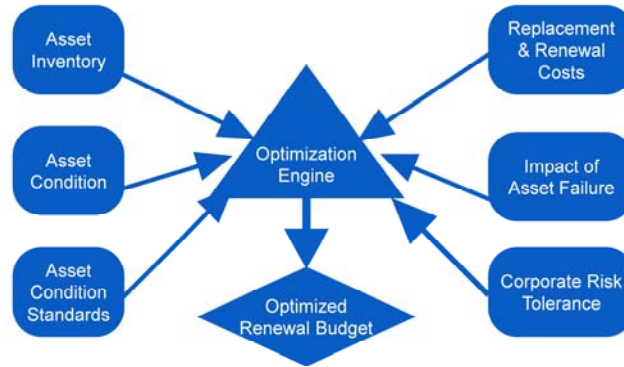
Transportation - Physical Condition



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Risk-Based Infrastructure Management (RIMS) Approach



Linking inventory, condition, deterioration, treatment options, costs, risks and funding for optimized asset management decision

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The central theme behind RIMS is the marriage of current infrastructure condition to accepted physical condition standards and risk exposure. RIMS then uses an optimization algorithm to find the best combination of reconstruction and rehabilitation actions to bring assets to a standard condition and risk exposure in a set number of years. Since we know what these various reconstruction and rehabilitation actions cost, we can determine an overall required renewal budget.

Assets Physical Performance Measure (Condition Index, %D+F)

	Condition Index	Example
Very Good → A	= 4.5	15.25 km
Good → B	= 3.5	10.00 km
Fair → C	= 2.5	0.00 km
Poor → D	= 1.5	2.50 km
Very Poor → F	= 0.5	3.00 km



Average Condition Index
Example: in a given neighbourhood if the residential road conditions are distributed as follow: A=15.25 km, B=10 km, C=0 km, D=2.5, and F=3 km, then.

$$C.I. = \frac{I_A * C.I._A + I_B * C.I._B + I_C * C.I._C + I_D * C.I._D + I_F * C.I._F}{Total Length}$$

$$C.I. = \frac{15.25 * 4.5 + 10 * 3.5 + 0 * 2.5 + 2.5 + 1.5 + 3 * 0.5}{15.25 + 10 + 0 + 2.5 + 3}$$

$$C.I. = 3.54$$

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$$\% (D+F) = \frac{I_D + I_F}{Total Length} = \frac{2.5 + 3}{30.75} = 17.9\%$$

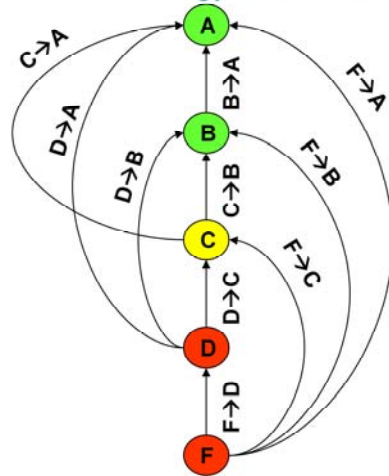


The Risk model is based on the A to F rating system, with A being new construction and F being in very poor condition.

The condition index is calculated by multiplying the quantity of infrastructure in each condition by the rating.

Another important indicator is the % of the assets in D&F condition. Overall, with the implementation of the Neighbourhood Infrastructure Renewal Program, City assets will not be allowed to fall into this condition because of the long-term predictable and self-sustaining funding source.

Renewal Strategy - Example Collector Road



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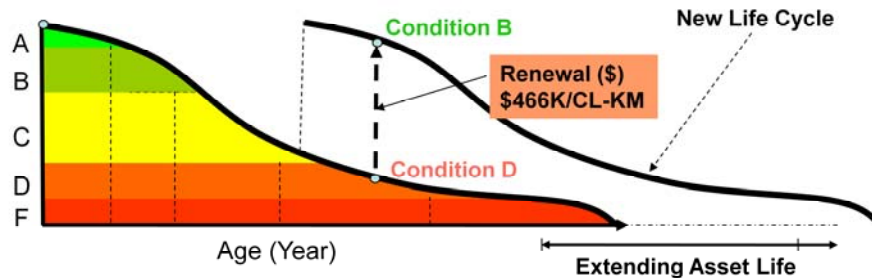


The Risk Model is based on the Markovian analysis whereby applying a particular renewal strategy to an asset will improve its condition.

It's clear that the more money that can be reinvested, the longer the expected life of that asset can be extended.

Deterioration Curve - Example Collector Road

Life Cycle of a Collector Road	
Life in A	2 years
Life in B	6 years
Life in C	6 years
Life in D	5 years
Life in F	1 year



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A deterioration curve for a collector road is illustrated on this slide. \$466 thousand per centre-line kilometre is the required amount of renewal dollars to bring the asset from a 'D' rating to a 'B' rating. This is one-third of the cost to reconstruct the road at a cost of \$1.49 million per centre-line kilometre. The right investment, in the right infrastructure at the right time can yield extensive cost savings over the long term.

	\$/CL-KM	
	D→B	F→A
Local	\$282K	\$1.1M
Collector	\$466K	\$1.48M
Arterial	\$510K	\$3.22M
Major Arterial	\$758K	\$3.53M

RIMS Targets

Importance Level	Average Condition Index	Severity	Max % of Assets in D&F	Max % of Assets in F	Examples
High	3.50	200	1%	0%	River Bridges, LRT Braking System
Medium-High	3.00	200	5%	2%	Hoists
Medium	2.75	200	10%	5%	Local Roads
Medium-Low	2.50	200	20%	7%	Bus Stops
Low	2.25	200	40%	10%	Alleys, Decorative Winter Lights

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RIMS* - 3 Scenarios

1. Recommended Budget based on Renewal Needs

- Given target physical condition and risk levels, ***what is the required (ideal) annual re-investment?***

2. Recommended Budget Minus \$50 million Annually

3. Recommended Budget Minus \$150 million Annually

- Given a fixed (or known) funding amount, ***what will be the resulting condition*** and risk for the corporation and assets?
- Given a fixed (or known) funding amount, how should this budget be redistributed into the asset best in the fairest way possible?

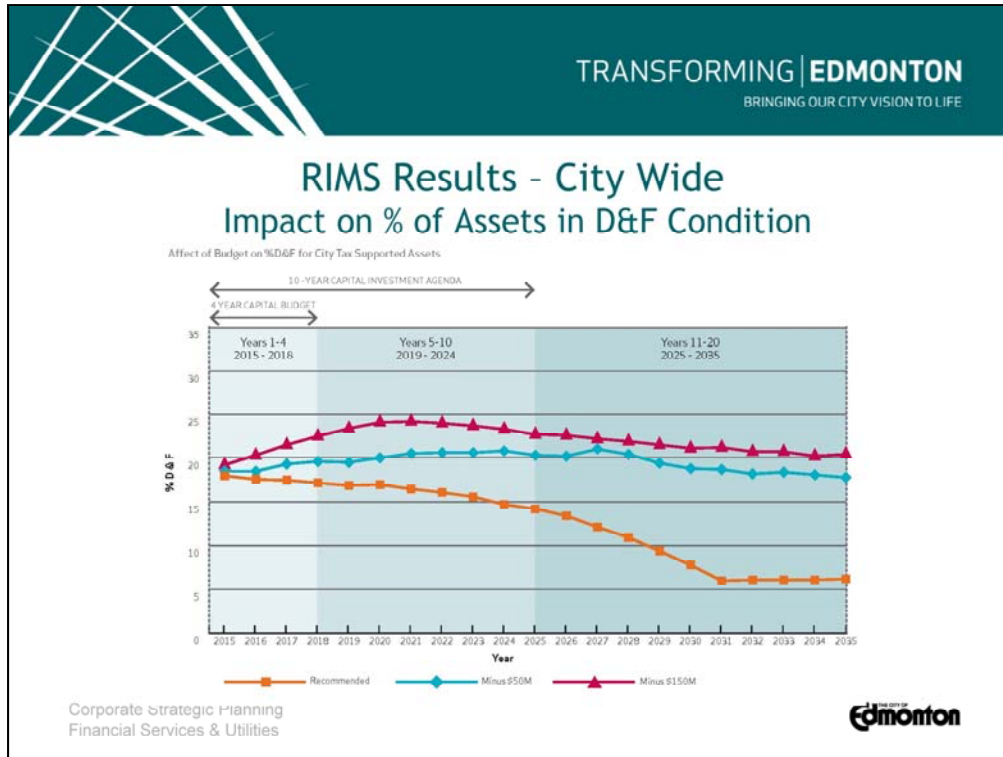
* Risk-based Infrastructure Management System
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Recommended Transportation Average Annual Renewal Budget (2015 - 2024)



- Road Right-of-Way assets require the highest renewal investment of an average of \$199 million per year over the first four years increasing to \$255 million per year for the remaining six years. .
- Note the increased investment in the Transit assets from \$19M/yr for the first four years to \$105M/yr for the 2019-2024 timeframe. Edmonton considers LRT expansion as one of their top priorities.



- 2 scenarios were modeled in addition to the \$466 million annual recommended renewal budget
 - a budget reduction of \$50 million (8%)
 - a budget reduction of \$150 million (23%) were considered
- Overall aggregate life span of the City's infrastructure is 45 years so the impacts of funding shortfalls or deficiencies may not be apparent for many years
- Recommended \$466 annual renewal budget would decrease % assets in D&F condition from 18% to 15% at Year 10 with a much more significant decrease to 7% at Year 20.
- \$50 million reduction – will increase from 18% to 20% by Year 4, to 21% at Year 10 and then basically flattens out for next 10 years
- \$150 million reduction – will increase from 19% to 22% by Year 4, to 23% at Year 10 and then flattens out Years 10-20 – note that the same reduction over 30 years will increase % of assets to 32% at Year 3 - **1/3 of City assets will be in poor and very poor condition**

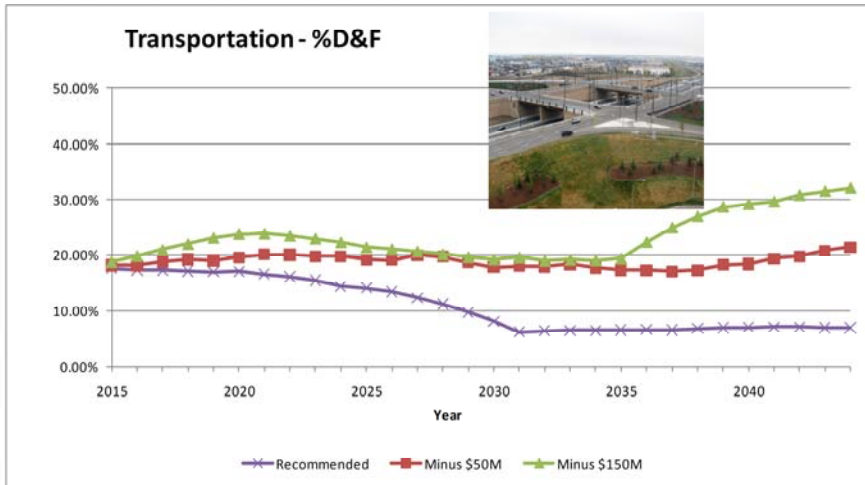
Budget Scenarios - Transportation - Overall



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%D&F - Transportation - Overall



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Neighbourhood Renewal Program

- Long-term sustainable program for infrastructure assets
- Combination of rehabilitation and reconstruction work
- 1-2% increase in property tax each year until a stable fund is built
- Encourages more competitive bidding among qualified contractors
- Provides the ability to negotiate long-term contracts at lower costs than originally estimated

Moving Forward

- Integration of Asset Management and Budgeting (One City Approach) to optimize funding
- Continue to improve and implement Asset Management Practices across the corporation
- Encourage relationships and co-operation with other municipalities, other orders of government and other infrastructure agencies
- Promote Edmonton nationally and internationally as a leader in Asset Management

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- The City utilizes the Risk-based Infrastructure Management System (RIMS) to assist with this evaluation of Core Capital.
- Use the RIMS model (Risk-based Infrastructure Management System)
- Made-for Edmonton system managed by Office of Infrastructure & Funding Strategy
- Looks at physical condition, capacity, functionality
- Identifies renewal needs
- After going thru several years of ramping up our capital budget thru fast tracking grants and tax supported borrowing, administration and Council is faced with the stark reality that, given our current funding sources, our level of Capital spending is unsustainable.
- It is anticipated that Edmonton's current \$1.2B annual capital budget will be halved during the next budget period.
- Upcoming decisions are going to be tough, and with the City continuing to receive unprecedented growth pressures, its has become vital to not only be able to determine the required reinvestment into our existing infrastructure, but also defend that spending, and show to Council what the consequences are of not meeting that spending requirement.
- We are planning to use RIMS throughout the capital planning process.
- Its use in the process can be summarized by its ability to answer the following questions.