

# AMP 2016



The 2016 Asset Management Plan for the

## County of Grey

SUBMITTED BY THE PUBLIC SECTOR DIGEST INC. (PSD)  
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# Executive Summary

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Infrastructure is inextricably linked to the economic, social and environmental advancement of a community. Municipalities own and manage nearly 60% of the public infrastructure stock in Canada. As analyzed in this asset management plan (AMP), the County of Grey's infrastructure portfolio comprises seven distinct asset categories: road network, bridges & culverts, buildings & facilities, social housing, land improvements, fleet, and machinery & equipment. The asset classes analyzed in this asset management plan for the County had a total 2016 valuation of \$866 million, of which roads comprised 59%, followed by bridges & culverts at 19%.

Investments in infrastructure increased sharply in the mid-1960s and 1970s. Between 1965-1979, expenditures on major capital assets totaled \$321.4 million, \$199 million of which was allocated to roads. Since 2005, expenditures have totaled approximately \$146 million.

Strategic asset management is critical in extracting the highest total value from public assets at the lowest lifecycle cost. This AMP, the County's second following the completion of its first edition in 2013, details the state of infrastructure of the County's service areas and provides asset management and financial strategies designed to facilitate its pursuit of developing an advanced asset management program and mitigate long-term funding gaps.

Based on a combination of assessed and age-based data, while 41% of assets are in good to very good condition, 31%, with a valuation of \$272 million, are in poor to very poor condition. While 89% of assets have at least 10 years of useful life remaining, 4%, with a valuation of \$38 million, remain in operation beyond their useful life. An additional 2% will reach the end of their useful life in the next five years.

In order for an AMP to be effectively put into action, it must be integrated with financial planning and long-term budgeting. The development of a comprehensive financial plan will allow the County to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.

The average annual investment requirement for tax-funded categories is \$23,699,000. Annual revenue currently allocated to these assets for capital purposes is \$14,702,000, leaving an annual deficit of \$8,997,000. To put it another way, these infrastructure categories are currently funded at 62% of their long-term requirements. In 2016, the County has annual tax revenues of \$52,900,000. We recommend a 15-year phase-in period that achieves full funding by:

- when realized, reallocating the debt cost reductions of \$745,000 to the infrastructure deficit.
- increasing tax revenues by 1.0% each year for the next 15 years solely for the purpose of phasing in full funding to the tax-funded asset classes covered in this AMP.
- allocating the current gas tax and OCIF revenue to the infrastructure deficit.
- increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

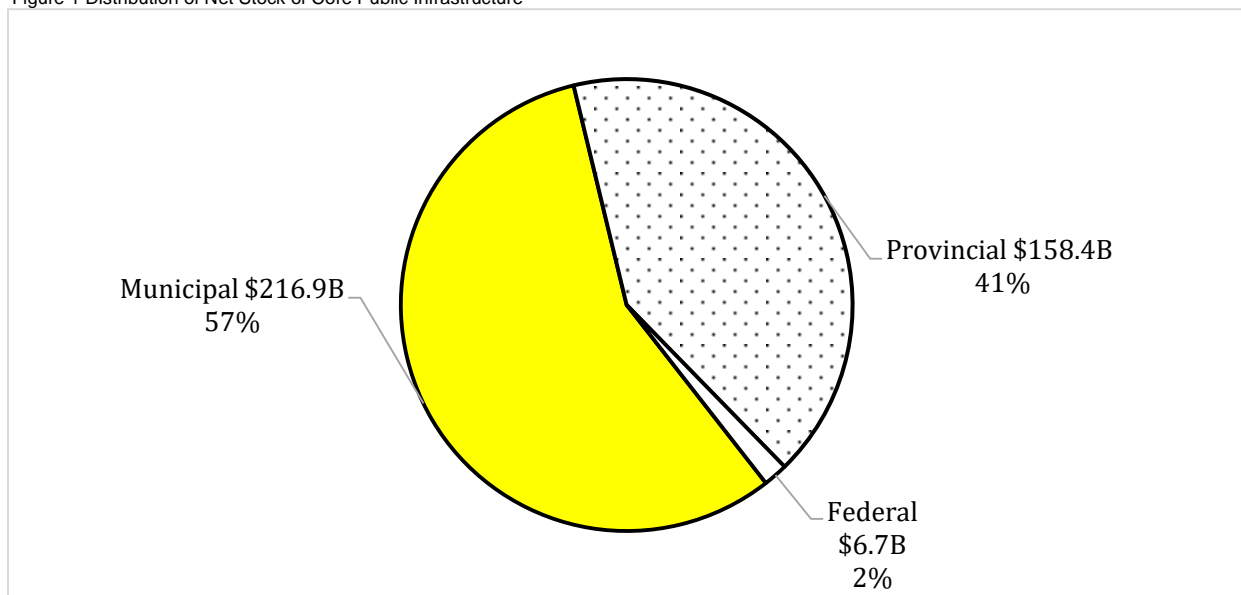
Although our financial strategies allow the municipality to meet its long-term funding requirements and reach fiscal sustainability, injection of additional revenues will be required to mitigate existing infrastructure backlogs.

A critical aspect of this asset management plan is the level of confidence the County has in the data used to develop the state of the infrastructure and form the appropriate financial strategies. The County has indicated a high degree of confidence in the accuracy, validity and completeness of the asset data for all categories analyzed in this asset management plan.

# I. Introduction & Context

Across Canada, municipal share of public infrastructure increased from 22% in 1955 to nearly 60% in 2013. The federal government's share of critical infrastructure stock, including roads, water and wastewater, declined by nearly 80% in value since 1963.<sup>1</sup>

Figure 1 Distribution of Net Stock of Core Public Infrastructure



Ontario's municipalities own more of the province's infrastructure assets than both the provincial and federal government. The asset portfolios managed by Ontario's municipalities are also highly diverse. County of Grey's capital assets portfolio, as analyzed in this asset management plan (AMP) is valued at \$866 million using 2016 replacement costs. The County relies on these assets to provide residents, businesses, employees and visitors with safe access to important services, such as transportation, recreation, culture, economic development and much more. As such, it is critical that the County manage these assets optimally in order to produce the highest total value for taxpayers. This asset management plan, (AMP) will assist the County in the pursuit of judicious asset management for its capital assets.

<sup>1</sup> Larry Miller, Updating Infrastructure In Canada: An Examination of Needs And Investments Report of the Standing Committee on Transport, Infrastructure and Communities, June 2015

## II. Asset Management

Asset management can be best defined as an integrated business approach within an organization with the aim to minimize the lifecycle costs of owning, operating, and maintaining assets, at an acceptable level of risk, while continuously delivering established levels of service for present and future customers. It includes the planning, design, construction, operation and maintenance of infrastructure used to provide services. By implementing asset management processes, infrastructure needs can be prioritized over time, while ensuring timely investments to minimize repair and rehabilitation costs and maintain municipal assets.

Table 1 Objectives of Asset Management

Inventory	Capture all asset types, inventories and historical data.
Current Valuation	Calculate current condition ratings and replacement values.
Life Cycle Analysis	Identify Maintenance and Renewal Strategies & Life Cycle Costs.
Service Level Targets	Define measurable Levels of Service Targets
Risk & Prioritization	Integrates all asset classes through risk and prioritization strategies.
Sustainable Financing	Identify sustainable Financing Strategies for all asset classes.
Continuous Processes	Provide continuous processes to ensure asset information is kept current and accurate.
Decision Making & Transparency	Integrate asset management information into all corporate purchases, acquisitions and assumptions.
Monitoring & Reporting	At defined intervals, assess the assets and report on progress and performance.

# 1. Overarching Principles

The Institute of Asset Management (IAM) recommends the adoption of seven key principles for a sustainable asset management program. According to IAM, asset management must be:<sup>2</sup>

Table 2 Principles of Asset Management

Holistic	Asset management must be cross-disciplinary, total value focused
Systematic	Rigorously applied in a structured management system
Systemic	Looking at assets in their systems context, again for net, total value
Risk-based	Incorporating risk appropriately into all decision-making
Optimal	Seeking the best compromise between conflicting objectives, such as costs versus performance versus risks etc.
Sustainable	Plans must deliver optimal asset life cycles, ongoing systems performance, environmental and other long term consequences.
Integrated	At the heart of good asset management lies the need to be joined-up. The total jigsaw puzzle needs to work as a whole - and this is not just the sum of the parts.

<sup>2</sup> "Key Principles", The Institute of Asset Management, [www.iam.org](http://www.iam.org)

# III. AMP Objectives and Content

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This AMP is one component of County of Grey's overarching corporate strategy. It was developed to support the County's vision for its asset management practice and programs. It provides key asset attribute data, including current composition of the County's infrastructure portfolio, inventory, useful life etc., summarizes the physical health of the capital assets, assesses the County's current capital spending framework, and outlines financial strategies to achieve fiscal sustainability in the long-term while reducing and eventually eliminating funding gaps.

As with the first edition of the County's asset management plan in 2013, this AMP is developed in accordance with provincial standards and guidelines, and new requirements under the federal Gas Tax Fund stipulating the inclusion of all eligible asset classes. Previously, only core infrastructure categories were analyzed. The following asset classes are analysed in this document: road network; bridges & culverts; buildings & facilities; machinery & equipment; fleet; social housing and land improvements.

This AMP includes a detailed discussion of the state of local infrastructure and assets for each class; outlines industry standards levels of service and key performance indicators (KPIs); outlines asset management renewal strategy for major infrastructure; and provides financial strategy to mitigate funding shortfalls.



## IV. Data and Methodology

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The County's dataset for the asset classes analyzed in this AMP are maintained in PSD's CityWide® Tangible Assets module. This dataset includes key asset attributes and PSAB 3150 data, including historical costs, in-service dates, field inspection data (as available), asset health, replacement costs, etc.

### 1. Condition Data

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Municipalities implement a straight-line amortization schedule approach to depreciate their capital assets. In general, this approach may not be reflective of an asset's actual condition and the true nature of its deterioration, which tends to accelerate toward the end of the asset's lifecycle. However, it is a useful approximation in the absence of standardized decay models and actual field condition data and can provide a benchmark for future requirements. We analyze each asset individually; therefore, while deficiencies may be present at the individual level, imprecisions are minimized at the asset-class level as the data is aggregated.

As available, actual field condition data was used to make recommendations more precise. The value of condition data cannot be overstated as they provide a more accurate representation of the state of infrastructure. The type of condition data used for each class is indicated in Chapter V, Section 2.

## 2. Financial Data

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In this AMP, the average annual requirement is the amount based on current replacement costs that municipalities should set aside annually for each infrastructure class so that assets can be replaced upon reaching the end of their lifecycle.

To determine current funding capacity, all existing sources of funding are identified, aggregated, and an average for the previous three years is calculated, as data is available. These figures are then assessed against the average annual requirements, and are used to calculate the annual funding shortfall (surplus) and for forming the financial strategies.

In addition to the annual shortfall, the majority of municipalities face significant infrastructure backlogs. The infrastructure backlog is the accrued financial investment needed in the short-term to bring the assets to a state of good repair. This amount is identified for each asset class.

Only predictable sources of funding are used, e.g., tax and rate revenues, user fees, and other streams of income the County can rely on with a high degree of certainty. Government grants and other ad-hoc injections of capital are not enumerated in this asset management plan given their unpredictability. As senior governments make greater, more predictable and permanent commitments to funding municipal infrastructure programs, e.g., the federal Gas Tax Fund, future iterations of this asset management plan will account for such funding sources.

### 3. Infrastructure Report Card

The asset management plan is a complex document, but one with direct implications on the public, a group with varying degrees of technical knowledge. To facilitate communications, we've developed an Infrastructure Report Card that summarizes our findings in accessible language that municipalities can use for internal and external distribution. The report card is developed using two key, equally weighted factors:

Table 3 Infrastructure Report Card Description

Financial Capacity		A County's financial capacity grade is determined by the level of funding available (0-100%) in each asset class for the purpose of meeting the average annual investment requirements.
Asset Health		Using either field inspection data as available or age-based data, the asset health component of the report card uses condition (0-100%) to estimate how capable assets are in performing their required functions. We use replacement cost to determine the weight of each condition group within the asset class.
Letter Grade	Rating	Description
A	Very Good	The asset is functioning and performing well; only normal preventative maintenance is required. The County is fully prepared for its long-term replacement needs based on its existing infrastructure portfolio.
B	Good	The County is well prepared to fund its long-term replacement needs but requires additional funding strategies in the short-term to begin to increase its reserves.
C	Fair	The asset's performance or function has started to degrade and repair/rehabilitation is required to minimize lifecycle cost. The County is underpreparing to fund its long-term infrastructure needs. The replacement of assets in the short- and medium-term will likely be deferred to future years.
D	Poor	The asset's performance and function is below the desired level and immediate repair/rehabilitation is required. The County is not well prepared to fund its replacement needs in the short-, medium- or long-term. Asset replacements will be deferred and levels of service may be reduced.
F	Very Poor	The County is significantly underfunding its short-term, medium-term, and long-term infrastructure requirements based on existing funds allocation. Asset replacements will be deferred indefinitely. The County may have to divest some of its assets (e.g., bridge closures) and levels of service will be reduced significantly.

## 4. Limitations and Assumptions

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Several limitations continue to persist as municipalities advance their asset management practices.

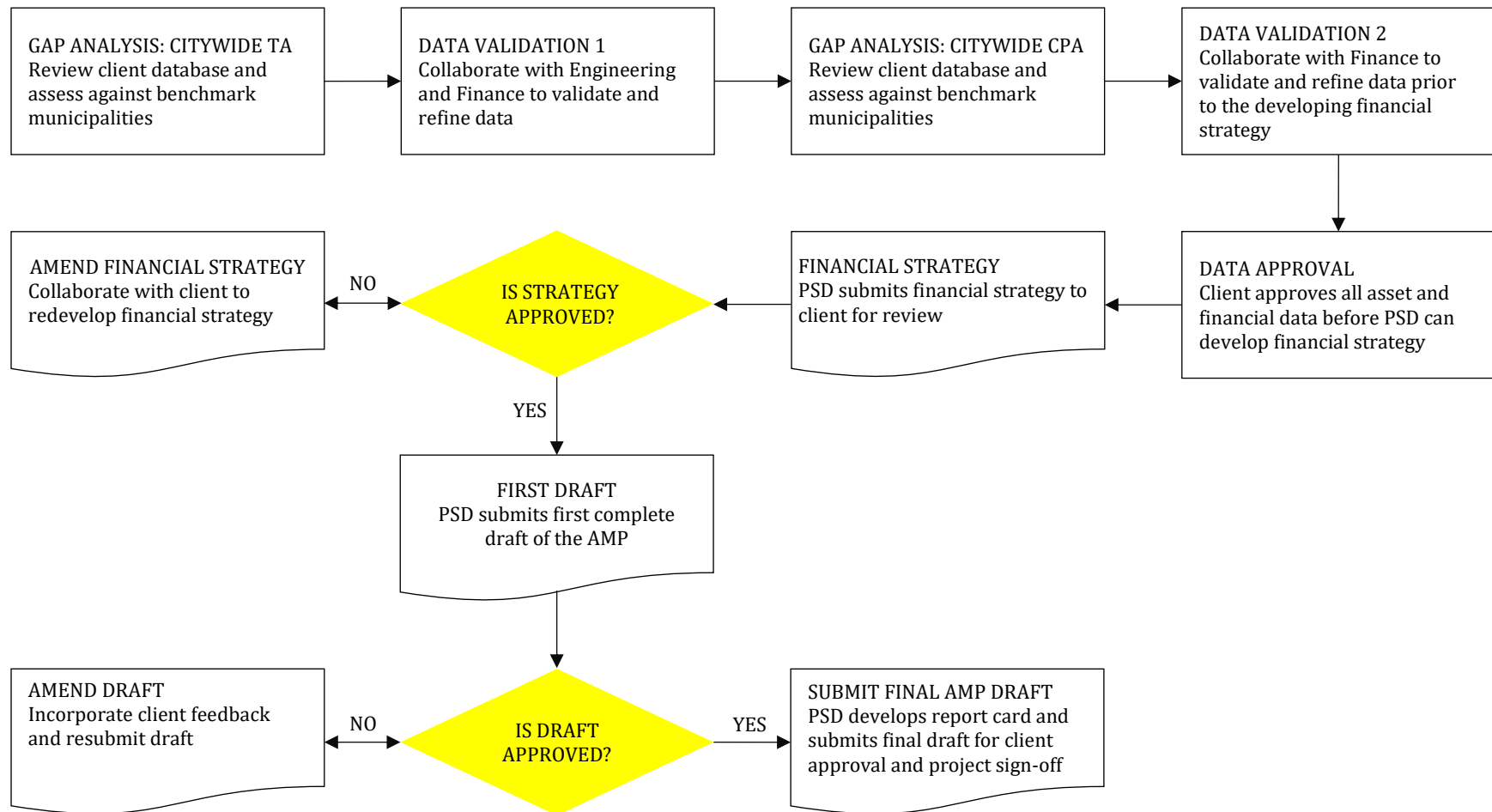
- As available, we use field condition assessment data to determine both the state of infrastructure and develop the financial strategies. However, in the absence of observed data, we rely on the age of assets to estimate their physical condition.
- A second limitation is the use of inflation measures, for example using CPI/NRBCPI to inflate historical costs in the absence of actual replacement costs. While a reasonable approximation, the use of such multipliers may not be reflective of market prices and may over- or understate the value of a County's infrastructure portfolio and the resulting capital requirements.
- Our calculations and recommendations will reflect the best available data at the time this AMP was developed.
- The focus of this plan is restricted to capital expenditures and does not capture O&M expenditures on infrastructure.



## 5. Process

High data quality is the foundation of intelligent decision-making. Generally, there are two primary causes of poor decisions: Inaccurate or incomplete data, and the misinterpretation of data used. The figure below illustrates an abbreviated version of our work order/work flow process between PSD and municipal staff. It is designed to ensure maximum confidence in the raw data used to develop the AMP, the interpretation of the AMP by all stakeholders, and ultimately, the application of the strategies outlined in this AMP.

Figure 2 Developing the AMP – Work Flow and Process



## 6. Data Confidence Rating

Staff confidence in the data used to develop the AMP can determine the extent to which recommendations are applied. Low confidence suggests uncertainty about the data and can undermine the validity of the analysis. High data confidence endorses the findings and strategies, and the AMP can become an important, reliable reference guide for interdepartmental communication as well as a manual for long-term corporate decision-making. Having a numerical rating for confidence also allows the County to track its progress over time and eliminate data gaps.

Data confidence in this AMP is determined using five key factors and is based on the City of Brantford's approach. Municipal staff provide their level of confidence (score) in each factor for major asset classes along a spectrum, ranging from 0, suggesting low confidence in the data, to 100 indicative of high certainty regarding inputs. The five Factors used to calculate the County's data confidence ratings are:

F1	F2	F3	F4	F5
The data is up to date.	The data is complete and uniform.	The data comes from an authoritative source	The data is error free.	The data is verified by an authoritative source.

The County's self-assessed score in each factor is then used to calculate data confidence in each asset class using Equation 1 below.

$$\text{Asset Class Data Confidence Rating} = \sum \text{Score in each factor} \times \frac{1}{5}$$

## V. Summary Statistics

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In this section, we aggregate technical and financial data across all asset classes analyzed in this AMP, and summarize the state of the infrastructure using key indicators, including asset condition, useful life consumption, and important financial measurements.



# 1. Asset Valuation

The asset classes analyzed in this asset management plan for the County had a total 2016 valuation of \$866 million, of which roads comprised 59%, followed by bridges & culverts at 19%. The ownership per household (Figure 4) totaled \$18,624 based on 46,481 households for all service areas.

Figure 3 Asset Valuation by Class

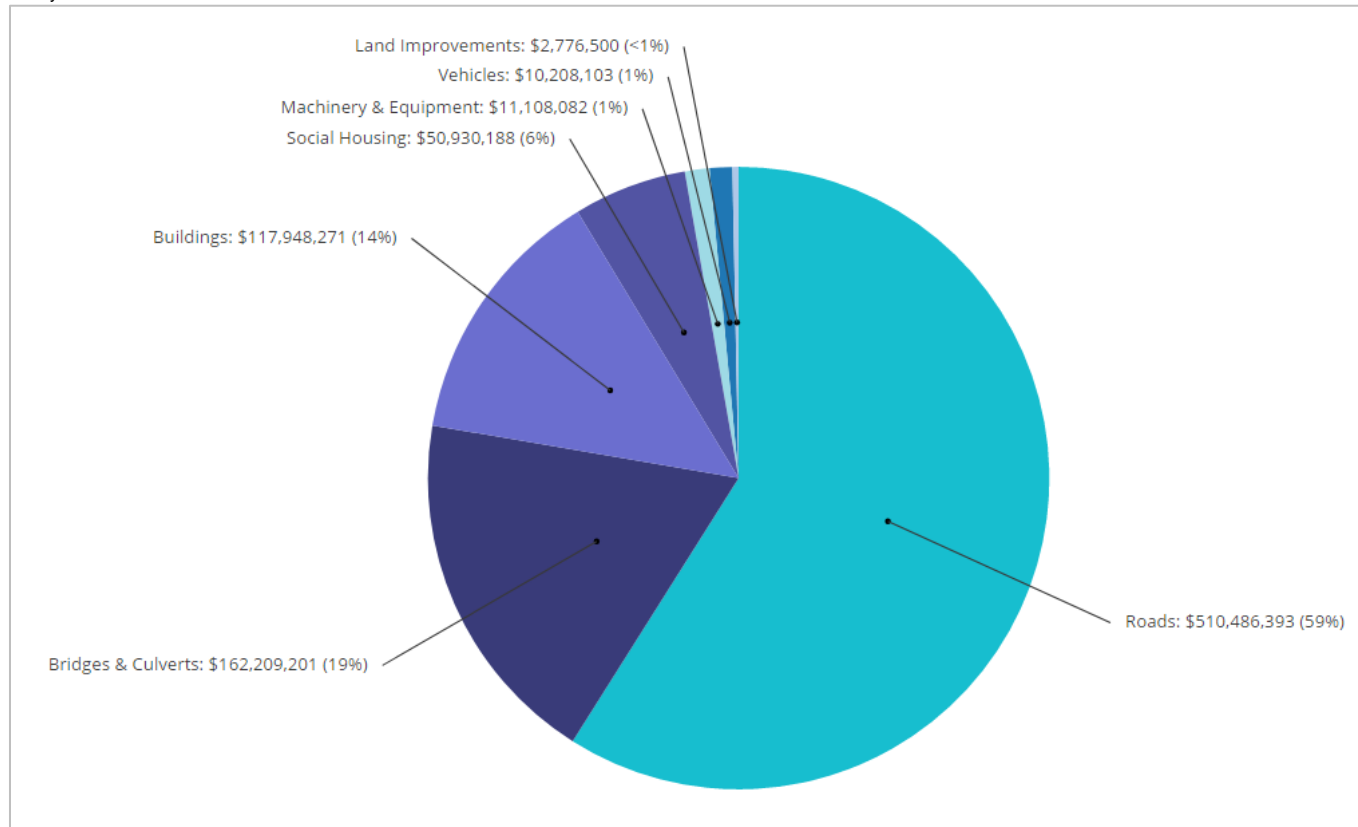
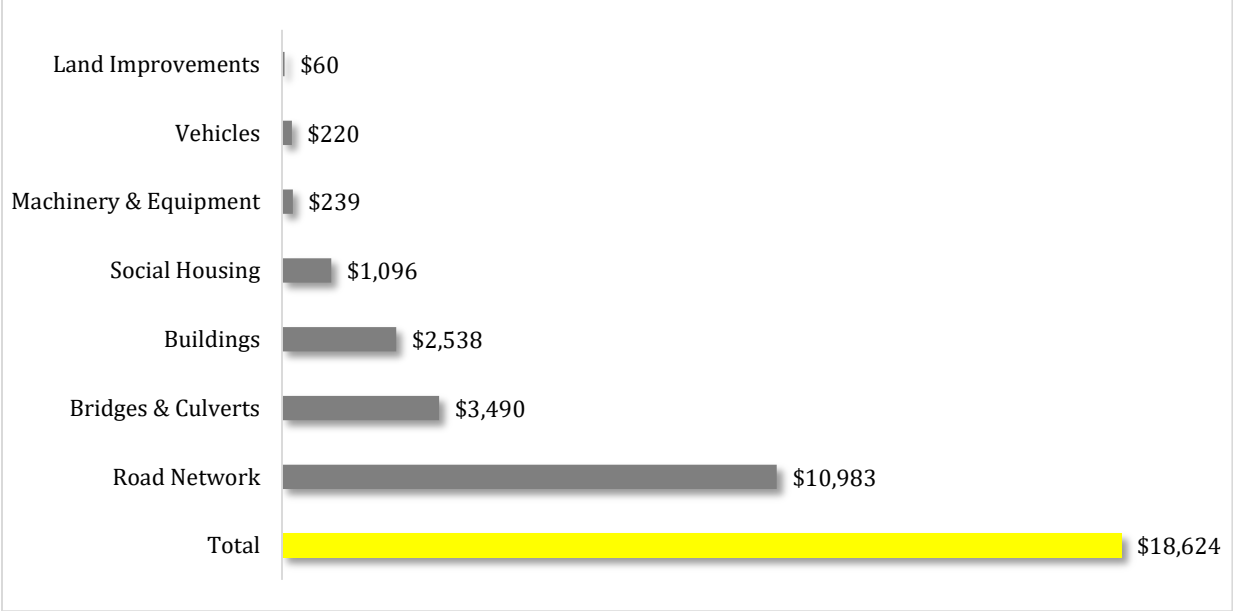


Figure 4 2016 Ownership Per Household



## 2. Source of Condition Data by Asset Class

Observed data will provide the most precise indication of an asset's physical health. In the absence of such information, age of capital assets can be used as a meaningful approximation of the asset's condition. Table 4 indicates the source of condition data used for each asset class as analyzed in this AMP.

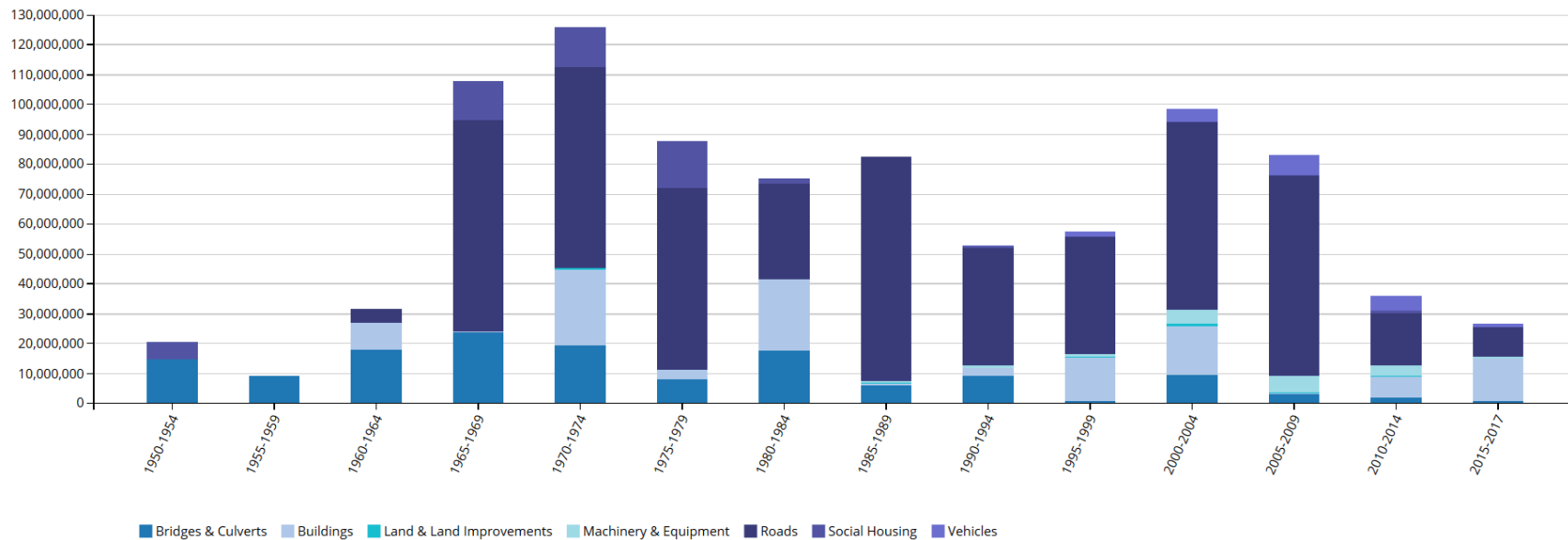
Table 4 Source of Condition Data by Asset Class

Asset class	Component	Source of Condition Data
Roads Network	Rural Surface	100% Assessed
	Rural Base	Age-based
	Rural/Urban Surface	100% Assessed
	Rural/Urban Base	Age-based
	Semi-Urban Surface	100% Assessed
	Semi-Urban Base	Age-based
	Urban Surface	100% Assessed
	Urban Base	Age-based
	Traffic Signal	Age-based
Bridges & Culverts	Bridges	100% Assessed
	Culverts	100% Assessed
Social Housing	ALL	Age-based
Buildings & Facilities	ALL	Age-based
Machinery & Equipment	ALL	Age-based
Land Improvements	ALL	Age-based
Fleet	ALL	Age-based

### 3. Historical Investment in Infrastructure – All Asset Classes

In conjunction with condition data, two other measurements can augment staff understanding of the state of infrastructure and impending and long-term infrastructure needs: installation year profile, and useful life remaining. The installation year profile in Figure 5 illustrates the historical investments in infrastructure across the asset classes analyzed in this AMP since 1950 using 2016 replacement costs. Often, investment in critical infrastructure parallels population growth or other significant shifts in demographics. Note that this graph only includes the active asset inventory as of December 31, 2015.

Figure 5 Historical Investment in Infrastructure – All Asset Classes

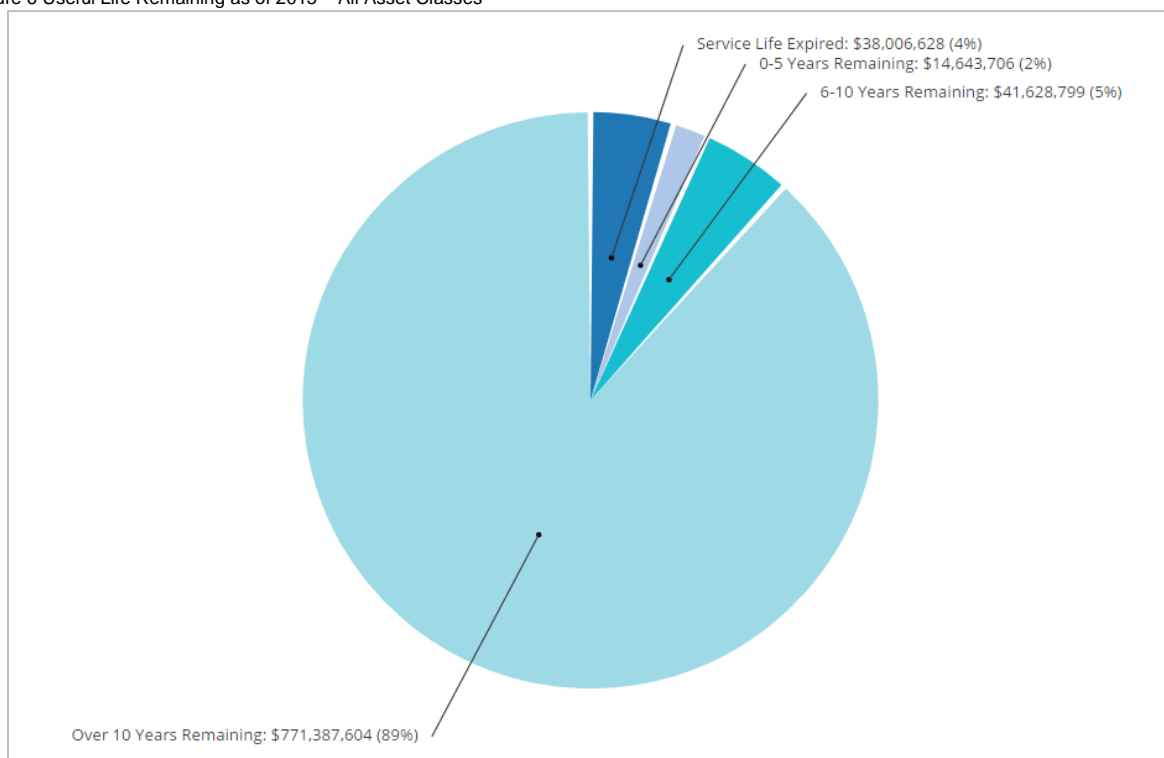


Investments in infrastructure increased sharply in the mid-1960s and 1970s. Between 1965-1979, expenditures on major capital assets totaled \$321.4 million, \$199 million of which was allocated to roads. Since 2005, expenditures have totaled approximately \$146 million.

## 4. Useful Life Consumption – All Asset Classes

While age is not a precise indicator of an asset's health, in the absence of observed condition assessment data, it can serve as a high-level, meaningful approximation and help guide replacement needs and facilitate strategic budgeting. Figure 6 shows the distribution of assets based on the percentage of useful life already consumed.

Figure 6 Useful Life Remaining as of 2015 – All Asset Classes

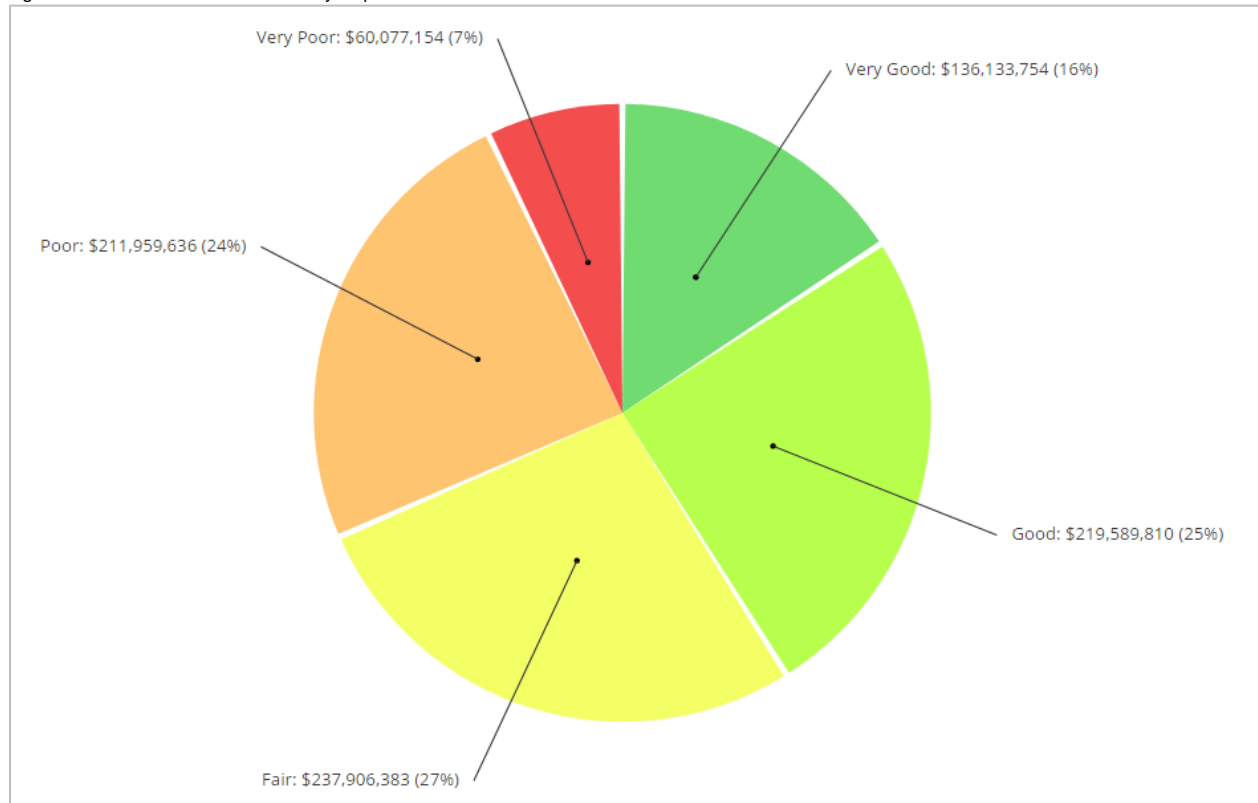


While 89% of assets have at least 10 years of useful life remaining, 4%, with a valuation of \$38 million, remain in operation beyond their useful life. An additional 2% will reach the end of their useful life in the next five years.

## 5. Overall Condition – All Asset Classes

Based on a combination of assessed and age-based data, while 41% of assets are in good to very good condition, 31%, with a valuation of \$272 million, are in poor to very poor condition.

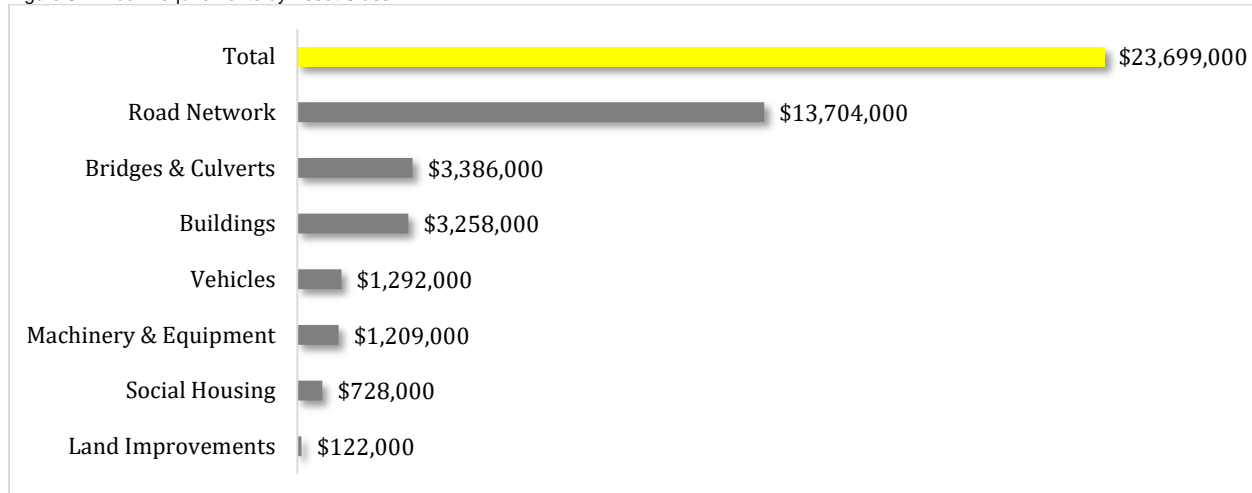
Figure 7 Asset Condition Distribution by Replacement Cost as of 2015 – All Asset Classes



## 6. Financial Profile

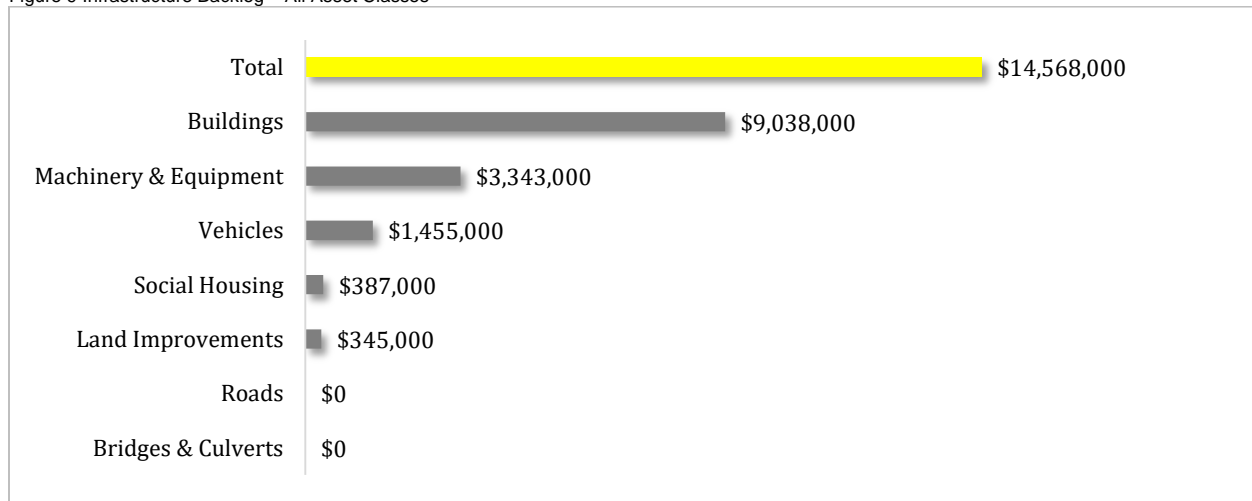
This section details key financial indicators related to the County's asset classes as analyzed in this asset management plan.

Figure 8 Annual Requirements by Asset Class



The annual requirements represent the amount the County should allocate annually to each of its asset classes to meet replacement need as they arise, prevent infrastructure backlogs and achieve long-term sustainability. In total, the County must allocate \$23.7 million annually for the assets covered in this AMP.

Figure 9 Infrastructure Backlog – All Asset Classes

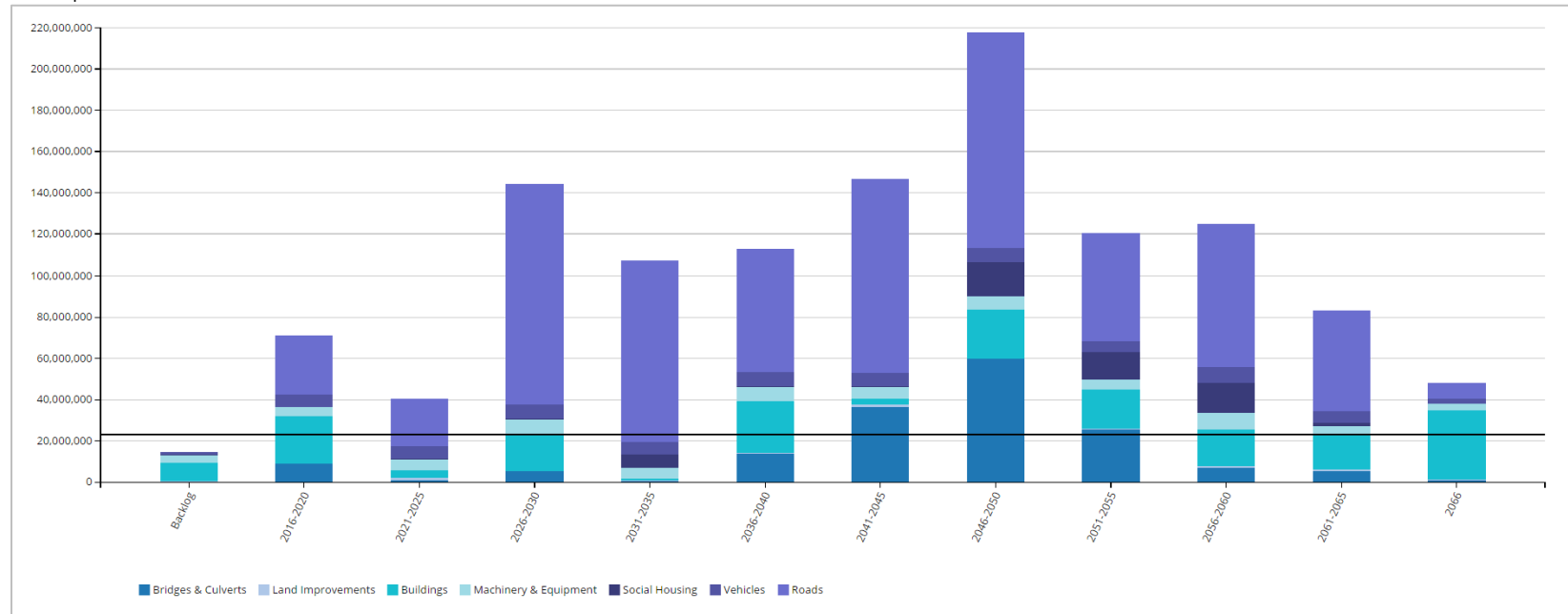


The County has a combined infrastructure backlog of \$14.6 million, with buildings comprising 62%. The backlog represents the investment needed today to meet previously deferred replacement needs. In the absence of assessed data, the backlog represents the value of assets still in operation beyond their established useful life.

## 7. Replacement Profile – All Asset Classes

In this section, we illustrate the aggregate short-, medium- and long-term infrastructure spending requirements (replacement only) for the County's asset classes as analyzed in this AMP. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 10 Replacement Profile – All Asset Classes



Based on a combination of assessed and age-based data, the County has an infrastructure backlog of \$14.6 million. Replacement needs will total nearly \$71 million over the next five years; an additional \$40 million will be required between 2021 and 2025. The County's aggregate annual requirements (indicated by the black line) total \$23.7 million. At this funding level, the County is allocating sufficient funds on an annual basis to meet the replacement needs for its various asset classes as they arise without the need for deferring projects and accruing annual infrastructure deficits. Currently, the County is funding only 62% of the annual requirements for its tax-funded assets. See the 'Financial Strategy' chapter for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the County to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

## 8. Data Confidence

The County has a high degree of confidence in the data used to develop this AMP, receiving a weighted confidence rating of 85%. This is indicative of significant effort in collecting and refining its data set. The lowest data confidence rating was assigned to the County's social housing assets.

Table 5 Data Confidence Ratings

Asset Class	The data is up-to-date.	The data is complete and uniform.	The data comes from an authoritative source.	The data is error free.	The data is verified by an authoritative source.	Average Confidence Rating	Weighted Average Data Confidence Rating
Road Network	100%	100%	90%	70%	70%	86%	51%
Bridges & Culverts	100%	100%	90%	70%	70%	86%	16%
Social Housing	100%	80%	90%	70%	70%	82%	5%
Buildings & Facilities	100%	80%	90%	70%	70%	82%	11%
Machinery & Equipment	100%	100%	90%	90%	80%	92%	1%
Land Improvements	100%	100%	90%	70%	70%	86%	<1%
Fleet	100%	100%	90%	90%	90%	94%	1%
Overall Weighted Average Data Confidence Rating							85%

## VI. State of Local Infrastructure

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In this section, we detail key indicators for each class discussed in this asset management plan. The state of local infrastructure includes the full inventory, condition ratings, useful life consumption data, and the backlog and upcoming infrastructure needs for each asset class. As available, assessed condition data was used to inform the discussion and recommendations; in the absence of such information, age-based data was used as the next best alternative.



# 1. Road Network

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## 1.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

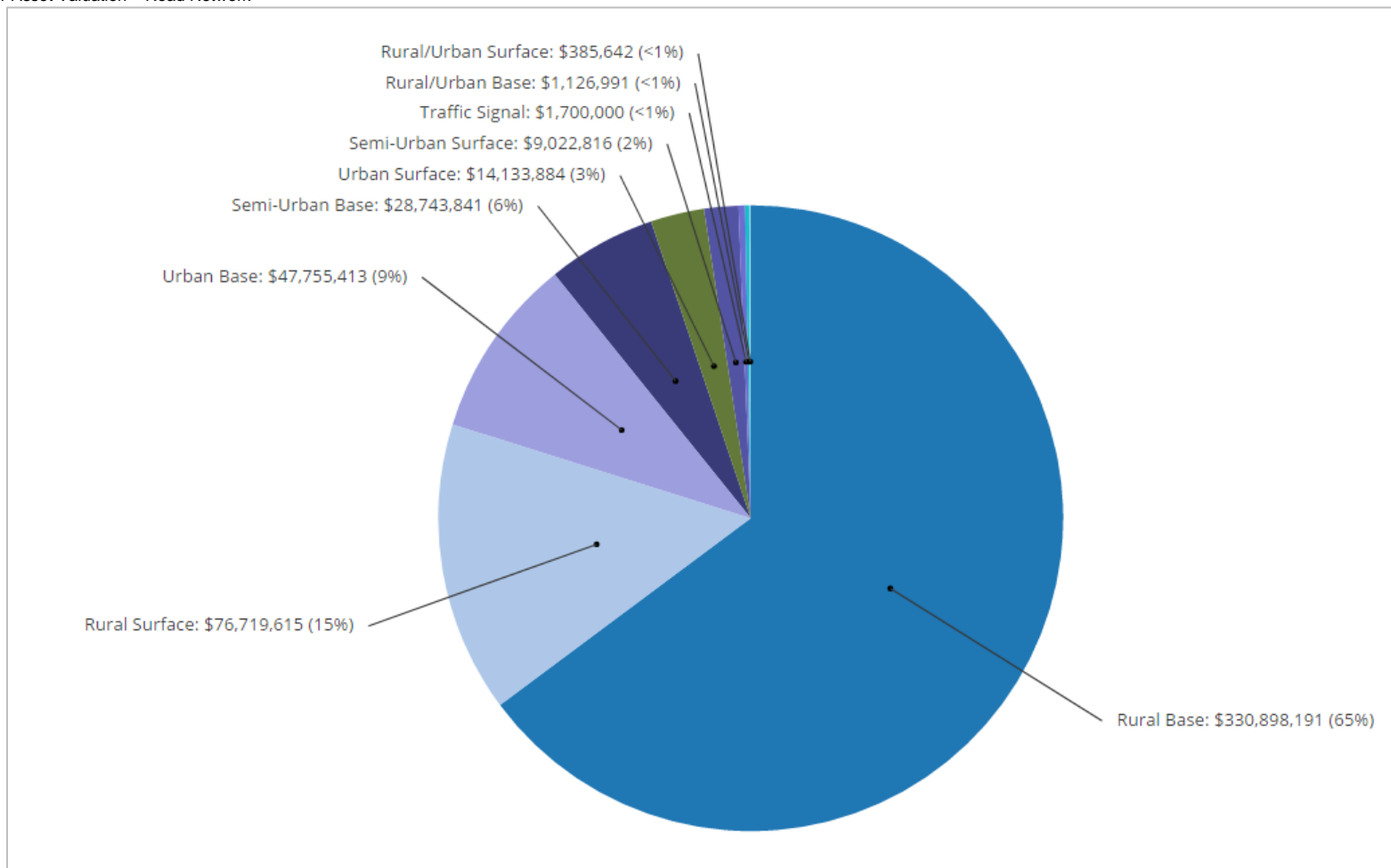
Table 6 illustrates key asset attributes for the County's road network, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement cost were derived. In total, the County's roads assets are valued at \$510 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the County and obtained from the County's accounting data as maintained in the CityWide® Tangible Asset module.

Table 6 Key Asset Attributes – Road Network

Asset Type	Asset Component	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Road Network	Rural Surface	765km	15/20	NRBCPI (Toronto)	\$76,719,615
	Rural Base	765km	60	NRBCPI (Toronto)	\$330,898,191
	Rural/Urban Surface	3km	15	NRBCPI (Toronto)	\$385,642
	Rural/Urban Base	3km	60	NRBCPI (Toronto)	\$1,126,991
	Semi-Urban Surface	55km	15/20	NRBCPI (Toronto)	\$9,022,816
	Semi-Urban Base	55km	60	NRBCPI (Toronto)	\$28,743,841
	Urban Surface	46km	15	NRBCPI (Toronto)	\$14,133,884
	Urban Base	46km	60	NRBCPI (Toronto)	\$47,755,413
	Traffic Signal	32 units	30	NRBCPI (Toronto)	\$1,700,000
Total					\$510,486,393

Note that the County's TCA policy for road bases is 40 years while this AMP is using 60 years. Similarly, the TCA policy for traffic signals is 20 while this AMP is using 30 years.

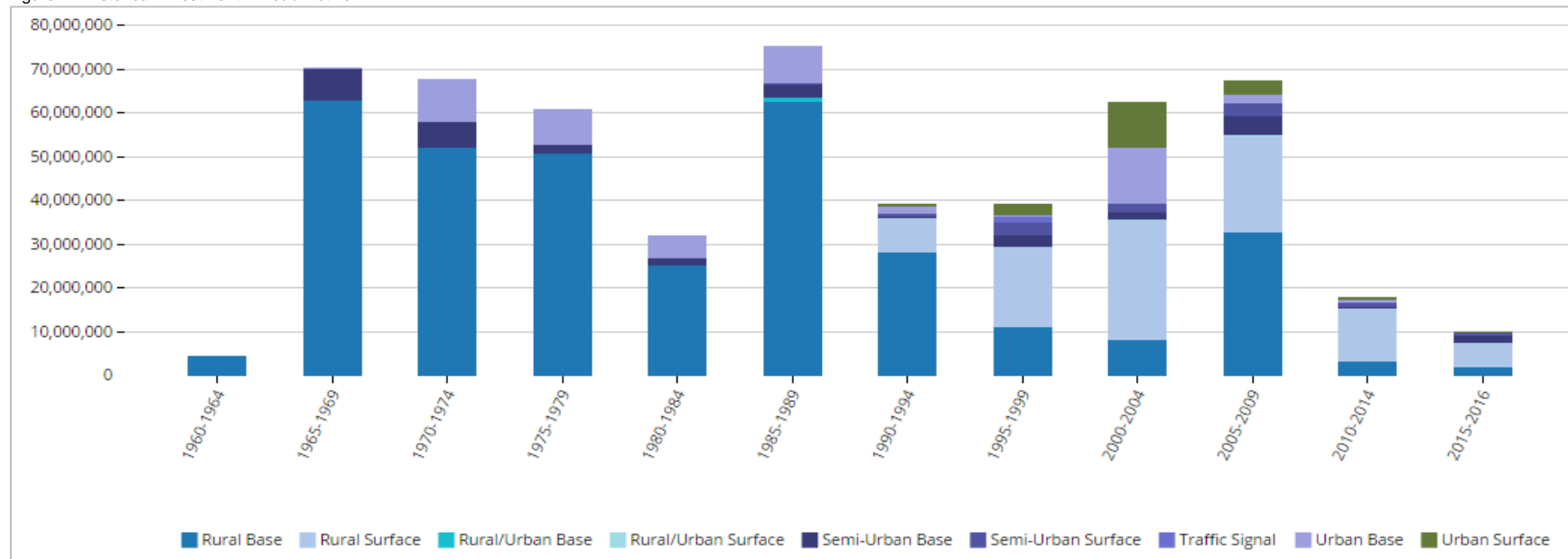
Figure 11 Asset Valuation – Road Network



## 1.2 Historical Investment in Infrastructure

Figure 12 shows the County's historical investments in its road network since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 1.3) can inform the forecasting and planning of short-, medium- and long-term replacement needs. Note that this graph only includes the active asset inventory as of December 31, 2015.

Figure 12 Historical Investment – Road Network

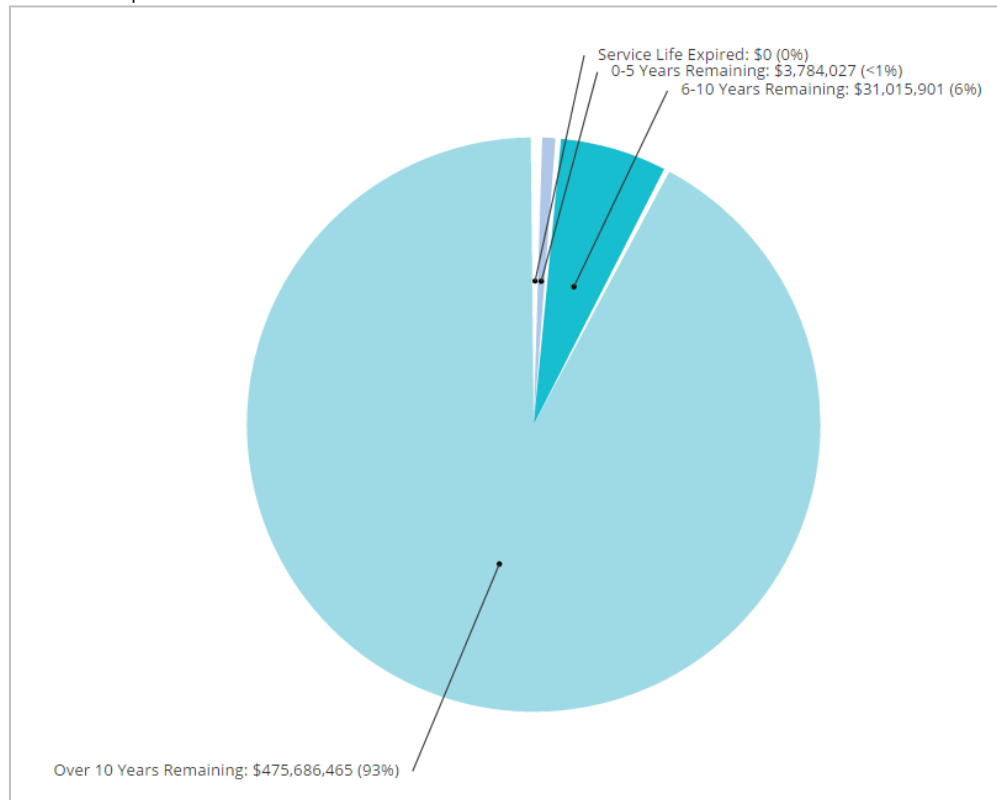


Investments in the County's road network increased sharply in the mid-1960s. The County's expenditures totaled \$199 million between 1965-1979. Between 1985-1989, the period of the largest investments in roads, expenditures totaled more than \$75 million. Since 2010, investments have totaled \$27.6 million.

### 1.3 Useful Life Consumption

In this section, we detail the extent to which assets have consumed their useful life based on the above, established useful life standards. In conjunction with historical spending patterns and observed condition data, understanding the useful life consumption rate of assets provides a more complete profile of the state of a community's infrastructure. Figure 13 illustrates the useful life consumption levels as of 2015 for the County's road network.

Figure 13 Useful Life Consumption - Road Network

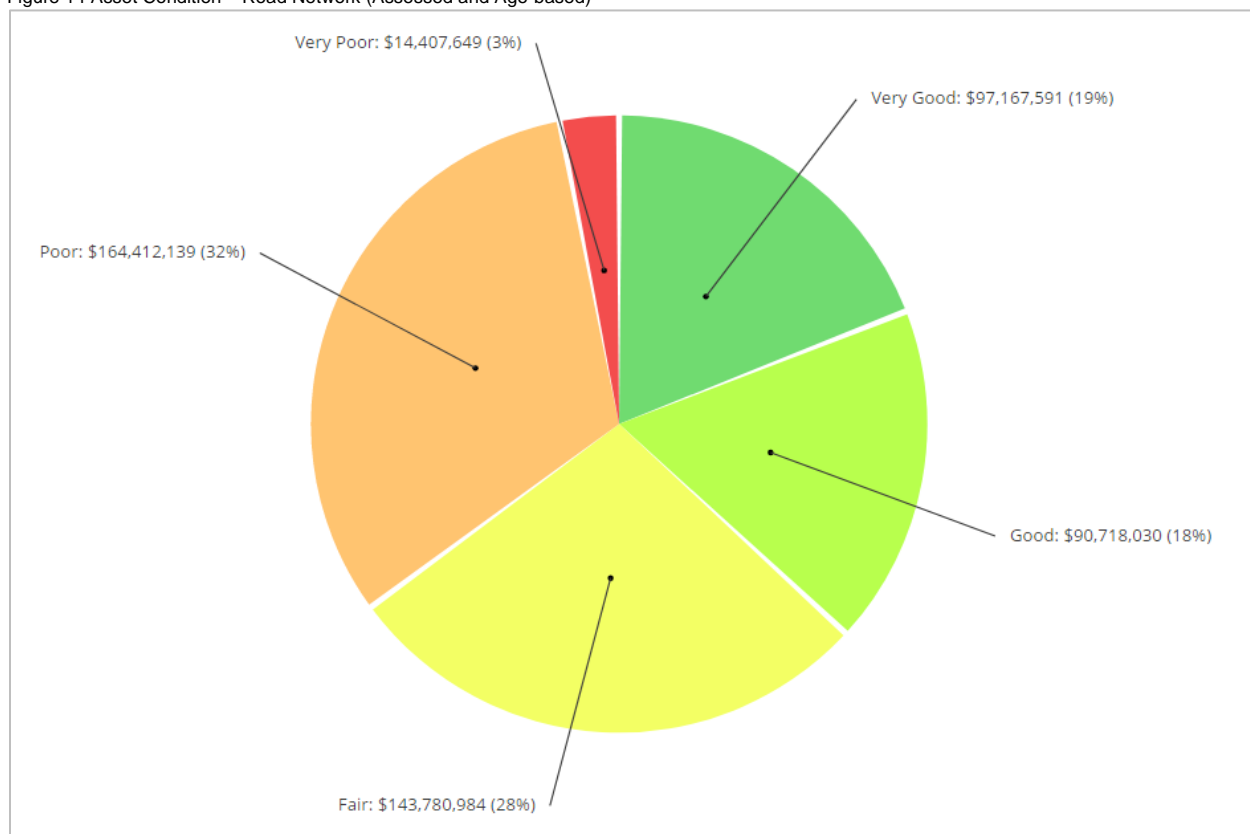


Over 90% of the County's road network has at least 10 years of useful life remaining. Less than 1% will reach the end of their useful life within the next five years.

## 1.4 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the County's road network as of 2015. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The County has provided condition data for 100% of its rural surface, rural/urban surface, semi-urban surface, and urban surface assets. For road base and traffic signals age-based condition data was used.

Figure 14 Asset Condition – Road Network (Assessed and Age-based)

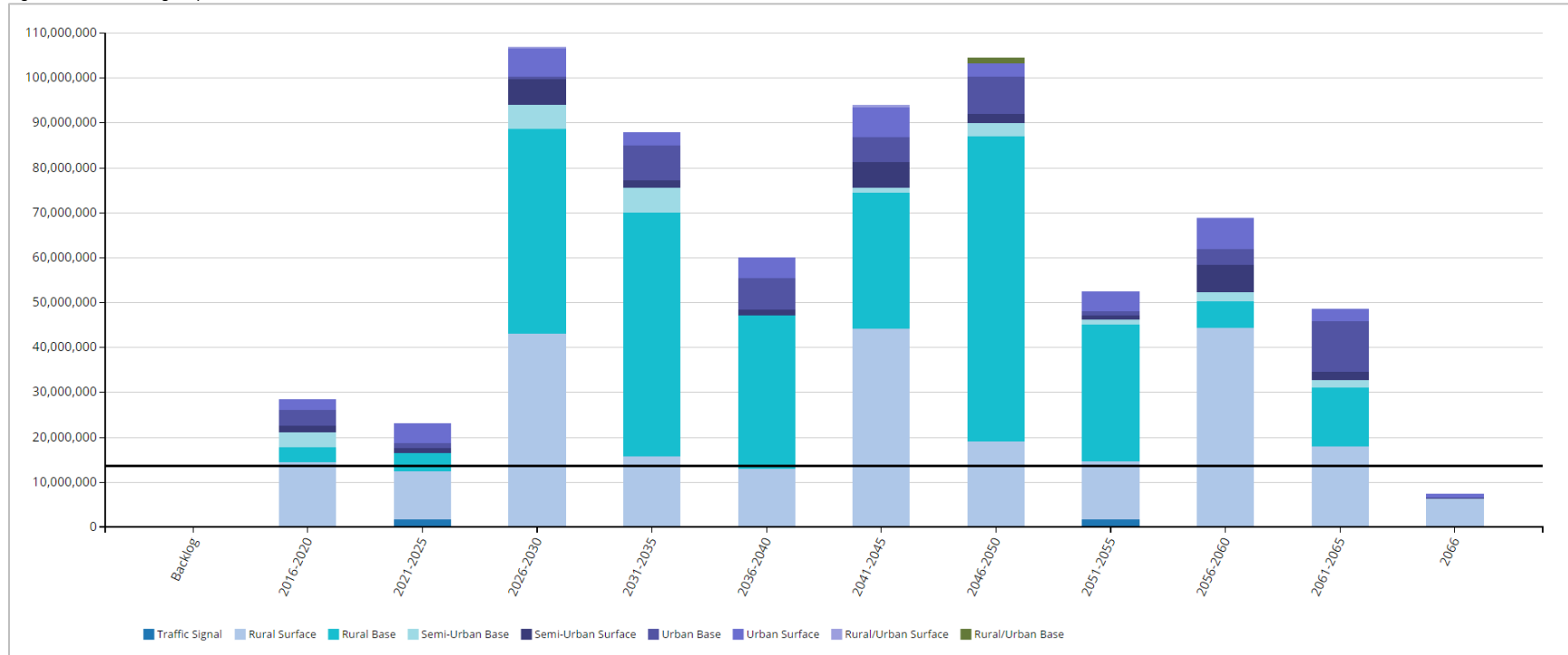


Based on a blend of age-based and assessed condition data, while 37% of assets are in good to very good condition, 36%, with a valuation of \$179 million, are in poor to very poor condition.

## 1.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the County's road network assets. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 15 Forecasting Replacement Needs – Road Network



Despite no backlog, replacement needs are forecasted to be \$28.4 million in the next five years; an additional \$23.1 million is forecasted in replacement needs between 2021-2025. The County's annual requirements (indicated by the black line) for its road network total \$13,704,000. At this funding level, the County is allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the County is currently allocating \$7,810,000, leaving an annual deficit of \$5,894,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the County to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

## 1.6 Recommendations – Road Network

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- A blend of age and field inspection data indicates significant 10-year replacement needs of \$51.5 million. The County should continue its condition assessments and expand the program to incorporate additional asset components, like road bases, in order to more precisely estimate its actual financial requirements and field needs. Currently, the County has not assessed any of its road base assets. A comprehensive road base condition assessment program, including a falling weight deflectometer, should be incorporated across the road network. This device will determine which roads and road bases are actually in need of structural repair or replacement. See Section 2, ‘Condition Assessment Programs’ in the ‘Asset Management Strategies’ chapter.
- The data collected through condition assessment programs should be integrated into a risk management framework which will guide prioritization of the backlog as well as short, medium, and long term replacement needs. See Section 4, ‘Risk’ in the ‘Asset Management Strategies’ chapter for more information.
- In addition to the above, a tailored life cycle activity framework should also be developed to promote standard life cycle management of the road network as outlined further within the “Asset Management Strategy” section of this AMP.
- Road network key performance indicators should be established and tracked annually as part of an overall level of service model. See Section 7 ‘Levels of Service’.
- The County is funding only 57% of its long-term requirements on an annual basis. See the ‘Financial Strategy’ section on how to achieve more sustainable funding levels.

## 2. Bridges & Culverts



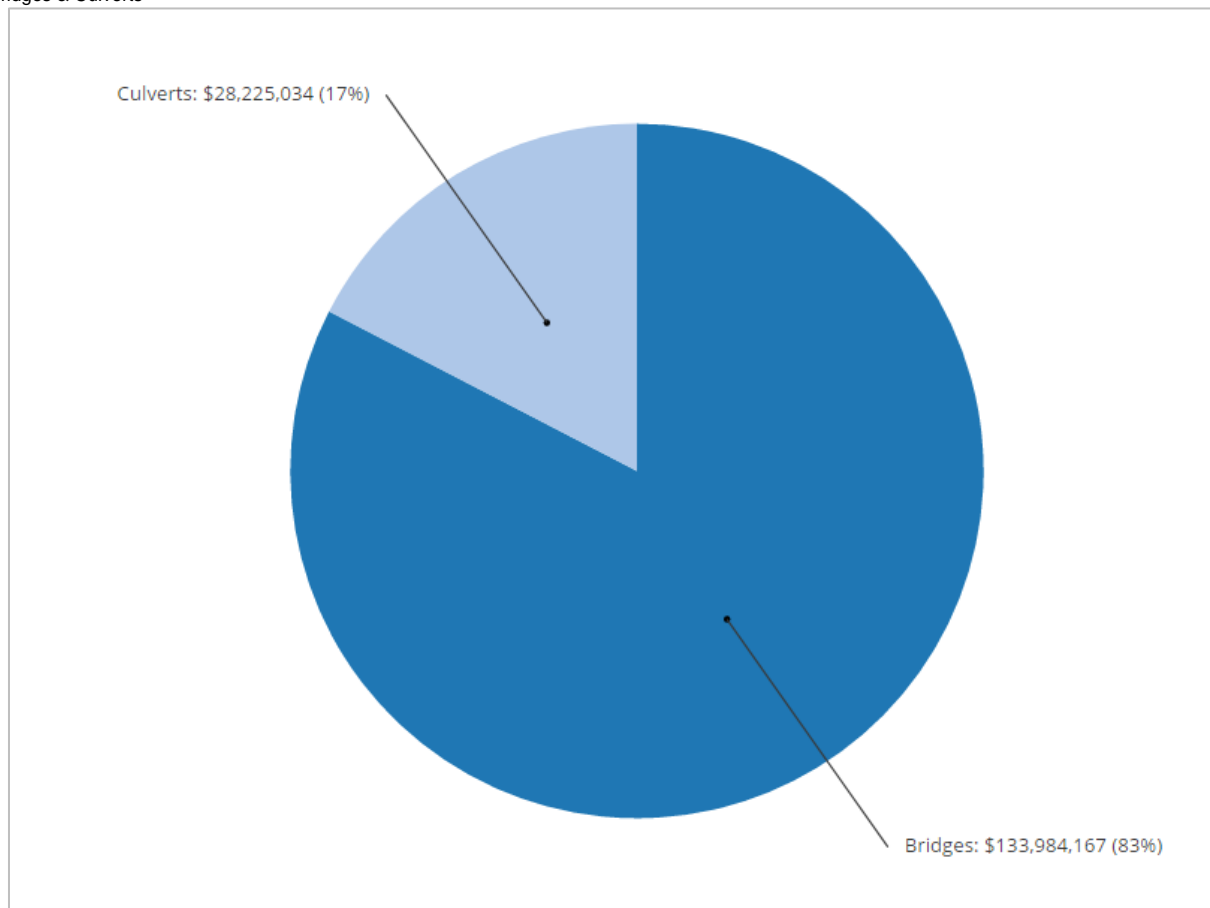
## 2.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 7 illustrates key asset attributes for the County's bridges & culverts, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the County's bridges & culverts assets are valued at \$162 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the municipality.

Table 7 Key Asset Attributes – Bridges & Culverts

Asset Type	Asset Component	Quantity	Useful Life in Years	Valuation Method	2016 Overall Replacement Cost
Bridges & Culverts	Bridge - Structure	131 structures	50	NRBCIP (Toronto)	\$133,984,167
	Bridge - Deck	131 structures	15	NRBCIP (Toronto)	
	Culverts	61 structures	40	NRBCIP (Toronto)	\$28,225,034
Total					\$162,209,201

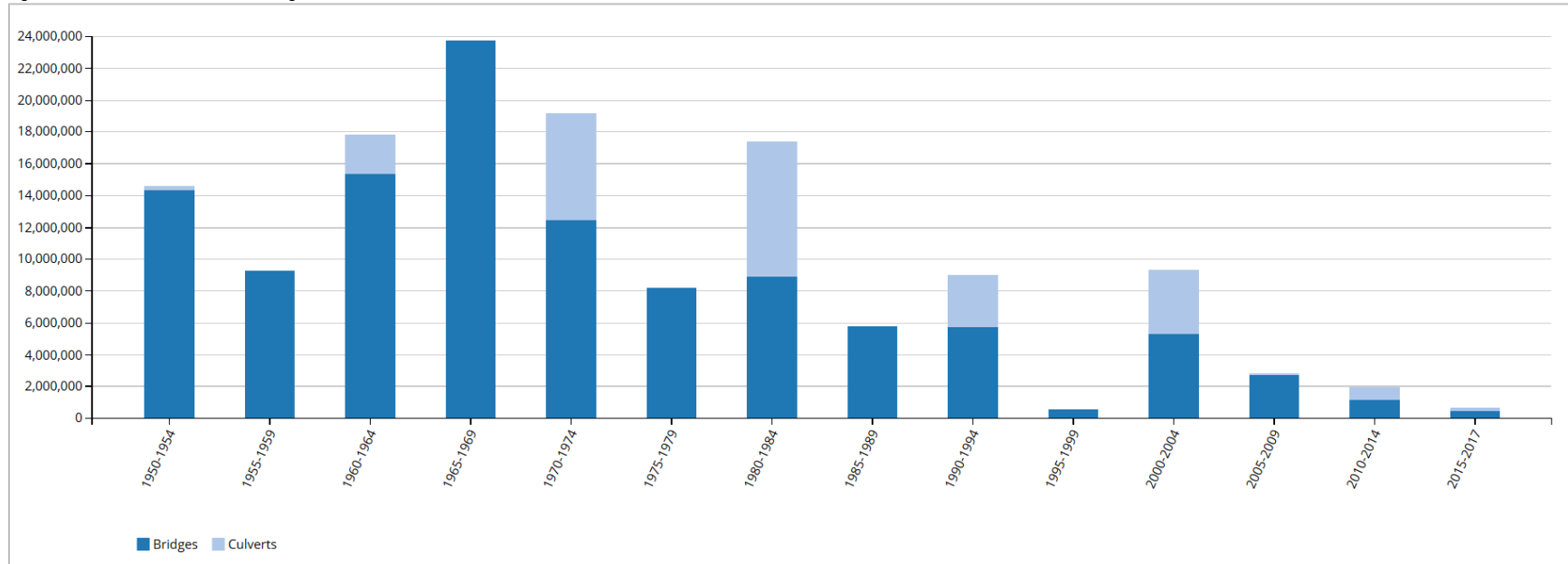
Figure 16 Asset Valuation – Bridges & Culverts



## 2.2 Historical Investment in Infrastructure

Figure 17 shows the County's historical investments in its bridges & culverts since 1950 based on 2016 replacement costs. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 2.3) can inform the forecasting and planning of short-, medium- and long-term replacement needs. Note that this graph only includes the active asset inventory as of December 31, 2015.

Figure 17 Historical Investment – Bridges & Culverts

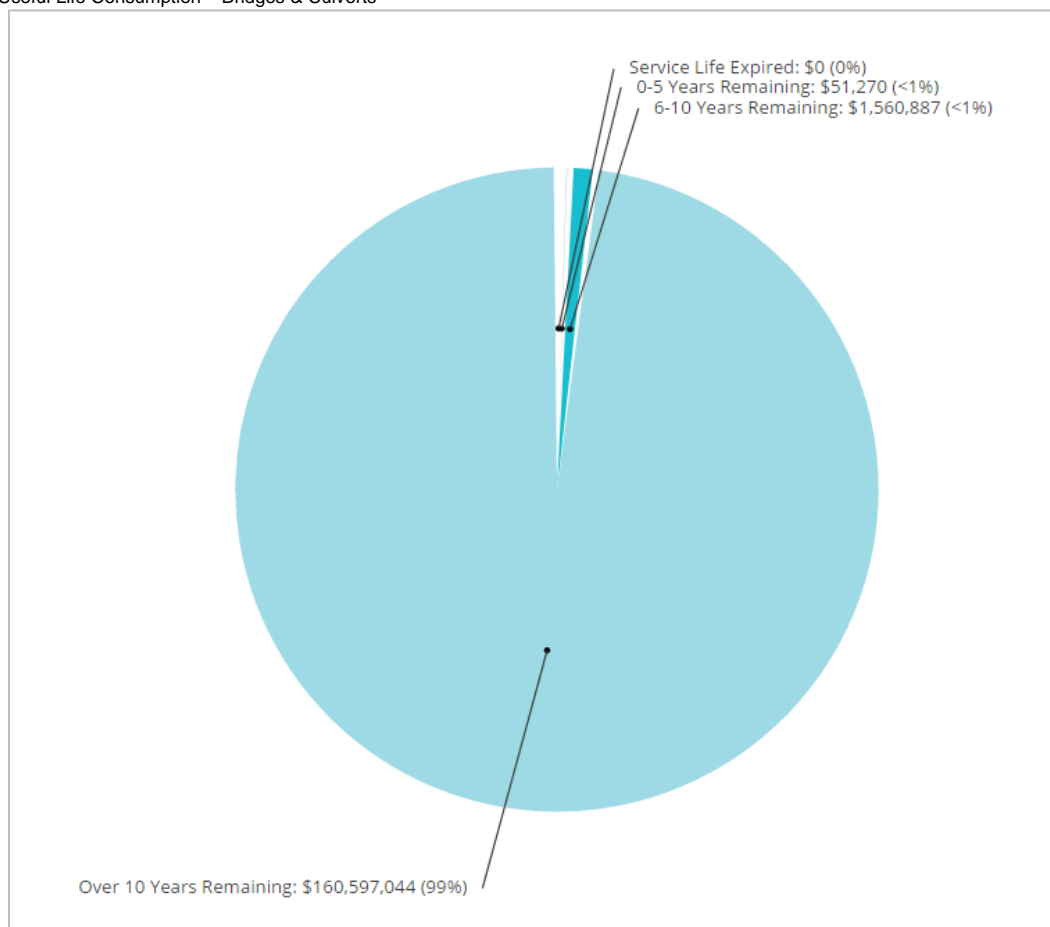


The County invested heavily in its bridges and culverts assets beginning in the 1950s, with expenditures totalling \$26 million between 1950-1959. The late-1960s represented the period of the largest investments in bridges & culverts, with expenditures totaling nearly \$24 million between 1965-1969. Since 2000, expenditures have totaled \$14.7 million.

## 2.3 Useful Life Consumption

In this section, we detail the extent to which assets have consumed their useful life based on the above, established useful life standards. In conjunction with historical spending patterns and observed condition data, understanding the useful life consumption rate of assets provides a more complete profile of the state of a community's infrastructure. Figure 18 illustrates the useful life consumption levels as of 2015 for the County's bridges & culverts.

Figure 18 Useful Life Consumption – Bridges & Culverts

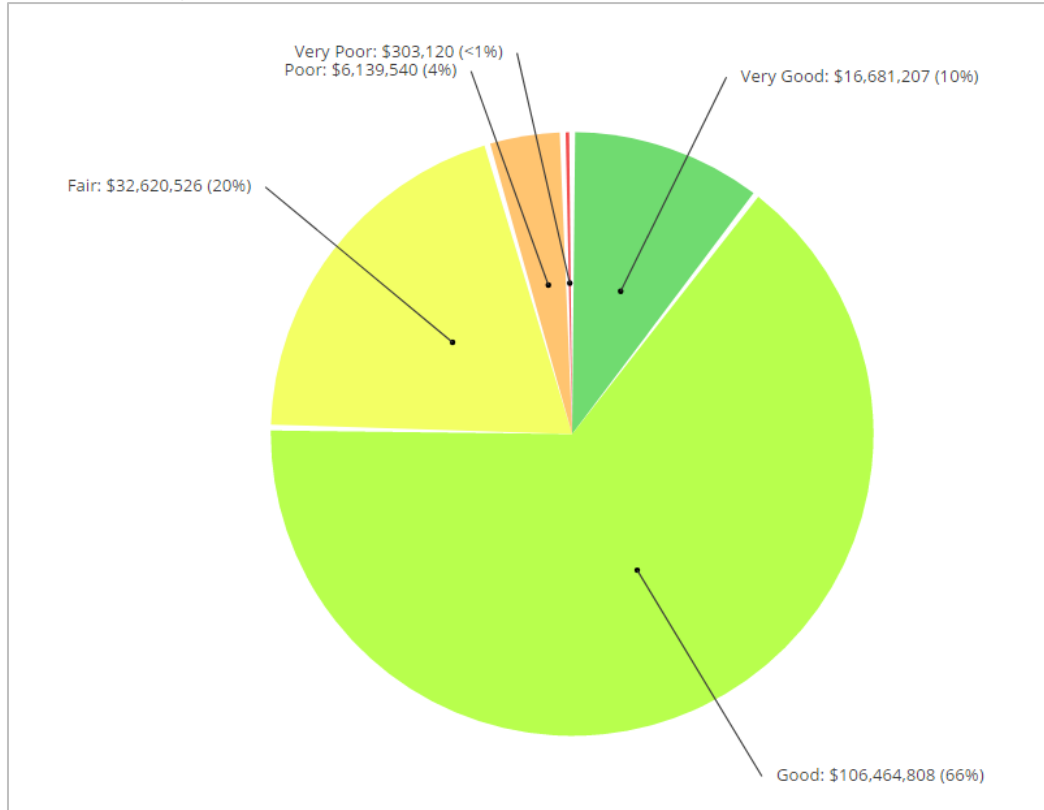


Virtually all bridges & culverts assets have at least 10 years of useful life remaining.

## 2.4 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the County's bridges & culverts as of 2015. By default, we rely on observed field data adapted from OSIM inspections as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The County has provided its OSIM inspection data for the purpose of this AMP.

Figure 19 Asset Condition – Bridges & Culverts (Assessed)

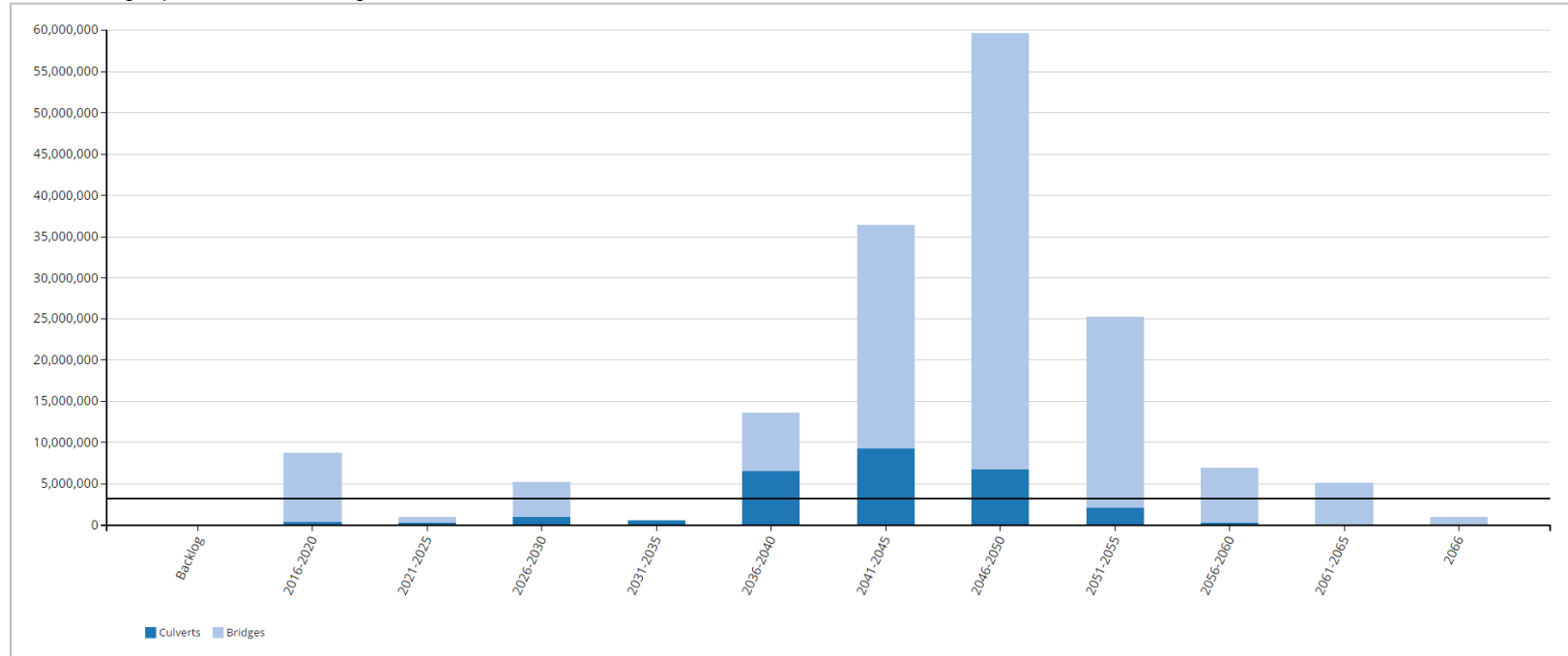


While over 75% of the County's bridges & culverts are in good to very good condition, 5%, with a valuation of \$6.4 million, are in poor to very poor condition.

## 2.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the County's bridges & culverts. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 20 Forecasting Replacement Needs – Bridges & Culverts



While there is no infrastructure backlog associated with bridges & culverts, short-term needs will total \$8.8 million over the next five years. The County's annual requirements (indicated by the black line) for its bridges & culverts total \$3,386,000. At this funding level, the County is allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. The County is currently allocating \$1,242,000, leaving an annual deficit of \$2,144,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level.

## **2.6 Recommendations – Bridges & Culverts**

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- The results and recommendations from the OSIM inspections should be used to generate the short-and long-term capital and maintenance budgets for the bridge and large culvert structures. See Section VIII, ‘Asset Management Strategies’.
- Bridge & culvert structure key performance indicators should be established and tracked annually as part of an overall level of service model. See Section VII ‘Levels of Service’.
- The County is funding only 37% of its long-term requirements on an annual basis. See the ‘Financial Strategy’ section on how to achieve more sustainable and optimal funding levels.

### 3. Social Housing

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### 3.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

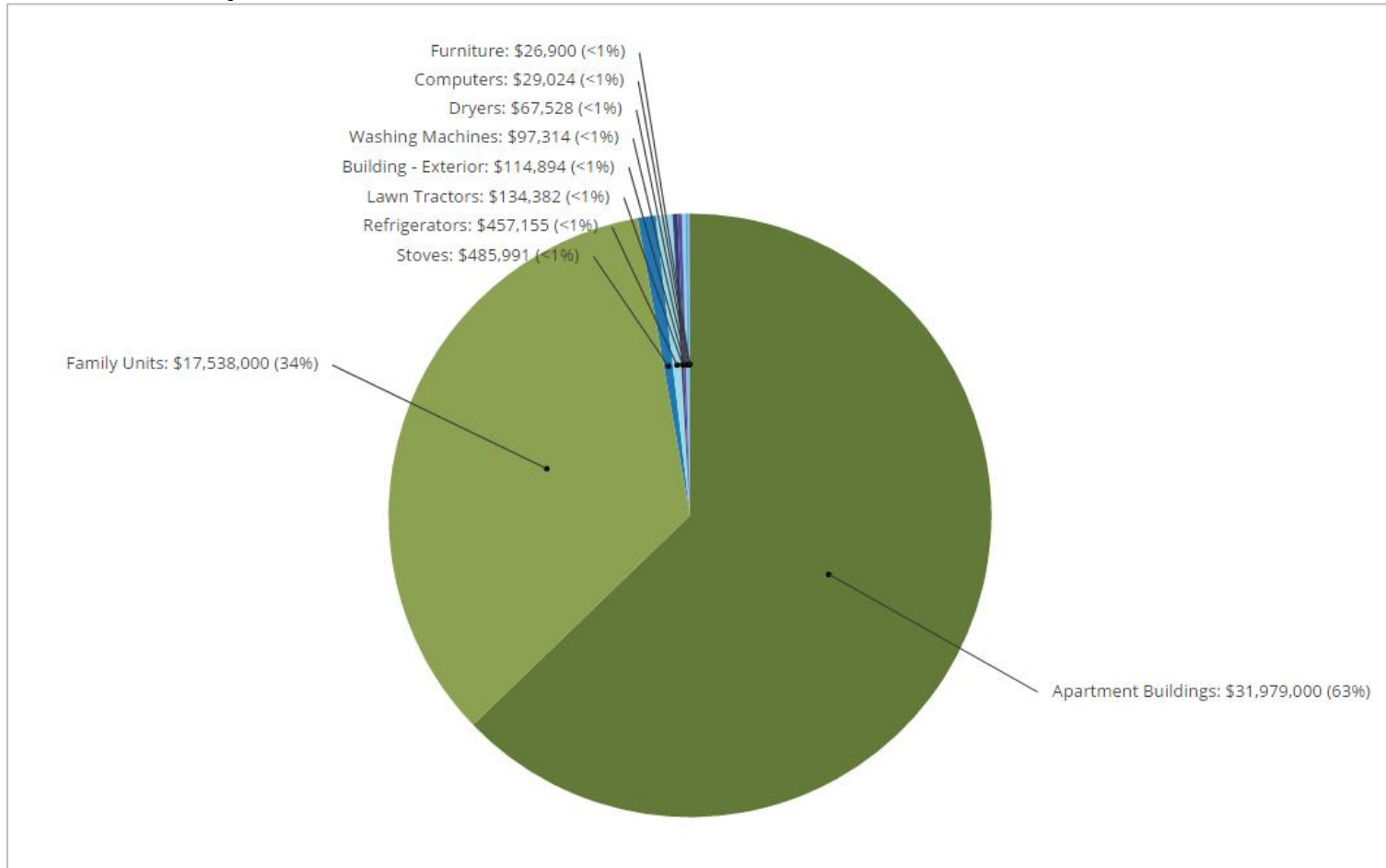
Table 8 illustrates key asset attributes for the County's social housing assets, including quantities of various assets, their useful life, replacement costs, and the valuation method by which the replacement costs were derived. In total, the County's social housing assets are valued at \$51 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the County and obtained from the County's accounting data as maintained in the CityWide® Tangible Asset module.

Table 8 Key Asset Attributes – Social Housing

Asset Type	Asset Component	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Social Housing	Apartment Buildings	716 units	80	Cost per unit	\$31,979,000
	Building Exterior	3 units	10/20	NRBCPI (Toronto)	\$114,894
	Computers	15 units	3	CPI (Ontario)	\$29,024
	Dryers	63 units	10	NRBCPI (Toronto)	\$67,528
	Family Units	172 units	80	Cost per unit	\$17,538,000
	Furniture	12 units	15	NRBCPI (Toronto)	\$26,900
	Lawn Tractors	8 units	15	NRBCPI (Toronto)	\$134,382
	Refrigerators	750 units	15	Cost per unit	\$457,155
	Stoves	731 units	15	Cost per unit	\$485,991
	Washing Machines	62 units	10	NRBCPI (Toronto)	\$97,314
Total					\$50,930,188

Note that the County's current policy has a useful of 50 years for buildings however this plan reflects useful life of 80 years.

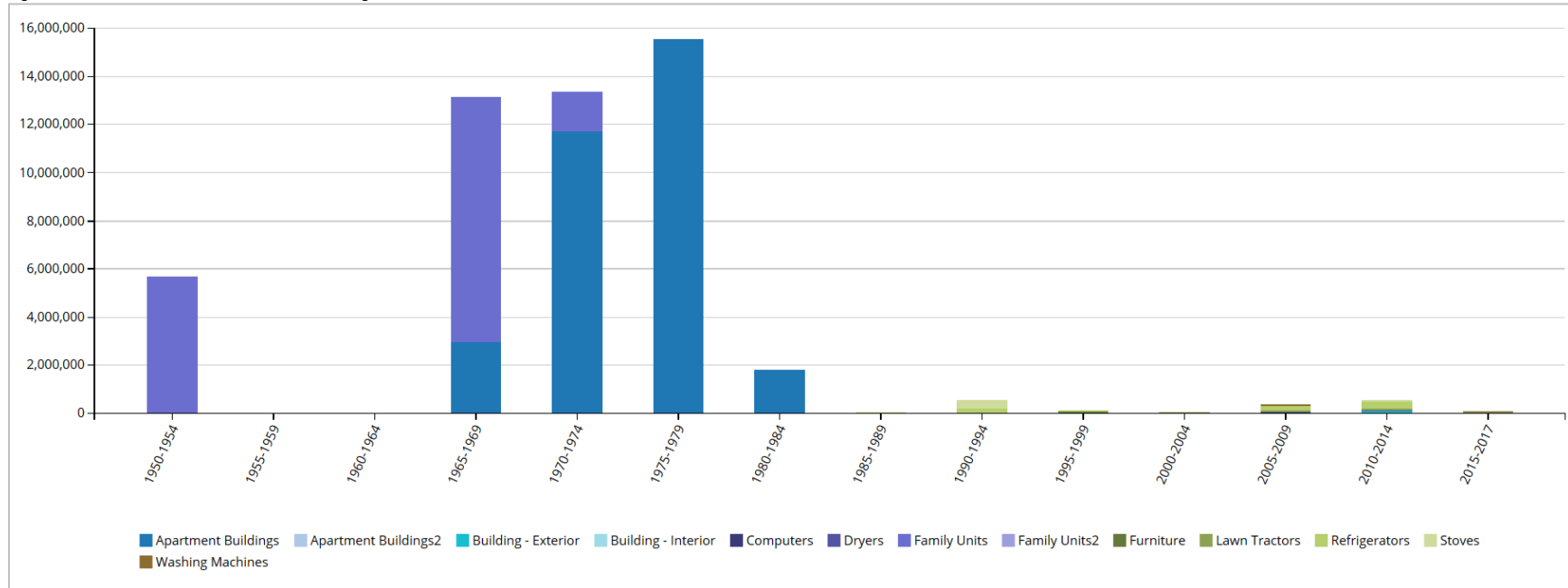
Figure 21 Asset Valuation – Social Housing



## 3.2 Historical Investment in Infrastructure

Figure 22 shows the historical investment in its social housing assets since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 3.3) can inform the forecasting and planning of short-, medium- and long-term replacement needs. Note that this graph only includes the active asset inventory as of December 31, 2015.

Figure 22 Historical Investment – Social Housing

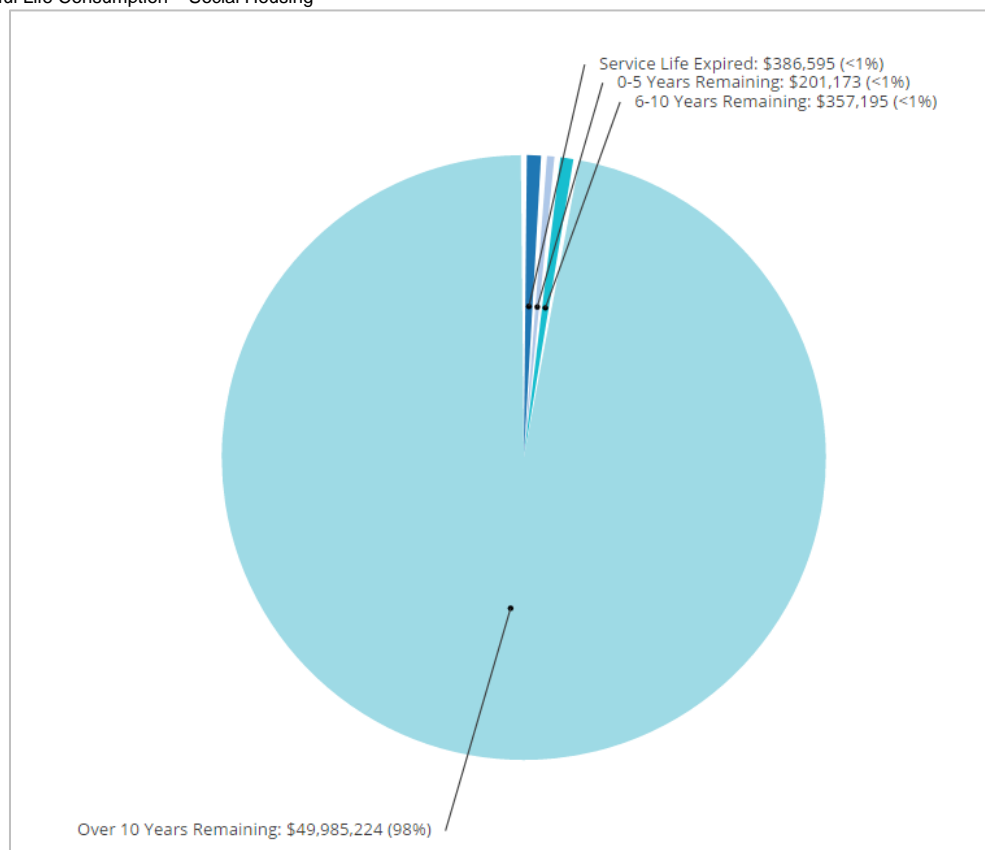


Major investments in social housing were made between 1965-1984, totaling \$44 million, of which \$32 million was allocated to apartment buildings.

### 3.3 Useful Life Consumption

In this section, we detail the extent to which assets have consumed their useful life based on the above, established useful life standards. In conjunction with historical spending patterns and observed condition data, understanding the useful life consumption rate of assets provides a more complete profile of the state of a community's infrastructure. Figure 23 illustrates the useful life consumption levels as of 2015 for the County's social housing.

Figure 23 Useful Life Consumption – Social Housing

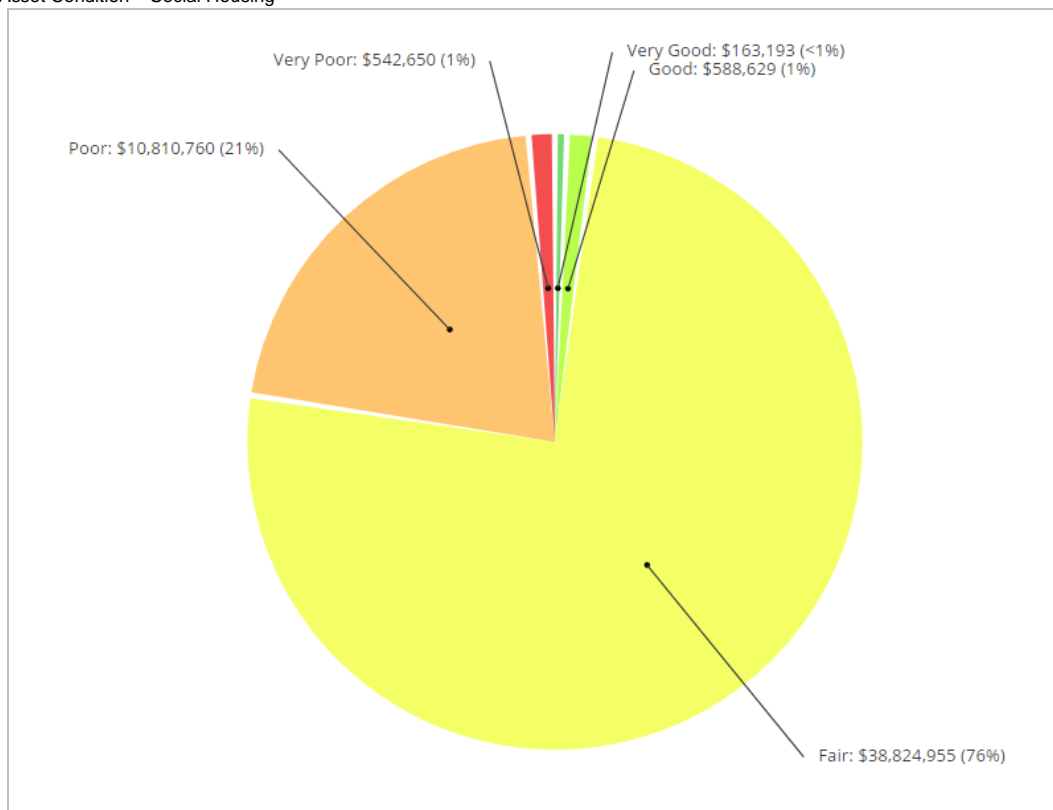


Approximately 98% of assets have at least 10 years of useful life remaining.

### 3.4 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the County's social housing assets. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The County has not provided condition data for its social housing assets.

Figure 24 Asset Condition – Social Housing

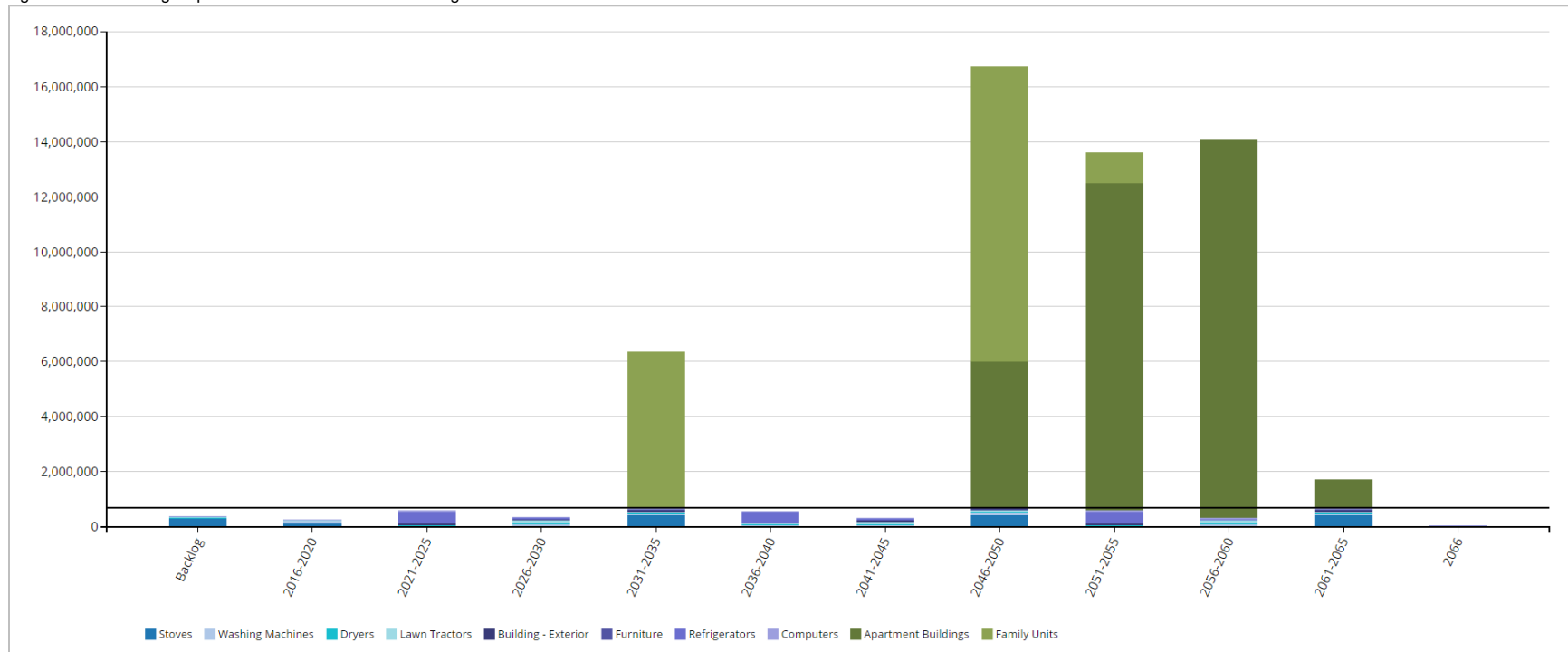


Based upon age-base data, less than 2% of assets are in good to very good condition; 22%, with a valuation of \$11.4 million, are in poor to very poor condition.

### 3.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the County's social housing assets. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 25 Forecasting Replacement Needs – Social Housing



Age-based data shows a backlog of \$387,000, with replacement needs totaling \$266,000 over the next five years; an additional \$597,000 will be required between 2021-2025. As major assets reach the end of their useful life, replacement needs will rise to \$16.7 million between 2046-2050. The County's annual requirements (indicated by the black line) for its social housing total \$728,000. At this funding level, the County is allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. The County is currently allocating \$1,163,000, leaving an annual surplus of \$435,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Condition assessments can assist in more precisely estimating actual field needs, e.g., the existing backlog. Note that future iterations of the AMP will take into account social housing asset conditions which will better predict future needs.

### 3.6 Recommendations – Social Housing

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- A detailed study to define the current condition of the social housing facilities and their components (structural, architectural, electrical, mechanical, site, etc.) should be undertaken. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.
- The end of life of many social housing assets is approaching, therefore a plan will need to be developed to address this.
- Social housing key performance indicators should be established and tracked annually as part of an overall level of service model. See Section VII 'Levels of Service'.
- The County should assess its short-, medium- and long-term capital, and operations and maintenance needs.
- An appropriate percentage of the replacement costs should then be allocated for the County's O&M requirements.
- The County is overfunding (160%) its long-term requirements on an annual basis. See the 'Financial Strategy' section on how to achieve more sustainable and optimal funding levels.

## 4. Buildings & Facilities

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#### 4.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

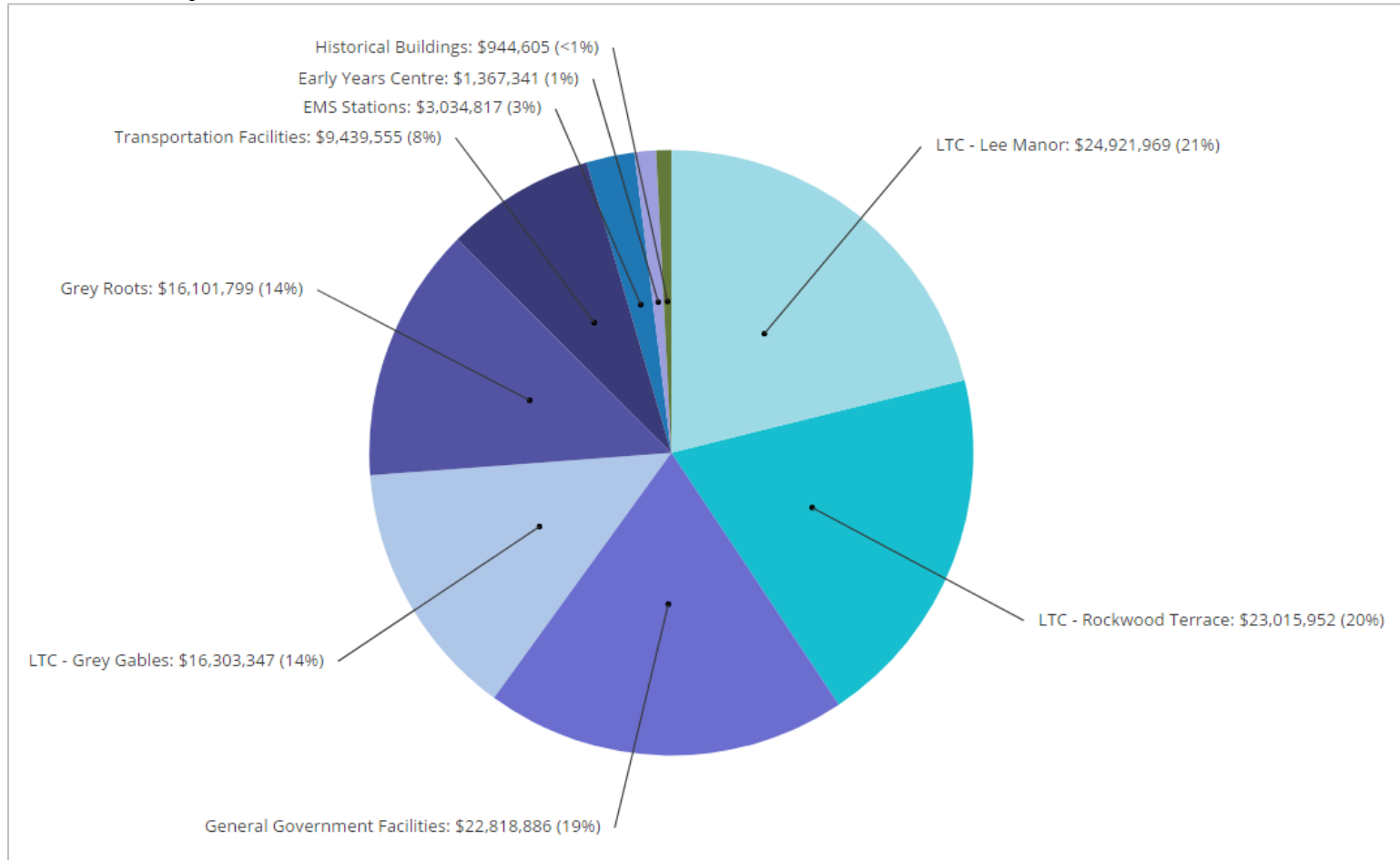
Table 9 illustrates key asset attributes for the County's buildings assets, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the County's buildings & facilities assets are valued at \$118 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the municipality.

Table 9 Key Asset Attributes – Buildings & Facilities

Asset Type	Asset Component	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Buildings & Facilities	Early Years Centre	1 structure	50	Cost per unit	\$1,367,341
	EMS	3 structures	50	Cost per unit/NRBCPI (Toronto)	\$3,034,817
	General Government Facilities	7 structures	20/40/50	Cost per unit	\$22,818,886
	Grey Roots	10 structures	50	Cost per unit/NRBCPI (Toronto)	\$16,101,799
	Historical Buildings	4 Structures	50	Cost per unit	\$944,605
	Long-Term Care - Grey Gables	2 structures (13 components)	30	Cost per unit/NRBCPI (Toronto)	\$16,303,347
	Long-Term Care - Lee Manor	1 structure (7 components)	30	Cost per unit/NRBCPI (Toronto)	\$24,921,969
	Long-Term Care - Rockwood Terrace	1 structure (1 component)	30	Cost per unit	\$23,015,952
	Transportation Facilities	23 structures (5 components)	25 - 50	Cost per unit/NRBCPI (Toronto)/CPI (Canada)	\$9,439,555
Total					\$117,948,271

NOTE: Most buildings were values based on a 2008 insurance appraisal that was inflated to current value. Rockwood Terrace was based on a consultant's report in 2016.

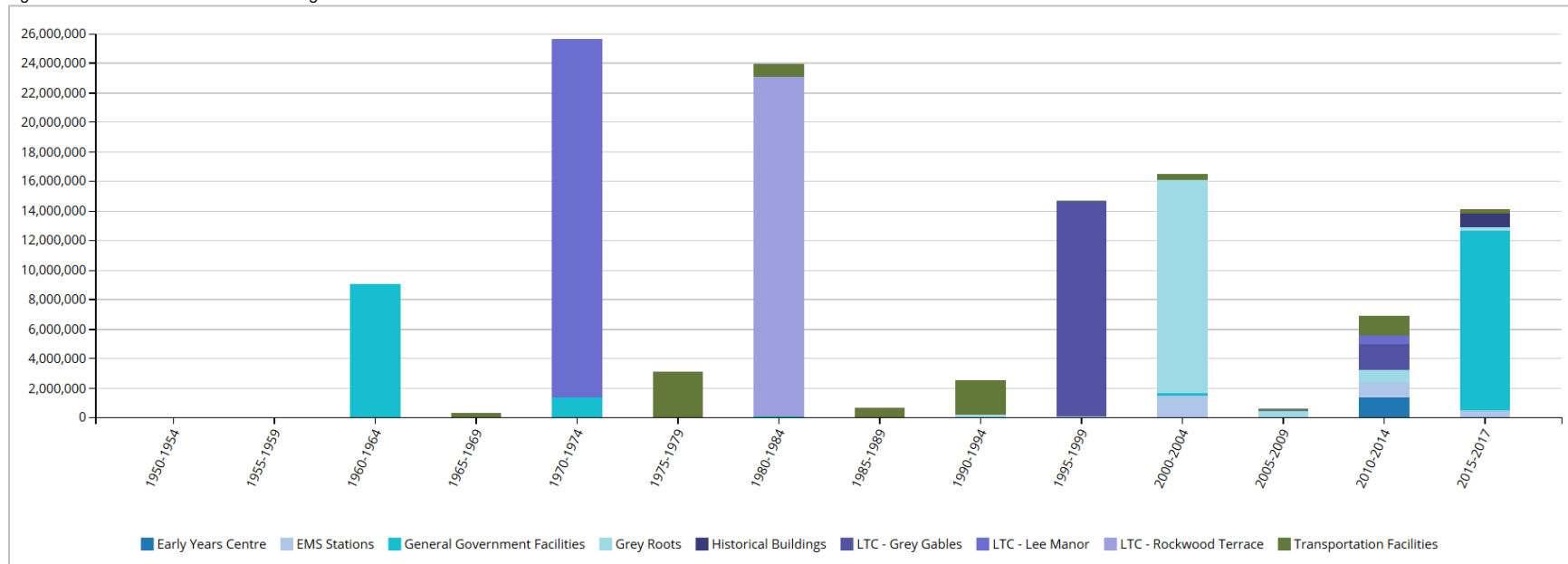
Figure 26 Asset Valuation – Buildings & Facilities



## 4.2 Historical Investment in Infrastructure

Figure 27 shows the County's historical investments in its buildings & facilities since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 4.3) can inform the forecasting and planning of short-, medium- and long-term replacement needs. Note that this graph only includes the active asset inventory as of December 31, 2015.

Figure 27 Historical Investment – Buildings & Facilities

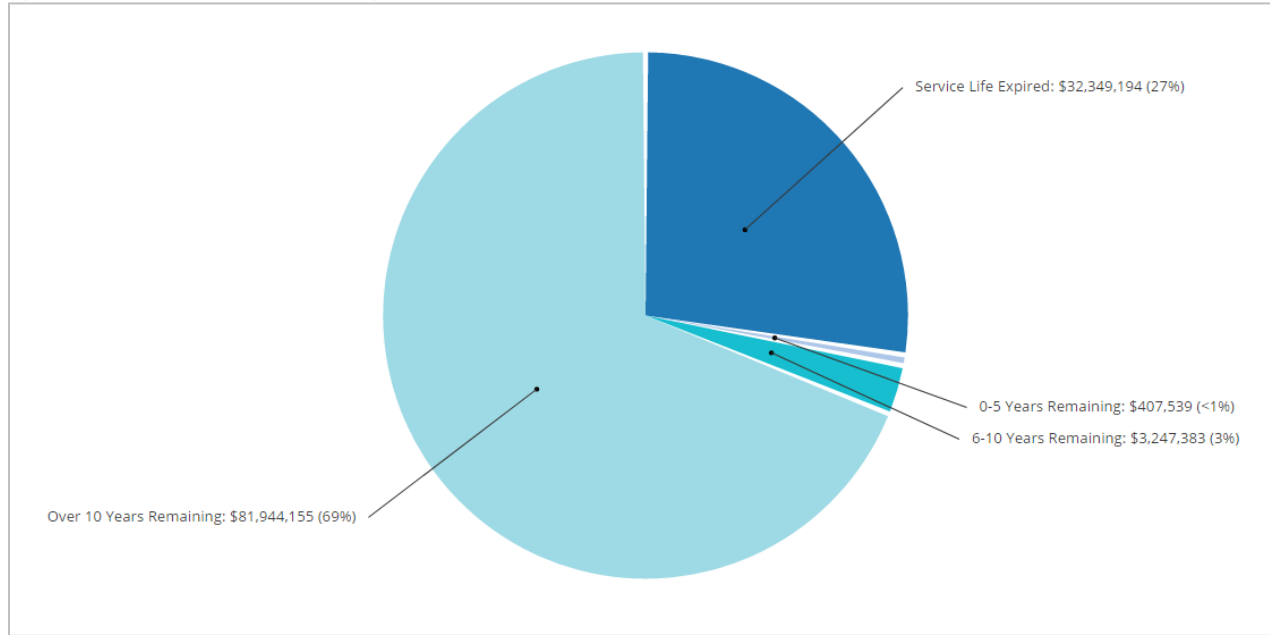


The largest expenditures in buildings & facilities were made in the 1970s, totaling nearly \$29 million, of which \$24 million was allocated to Lee Manor. Additionally, significant investments were made in the early 1980s, totaling \$24 million. Since 2010, expenditures have totaled \$21 million.

### 4.3 Useful Life Consumption

In this section, we detail the extent to which assets have consumed their useful life based on the above, established useful life standards. In conjunction with historical spending patterns and observed condition data, understanding the useful life consumption rate of assets provides a more complete profile of the state of a community's infrastructure. Figure 28 illustrates the useful life consumption levels as of 2015 for the County's buildings assets.

Figure 28 Useful Life Consumption – Buildings & Facilities

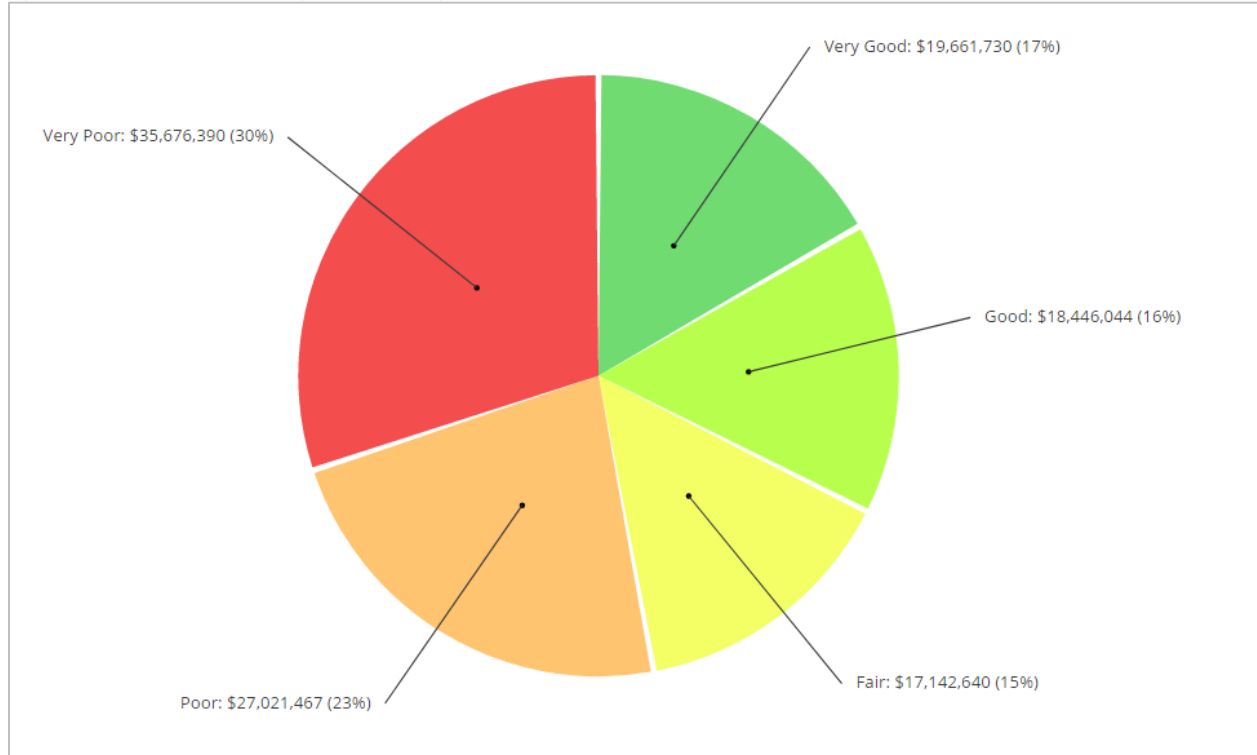


While nearly 70% of assets have at least 10 years of useful life remaining, 27%, with a valuation of \$32 million, remain in operation beyond their useful life.

## 4.4 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the County's buildings assets. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The County has not provided condition data.

Figure 29 Asset Condition – Buildings & Facilities (Age-based)

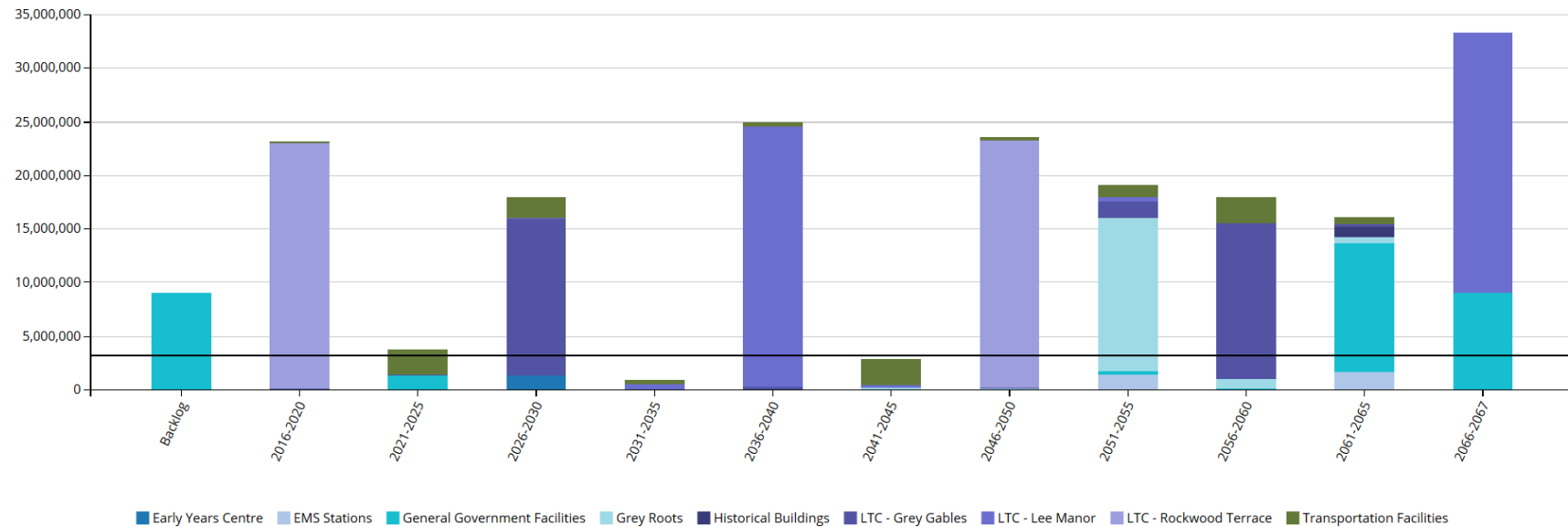


Age-based data indicates that 33% of assets are in good to very good condition. However, 53%, with a valuation of nearly \$63 million, are in poor to very poor condition.

## 4.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the County's buildings assets. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 30 Forecasting Replacement Needs – Buildings & Facilities



Age-based data indicates a backlog of \$9 million; \$23 million in short-term replacement needs will be required over the next five years. The County's annual requirements (indicated by the black line) for its buildings total \$3,258,000. At this funding level, the County is allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. The County is currently allocating \$2,664,000, leaving an annual deficit of \$594,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the County to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

## 4.6 Recommendations – Buildings & Facilities

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- The County should implement a component based condition inspection program for its facilities. This will provide a more precise estimate of actual asset needs. See Section 2, ‘Condition Assessment Programs’ in the ‘Asset Management Strategies’ chapter.
- Using the above information, the County should assess its short-, medium- and long-term capital, and operations and maintenance needs.
- An appropriate percentage of the replacement costs should then be allocated for the County’s O&M requirements.
- Facility key performance indicators should be established and tracked annually as part of an overall level of service model. See Chapter VII, ‘Levels of Service’.
- The County is funding 82% of its long-term requirements on an annual basis. See the ‘Financial Strategy’ section on how to achieve more sustainable and optimal funding levels.

## 5. Machinery & Equipment



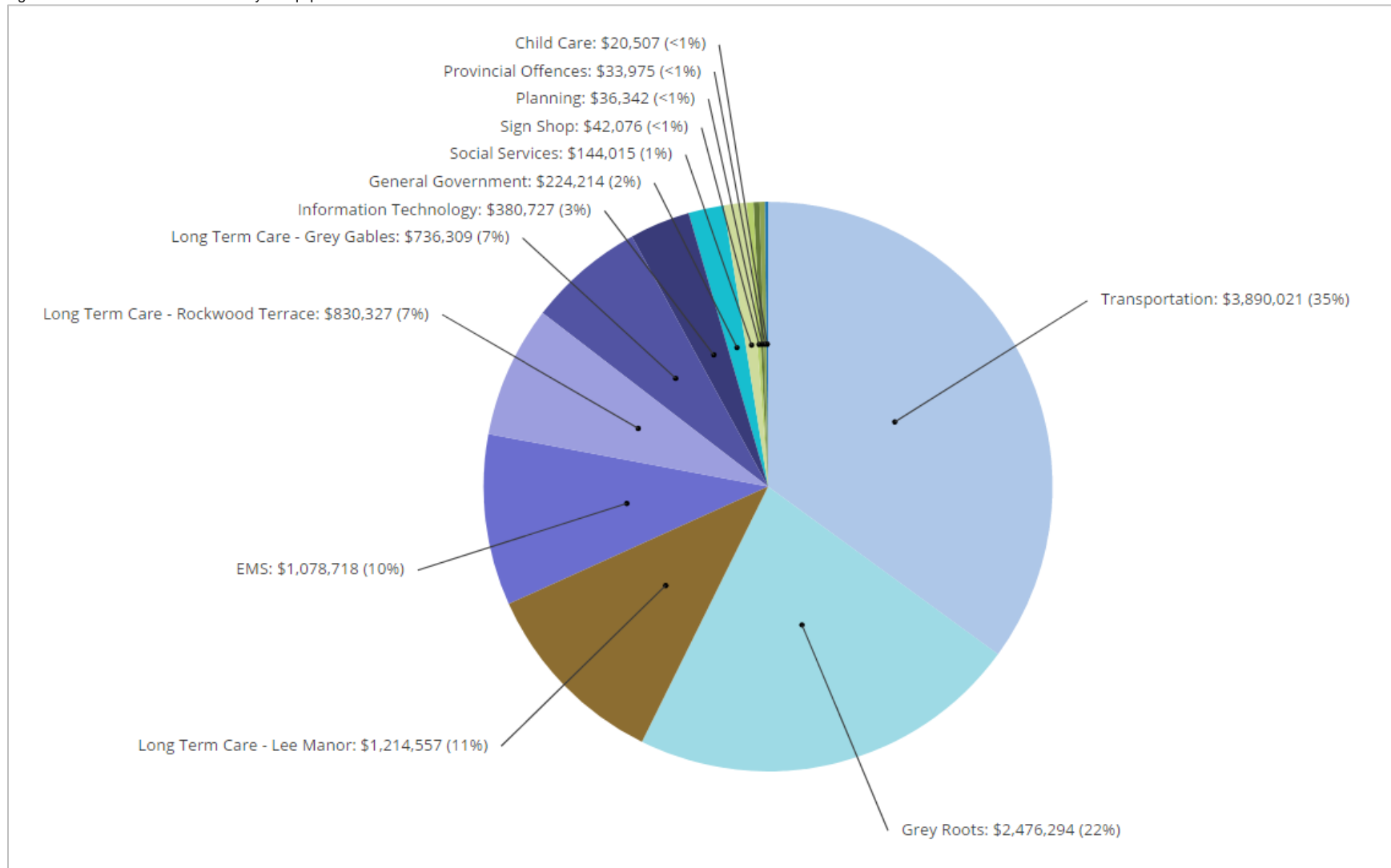
## 5.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 10 illustrates key asset attributes for the County's machinery & equipment assets, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the County's machinery & equipment assets are valued at \$11.1 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the County and obtained from the County's accounting data as maintained in the CityWide® Tangible Asset module.

Table 10 Asset Inventory – Machinery & Equipment

Asset Type	Components	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Machinery & Equipment	Child Care	13 units	3/15	CPI (Ontario)	\$20,507
	EMS	133 units	3/4/5/10/15	Cost per unit/CPI (Ontario)	\$1,078,718
	General Government	110 units	3/10/15/20	CPI (Ontario)	\$224,214
	Grey Roots	72 units	3/5/10/15/20/25/30	CPI (Ontario)	\$2,476,294
	Information Technology	67 units	3/5/7/10/15	CPI (Ontario)	\$380,727
	Long Term Care - Grey Gables	297 units	3/4/5/10/15/17/20	CPI (Ontario)	\$736,309
	Long Term Care - Lee Manor	427 units	3/4/5/10/15/17/20/25/30	CPI (Ontario)	\$1,214,557
	Long Term Care - Rockwood Terrace	289 units	3/4/5/7/10/15/17/20/30	CPI (Ontario)	\$830,327
	Planning	17 units	3/10/15	CPI (Ontario)	\$36,342
	Provincial Offences	26 units	3/15	CPI (Ontario)	\$33,975
	Sign Shop	4 units	4/10	CPI (Ontario)	\$42,076
	Social Services	123 units	3/5/15	CPI (Ontario)	\$144,015
	Transportation	120 units	3/5/6/8/10/12/14/15/18/20/22/24/25/30	CPI (Ontario)	\$3,890,021
Total					\$11,108,082

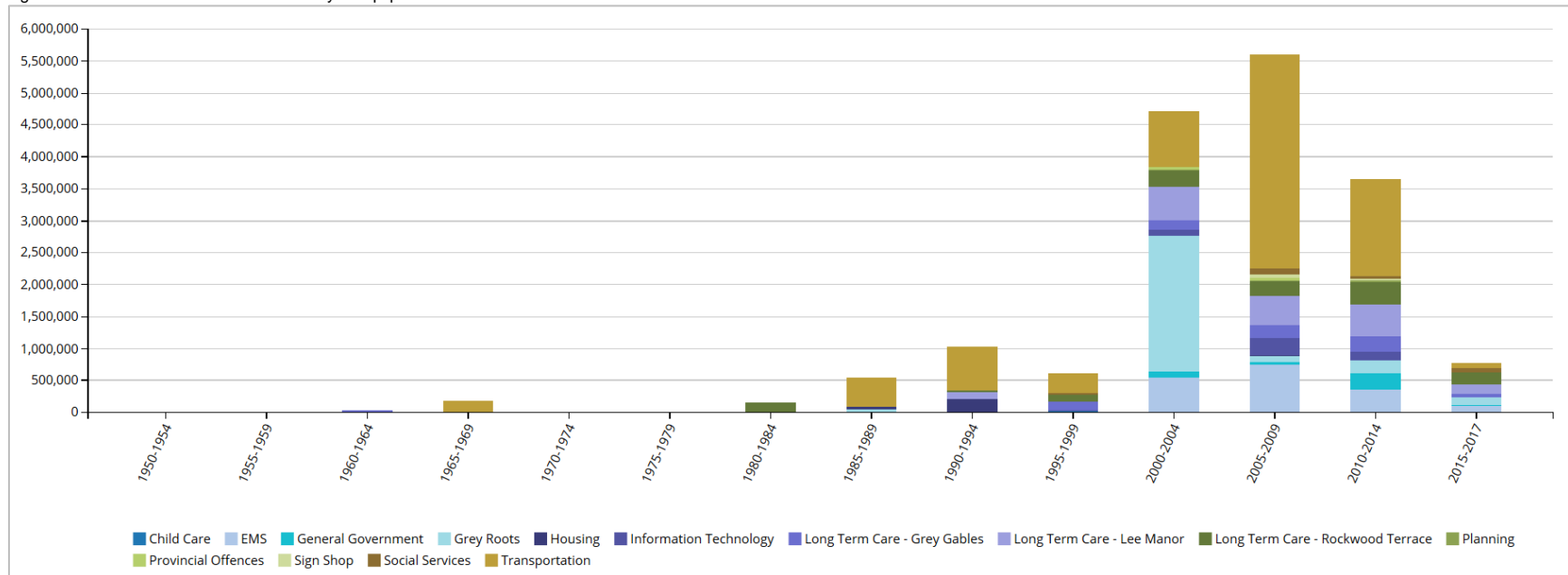
Figure 31 Asset Valuation – Machinery & Equipment



## 5.2 Historical Investment in Infrastructure

Figure 32 shows the County's historical investments in its machinery & equipment since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 5.3) can inform the forecasting and planning of short-, medium- and long-term replacement needs. Note that this graph only includes the active asset inventory as of December 31, 2015.

Figure 32 Historical Investment – Machinery & Equipment

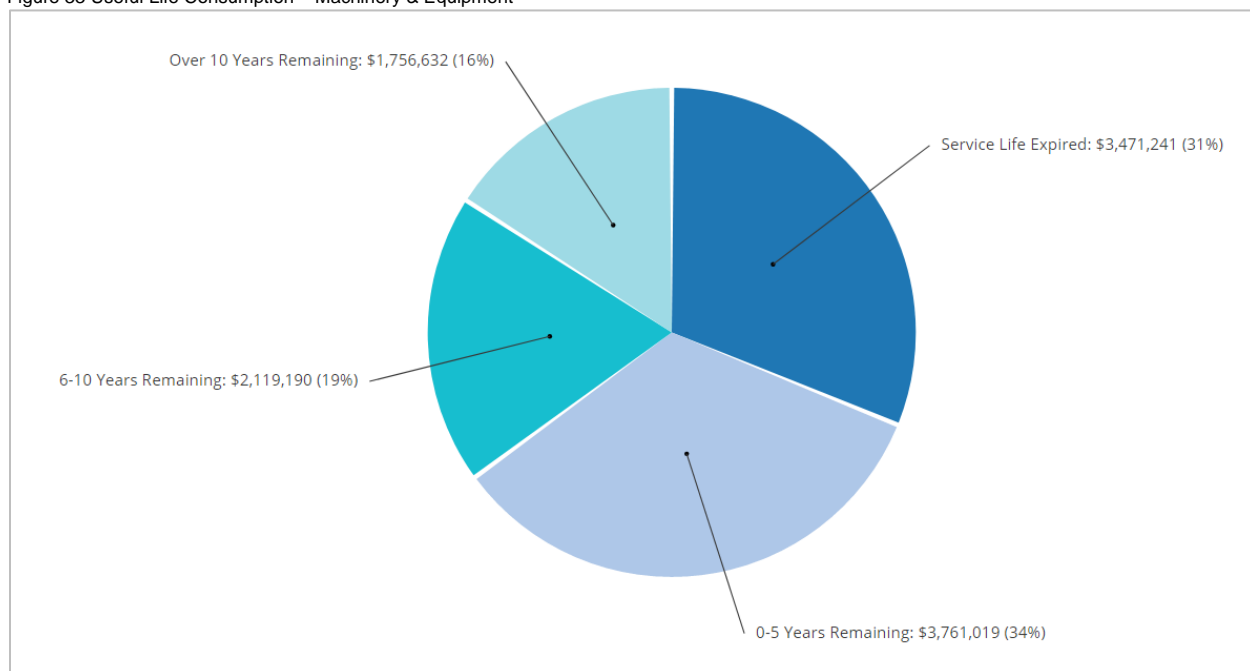


The County rapidly expanded its machinery & equipment portfolio in the 2000s: between 2000-2014, investments totaled \$13.5 million. Since 2015, an additional \$777,000 has been allocated to machinery & equipment.

### 5.3 Useful Life Consumption

In this section, we detail the extent to which assets have consumed their useful life based on the above, established useful life standards. In conjunction with historical spending patterns and observed condition data, understanding the useful life consumption rate of assets provides a more complete profile of the state of a community's infrastructure. Figure 33 illustrates the useful life consumption levels as of 2015 for the County's machinery & equipment assets.

Figure 33 Useful Life Consumption – Machinery & Equipment

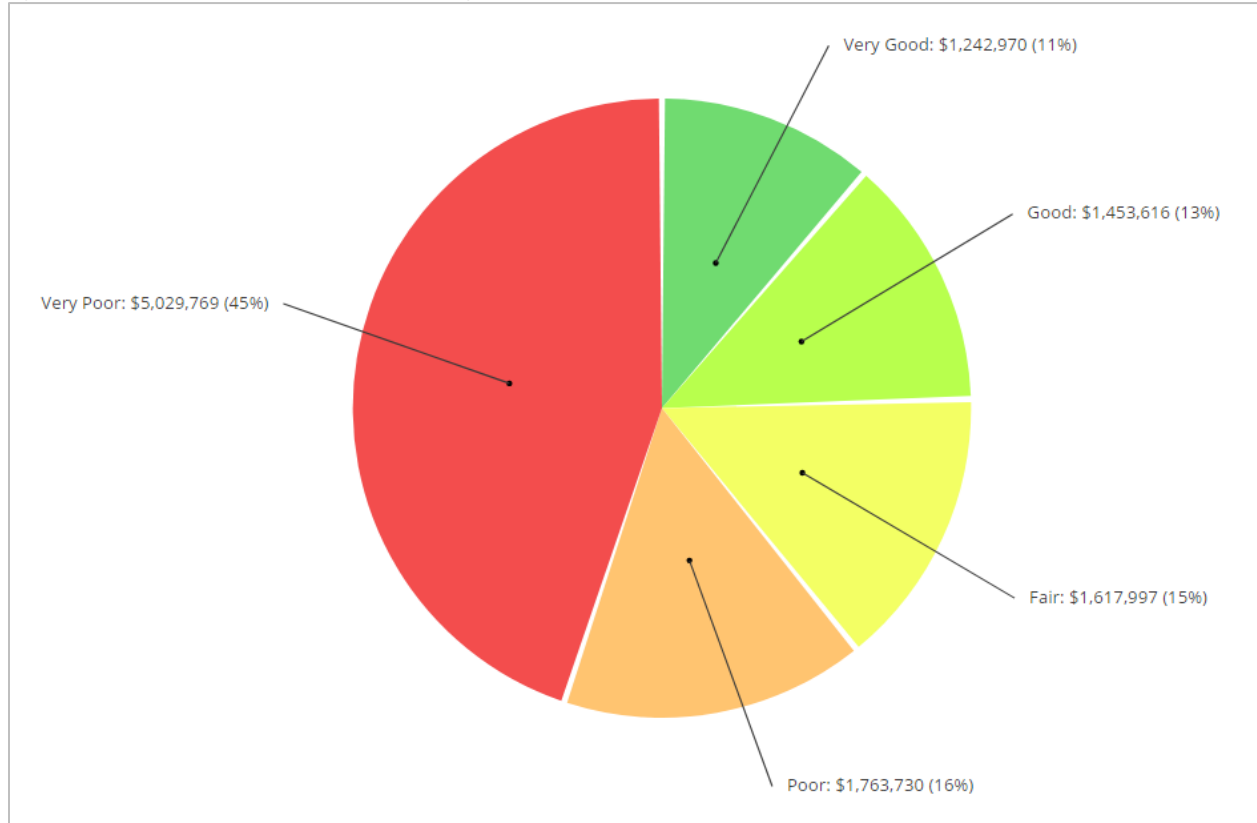


Less than 20% of assets have at least 10 years of useful life remaining; 31%, with a valuation of \$3.5 million, remain in operation beyond their useful life. An additional 34% will reach the end of their useful life in the next five years.

## 5.4 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the County's machinery & equipment assets as of 2015. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The County has not provided condition data.

Figure 34 Asset Condition – Machinery & Equipment (Age-based)

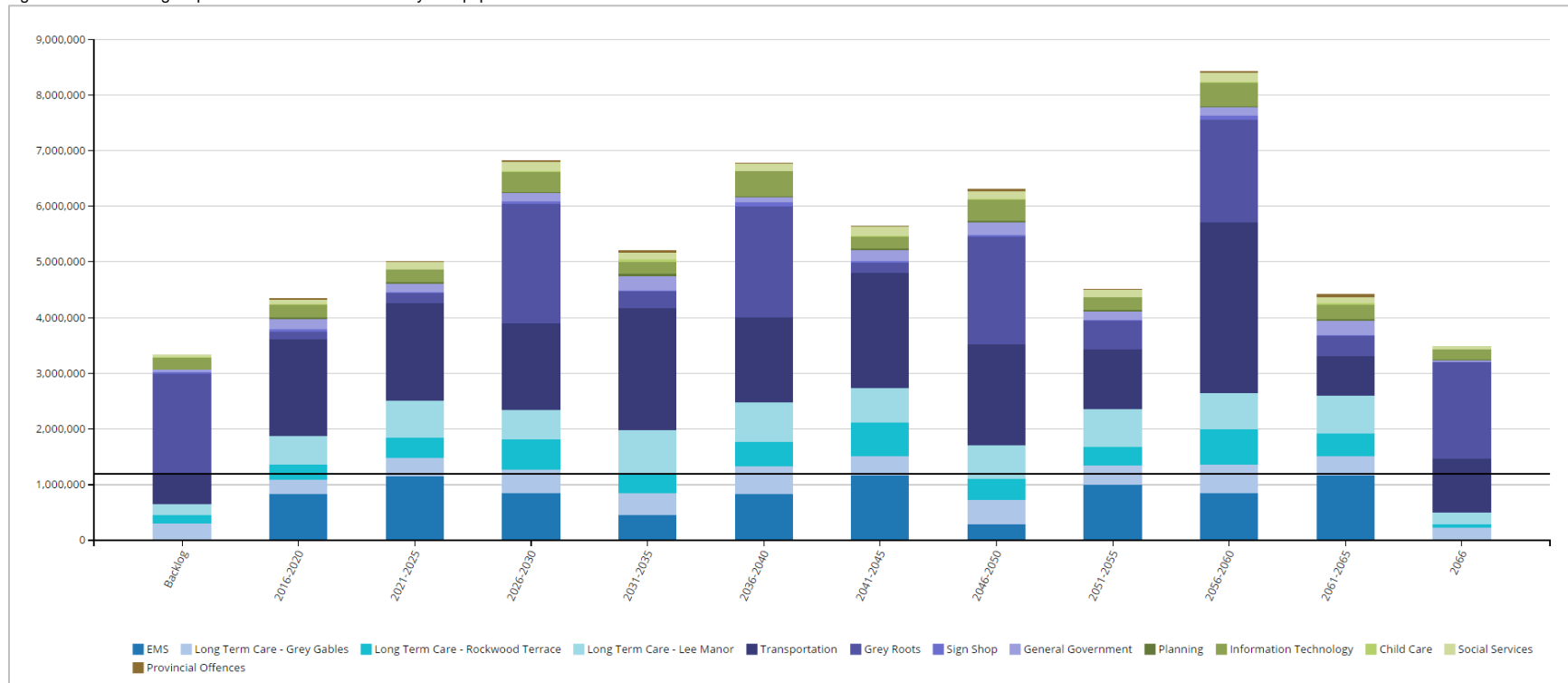


Based on age data, 61% of assets, with a valuation of \$6.8 million, are in poor to very poor condition; 24% are in good to very good condition.

## 5.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the County's machinery & equipment assets. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 35 Forecasting Replacement Needs – Machinery & Equipment



In addition to an age-based backlog of \$3.3 million, the County's replacement needs total \$4.4 million in the next five years. An additional \$5 million will be required between 2021-2025. The County's annual requirements (indicated by the black line) for its machinery & equipment total \$1,209,000. At this funding level, the County is allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the County is currently allocating \$733,000, leaving an annual deficit of \$476,000. See the 'Financial Strategy' section for maintaining a sustainable funding level. Further, while fulfilling the annual requirements will position the County to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing backlogs.

## 5.6 Recommendations – Machinery & Equipment

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- The County should implement a component based condition inspection program to better define financial requirements for its machinery and equipment. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.
- Using the above information, the County should assess its short-, medium- and long-term capital, and operations and maintenance needs.
- An appropriate percentage of the replacement costs should then be allocated for the County's O&M requirements.
- The County is funding 61% of its long-term requirements on an annual basis. See the 'Financial Strategy' section on how to maintain sustainable and optimal funding levels.

## 6. Land Improvements

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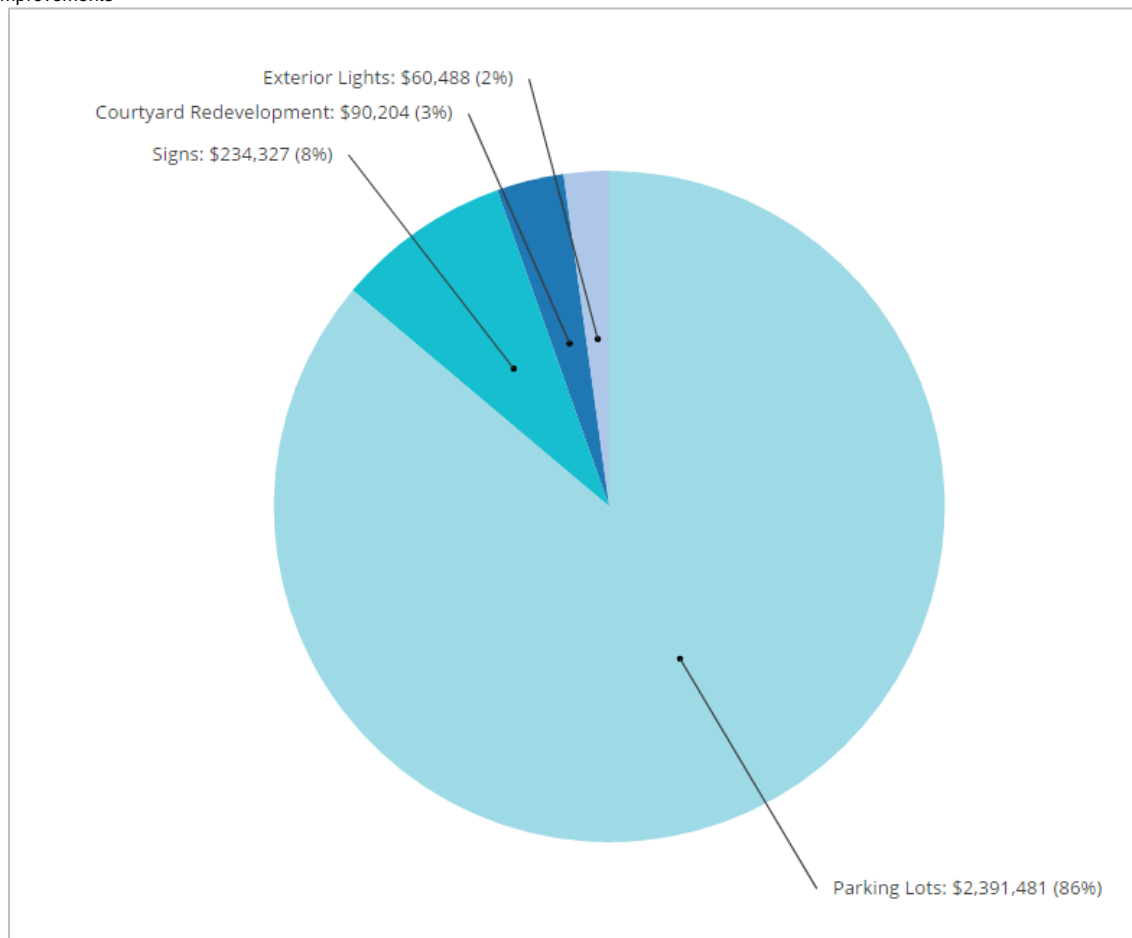
## 6.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 11 illustrates key asset attributes for the County's land improvement assets, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the County's land improvements assets are valued at \$2.8 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the municipality.

Table 11 Asset Inventory – Land Improvements

Asset Type	Components	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Land Improvements	Parking Lots	10 units	20/25/40	Cost per unit/NRBCPI (Toronto)	\$2,391,481
	Exterior Lights	1 unit	25	NRBCPI (Toronto)	\$60,488
	Signs	5 units	20	NRBCPI (Toronto)	\$234,327
	Courtyard Redevelopment	1 unit	25	NRBCPI (Toronto)	\$90,204
Total					\$2,776,500

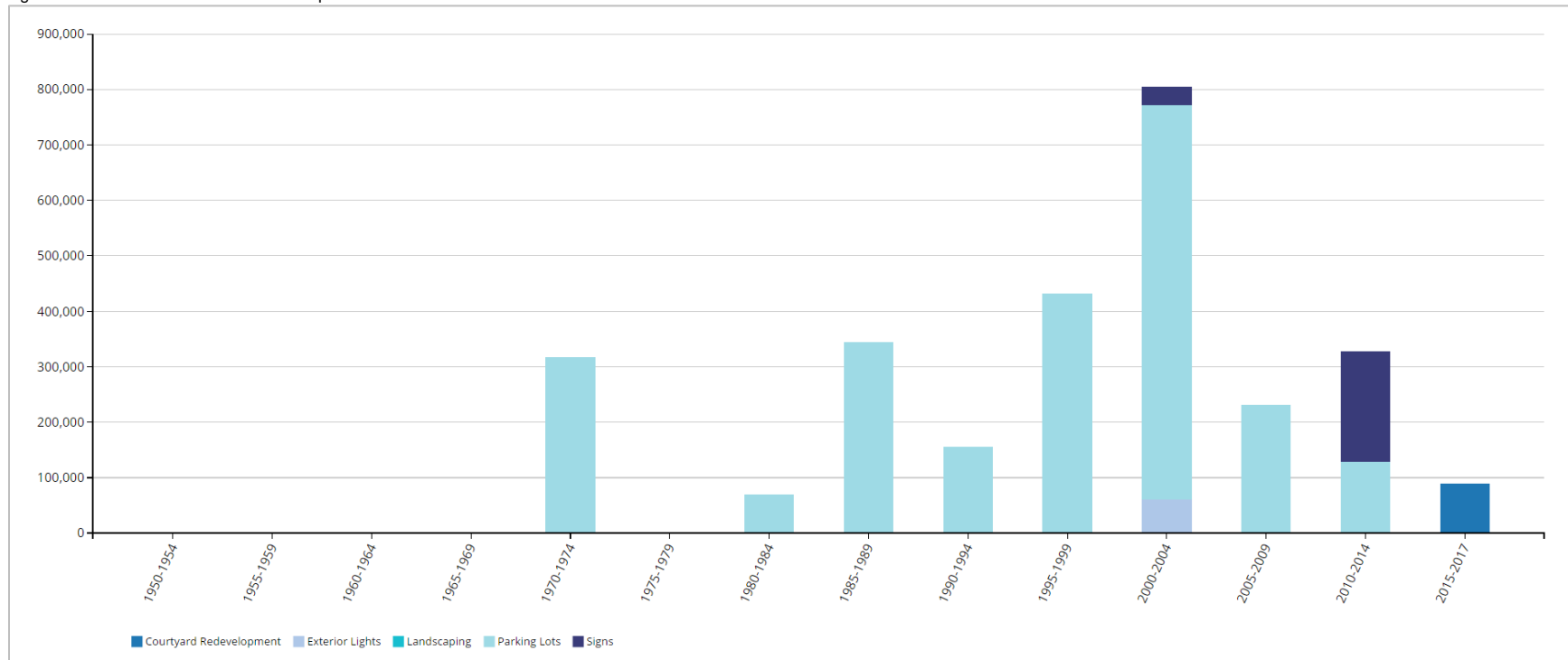
Figure 36 Asset Valuation – Land Improvements



## 6.2 Historical Investment in Infrastructure

Figure 37 shows the County's historical investments in its land improvements since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 6.3) can inform the forecasting and planning of short-, medium- and long-term replacement needs. Note that this graph only includes the active asset inventory as of December 31, 2015.

Figure 37 Historical Investment – Land Improvements

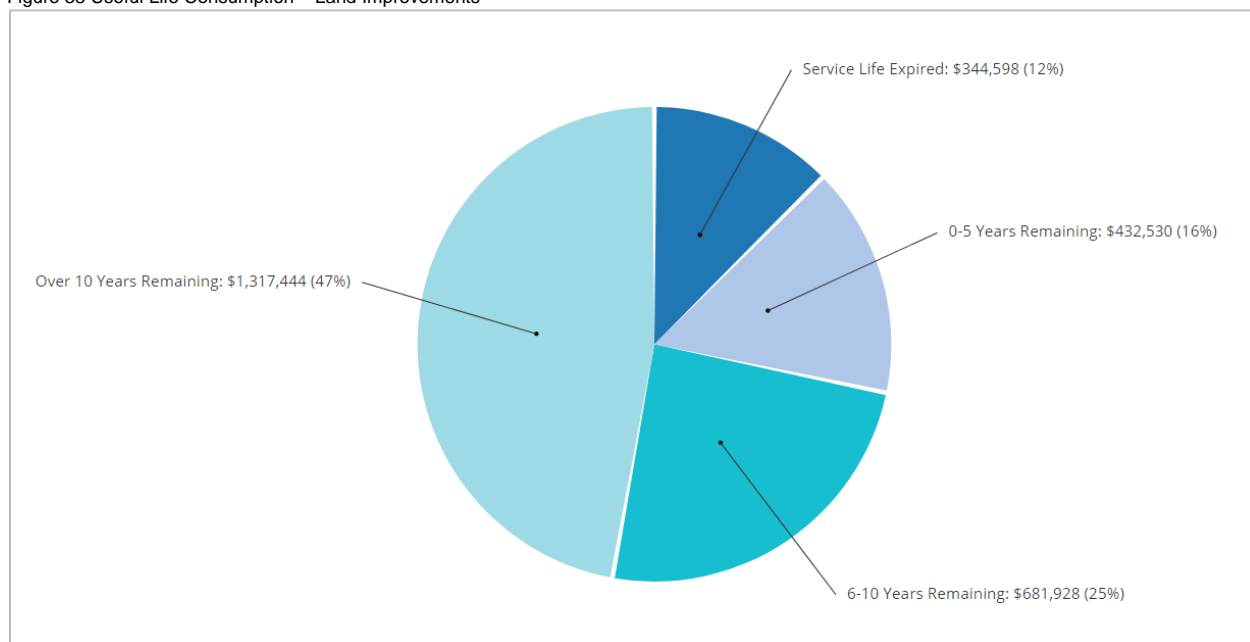


In addition to periodic investments since the 1970s, major expenditures on land improvements were made between 2000-2004, totaling \$806,000. Since 2010, expenditures have totaled \$418,000.

### 6.3 Useful Life Consumption

In this section, we detail the extent to which assets have consumed their useful life based on the above, established useful life standards. In conjunction with historical spending patterns and observed condition data, understanding the useful life consumption rate of assets provides a more complete profile of the state of a community's infrastructure. Figure 38 illustrates the useful life consumption levels as of 2015 for the County's land improvement assets.

Figure 38 Useful Life Consumption – Land Improvements

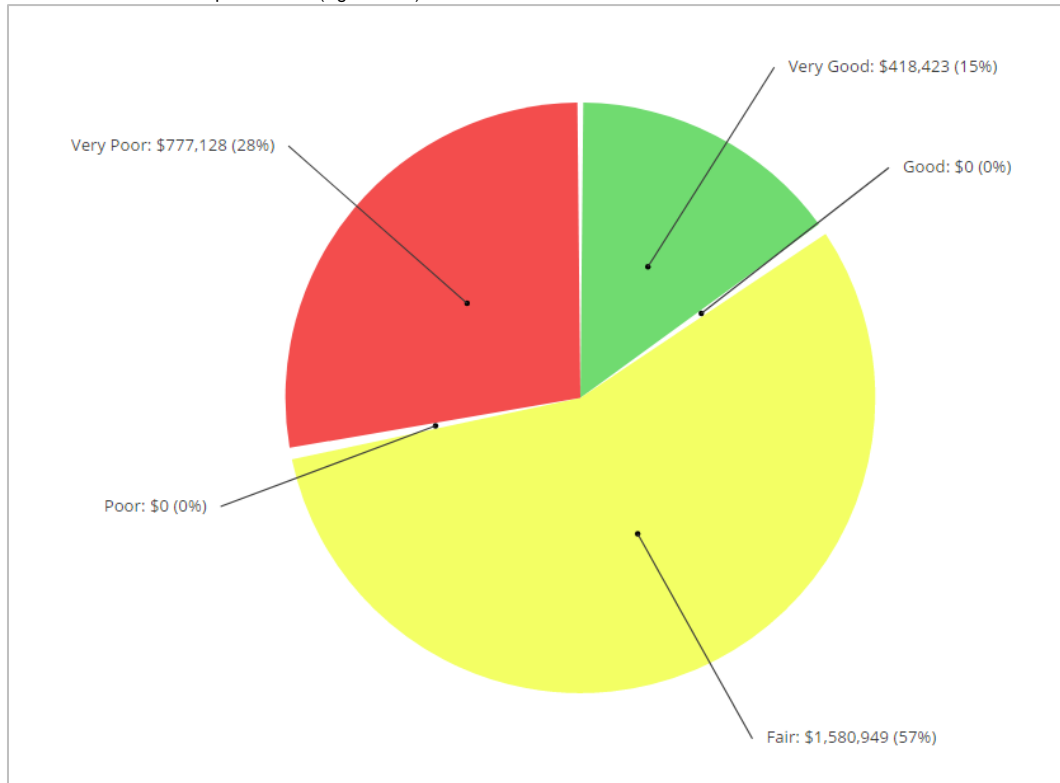


While 47% of the County's land improvement assets have at least 10 years of useful life remaining, 12%, with a valuation of \$345,000 remain in operation beyond their useful life. An additional 16% will reach the end of their useful life in the next five years.

## 6.4 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the County's land improvement assets. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The County has not provided condition data.

Figure 39 Asset Condition - Land Improvements (Age-based)

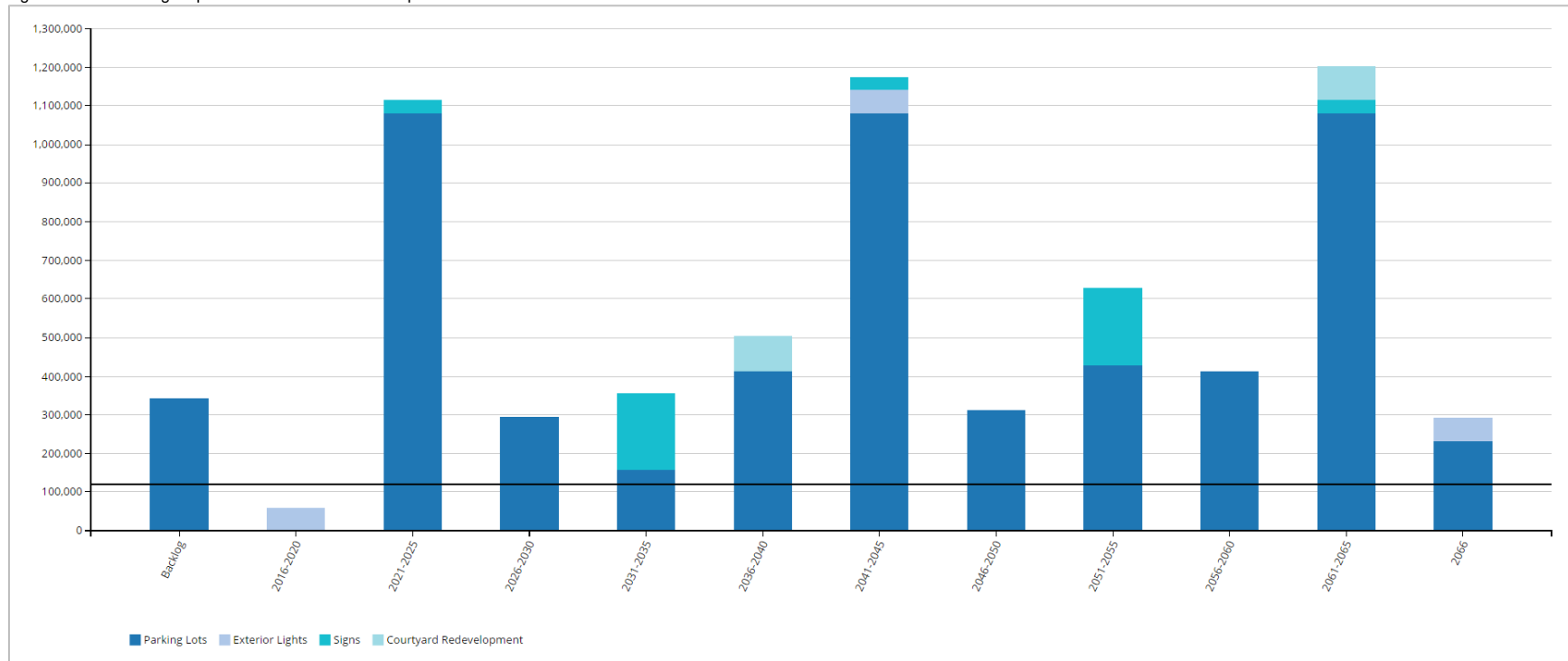


Based on age data, 28% of the County's land improvement assets, with a valuation of \$777,000, are in poor to very poor condition; 15% are in good to very good condition.

## 6.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the County's land improvements assets. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 40 Forecasting Replacement Needs – Land Improvements



Age-based data shows a backlog of \$345,000. While the County's replacement needs are minimal over the next five years, this figure will rise to \$1.1 million between 2021-2025. The County's annual requirements (indicated by the black line) for its land improvements total \$122,000. At this funding level, the County is allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the County is currently allocating \$100,000, leaving an annual deficit of \$22,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the County to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

## 6.6 Recommendations – Land Improvements

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- The County should implement a condition assessment program for its land improvement assets to better estimate actual condition levels. See Section 2, ‘Condition Assessment Programs’ in the ‘Asset Management Strategies’ chapter.
- Using the above information the County should assess its short-, medium- and long-term capital and operations and maintenance needs.
- An appropriate percentage of the replacement costs should then be allocated for the County’s O&M requirements.
- The County is funding 82% of its long-term replacement needs on an annual basis. See the ‘Financial Strategy’ section on how to achieve more sustainable and optimal funding levels

## 7. Fleet

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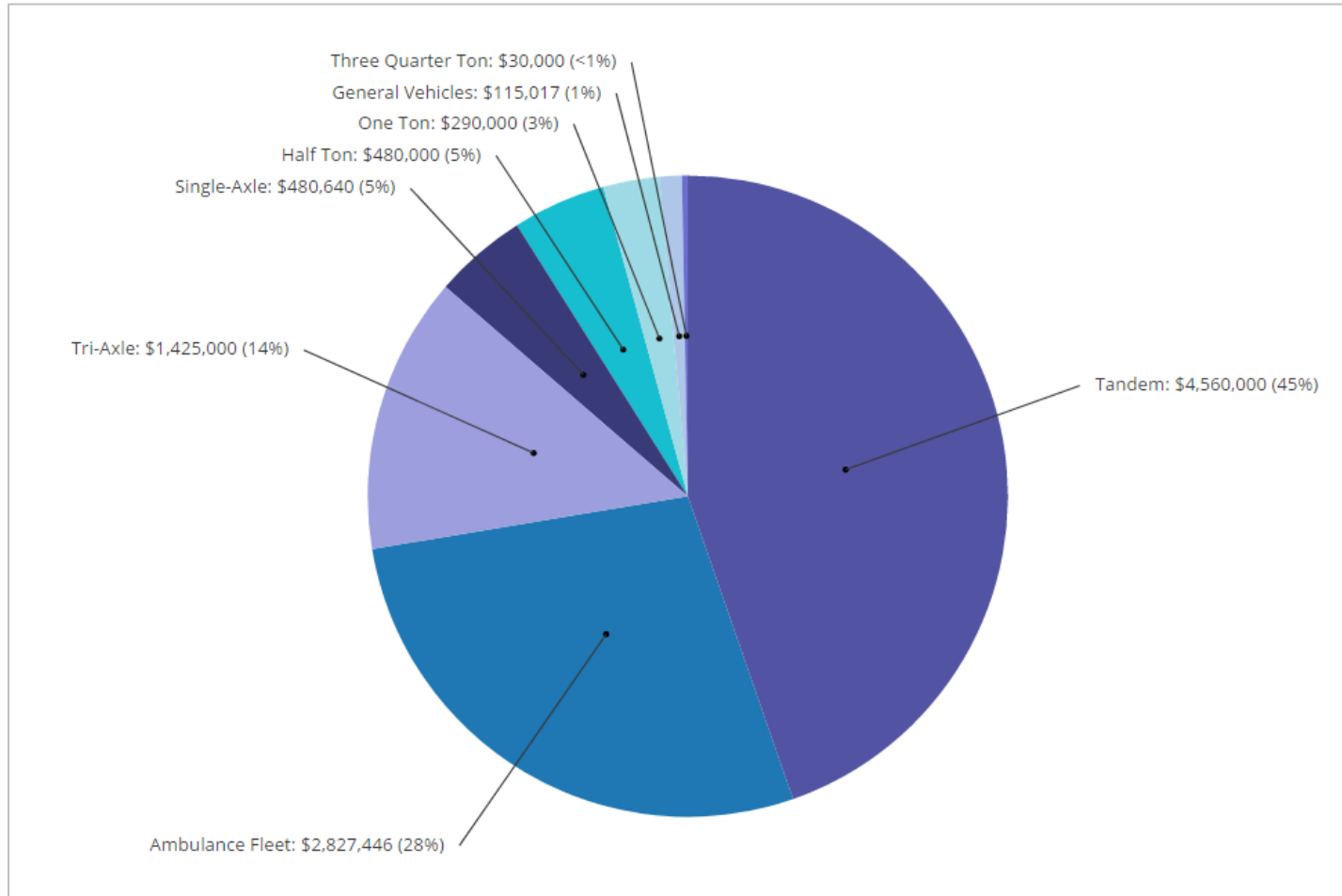
## 7.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 12 illustrates key asset attributes for the County's fleet assets, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the County's fleet assets are valued at \$10.2 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the municipality.

Table 12 Asset Inventory – Fleet

Asset Type	Components	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Fleet	Ambulance Fleet	18 units	6/5/10	Cost per unit	\$2,827,446
	One Ton	5 units	7/10	Cost per unit	\$290,000
	Half Ton	16 units	7	Cost per unit	\$480,000
	Three Quarter Ton	1 unit	7	Cost per unit	\$30,000
	Single-Axle	5 units	12	Cost per unit/CPI (Ontario)	\$480,640
	Tri-Axle	5 units	8	Cost per unit	\$1,425,000
	Tandem	16 units	10	Cost per unit	\$4,560,000
	General Vehicles	2 units	2/7	Cost per unit/CPI (Ontario)	\$115,017
Total					\$10,208,103

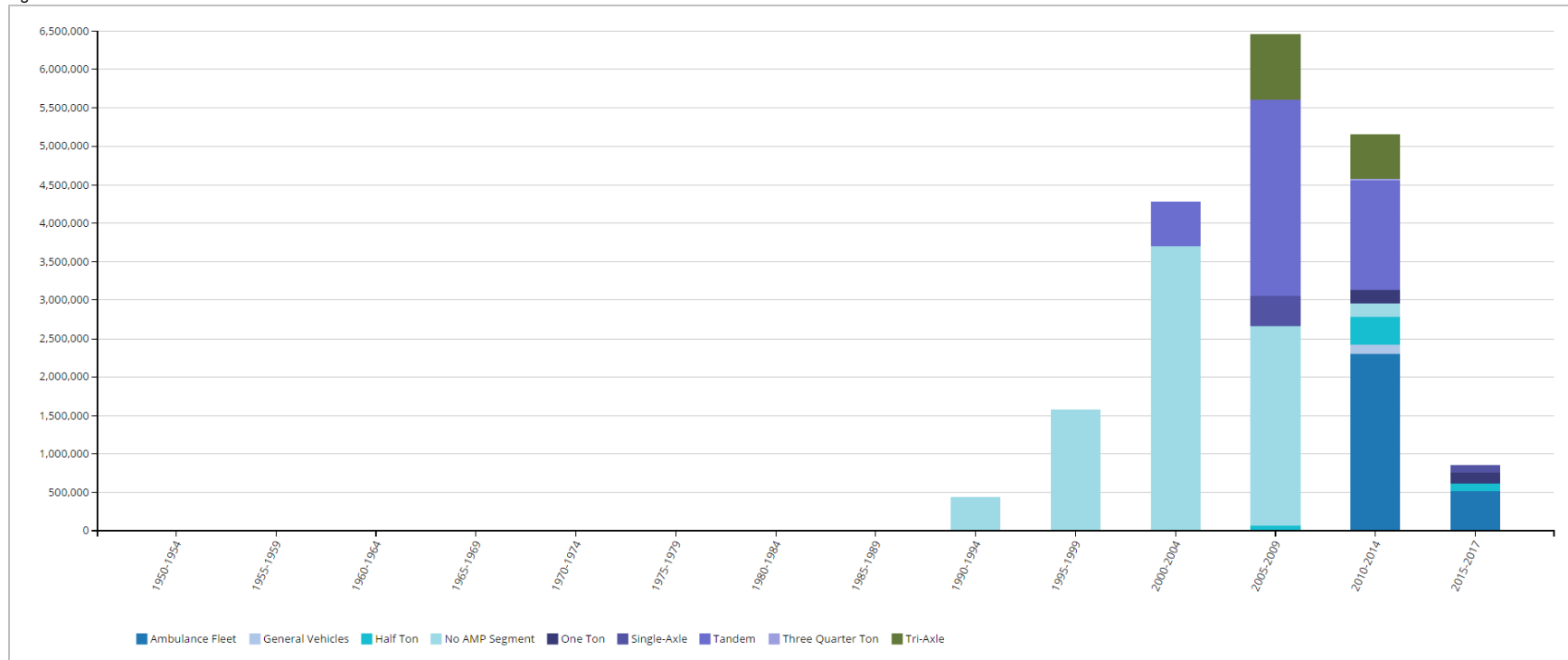
Figure 41 Asset Valuation – Fleet



## 7.2 Historical Investment in Infrastructure

Figure 42 shows the County's historical investments in its fleet since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 7.3) can inform the forecasting and planning of short-, medium- and long-term replacement needs. Note that this graph only includes the active asset inventory as of December 31, 2015.

Figure 42 Historical Investment – Fleet

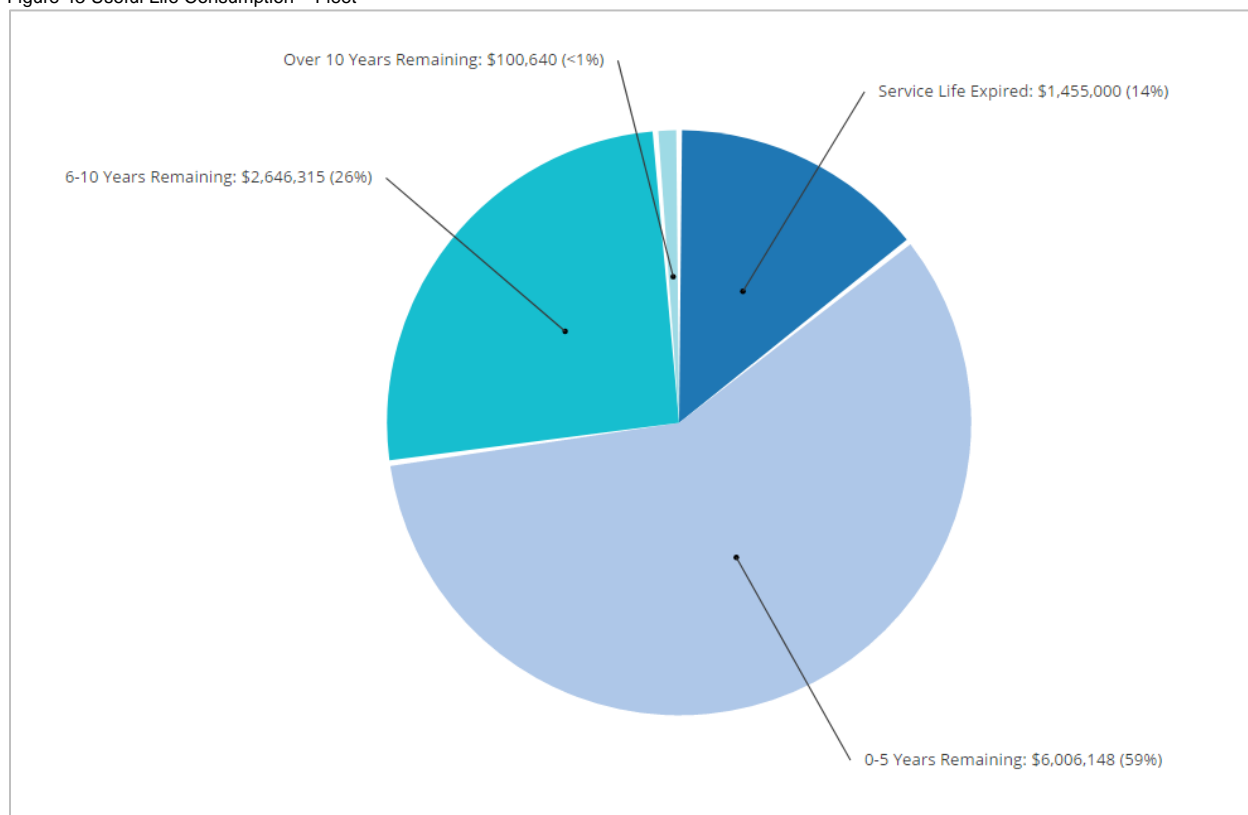


The majority of the County's fleet portfolio was created between 2000-2014. Since 2015, expenditures have totaled \$859,000.

### 7.3 Useful Life Consumption

In this section, we detail the extent to which assets have consumed their useful life based on the above, established useful life standards. In conjunction with historical spending patterns and observed condition data, understanding the useful life consumption rate of assets provides a more complete profile of the state of a community's infrastructure. Figure 43 illustrates the useful life consumption levels as of 2015 for the County's fleet.

Figure 43 Useful Life Consumption – Fleet

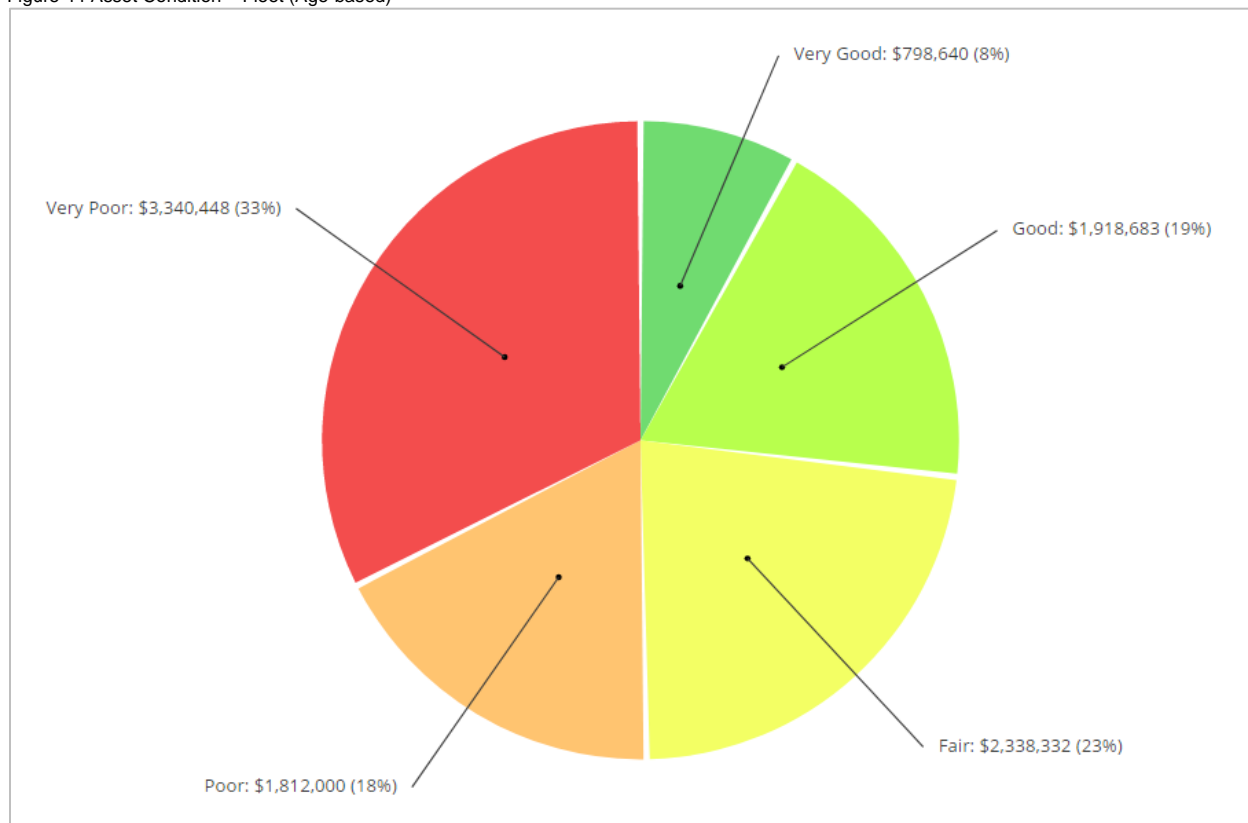


Nearly 60% of the municipality's fleet portfolio, with a valuation of \$6 million, will reach the end of its useful life within the next five years; 14% of assets remain in operation beyond their useful life.

## 7.4 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the County's fleet assets as of 2015. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The County has not provided condition data.

Figure 44 Asset Condition – Fleet (Age-based)

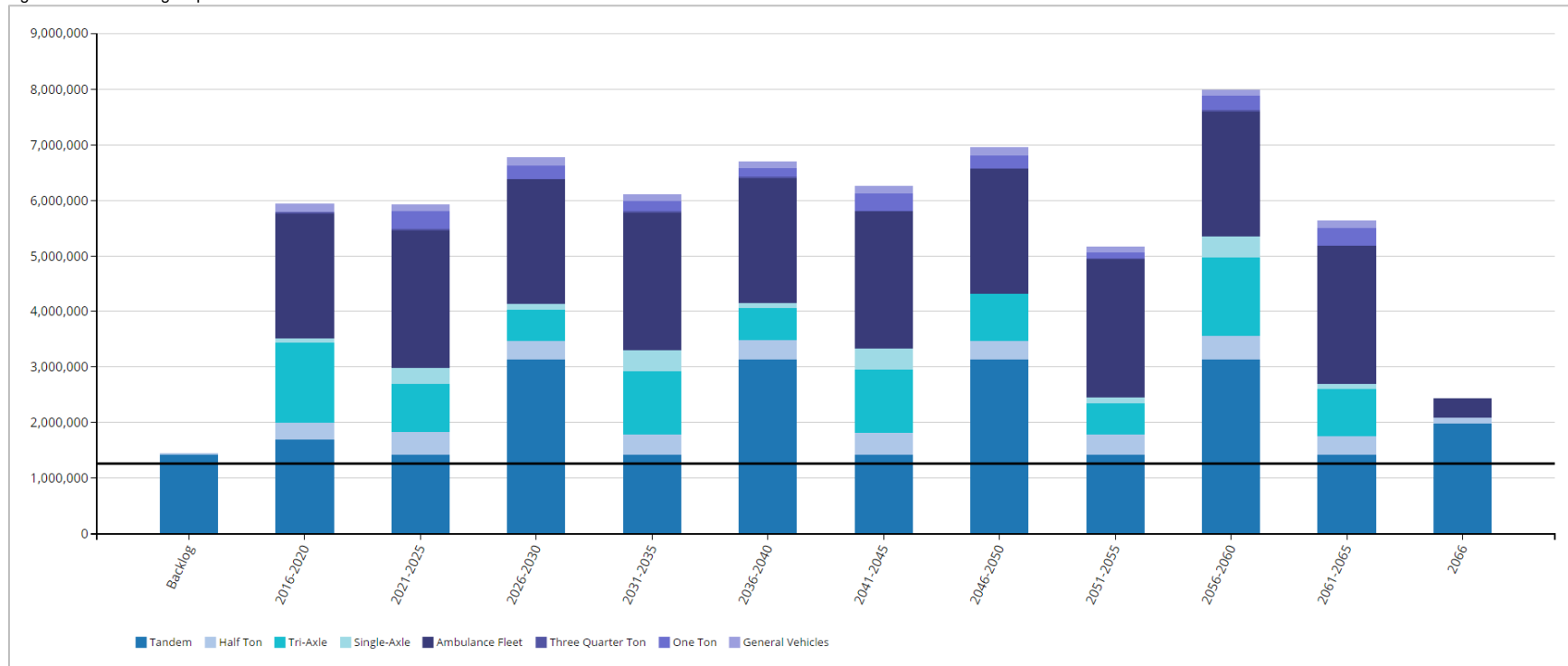


Age-based data shows that more than 50% of the County's fleet assets, with a valuation of \$5.2 million, are in poor to very poor condition; 27% are in good to very good condition.

## 7.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the County's fleet assets. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 45 Forecasting Replacement Needs – Fleet



In addition to an age-based backlog of \$1,455,000, replacement needs will total nearly \$6 million over the next five years; an additional \$6 million will be required between 2021-2025. The County's annual requirements (indicated by the black line) for its fleet total \$1,292,000. At this funding level, the County is allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the County is currently allocating \$990,000, leaving an annual deficit of \$302,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the County to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing backlogs.

## 7.6 Recommendations – Fleet

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- A preventative maintenance and life cycle assessment program should be established for the fleet class to gain a better understanding of current condition and performance as well as the short- and medium-term replacement needs. See Section 2, ‘Condition Assessment Programs’ in the ‘Asset Management Strategies’ chapter.
- Using the above information the County should assess its short-, medium- and long-term capital and operations and maintenance needs.
- An appropriate percentage of the replacement costs should then be allocated for the County’s O&M requirements.
- The County is funding 77% of its long-term replacement needs on an annual basis. See the ‘Financial Strategy’ section on how to achieve more sustainable and optimal funding levels.

## VII. Levels of Service

The two primary risks to a County's financial sustainability are the total lifecycle costs of infrastructure, and establishing levels of service (LOS) that exceed its financial capacity. In this regard, municipalities face a choice: overpromise and underdeliver; underpromise and overdeliver; or promise only that which can be delivered efficiently without placing inequitable burden on taxpayers. In general, there is often a trade-off between political expedience and judicious, long-term fiscal stewardship.

Developing realistic LOS using meaningful key performance indicators (KPIs) can be instrumental in managing citizen expectations, identifying areas requiring higher investments, driving organizational performance and securing the highest value for money from public assets. However, municipalities face diminishing returns with greater granularity in their LOS and KPI framework. That is, the objective should be to track only those KPIs that are relevant and insightful and reflect the priorities of the municipality.

### 1. Guiding Principles for Developing LOS

Beyond meeting regulatory requirements, levels of service established should support the intended purpose of the asset and its anticipated impact on the community and the municipality. LOS generally have an overarching corporate description, a customer oriented description, and a technical measurement. Many types of LOS, e.g., availability, reliability, safety, responsiveness and cost effectiveness, are applicable across all service areas in a municipality. The following LOS categories are established as guiding principles for the LOS that each service area in the County should strive to provide internally to the County and to residents/customers. These are derived from the *Whitby's Guide to Developing Service Area Asset Management Plans*.

Table 13 LOS Categories

LOS Category	Description
Reliable	Services are predictable and continuous; services of sufficient capacity are convenient and accessible to the entire community
Cost Effective	Services are provided at the lowest possible cost for both current and future customers, for a required level of service, and are affordable
Responsive	Opportunities for community involvement in decision making are provided; and customers are treated fairly and consistently, within acceptable timeframes, demonstrating respect, empathy and integrity
Safe	Services are delivered such that they minimize health, safety and security risks
Suitable	Services are suitable for the intended function (fit for purpose)
Sustainable	Services preserve and protect the natural and heritage environment.

While the above categories provide broad strategic direction to council and staff, specific and measurable KPIs related to each LOS category are needed to ensure the County remains steadfast in its pursuit of delivering the highest value for money to various internal and external stakeholders.

Level	KPI (Reported Annually)
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## 2. Key Performance Indicators and Targets

In this section, we identify industry standard KPIs for major infrastructure classes that the County can incorporate into its performance measurement and for tracking its progress over future iterations of its AMPs. The County should develop appropriate and achievable targets that reflect evolving demand on infrastructure, its fiscal capacity and the overall corporate objectives.

Table 14 Key Performance Indicators – Road Network and Bridges & Culverts

Level	KPI (Reported Annually)
Strategic	<ul style="list-style-type: none"> <li>– Percentage of total reinvestment compared to asset replacement value</li> <li>– Completion of strategic plan objectives</li> </ul>
Financial Indicators	<ul style="list-style-type: none"> <li>– Annual revenues compared to annual expenditures</li> <li>– Annual replacement value depreciation compared to annual expenditures</li> <li>– Cost per capita for roads, and bridges &amp; culverts</li> <li>– Maintenance cost per square metre</li> <li>– Revenue required to maintain annual network growth</li> <li>– Total cost of borrowing vs. total cost of service</li> </ul>
Tactical	<ul style="list-style-type: none"> <li>– Overall Bridge Condition Index (BCI) as a percentage of desired BCI</li> <li>– Percentage of road network rehabilitated/reconstructed</li> <li>– Percentage of paved road lane km rated as poor to very poor</li> <li>– Percentage of bridges and large culverts rated as poor to very poor</li> <li>– Percentage of asset class value spent on O&amp;M</li> <li>– Percentage of signage that pass reflectivity test. The remaining should be replaced</li> </ul>
Operational Indicators	<ul style="list-style-type: none"> <li>– Percentage of roads inspected within the last five years</li> <li>– Percentage of bridges and large culverts inspected within the last two years</li> <li>– Operating costs for paved lane per km</li> <li>– Operating costs for bridge and large culverts per square metre</li> <li>– Percentage of customer requests with a 24-hour response rate</li> </ul>

Table 15 Key Performance Indicators – Buildings & Facilities

Strategic	<ul style="list-style-type: none"> <li>– Percentage of total reinvestment compared to asset replacement value</li> <li>– Completion of strategic plan objectives</li> </ul>
Financial Indicators	<ul style="list-style-type: none"> <li>– Annual revenues compared to annual expenditures</li> <li>– Annual replacement value depreciation compared to annual expenditures</li> <li>– Revenue required to meet growth related demand</li> <li>– Repair and maintenance costs per square metre</li> <li>– Energy, utility and water cost per square metre</li> </ul>
Tactical	<ul style="list-style-type: none"> <li>– Percentage of component value replaced</li> <li>– Overall facility condition index as a percentage of desired condition index</li> <li>– Annual adjustment in condition indexes</li> <li>– Annual percentage of new facilities (square metre)</li> <li>– Percent of facilities rated poor or critical</li> <li>– Percentage of facilities replacement value spent on operations and maintenance</li> <li>– Increase facility utilization rate by [x] percent by 2020.</li> <li>– <math>Utilization Rate = \frac{Occupied Space}{Facility Usable Area}</math></li> </ul>
Operational Indicators	<ul style="list-style-type: none"> <li>– [x] sq.ft. of facilities per full-time employee (or equivalent), i.e., maintenance staff</li> <li>– Percentage of facilities inspected within the last five years</li> <li>– Number/type of service requests</li> <li>– Percentage of customer requests responded to within 24 hours</li> </ul>

Table 16 Key Performance Indicators – Fleet

Level	KPI (Reported Annually)
Strategic	<ul style="list-style-type: none"> <li>– Percentage of total reinvestment compared to asset replacement value</li> <li>– Completion of strategic plan objectives</li> </ul>
Financial Indicators	<ul style="list-style-type: none"> <li>– Annual revenues compared to annual expenditures</li> <li>– Annual replacement value depreciation compared to annual expenditures</li> <li>– Revenue required to maintain annual network growth</li> <li>– Total cost of borrowing vs. total cost of service</li> </ul>
Tactical	<ul style="list-style-type: none"> <li>– Percentage of all fleet replaced</li> <li>– Average age of fleet</li> <li>– Percent of fleet rated poor or critical</li> <li>– Percentage of fleet replacement value spent on operations and maintenance</li> </ul>
Operational Indicators	<ul style="list-style-type: none"> <li>– Average downtime per fleet category</li> <li>– Average utilization per fleet category and/or each vehicle</li> <li>– Ratio of preventative maintenance repairs vs. reactive repairs</li> <li>– Percent of fleet that received preventative maintenance</li> <li>– Number/type of service requests</li> <li>– Percentage of customer requests responded to within 24 hours</li> </ul>

Table 17 Key Performance Indicators – Machinery &amp; Equipment

Level	KPI (Reported Annually)
Strategic	– Percentage of total reinvestment compared to asset replacement value
	– Completion of strategic plan objectives
Financial Indicators	– Annual revenues compared to annual expenditures
	– Annual replacement value depreciation compared to annual expenditures
	– Cost per capita for machinery & equipment
	– Revenue required to maintain annual network growth
	– Total cost of borrowing vs. total cost of service
Tactical	– Percentage of all machinery & equipment replaced
	– Average age of machinery & equipment assets
	– Percent of machinery & equipment rated poor or critical
	– Percentage of fleet replacement value spent on operations and maintenance
Operational Indicators	– Average downtime per machinery & equipment asset
	– Ratio of preventative maintenance repairs vs. reactive repairs
	– Percent of machinery & equipment that received preventative maintenance
	– Number/type of service requests

Table 18 Key Performance Indicators – Land Improvements

Level	KPI (Reported Annually)
Strategic	– Percentage of total reinvestment compared to asset replacement value
	– Completion of strategic plan objectives
Financial Indicators	– Annual revenues compared to annual expenditures
	– Annual replacement value depreciation compared to annual expenditures
	– Repair and maintenance costs per square metre
Tactical	– Annual adjustment in condition indexes
	– Percentage of replacement value spent on operations and maintenance
Operational Indicators	– Number/type of service requests

Table 19 Key Performance Indicators – Social Housing

Level	KPI (Reported Annually)
Strategic	<ul style="list-style-type: none"> <li>– Percentage of total reinvestment compared to asset replacement value</li> <li>– Completion of strategic plan objectives</li> </ul>
Financial Indicators	<ul style="list-style-type: none"> <li>– Annual revenues compared to annual expenditures</li> <li>– Annual replacement value depreciation compared to annual expenditures</li> <li>– Cost per capita for supplying social housing</li> <li>– Repair and maintenance costs per square metre</li> <li>– Energy, utility and water cost per square metre</li> </ul>
Tactical	<ul style="list-style-type: none"> <li>– Percentage of component value replaced</li> <li>– Overall facility condition index as a percentage of desired condition index</li> <li>– Annual adjustment in condition indexes</li> <li>– Percent of social housing infrastructure rated poor or critical</li> <li>– Percentage of replacement value spent on operations and maintenance</li> <li>– Social housing units per capita</li> </ul>
Operational Indicators	<ul style="list-style-type: none"> <li>– Percentage of social housing buildings inspected within the last five years</li> <li>– Number of applicants on wait-list</li> <li>– Number and type of service requests</li> <li>– Percentage of customer requests addressed within 24 hours</li> </ul>

### 3. Future Performance

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In addition to the financial capacity, and legislative requirements, e.g., *Safe Drinking Water Act*, the Minimum Maintenance Standards for municipal highways, building codes and the *Accessibility for Ontarians with Disability Act*, many factors, internal and external, can influence the establishment of LOS and their associated KPIs, both target and actual, including the County's overarching mission as an organization, the current state of its infrastructure, and the County's financial capacity.

#### **Strategic Objectives and Corporate Goals**

The County's long-term direction is outlined in its corporate and strategic plans. This direction will dictate the types of services it aims to deliver to its residents and the quality of those services. These high level goals are vital in identifying strategic (long-term) infrastructure priorities and as a result, the investments needed to produce desired levels of service.

#### **State of the Infrastructure**

The current state of capital assets will determine the quality of service the County can deliver to its residents. As such, levels of service should reflect the existing capacity of assets to deliver those services, and may vary (increase) with planned maintenance, rehabilitation or replacement activities and timelines.

#### **Community Expectations**

The general public will often have qualitative and quantitative opinions and insights regarding the levels of service a particular asset should deliver, e.g., what a road in 'good' condition should look like or the travel time between destinations. The public should be consulted in establishing LOS; however, the discussions should be centered on clearly outlining the lifecycle costs associated with delivering any improvements in LOS.

#### **Economic Trends**

Macroeconomic trends will have a direct impact on the LOS for most infrastructure services. Fuel costs, fluctuations in interest rates, and the purchasing power of the Canadian dollar can impede or facilitate any planned growth in infrastructure services.

#### **Demographic Changes**

The type of residents that dominate a municipality can also serve as infrastructure demand drivers, and as a result, can change how a municipality allocates its resources (e.g., an aging population may require diversion of resources from parks and sports facilities to additional wellbeing centers). Population growth is also a significant demand driver for existing assets (lowering LOS), and may require the County to construct new infrastructure to parallel community expectations.

#### **Environmental Change**

Forecasting for infrastructure needs based on climate change remains an imprecise science. However, broader environmental and weather patterns have a direct impact on the reliability of critical infrastructure services.

## **4. Monitoring, Updating and Actions**

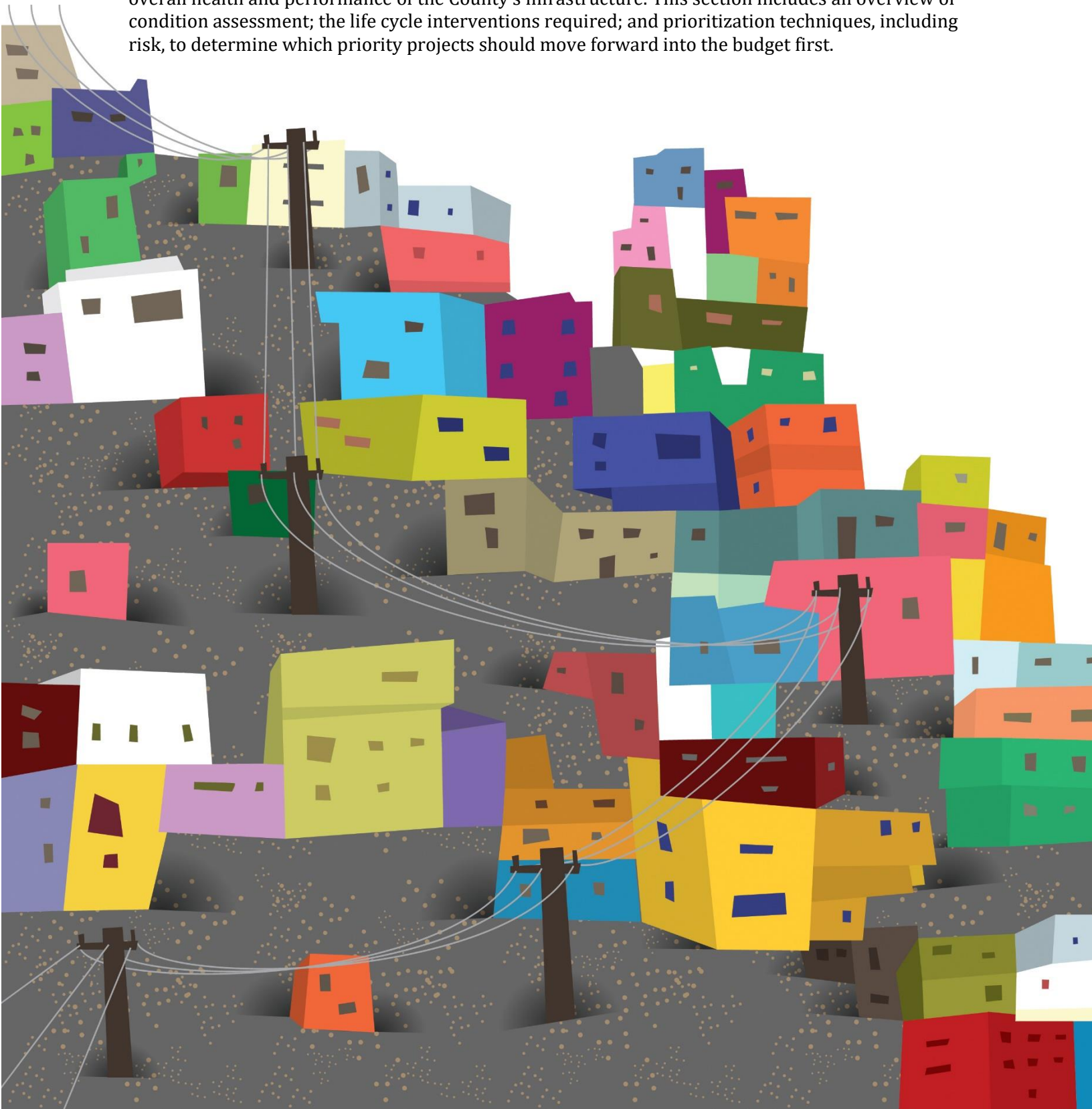
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The County should collect data on its current performance against the KPIs listed and establish targets that reflect the current fiscal capacity of the municipality, its corporate and strategic goals, and as feasible, changes in demographics that may place additional demand on its various asset classes. For some asset classes, e.g., minor equipment, furniture, etc., cursory levels of service and their respective KPIs will suffice. For major infrastructure classes, detailed technical and customer-oriented KPIs can be critical. Once this data is collected and targets are established, the progress of the County should be tracked annually.

## VIII. Asset Management Strategies

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The asset management strategy will develop an implementation process that can be applied to the needs identification and prioritization of renewal, rehabilitation, and maintenance activities. This will assist in the production of a 10-year plan, including growth projections, to ensure the best overall health and performance of the County's infrastructure. This section includes an overview of condition assessment; the life cycle interventions required; and prioritization techniques, including risk, to determine which priority projects should move forward into the budget first.



# 1. Non-Infrastructure Solutions & Requirements

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The County should explore, as requested through the provincial requirements, which non-infrastructure solutions should be incorporated into the budgets for its infrastructure services. Non-Infrastructure solutions are such items as studies, policies, condition assessments, consultation exercises, etc., that could potentially extend the life of assets or lower total asset program costs in the future without a direct investment into the infrastructure.

Typical solutions for a municipality include linking the asset management plan to the strategic plan, growth and demand management studies, infrastructure master plans, better integrated infrastructure and land use planning, public consultation on levels of service, and condition assessment programs. As part of future asset management plans, a review of these requirements should take place, and a portion of the capital budget should be dedicated for these items in each programs budget.

It is recommended, under this category of solutions, that the County should develop and implement holistic condition assessment programs for all asset classes. This will advance the understanding of infrastructure needs, improve budget prioritization methodologies, and provide a clearer path of what is required to achieve sustainable infrastructure programs.

# 2. Condition Assessment Programs

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The foundation of good asset management practice is based on having comprehensive and reliable information on the current condition of the infrastructure. Municipalities need to have a clear understanding regarding performance and condition of their assets, as all management decisions regarding future expenditures and field activities should be based on this knowledge. An incomplete understanding about an asset may lead to its premature failure or premature replacement.

Some benefits of holistic condition assessment programs within the overall asset management process are listed below:

- Understanding of overall network condition leads to better management practices
- Allows for the establishment of rehabilitation programs
- Prevents future failures and provides liability protection
- Potential reduction in operation/maintenance costs
- Accurate current asset valuation
- Allows for the establishment of risk assessment programs
- Establishes proactive repair schedules and preventive maintenance programs
- Avoids unnecessary expenditures
- Extends asset service life therefore improving level of service
- Improves financial transparency and accountability
- Enables accurate asset reporting which, in turn, enables better decision making

Condition assessment can involve different forms of analysis such as subjective opinion, mathematical models, or variations thereof, and can be completed through a very detailed or very cursory approach.

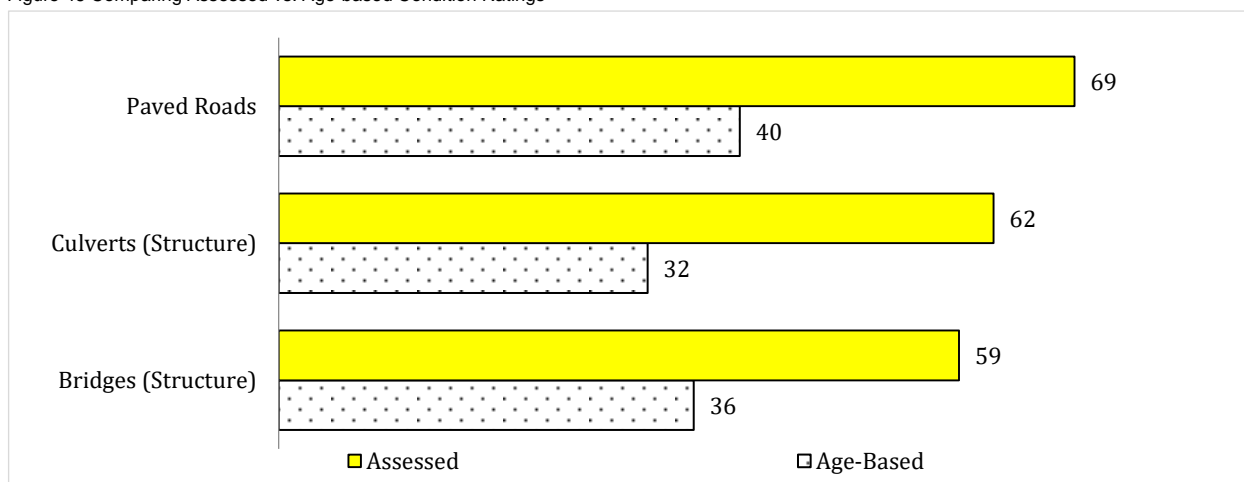
When establishing the condition assessment of an entire asset class, the cursory approach (metrics such as good, fair, poor, very poor) is used. This will be a less expensive approach when applied to thousands of assets, yet will still provide up to date information, and will allow for detailed assessment or follow up inspections on those assets captured as poor or critical condition later.

## The Impact of Condition Assessments

In 2015, PSD published a study in partnership with the Association of Municipalities of Ontario (AMO). The report, *The State of Ontario's Roads and Bridges: An Analysis of 93 Municipalities*, enumerated the infrastructure deficits, annual investment gaps, and the physical state of roads, bridges and culverts with a 2013 replacement value of \$28 billion.

A critical finding of the report was the dramatic difference in the condition profile of the assets when comparing age-based estimates and actual field inspection observations. For each asset group, field data based condition ratings were significantly higher than age-based condition ratings, with paved roads, culverts, and bridges showing an increase in score (0-100) of +29, +30, and +23 points respectively. In other words, age-based measurements maybe underestimating the condition of assets by as much as 30%.

Figure 46 Comparing Assessed vs. Age-based Condition Ratings



## 2.1 Pavement Network

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Typical industry pavement inspections are performed by consulting firms using specialized assessment fleet equipped with various electronic sensors and data capture equipment. The fleet will drive the entire road network and typically collect two different types of inspection data – surface distress data and roughness data.

Surface distress data involves the collection of multiple industry standard surface distresses, which are captured either electronically, using sensing detection equipment mounted on the van, or visually, by the van's inspection crew. Roughness data capture involves the measurement of the roughness of the road, measured by lasers that are mounted on the inspection van's bumper, calibrated to an international roughness index.

Another option for a cursory level of condition assessment is for municipal road crews to perform simple windshield surveys as part of their regular patrol. Many municipalities have created data collection inspection forms to assist this process and to standardize what presence of defects would constitute a good, fair, poor, or critical score. Lacking any other data for the complete road network, this can still be seen as a good method and will assist greatly with the overall management of the road network. The CityWide Works software has a road patrol component built in that could capture this type of inspection data during road patrols in the field, enabling later analysis of rehabilitation and replacement needs for budget development.

It is recommended that the County continue to its pavement condition assessment program and that a portion of capital funding is dedicated to this. We also recommend expansion of this program to incorporate additional components.

## 2.2 Bridges & Culverts

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Ontario municipalities are mandated by the Ministry of Transportation to inspect all structures that have a span of 3 metres or more, according to the OSIM (Ontario Structure Inspection Manual).

Structure inspections must be performed by, or under the guidance of, a structural engineer, must be performed on a biennial basis (once every two years), and include such information as structure type, number of spans, span lengths, other key attribute data, detailed photo images, and structure element by element inspection, rating and recommendations for repair, rehabilitation, and replacement.

The best approach to develop a 10-year needs list for the County's structure portfolio would be to have the structural engineer who performs the inspections to develop a maintenance requirements report, and rehabilitation and replacement requirements report as part of the overall assignment. In addition to refining the overall needs requirements, the structural engineer should identify those structures that will require more detailed investigations and non-destructive testing techniques. Examples of these investigations are:

- Detailed deck condition survey
- Non-destructive delamination survey of asphalt covered decks
- Substructure condition survey
- Detailed coating condition survey
- Underwater investigation
- Fatigue investigation

- Structure evaluation

Through the OSIM recommendations and additional detailed investigations, a 10-year needs list will be developed for the County's bridges. The County's Bridge Foreman and Engineering department are currently developing and continually updating the 10-year needs list based on the structural engineer's report, detailed investigations, and roads needs study, to efficiently coordinate projects.

## 2.3 Buildings & Facilities

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The most popular and practical type of buildings and facility assessment involves qualified groups of trained industry professionals (engineers or architects) performing an analysis of the condition of a group of facilities, and their components, that may vary in terms of age, design, construction methods, and materials. This analysis can be done by walk-through inspection, mathematical modeling, or a combination of both. But the most accurate way of determining the condition requires a walk-through to collect baseline data. The following asset classifications are typically inspected:

- **Site Components** – property around the facility and includes the outdoor components such as utilities, signs, stairways, walkways, parking lots, fencing, courtyards and landscaping.
- **Structural Components** – physical components such as the foundations, walls, doors, windows, roofs.
- **Electrical Components** – all components that use or conduct electricity such as wiring, lighting, electric heaters, and fire alarm systems
- **Mechanical Components** – components that convey and utilize all non-electrical utilities within a facility such as gas pipes, furnaces, boilers, plumbing, ventilation, and fire extinguishing systems
- **Vertical Movement** – components used for moving people between floors of buildings such as elevators, escalators and stair lifts.

Once collected this type of information can be uploaded into the CityWide®, the County's asset management and asset registry software database in order for short- and long-term repair, rehabilitation and replacement reports to be generated to assist with programming the short- and long-term maintenance and capital budgets.

It is recommended that the County establish a facilities condition assessment program for its buildings and facilities. It is also recommended that a portion of capital funding is dedicated to this.

## 2.4 Fleet, and Machinery & Equipment

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The typical approach to optimizing the maintenance expenditures of fleet and machinery & equipment assets is through routine inspections, servicing, and an established preventative maintenance program. Most, if not all, makes and models of fleet and equipment are supplied with maintenance manuals that define the appropriate schedules and routines for typical maintenance and servicing and also more detailed restoration or rehabilitation protocols.

The primary goal of maintenance is to avoid or mitigate the consequence of failure of equipment or parts. An established preventative maintenance program serves to ensure this, as it will consist of scheduled inspections and follow up repairs of fleet and equipment in order to decrease breakdowns and excessive downtimes.

A good preventative maintenance program will include partial or complete overhauls of equipment at specific periods, including oil changes, lubrications, fluid changes and so on. In addition, workers can record equipment or part deterioration so they can schedule to replace or repair worn parts before they fail. The ideal preventative maintenance program would move further and further away from reactive repairs and instead towards the prevention of all equipment failure before it occurs.

The County has a preventative maintenance routine established for all of its Transportation Services and Paramedic Services fleet. A software application is utilized for the overall management of the program.

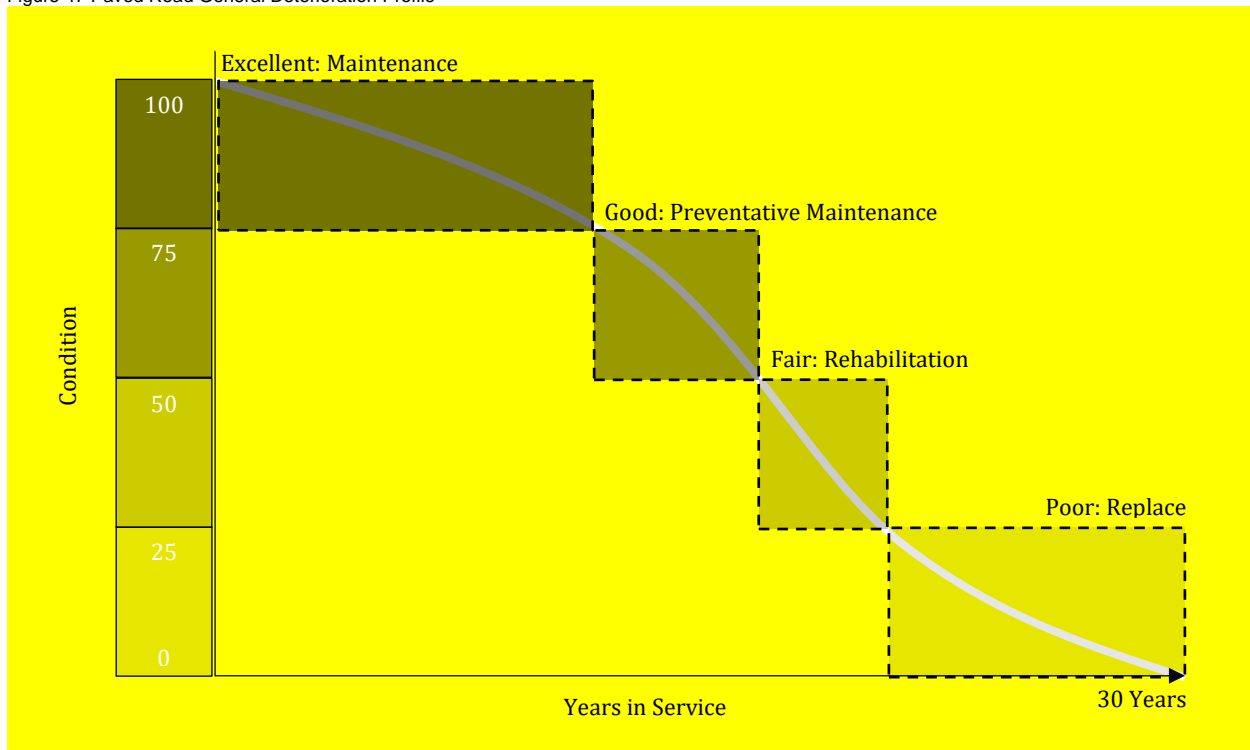
### 3. Life Cycle Analysis Framework

An industry review was conducted to determine which life cycle activities can be applied at the appropriate time in an asset's life, to provide the greatest additional life at the lowest cost. In the asset management industry, this is simply put as doing the right thing to the right asset at the right time. If these techniques are applied across entire asset networks or portfolios (e.g., the entire road network), the County could gain the best overall asset condition while expending the lowest total cost for those programs.

#### 3.1 Paved Roads

The following analysis has been conducted at a fairly high level, using industry standard activities and costs for paved roads. With future updates of this Asset Management Strategy, the County may wish to run the same analysis with a detailed review of municipality activities used for roads and the associated local costs for those work activities. All of this information can be input into the CityWide software suite in order to perform updated financial analysis as more detailed information becomes available. The following diagram depicts a general deterioration profile of a road with a 30-year life.

Figure 47 Paved Road General Deterioration Profile



As shown above, during the road's life cycle there are various windows available for work activity that will maintain or extend the life of the asset. These windows are: maintenance; preventative maintenance; rehabilitation; and replacement or reconstruction.

The windows or thresholds for when certain work activities should be applied to also coincide approximately with the condition state of the asset as shown below:

Table 20 Asset Condition and Related Work Activity for Paved Roads

Condition	Condition Range	Work Activity
Very Good (Maintenance only phase)	100-81	– Maintenance only
Good (Preventative maintenance phase)	80-61	– Crack sealing – Emulsions
Fair (Rehabilitation phase)	60-41	– Resurface - mill & pave – Resurface - asphalt overlay – Single & double surface treatment (for rural roads)
Poor (Reconstruction phase)	40-21	– Reconstruct - pulverize and pave – Reconstruct - full surface and base reconstruction
Very Poor (Reconstruction phase)	20-0	– Critical includes assets beyond their useful lives which make up the backlog. They require the same interventions as the 'poor' category above.

With future updates of this asset management strategy, the County may wish to review the above condition ranges and thresholds for when certain types of work activity occur, and adjust to better suit the County's work program. Also note: when adjusting these thresholds, it actually adjusts the level of service provided and ultimately changes the amount of money required. These threshold and condition ranges can be easily updated and a revised financial analysis can be calculated. These adjustments will be an important component of future Asset Management Plans, as the province requires each municipality to present various management options within the financing plan.

It is recommended that the County establish a life cycle activity framework for the various classes of paved road within their transportation network.

### 3.2 Bridges & Culverts

The best approach to develop a 10 year needs list for the County's bridge structure portfolio would be to have the structural engineer who performs the inspections to develop a maintenance requirements report, a rehabilitation and replacement requirements report and identify additional detailed inspections as required. County staff have developed this needs list based on the structural engineer's report.

### 3.3 Facilities & Buildings

The best approach to develop a 10-year needs list for the County's facilities portfolio would be to have the engineers, operational staff or architects who perform the facility inspections to also develop a complete portfolio maintenance requirements report and rehabilitation and replacement requirements report, and also identify additional detailed inspections and follow up studies as

required. This may be performed as a separate assignment once all individual facility audits/inspections are complete.

The above reports could be considered the beginning of a 10-year maintenance and capital plan, however, within the facilities industry there are other key factors that should be considered to determine over all priorities and future expenditures. Some examples would be functional/legislative requirements, energy conservation programs and upgrades, customer complaints and health and safety concerns, and also customer expectations balanced with willingness to pay initiatives.

It is recommended that the County establish a prioritization framework for the facilities asset class that incorporates the key components outlined above.

### **3.4 Fleet, and Machinery & Equipment**

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The best approach to develop a 10-year needs list for the County's fleet and equipment portfolio would first be through a defined preventative maintenance program, and secondly, through an optimized life cycle asset replacement schedule. The preventative maintenance program would serve to determine budget requirements for operating and minor capital expenditures for part renewal and major refurbishments and rehabilitations. An optimized asset replacement program will ensure an equipment or fleet asset is replaced at the correct point in time in order to minimize overall cost of ownership, minimize costly repairs and downtime, while maximizing potential re-sale value. There is significant benchmarking information available within the fleet industry in regards to vehicle life cycles which can be used to assist in this process. Once appropriate replacement schedules are established the short- and long-term budgets can be funded accordingly.

There are, of course, functional aspects of fleet and equipment management that should also be examined in further detail as part of the long-term management plan, such as fleet utilization and incorporating green assets, etc. It is recommended that the County establish a prioritization framework for the fleet asset class that incorporates the key components outlined above.

## **4. Growth and Demand**

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Growth is a critical infrastructure demand driver for most infrastructure services. As such, the County must not only account for the lifecycle cost for its existing asset portfolio, but those of any anticipated and forecasted capital projects associated specifically with growth. Changes in population levels as well as shifts within the demographics of a community have structural impact on the types and levels of service a municipality is able to provide. For example, increasing population may place disproportionate demand on particular asset classes, whereas decreasing populations, while reducing the consumption of infrastructure, may also compromise the extent to which assets are funded.

## 5. Project Prioritization and Risk Management

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Generally, infrastructure needs exceed municipal capacity. As such, municipalities rely heavily on provincial and federal programs and grants to finance important capital projects. Fund scarcity means projects and investments must be carefully selected based on the state of infrastructure, economic development goals, and the needs of an evolving and growing community. These factors, along with social and environmental considerations will form the basis of a robust risk management framework.

### 5.1 Defining Risk Management

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From an asset management perspective, risk is a function of the consequences of failure (e.g., the negative economic, financial, and social consequences of an asset in the event of a failure); and, the probability of failure (e.g., how likely is the asset to fail in the short- or long-term). The consequences of failure are typically reflective of:

- An asset's importance in an overall system:  
For example, the failure of an individual computer workstation for which there are readily available substitutes is much less consequential and detrimental than the failure of a network server or telephone exchange system.
- The criticality of the function performed:  
For example, a mechanical failure on a piece road construction equipment may delay the progress of a project, but a mechanical failure on a plow truck may lead to immediate life safety concerns as well as significant property damage.
- The exposure of the public and/or staff to injury or loss of life:  
For example, a facility sidewalk asset may demand little consideration and carry minimum importance to the County's overall infrastructure and performs a modest function. However, members of the public interact directly with the asset daily and are exposed to potential injury due to any trip hazards or other structural deficiencies that may exist.

The probability of failure is generally a function of an asset's physical condition, which is heavily influenced by the asset's age and the amount of investment that has been made in the maintenance and renewal of the asset throughout its life.

Risk mitigation is traditionally thought of in terms of safety and liability factors. In asset management, the definition of risk should heavily emphasize these factors but should be expanded to consider the risks to the County's ability to deliver targeted levels of service

- The impact that actions (or inaction) on one asset will have on other related assets
- The opportunities for economic efficiency (realized or lost) relative to the actions taken

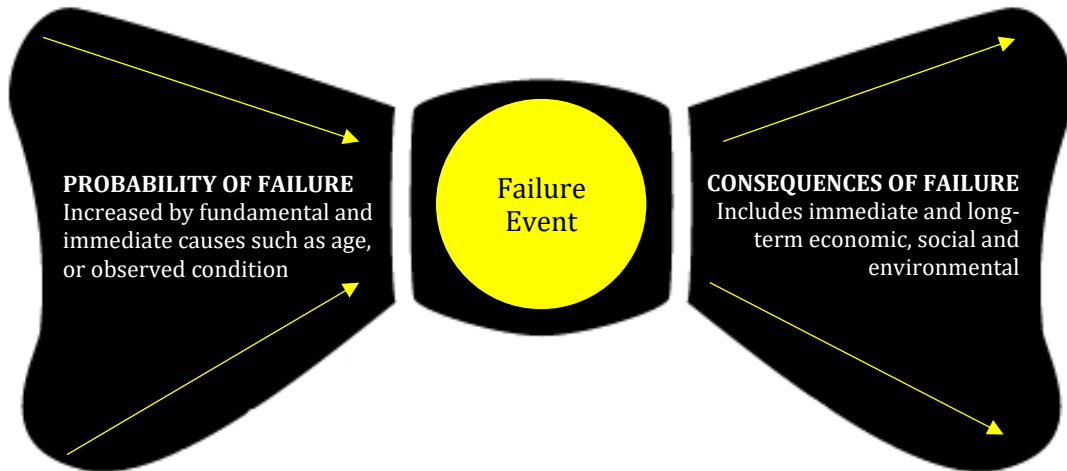
### 5.2 Risk Matrices

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Using the logic above, a risk matrix will illustrate each asset's overall risk, determined by multiplying the probability of failure (PoF) scores with the consequence of failure (CoF) score, as illustrated in the table below. This can be completed as a holistic exercise against any data set by determining which factors (or attributes) are available and will contribute to the PoF or CoF of an asset. The following diagram (known as a bowtie model in the risk industry) illustrates this

concept. The probability of failure is increased as more and more factors collude to cause asset failure.

Figure 48 Bow Tie Risk Model



## Probability of Failure

In this AMP, the probability of a failure event is predicted by the condition of the asset.

Table 21 Probability of Failure – All Assets

Asset Classes	Condition Rating	Probability of Failure
ALL	0-20 Very Poor	5 – Very High
	21-40 Poor	4 – High
	41-60 Fair	3 – Moderate
	61-80 Good	2 – Low
	81-100 Excellent	1 – Very Low

## Consequence of Failure

The consequence of failure for the asset classes analyzed in this AMP will be determined either by the replacement costs of assets, or their material types, classifications (or other attributes). Asset classes for which replacement cost is used include: bridges & culverts, buildings, land improvements, fleet, social housing and machinery & equipment. This approach is premised on the assumption that the higher the replacement cost, the larger (and likely more important) the asset, requiring higher risk scoring. For roads, risk ratings are based on road classification as this reflects traffic volumes.

Table 22 Consequence of Failure – Roads

Road Classification	Consequence of failure
Rural	Score of 2
Rural Urban	Score of 3
Semi-Urban	Score of 4
Urban	Score of 4

Table 23 Consequence of Failure – Bridges & Culverts

Replacement Value	Consequence of failure
Up to \$200k	Score of 1
\$201 to \$400k	Score of 2
\$401 to \$1 Million	Score of 3
\$1 Million to \$2 Million	Score of 4
\$2 Million and over	Score of 5

Table 24 Consequence of Failure – Buildings &amp; Facilities

Replacement Value	Consequence of failure
Up to \$50k	Score of 1
\$51k to \$200k	Score of 2
\$201k to \$1 million	Score of 3
\$1 million to \$10 million	Score of 4
Over \$10 million	Score of 5

Table 25 Consequence of Failure – Social Housing

Replacement Value	Consequence of failure
Up to \$50k	Score of 1
\$51k to \$100k	Score of 2
\$210k to \$1 million	Score of 3
\$1 million to \$2 million	Score of 4
Over \$2 million	Score of 5

Table 26 Consequence of Failure – Machinery &amp; Equipment

Replacement Value	Consequence of failure
Up to \$10k	Score of 1
\$11k to \$50k	Score of 2
\$51k to \$120k	Score of 3
\$121k to \$300k	Score of 4
Over \$300k	Score of 5

Table 27 Consequence of Failure – Land Improvements

Replacement Value	Consequence of failure
Up to \$30k	Score of 1
\$31k to \$60k	Score of 2
\$61k to \$100k	Score of 3
\$101k to \$300k	Score of 4
Over \$300k	Score of 5

Table 28 Consequence of Failure – Fleet

Replacement Value	Consequence of failure
Up to \$25k	Score of 1
\$26k to \$50k	Score of 2
\$51k to \$100k	Score of 3
\$101k to \$200k	Score of 4
Over \$200k	Score of 5

The risk matrices that follow show the distribution of assets within each asset class according to the probability and likelihood of failure scores as discussed above.

Figure 49 Distribution of Assets Based on Risk – All Asset Classes

Consequence	5	39 Assets 24.61 unit(s), km \$24,456,762.00	83 Assets 42.42 unit(s), km \$65,951,993.00	60 Assets 36.75 unit(s), km \$56,624,647.00	31 Assets 30.05 unit(s), km \$53,618,699.00	15 Assets 48.00 unit(s) \$28,810,971.00
	4	49 Assets 52.67 unit(s), km \$19,678,968.00	59 Assets 48.02 unit(s), km \$34,068,853.00	54 Assets 48.14 unit(s), km \$35,059,043.00	36 Assets 47.88 unit(s), km \$16,449,909.00	10 Assets 9.01 unit(s), km \$13,899,354.00
	3	29 Assets 44.40 unit(s), km \$8,506,391.00	64 Assets 64.82 unit(s), km \$37,055,539.00	44 Assets 44.22 unit(s), km \$22,176,984.00	12 Assets 78.00 unit(s) \$3,930,959.00	10 Assets 57.00 unit(s) \$1,115,607.00
	2	315 Assets 660.58 unit(s), km \$81,539,120.00	214 Assets 522.87 unit(s), km \$74,507,940.92	190 Assets 424.39 unit(s), km \$120,871,879.00	161 Assets 358.75 unit(s), km \$136,442,826.00	69 Assets 326.94 unit(s), km \$13,025,789.95
	1	120 Assets 283.00 unit(s), km \$1,952,512.69	349 Assets 1,072.00 unit(s) \$8,005,484.51	160 Assets 207.00 unit(s) \$3,173,830.32	50 Assets 126.00 unit(s) \$1,517,243.32	296 Assets 874.00 unit(s) \$3,225,432.02
		1	2	3	4	5
		Probability				

Figure 50 Distribution of Assets Based on Risk – Road Network

Consequence	5	36 Assets 21.61 km \$7,166,968.00	67 Assets 26.42 km \$19,716,676.00	47 Assets 23.75 km \$18,221,087.00	22 Assets 21.05 km \$16,784,566.00	0 Assets - \$0.00
	4	38 Assets 41.67 km \$10,308,977.00	39 Assets 28.02 km \$8,249,024.00	24 Assets 18.14 km \$6,046,161.00	28 Assets 19.88 km \$12,058,287.00	3 Assets 2.01 km \$1,104,208.00
	3	3 Assets 2.40 km \$635,017.00	1 Assets 0.82 km \$178,940.00	3 Assets 3.22 km \$1,126,991.00	0 Assets - \$0.00	0 Assets - \$0.00
	2	262 Assets 513.58 km \$78,964,008.00	149 Assets 338.87 unit(s), km \$62,523,390.00	163 Assets 375.39 km \$118,336,745.00	137 Assets 278.75 km \$135,569,286.00	12 Assets 23.94 km \$11,753,441.00
	1	1 Assets 0.00 km \$92,621.00	1 Assets 1.00 unit(s) \$50,000.00	1 Assets 1.00 unit(s) \$50,000.00	0 Assets - \$0.00	29 Assets 29.00 unit(s) \$1,550,000.00
		1	2	3	4	5
		Probability				

Figure 51 Distribution of Assets Based on Risk – Bridges &amp; Culverts

Consequence	5	2 Assets 2.00 unit(s) \$5,165,794.00	11 Assets 11.00 unit(s) \$30,738,236.00	2 Assets 2.00 unit(s) \$5,182,432.00	0 Assets - \$0.00	0 Assets - \$0.00
	4	4 Assets 4.00 unit(s) \$4,943,995.00	16 Assets 16.00 unit(s) \$22,657,385.00	9 Assets 9.00 unit(s) \$11,519,177.00	3 Assets 3.00 unit(s) \$3,438,056.00	0 Assets - \$0.00
	3	8 Assets 8.00 unit(s) \$4,525,623.00	51 Assets 51.00 unit(s) \$35,669,269.00	17 Assets 17.00 unit(s) \$11,256,799.00	2 Assets 2.00 unit(s) \$990,894.00	0 Assets - \$0.00
	2	3 Assets 3.00 unit(s) \$734,029.00	25 Assets 25.00 unit(s) \$10,526,542.00	3 Assets 3.00 unit(s) \$1,954,019.00	1 Assets 1.00 unit(s) \$399,734.00	0 Assets - \$0.00
	1	16 Assets 16.00 unit(s) \$1,311,766.00	85 Assets 85.00 unit(s) \$6,873,376.00	30 Assets 30.00 unit(s) \$2,708,099.00	7 Assets 7.00 unit(s) \$1,310,856.00	1 Assets 1.00 unit(s) \$303,120.00
		1	2	3	4	5
		Probability				

Figure 52 Distribution of Assets Based on Risk – Buildings &amp; Facilities

Consequence	5	1 Assets 1.00 unit(s) \$12,124,000.00	1 Assets 1.00 unit(s) \$14,357,081.00	1 Assets 1.00 unit(s) \$14,524,567.00	1 Assets 1.00 unit(s) \$24,248,119.00	1 Assets 1.00 unit(s) \$23,000,000.00
	4	3 Assets 3.00 unit(s) \$3,765,558.00	2 Assets 2.00 unit(s) \$2,814,444.00	1 Assets 1.00 unit(s) \$2,335,874.00	0 Assets - \$0.00	3 Assets 3.00 unit(s) \$11,941,445.00
	3	8 Assets 8.00 unit(s) \$2,592,436.00	2 Assets 2.00 unit(s) \$472,872.00	1 Assets 1.00 unit(s) \$205,101.00	7 Assets 7.00 unit(s) \$2,750,559.00	2 Assets 2.00 unit(s) \$552,633.00
	2	9 Assets 9.00 unit(s) \$996,927.00	6 Assets 6.00 unit(s) \$645,240.00	0 Assets - \$0.00	0 Assets - \$0.00	1 Assets 1.00 unit(s) \$54,694.00
	1	9 Assets 11.00 unit(s) \$182,809.00	5 Assets 6.00 unit(s) \$156,407.00	3 Assets 3.00 unit(s) \$77,098.00	1 Assets 1.00 unit(s) \$22,789.00	4 Assets 4.00 unit(s) \$127,618.00
		1	2	3	4	5
		Probability				

Figure 53 Distribution of Assets Based on Risk – Social Housing

Consequence	5	0 Assets - \$0.00	0 Assets - \$0.00	4 Assets 4.00 unit(s) \$16,525,000.00	2 Assets 2.00 unit(s) \$10,776,000.00	0 Assets - \$0.00
	4	0 Assets - \$0.00	0 Assets - \$0.00	11 Assets 11.00 unit(s) \$13,298,000.00	0 Assets - \$0.00	0 Assets - \$0.00
	3	0 Assets - \$0.00	0 Assets - \$0.00	15 Assets 15.00 unit(s) \$8,918,000.00	0 Assets - \$0.00	0 Assets - \$0.00
	2	0 Assets - \$0.00	2 Assets 93.00 unit(s) \$124,696.92	0 Assets - \$0.00	0 Assets - \$0.00	1 Assets 135.00 unit(s) \$109,696.95
	1	33 Assets 148.00 unit(s) \$163,192.69	68 Assets 607.00 unit(s) \$463,932.51	20 Assets 33.00 unit(s) \$83,955.32	14 Assets 16.00 unit(s) \$34,760.32	62 Assets 551.00 unit(s) \$432,953.02
		1	2	3	4	5
		Probability				

Figure 54 Distribution of Assets Based on Risk – Machinery &amp; Equipment

Consequence	5	0 Assets \$0	0 Assets \$0	1 Assets \$303,079	3 Assets \$1,035,414	2 Assets \$2,183,843
	4	0 Assets \$0	0 Assets \$0	1 Assets \$284,157	1 Assets \$292,441	3 Assets \$644,826
	3	4 Assets \$307,736	5 Assets \$394,230	1 Assets \$79,550	4 Assets \$273,408	8 Assets \$562,974
	2	23 Assets \$480,068	28 Assets \$525,108	22 Assets \$431,366	15 Assets \$314,337	64 Assets \$1,231,412
	1	20 Assets \$87,790	52 Assets \$253,982	146 Assets \$288,253	106 Assets \$200,904	257 Assets \$933,204
		1	2	3	4	5
		Probability				

Figure 55 Distribution of Assets Based on Risk – Land Improvements

Consequence	5	0 Assets \$0	0 Assets \$0	0 Assets \$0	1 Assets \$648,082	2 Assets \$777,128
	4	1 Assets \$138,438	0 Assets \$0	2 Assets \$550,111	1 Assets \$155,563	0 Assets \$0
	3	2 Assets \$171,503	0 Assets \$0	1 Assets \$63,368	1 Assets \$69,491	0 Assets \$0
	2	4 Assets \$108,482	0 Assets \$0	1 Assets \$60,488	1 Assets \$33,846	0 Assets \$0
	1	0 Assets \$0	0 Assets \$0	0 Assets \$0	0 Assets \$0	0 Assets \$0
		1	2	3	4	5
		Probability				

Figure 56 Distribution of Assets Based on Risk – Fleet

Consequence	5	0 Assets \$0	4 Assets \$1,140,000	3 Assets \$855,000	6 Assets \$1,710,000	8 Assets \$2,280,000
	4	3 Assets \$522,000	2 Assets \$348,000	5 Assets \$870,000	3 Assets \$522,000	2 Assets \$348,000
	3	4 Assets \$274,640	4 Assets \$260,114	5 Assets \$453,332	0 Assets \$0	0 Assets \$0
	2	2 Assets \$60,000	5 Assets \$150,000	2 Assets \$60,000	5 Assets \$150,000	3 Assets \$90,000
	1	0 Assets \$0	1 Assets \$22,569	1 Assets \$40,000	1 Assets \$40,000	1 Assets \$12,448
		1	2	3	4	5
		Probability				

# IX. Financial Strategy

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## 1. General Overview

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In order for an AMP to be effective and meaningful, it must be integrated with financial planning and long-term budgeting. The development of a comprehensive financial plan will allow the County to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.



Figure 57 Cost Elements

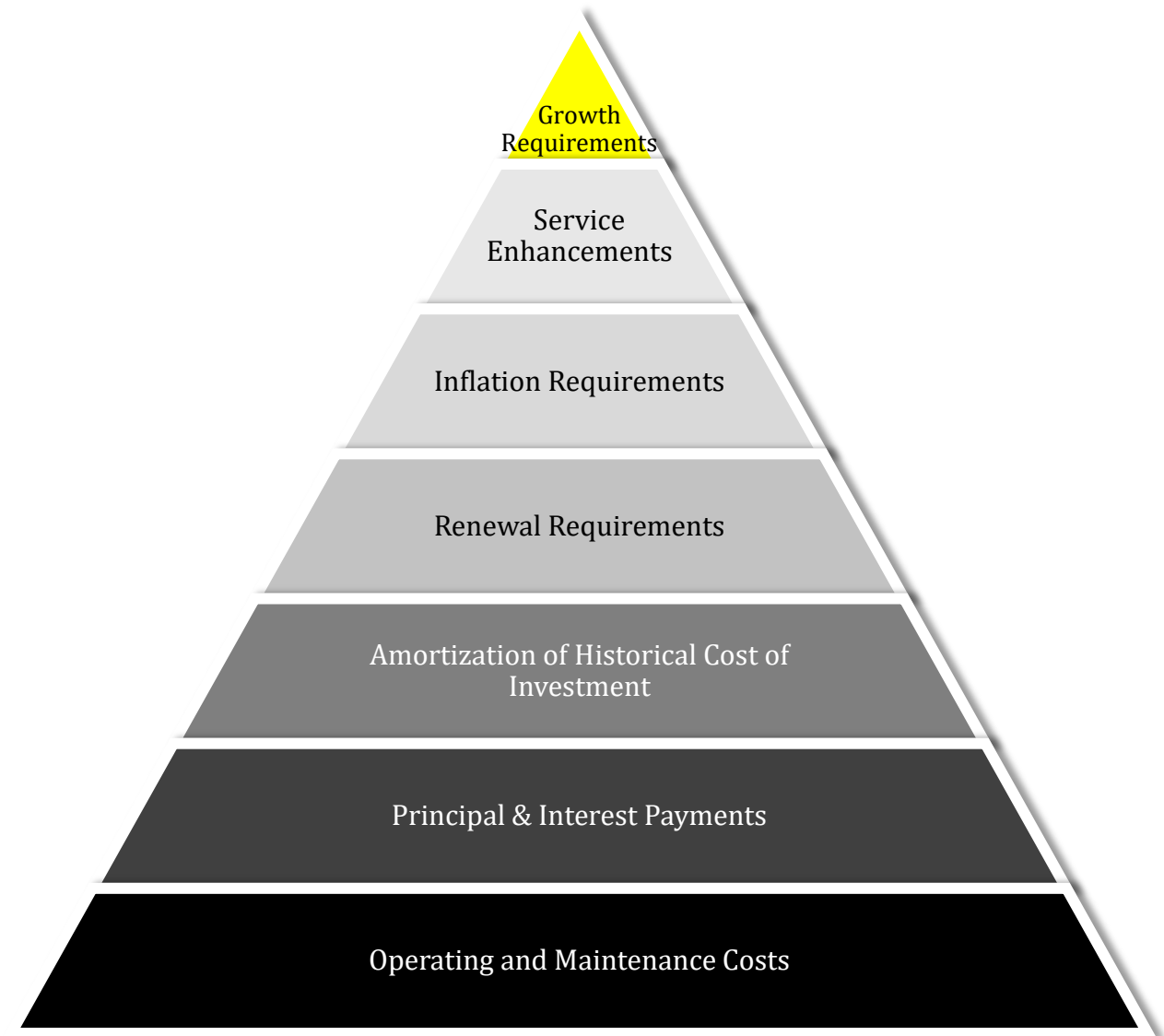


Figure 57 depicts the various cost elements and resulting funding levels that should be incorporated into AMPs that are based on best practices. Municipalities meeting their operational and maintenance needs, and debt obligations are funding only their cash cost. Funding at this level is severely deficient in terms of lifecycle costs.

Meeting the annual amortization expense based on the historical cost of investment will ensure municipalities adhere to accounting rules implemented in 2009; however, funding is still deficient for long-term needs. As municipalities graduate to the next level and meet renewal requirements, funding at this level ensures that need and cost of full replacement is deferred. If municipalities meet inflation requirements, they're positioning themselves to meet replacement needs at existing levels of service. In the final level, municipalities that are funding for service enhancement and growth requirements are fiscally sustainable and cover future investment needs.

This report develops a financial plan by presenting several scenarios for consideration and culminating with final recommendations. It includes recommendations that avoid long-term funding deficits. As outlined below, the scenarios presented model different combinations of the following components:

- the financial requirements (as documented in the SOTI section of this report) for existing assets, existing service levels, requirements of contemplated changes in service levels (none identified for this plan), and requirements of anticipated growth (none identified for this plan)
- use of traditional sources of municipal funds including tax levies, user fees, reserves, debt, and development charges
- use of non-traditional sources of municipal funds, e.g., reallocated budgets
- use of senior government funds, such as the federal Gas Tax Fund, Ontario Community Infrastructure Fund (OCIF)

If the financial plan component of an AMP results in a funding shortfall, the province requires the inclusion of a specific plan as to how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the province may evaluate a County's approach to the following:

- In order to reduce financial requirements, the County may consider or evaluate the option of revising service levels downward.
- All asset management and financial strategies have been considered. For example:
  - If a zero debt policy is in place, is it warranted? If not, the use of debt should be considered.

## 2. Financial Profile: Tax-funded Assets

### 2.1 Funding Objective

We have developed scenarios that would enable the County to achieve full funding within five to 20 years for the following assets: road network; bridges & culverts; social housing; buildings & facilities; machinery & equipment; fleet; and land improvements. For each scenario developed we have included strategies, where applicable, regarding the use of tax revenues, user fees, reserves and debt.

### 2.2 Current Funding Position

Table 29 and Table 30 outline, by asset class, the County's average annual asset investment requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes.

Table 29 Infrastructure Requirements and Current Funding Available: Tax-funded Assets

Asset class	Average Annual Investment Required	Total Funding Available in 2016							Annual Deficit/Surplus
		Taxes	Gas Tax	OCIF	Long Term Care Grant (Note 1)	Disposal of Assets	Taxes to Reserves	Total Funding Available	
Road Network	13,704,000	4,671,000	2,814,000	325,000	0	0	0	7,810,000	5,894,000
Bridges & Culverts	3,386,000	1,242,000	0	0	0	0	0	1,242,000	2,144,000
Social Housing	728,000	1,159,000	0	0	0	0	4,000	1,163,000	-435,000
Buildings & Facilities	3,258,000	272,000	0	0	635,000	0	1,757,000	2,664,000	594,000
Machinery & Equipment	1,209,000	300,000	0	0	0	58,000	375,000	733,000	476,000
Land Improvements	122,000	100,000	0	0	0	0	0	100,000	22,000
Fleet	1,292,000	0	0	0	0	104,000	886,000	990,000	302,000
Total	23,699,000	7,744,000	2,814,000	325,000	635,000	162,000	3,022,000	14,702,000	8,997,000

Note 1: The long-term care grant would be a 25 year commitment covering 70% of the project if it moves forward.

## 2.3 Recommendations for Full Funding

The average annual investment requirement for tax-funded categories is \$23,699,000. Annual revenue currently allocated to these assets for capital purposes is \$14,702,000, leaving an annual deficit of \$8,997,000. To put it another way, these infrastructure categories are currently funded at 62% of their long-term requirements. In 2016, the County has annual tax revenues of \$52,900,000. As illustrated in Table 30, without consideration of any other sources of revenue, full funding would require the following tax change over time:

Table 30 Tax Change Required for Full Funding

Asset class	Tax Change Required for Full Funding
Road Network	11.1%
Bridges & Culverts	4.1%
Social Housing	-0.8%
Buildings & Facilities	1.1%
Machinery & Equipment	0.9%
Land Improvements	0.0%
Fleet	0.6%
Total	17.0%

County of Grey's debt payments for these asset categories will be decreasing by \$672,000 over the next 5 years and by \$672,000 over the next 10 years. Although not shown in the table, debt payment decreases will be \$745,000 and \$745,000 over the next 15 and 20 years respectively. Our recommendations include capturing those decreases in cost and allocating them to the infrastructure deficit outlined above (the current plan is to allocate these savings to the facilities category so that savings realized on debt payments for Lee Manor will be allocated to a reserve for future Long Term Care redevelopment).

Table 31 outlines this concept and presents a number of options.

Table 31 Effect of Reallocating Decreases in Debt Costs

	Without Reallocation of Decreasing Debt Costs				With Reallocation of Decreasing Debt Costs			
	5 Year Scenario	10 Year Scenario	15 Year Scenario	20 Year Scenario	5 Year Scenario	10 Year Scenario	15 Year Scenario	20 Year Scenario
Infrastructure Deficit	8,997,000	8,997,000	8,997,000	8,997,000	8,997,000	8,997,000	8,997,000	8,997,000
Changes in Debt Costs	N/A	N/A	N/A	N/A	-672,000	-672,000	-745,000	-745,000
Resulting Infrastructure Deficit	8,997,000	8,997,000	8,997,000	8,997,000	8,325,000	8,325,000	8,252,000	8,252,000
Resulting Tax Increase Required:								
Total Over Time	17.0%	17.0%	17.0%	17.0%	15.7%	15.7%	15.6%	15.6%
Annually	3.4%	1.7%	1.1%	0.9%	3.1%	1.6%	1.0%	0.8%

Considering all of the above information, we recommend the 15 year option that includes capturing the changes. This involves full funding being achieved over 15 years by:

- when realized, reallocating the debt cost reductions of \$745,000 to the infrastructure deficit as outlined above.
- increasing tax revenues by 1.0% each year for the next 15 years solely for the purpose of phasing in full funding to the tax-funded asset classes covered in this AMP.
- allocating the current gas tax and OCIF revenue as outlined in Table 29.
- increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

**Notes:**

- As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included OCIF formula based funding, if applicable, since this funding is a multi-year commitment.
- We realize that raising tax revenues by the amounts recommended above for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

Although this option achieves full funding on an annual basis in 15 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of \$0 for bridges & culverts, \$9,038,000 for facilities, \$345,000 for land improvements, \$3,343,000 for machinery & equipment, \$0 for paved roads, \$387,000 for social housing and \$1,455,000 for vehicles. Prioritizing future projects will require the current data to be replaced by condition based data. Although our recommendations include no further use of debt, the results of the condition based analysis may require otherwise.

## 4. Use of Debt

For reference purposes, Table 32 outlines the premium paid on a project if financed by debt. For example, a \$1M project financed at 3.0%<sup>3</sup> over 15 years would result in a 26% premium or \$260,000 of increased costs due to interest payments. For simplicity, the table does not take into account the time value of money or the effect of inflation on delayed projects.

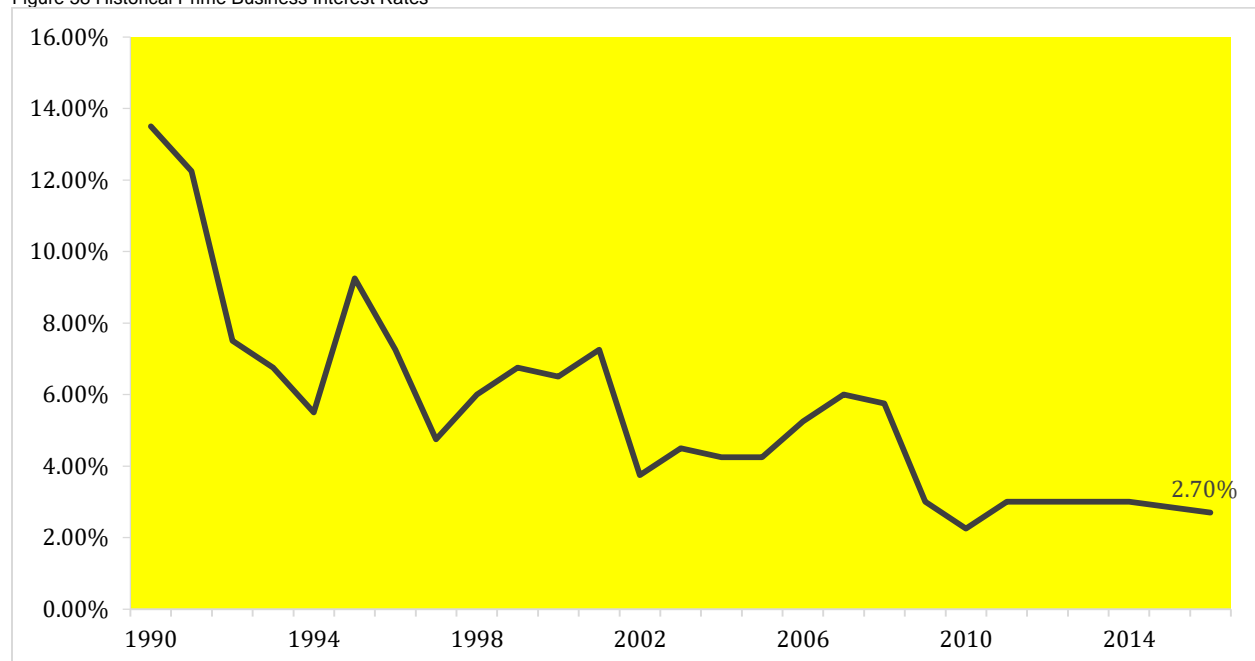
Table 32 Total Interest Paid as a Percentage of Project Costs

Interest Rate	Number of Years Financed					
	5	10	15	20	25	30
7.0%	22%	42%	65%	89%	115%	142%
6.5%	20%	39%	60%	82%	105%	130%
6.0%	19%	36%	54%	74%	96%	118%
5.5%	17%	33%	49%	67%	86%	106%
5.0%	15%	30%	45%	60%	77%	95%
4.5%	14%	26%	40%	54%	69%	84%
4.0%	12%	23%	35%	47%	60%	73%
3.5%	11%	20%	30%	41%	52%	63%
3.0%	9%	17%	26%	34%	44%	53%
2.5%	8%	14%	21%	28%	36%	43%
2.0%	6%	11%	17%	22%	28%	34%
1.5%	5%	8%	12%	16%	21%	25%
1.0%	3%	6%	8%	11%	14%	16%
0.5%	2%	3%	4%	5%	7%	8%
0.0%	0%	0%	0%	0%	0%	0%

<sup>3</sup> Current municipal Infrastructure Ontario rates for 15 year money is 3.2%.

It should be noted that current interest rates are near all-time lows. Sustainable funding models that include debt need to incorporate the risk of rising interest rates. The following graph shows where historical lending rates have been:

Figure 58 Historical Prime Business Interest Rates



As illustrated in Table 32 , a change in 15 year rates from 3% to 6% would change the premium from 26% to 54%. Such a change would have a significant impact on a financial plan.

Table 33 and Table 34 outline how County of Grey has historically used debt for investing in the asset classes as listed. There is currently \$1,447,000 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of \$745,000. In terms of overall debt capacity, in 2015, County of Grey had \$2,430,000 in total annual principal and interest payment commitments, well within its provincially prescribed maximum of \$18,448,000.

Table 33 Overview of Use of Debt

Asset class	Debt at December 31 <sup>st</sup> , 2015	Use of Debt in the Last Five Years				
		2011	2012	2013	2014	2015
Road Network	0	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0
Social Housing	0	0	0	0	0	0
Buildings & Facilities	1,447,000	0	0	0	0	0
Machinery & Equipment	0	0	0	0	0	0
Land Improvements	0	0	0	0	0	0
Fleet	0	0	0	0	0	0
Total Tax-funded	1,447,000	0	0	0	0	0

As illustrated in Table 34, County of Grey's debt payment for these asset categories decreases by \$672,000 in 2017 as the final debenture payment for the renovation of Lee Manor and the self-financed debenture for the Craighleith Paramedic Services station were made in 2016. Although not shown in the table, the debt payment will be reduced to zero in 2030 when the final self-financed debenture payment for the replacement of the roof at Grey Gables has been made. This illustration reflects known debt at the time of the report and does not take into account anticipated debt for the addition to the Administration Building currently underway, the build of a new Paramedic Services station at Chatsworth and the Long Term Care redevelopment that is under discussion. Our recommendations include capturing those decreases in cost and allocating them to the infrastructure deficit outlined above. The County's current plan is to allocate the savings to the facilities category so that savings realized on debt payments for Lee Manor will be allocated to a reserve for future Long Term Care redevelopment.

Table 34 Overview of Debt Costs

Asset class	Principal & Interest Payments in the Next Ten Years						
	2016	2017	2018	2019	2020	2021	2026
Road Network	0	0	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0	0
Social Housing	0	0	0	0	0	0	0
Buildings & Facilities	745,000	73,000	73,000	73,000	73,000	73,000	73,000
Machinery & Equipment	0	0	0	0	0	0	0
Land Improvements	0	0	0	0	0	0	0
Fleet	0	0	0	0	0	0	0
Total Tax-funded	745,000	73,000	73,000	73,000	73,000	73,000	73,000

The revenue options outlined in this plan allow County of Grey to fully fund its long-term infrastructure requirements without further use of debt. However, project prioritization based on replacing age-based data with observed data for several tax-funded classes may require otherwise.

## 5. Use of Reserves

### 5.1 Available Reserves

Reserves play a critical role in long-term financial planning. The benefits of having reserves available for infrastructure planning include: the ability to stabilize tax rates when dealing with variable and sometimes uncontrollable factors; financing one-time or short-term investments; accumulating the funding for significant future infrastructure investments; managing the use of debt; and, normalizing infrastructure funding requirements. By infrastructure class, Table 35 outlines the details of the reserves currently available to County of Grey.

Table 35 Summary of Reserves Available

Asset class	Balance at December 31 <sup>st</sup> , 2015
Road Network	11,521,459
Bridges & Culverts	2,642,000
Social Housing	3,214,000
Machinery & Equipment	2,118,000
Buildings & Facilities	9,206,699
Land Improvements	0
Fleet	4,935,000
Total Tax-funded	29,626,000

There is considerable debate in the municipal sector as to the appropriate level of reserves that a municipality should have on hand. There is no clear guideline that has gained wide acceptance. Factors that municipalities should take into account when determining their capital reserve requirements include: breadth of services provided, age and condition of infrastructure, use and level of debt, economic conditions and outlook, and internal reserve and debt policies.

The reserves in Table 35 are available for use by applicable asset classes during the phase-in period to full funding. This, coupled with County of Grey's judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity can be used for high priority and emergency infrastructure investments in the short to medium-term.

### 5.2 Recommendation

As County of Grey updates its AMP, we recommend that future planning should include determining what its long-term reserve balance requirements are and a plan to achieve such balances.

## X. 2016 Infrastructure Report Card

The following infrastructure report card illustrates the County's performance on the two key factors: Asset Health and Financial Capacity. Appendix 1 provides the full grading scale and conversion chart, as well as detailed descriptions, for each grading level.

Table 36 2016 Infrastructure Report Card

Asset class	Asset Health Grade	Funding Percentage	Financial Capacity Grade	Average Asset Class Grade	Comments
Road Network	C	57%	D	D	Based on a combination of assessed and age-based data, while 41% of assets are in good to very good condition, 31%, with a valuation of \$272 million, are in poor to very poor condition.
Bridges & Culverts	C	37%	F	D	
Social Housing	D	160%	A	C	
Buildings & Facilities	D	82%	B	C	
Machinery & Equipment	D	61%	D	D	
Land Improvements	D	82%	B	C	
Fleet	D	77%	B	C	
Average Asset Health Grade			C		The County is funding 62% of the annual requirements for its tax funded assets.
Average Financial Capacity Grade			F		
Overall Grade for the Municipality			D		

# XI. Appendix: Grading and Conversion Scales

Table 37 Asset Health Scale

Letter Grade	Rating	Description
A	Excellent	Asset is new or recently rehabilitated
B	Good	Asset is no longer new, but is fulfilling its function. Preventative maintenance is beneficial at this stage.
C	Fair	Deterioration is evident but asset continues to fulfil its function. Preventative maintenance is beneficial at this stage.
D	Poor	Significant deterioration is evident and service is at risk.
F	Very Poor	Asset is beyond expected life and has deteriorated to the point that it may no longer be fit to fulfill its function.

Table 38 Financial Capacity Scale

Letter Grade	Rating	Funding percent	Timing Requirements	Description
A	Excellent	90-100 percent	<input checked="" type="checkbox"/> Short Term <input checked="" type="checkbox"/> Medium Term <input checked="" type="checkbox"/> Long Term	The County is fully prepared for its short-, medium- and long-term replacement needs based on existing infrastructure portfolio.
B	Good	70-89 percent	<input checked="" type="checkbox"/> Short Term <input checked="" type="checkbox"/> Medium Term <input checked="" type="checkbox"/> Long Term	The County is well prepared to fund its short-term and medium-term replacement needs but requires additional funding strategies in the long-term to begin to increase its reserves.
C	Fair	60-69 percent	<input checked="" type="checkbox"/> Short Term <input checked="" type="checkbox"/> Medium Term <input checked="" type="checkbox"/> Long Term	The County is underpreparing to fund its medium- to long-term infrastructure needs. The replacement of assets in the medium-term will likely be deferred to future years.
D	Poor	40-59 percent	<input checked="" type="checkbox"/> Short Term <input checked="" type="checkbox"/> Medium Term <input checked="" type="checkbox"/> Long Term	The County is not well prepared to fund its replacement needs in the short-, medium- or long-term. Asset replacements will be deferred and levels of service may be reduced.
F	Very Poor	0-39 percent	<input checked="" type="checkbox"/> Short Term <input checked="" type="checkbox"/> Medium Term <input checked="" type="checkbox"/> Long Term	The County is significantly underfunding its short-term, medium-term, and long-term infrastructure requirements based on existing funds allocation. Asset replacements will be deferred indefinitely. The County may have to divest some of its assets (e.g., bridge closures, arena closures) and levels of service will be reduced significantly.