

# EXECUTIVE SUMMARY

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## Introduction

The need for adequate “Facility Renewal Funding” for the City of Plymouth portfolio has become a significant issue with facilities leadership and the cities financial stakeholders. Assets are becoming more expensive to maintain as they age, and the risk of failure increases as building systems near their “end of life”. The quality and overall condition of the assets is directly impacted by the level of funding for maintenance and building renewal.

The City of Plymouth engaged Ameresco to provide services for Capital Planning and Asset Management and to deliver the following:

- A **Decision Development Framework™** used to capture multiple streams of criteria that aid in effective decision making and risk mitigation to manage the deferred maintenance backlog, aging infrastructure and capital projects:
  - Quantify **Unfunded Liability** – graphical presentation of each asset based on Ameresco’s life cycle profiles (for each building, site and portfolio);
  - Establish the **Facility Condition Index (FCI)** profile for each asset based on Ameresco’s life cycle profiles (for each building, site and portfolio) to evaluate overall building risk and continued asset sustainability;
  - Establish an **Asset Sustainability Target** to measure funding appropriation levels based on prescribed risk tolerance;
- Establish **Life Cycle Profiles** for major building components and systems (incorporating both short term [5 Year] and long term [30 Year] planning renewal and life cycle data as well as current information (existing condition assessments, capital plans, relevant maintenance information, etc.) and phone-based interviews (which we refer to as Asset Reviews);
- **Subscription to AssetPlanner™** and **AuditPlanner™** to maintain and update a real time capital planning dataset;
- Present an **Executive Summary** of the life cycle and Asset Sustainability Planning review findings;
- **Funding Appropriation** will be benchmarked based on typical industry findings providing the City of Plymouth with a high-level view of possible Financial Strategies to reduce unfunded liability and mitigate overall building risk; and
- Development of a **Capital Plan** – incorporating multiple streams of criteria. Ameresco will aid with the development of executive reports and presentations to convey the optimal funding appropriation strategy including the leveraging concept around **Capital Creation Strategies™**.

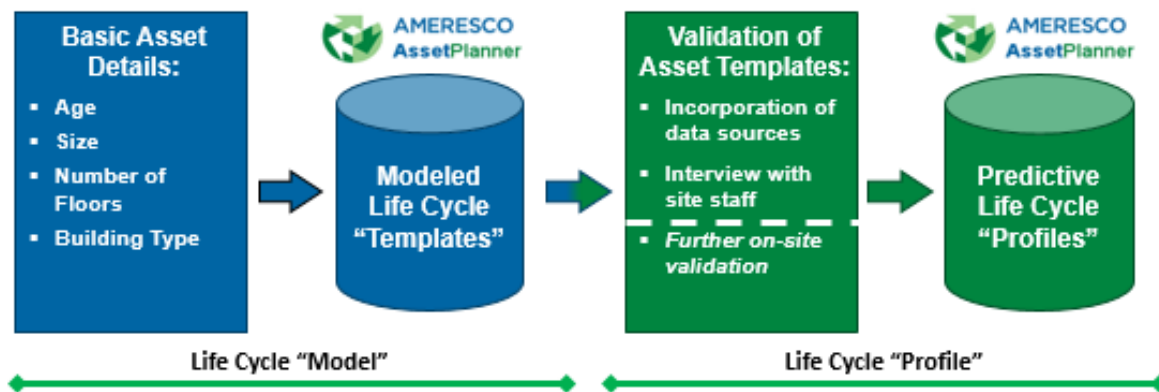
## Methodology

Working with the staff of the City of Plymouth, Ameresco followed a series of steps designed to efficiently establish life cycle profiles, quantify unfunded liability, and benchmark building performance while measuring the effectiveness of capital spend by establishing FCI profiles. The analysis covered a total of 403,245 square feet and consisted of 12 buildings. As shown in **Figure 1** below, the portfolio is represented by colored pins which show the FCI range the facility is currently in.



**Figure 1: Representative Map showing City of Plymouth facilities**

**Figure 2** highlights our approach, which begins with a data development process that created life cycle cost profiles for each asset utilizing the modeling capabilities of our *AssetPlanner™* software.



**Figure 2: Ameresco Data Development process – a unique and leading practice**

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Utilizing some basic asset details provided by the City of Plymouth’s staff (i.e. building age, number of floors, building type), Ameresco developed life cycle cost models for each building. The models contain a listing of building component inventory based on the various asset “types” and established order of magnitude replacement costs and renewal timelines for each major building system and component. Each model includes architectural, mechanical, and electrical components and systems as well as site elements. Ameresco worked with City of Plymouth staff to refine and set the predictive life cycle modeling costs and timelines.

Ameresco then validated and improved the models by incorporating other data for each asset that was provided by the City of Plymouth, and interviewed staff that were knowledgeable about the condition of the facilities. This data included component replacement years, modernization details, and current deficiencies. Ameresco also reviewed cost assumptions with the City of Plymouth aligning recent capital project cost experience.

Once the needs were captured, Ameresco performed a high-level quality assurance/quality control check and generated a capital forecast from the final data set. Ameresco then incorporated funding assumptions to compare expected funding dollars with anticipated capital needs. Funding models were then developed to quantify the amount of funding to ensure long term preservation and sustainability of the assets. The models addressed:

- Building component **renewal needs** based on preliminary assessment of condition and life cycle data;
- How capital needs will **grow** in both the short and long term as the buildings continue to age;
- Graphical representation of the **Unfunded Liability** and risk-based **Asset Sustainability Target**;
- Building performance using industry standard metrics including Facility Condition Index (**FCI**) to evaluate overall building **risk** and continued **asset sustainability**.

## Summary of Findings

The present level of the deferred maintenance backlog and facility renewal for the City of Plymouth’s portfolio is estimated to be **\$3.0 million**. The replacement value of assets is approximately **\$126 million** based on cost per square foot analysis projections (in current year dollars). Using these two numbers, we find that the portfolio is in “**Good**” condition overall today based on industry standards.

As capital needs continue to increase, we expect the portfolio to migrate to the “**Poor**” range by **2029** based on the results of our Data Development process. This is based on an estimate of **\$1.0 million** of capital funding dollars per annum for deferred maintenance and capital renewal. To maintain the portfolio in the “**Fair**” range, the University will need to invest approximately **\$1.5 million** each year in capital renewal.

*Capital Creation Strategies™* may be considered to help solve this funding challenge and mitigate building risk (FCI). By leveraging a series of alternative funding strategies, including energy efficiency and renewable energy solutions, and intersecting with life cycle renewal needs, a significant impact can be realized which helps reduce the funding gap and future need for Capital dollars. The main benefits of leveraging *Capital Creation Strategies™* include:

- Upfront capital funding to **reduce** deferred maintenance backlog & associated FCI;
- **Extension to useful life** for the entire portfolio;
- Enhancement of the **Quality of Community and Living**.

## Detailed Findings

### Facility Age

Various sources of funding are required to build, maintain, and operate a facility and assets during its life:

- Capital funding to construct it;
- Renewal funding for replacement of worn out components;
- Maintenance funding for repairs, up-keep and preservation of capital investments;
- Redevelopment and accommodation funding to offset the effects of code changes and required functional modifications.

The City of Plymouth portfolio has a weighted average age of **28 years**, as shown in **Figure 3** below. As facilities age, they require increased maintenance and upkeep. The overall condition of the facilities is directly attributable to the level of funding required for maintenance and building renewal.



Figure 3: Age Profile – Total Portfolio

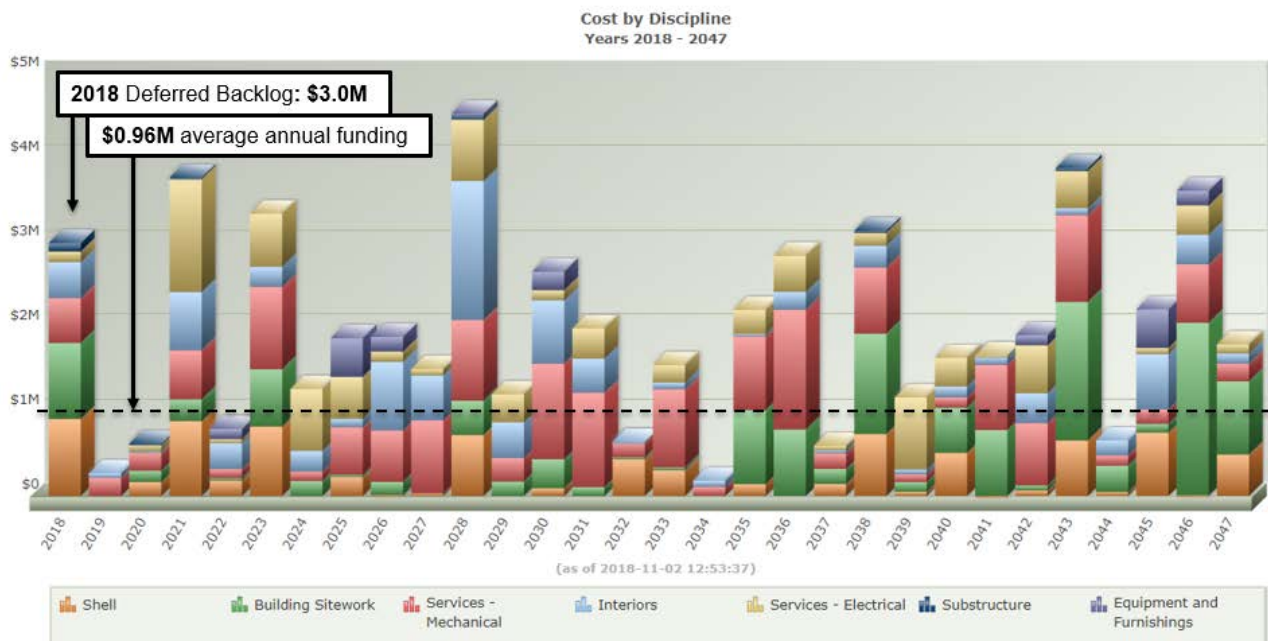
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## Life Cycle Projections

Different building components will undergo replacement at various times during the life of a facility. If one assumes a building lasts 100 years, some components, such as a roof, will require numerous cyclical replacements. Each component has a unique life cycle that may be altered depending on the type and level of maintenance adopted.

Based on preliminary estimates of life cycle timing and costs, the present level of “Deferred Maintenance Backlog” is estimated at **\$3.0 million** prior to any funding as shown in **Figure 4** below. Life cycle renewal costs for the major building components have been established for each building to determine the Capital Renewal budget requirements over the next 30 years.



**Figure 4: Current Deferred Backlog and 30-year Renewal Cost – Total Portfolio**

## Funding

### How much funding is required?

Many guidelines for facility renewal have been established by reputable professional organizations and asset management specialists.

One states, “It has become clear that *institutions* have failed in the stewardship of their facilities assets. Erosion of its buildings and supporting infrastructure undermines every aspect of an institution’s ability to function effectively. To restore those facilities .... Massive increases in the amount now spent on repair and renovation will be necessary”<sup>1</sup>.

The American Public Works Association (APWA)<sup>2</sup> has published maintenance and repair guidelines for facilities. As a minimum, between 0.5% to 1% of the current replacement value of those facilities is required to adequately maintain them. For the City of Plymouth’s assets, this would suggest a capital renewal reinvestment between **\$630,000 and \$1.26 million** per year based on a current replacement value of approximately **\$126 million**.

Another set of guidelines for funding of assets is based on facility subsystem life cycle evaluations (stipulated as follows):

- (1.5% to 2.5%) of the replacement value is required for sufficient “**Capital Renewal**” on an ongoing basis to keep the facilities in good condition for their present use;
- PLUS (0.5% to 1.5%) of the replacement value is required to sufficiently address “**Plant Adaptation**” funds on an ongoing basis to alter the facilities for changes in use as well as codes and standards;
- PLUS, sufficient “**Catch-up Maintenance**” funds over a short period to bring the facilities to a reliable operating condition by offsetting the effects of deferred maintenance.

Both the previously mentioned reports concur that 2% of the current replacement value should be allocated to annual renewal, assuming proper preventative maintenance practices are adhered to. In addition, special funds should be allocated to reduce the backlog of deferred maintenance for those facilities with an abnormally high backlog. Excluding special funds, the renewal funding for City of Plymouth would translate to **\$2.5 million** annually.

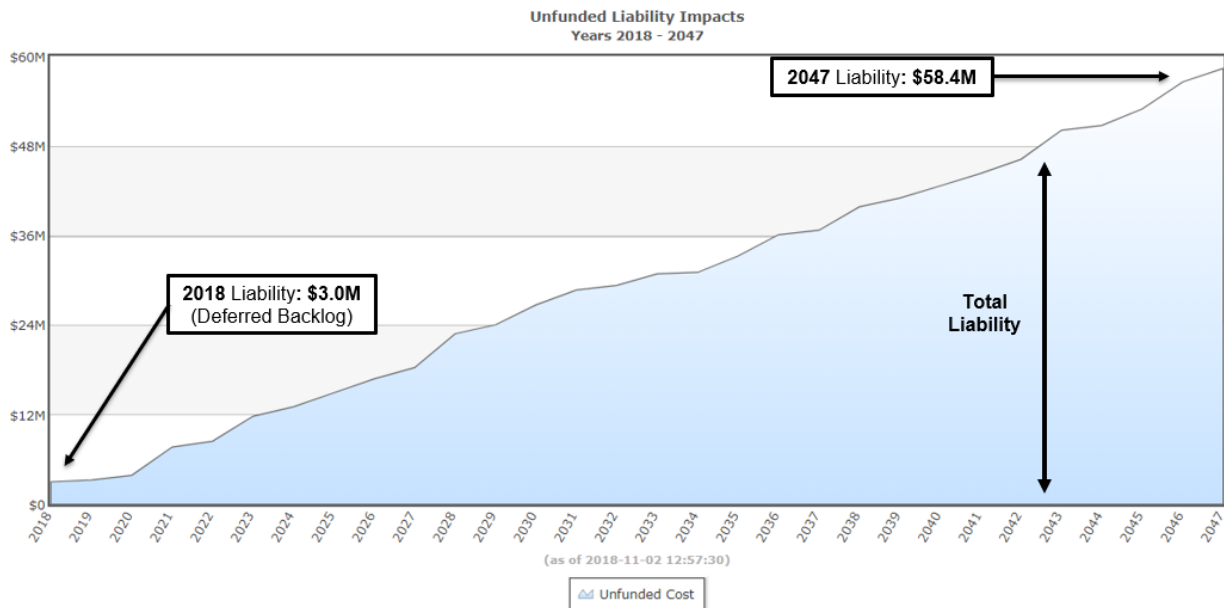
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<sup>1</sup> Financial Planning Guidelines for Facility Renewal and Adaptation. A joint project by SCUP (The Society for College and University Planning), NACUBO (The National Association of College and University Business Officers) APPA (The Association of Physical Plant Administrators of Universities and Colleges) and Coopers and Lybrand.

<sup>2</sup> Committing to the Cost of Ownership, Maintenance and Repair of Public Buildings Building Research Board, National Research Council, American Public Works Association - Special Report #60



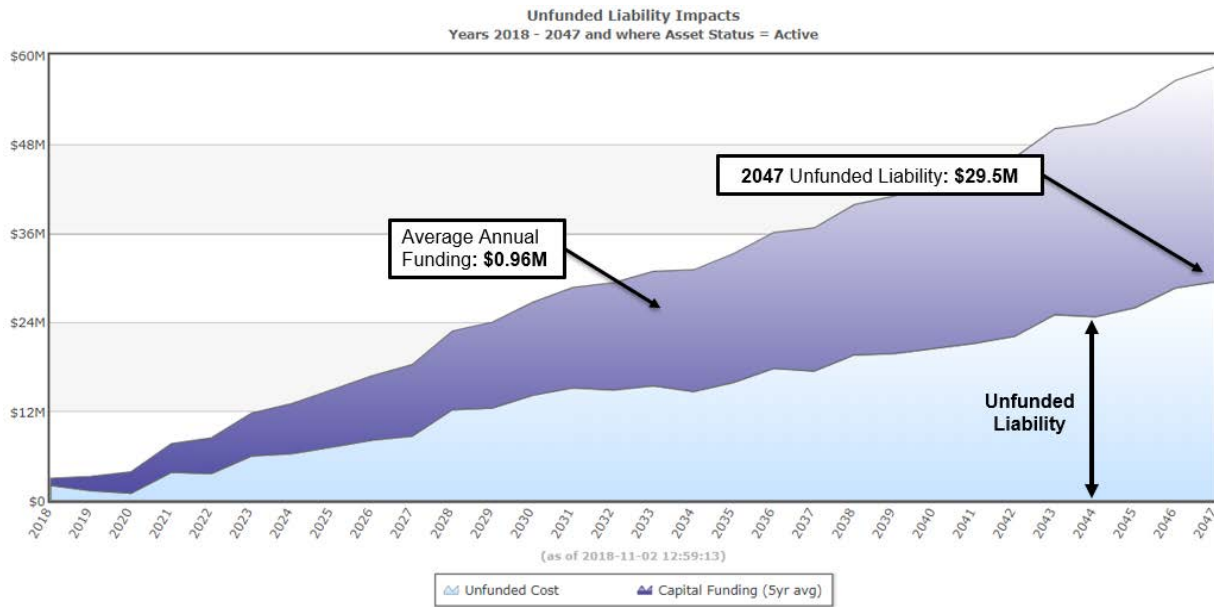
**Figure 5** below provides a graphical outline of the cumulative renewal costs. The total liability (light blue) over the next 30 years is approximately **\$58 million**.



**Figure 5: 30-year Cumulative Needs Profile showing Total Liability**

Presently, we estimate the average funding for City of Plymouth facilities, allocated to deferred maintenance and capital renewal, to be **\$1.0 million per year** (excluding operational improvements).

**Figure 6** below provides a graphical representation of the growing Unfunded Liability over a 30-year period (without inflationary adjustments or escalations). The top line represents the total liability and total cumulative capital renewal needs for the portfolio. The purple represents the impact that an annual investment of **\$1.0 million per year** would have on the current portfolio. The light blue area represents the Unfunded Liability gap that requires additional investment and alternative funding strategies. This Unfunded Liability for the City of Plymouth portfolio grows from **\$3.0 million** (2018) to **\$29.5 million** (2047).



**Figure 6: 30-year Cumulative Needs Profile showing Unfunded Liability**

The liability figures represent the findings and results obtained from the life cycle renewal cost analysis. Some dramatic adjustments must be considered to obtain control of the rapidly growing capital needs projected for the future.

## Facility Condition Index

The term Facility Condition Index (or FCI) is “a ratio of the cost of remedying capital deficiencies listed in the deferred maintenance backlog to the current replacement value (CRV)”. The formula used for determining the FCI for a facility, or a component of the facility, is as follows:

$$\text{F. C. I.} = \frac{\text{Unfunded Liability (\$)}}{\text{Current Replacement Value (\$)}}$$

Where the “Unfunded liability” represents the sum value of all capital deficiencies and renewal costs (at any given point in time) less the funding applied to the asset(s) for capital renewal. “Current Replacement Value” is defined as the total amount of expenditure in current dollars that would be required to replace the institution's facilities to its optimal condition.

The **FCI** provides a consistent measurement of condition for a single building, group of buildings, or a total portfolio. FCI is used by the U.S. Government Accounting Standards Board (GASB) as standard practice for Facility Condition Assessments (FCA) and Building Evaluation Reports (BER) for federal facilities. The FCI is calculated and represented by various benchmark & color-coded indicators as follows:

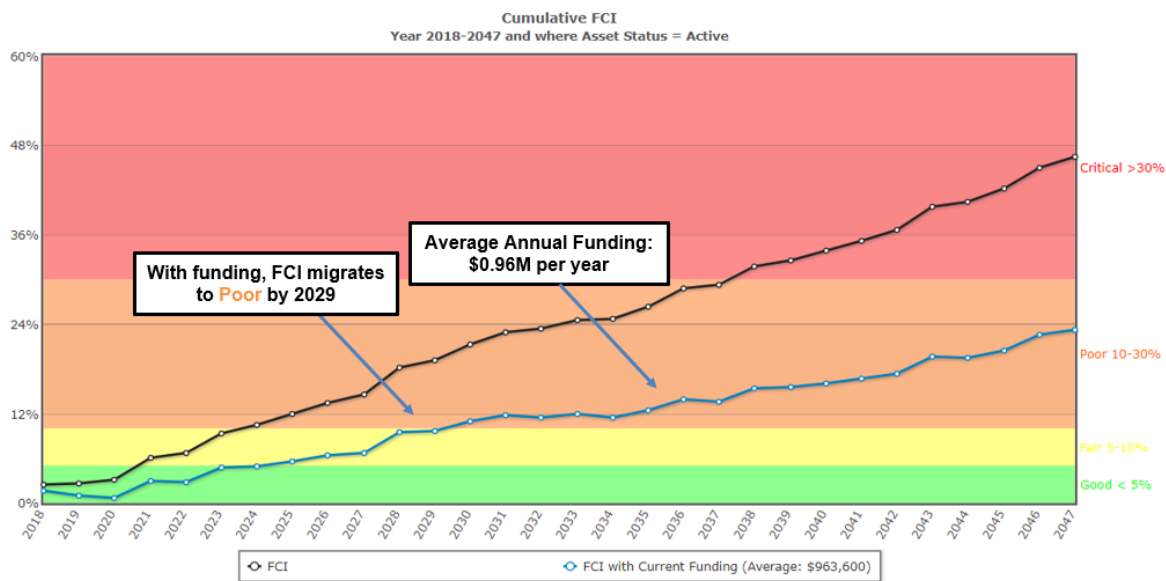
- A “**Good**” FCI rating is achieved when the unfunded liability for the asset(s) is less than 5% of the current asset(s) replacement value (**green**),
- A “**Fair**” FCI rating is achieved when the unfunded liability for the asset(s) is between 5% and 10% of the current asset(s) replacement value (**yellow**),
- A “**Poor**” FCI rating is achieved when the unfunded liability for the asset(s) is between 10% and 30% of the current asset(s) replacement value (**orange**);
- A “**Critical**” FCI rating is achieved when the unfunded liability for the asset(s) is greater than 30% of the current asset(s) replacement value (**red**),

As an FCI rating increases, facilities will experience:

- Increased failure risk to components
- Increased maintenance and operating costs of facilities
- Negative impacts on building occupants

**Figure 7** illustrates that the City of Plymouth’s portfolio has an FCI of **2.4%** in **2018**, which places the assets in the “**Good**” range based on its current FCI rating. Based on current funding of **\$1.0 million per year**, the FCI migrates to the “**Poor**” range in **2029** as many significant components come due.

The life cycle modelling show that the current average annual funding level for facility renewal and deferred maintenance is inadequate for the short and long-term preservation of City of Plymouth’s buildings.



**Figure 7: FCI (with funding) for all City of Plymouth facilities**

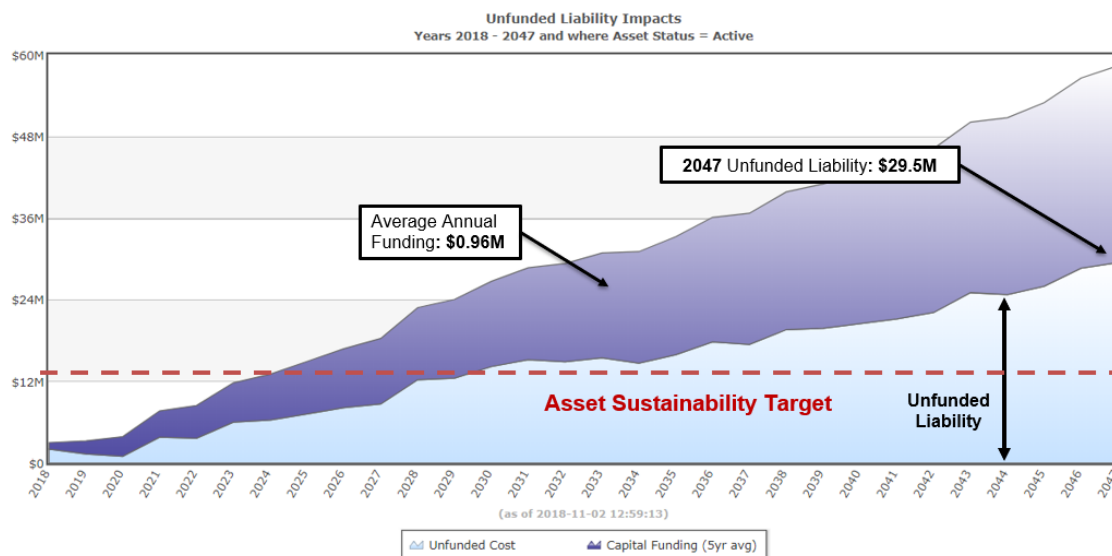
**Figure 8** illustrates the FCI migration of some of the City of Plymouth facilities, over a 30-year period. Within the next 10 years, the majority of assets will migrate to the “**Poor**” range if left unfunded. Based on the current average annual funding levels, the entire portfolio average will migrate to **Poor** by 2029.

Facility Name	Year 1 FCI	Year 5 FCI	Year 10 FCI	Year 15 FCI	Year 20 FCI	Year 25 FCI	Year 30 FCI
Central Treatment Plant - New	1.90%	2.56%	15.54%	24.92%	30.54%	37.44%	44.90%
Central Treatment Plant - Old	1.53%	8.00%	14.30%	15.49%	16.42%	17.32%	21.96%
City Hall	2.92%	13.36%	19.13%	33.54%	35.38%	38.61%	53.43%
County Road 73 Transit Station	0.08%	0.92%	3.72%	17.28%	22.61%	25.40%	42.03%
Fire Station #1	0.28%	1.13%	31.25%	43.34%	48.89%	58.14%	70.47%
Fire Station #2	5.91%	22.98%	32.49%	40.62%	46.90%	55.80%	66.64%
Fire Station #3	10.56%	16.63%	27.86%	40.22%	55.87%	72.55%	75.50%
Maintenance Facility	0.51%	3.15%	8.76%	12.56%	17.52%	25.09%	26.83%
Plymouth Creek Center	5.97%	15.70%	30.45%	45.27%	51.10%	60.89%	73.71%
Public Safety Building	1.76%	3.37%	16.63%	38.27%	44.17%	45.59%	48.50%
Reserve Transit Station	5.94%	26.43%	36.85%	52.26%	101.62%	109.57%	140.14%
Treatment Plant #2	1.06%	8.40%	21.14%	25.32%	31.43%	43.01%	47.37%

**Figure 8: 30-year FCI Migration Chart for City of Plymouth**

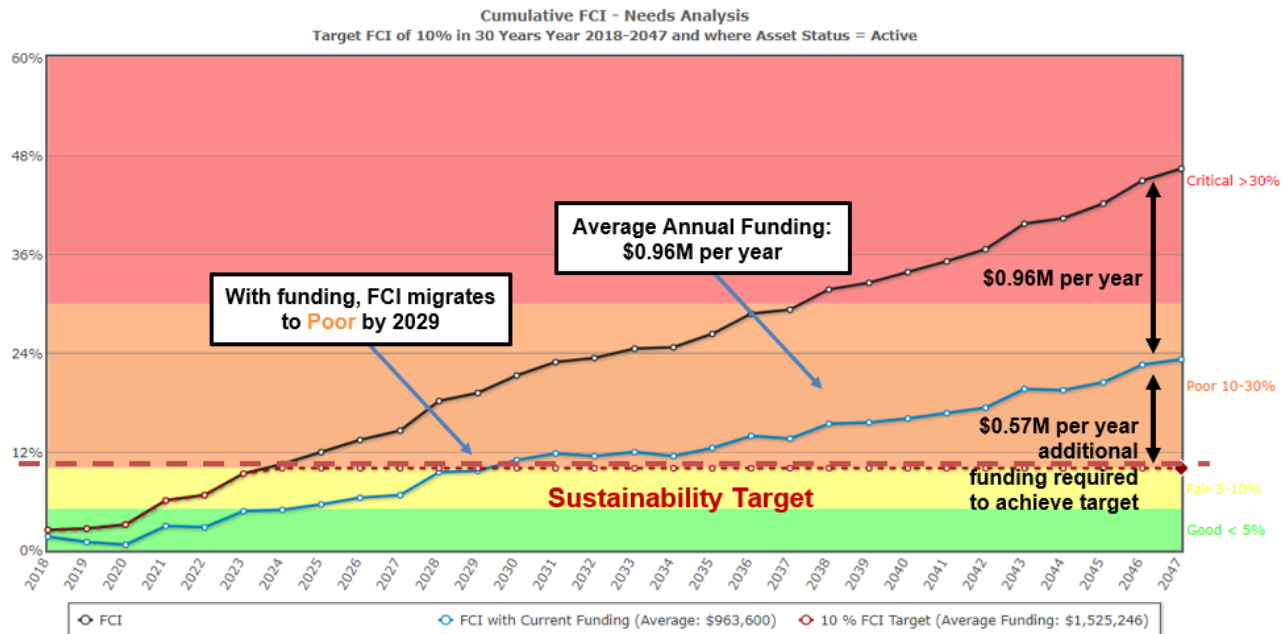
## Sustainability Target

It is recommended that the City of Plymouth establish an “**Asset Sustainability Target**” for funding using the FCI metric. Many organizations have begun using **10%**, or lower, as an appropriate FCI level for their portfolios, stating that it is acceptable to carry a deferred backlog of up to 10% of the replacement value of the asset. If the deferred backlog can remain at less than 10%, then the assets will be continually “sustained” at an acceptable level of risk preserving the initial capital investment and minimizing impacts to end users and staff. This **Asset Sustainability Target** compared to the Unfunded Liability is shown in **Figure 9**.



**Figure 9: Unfunded Liability with Sustainability Target**

The Asset Sustainability Target funding levels are also illustrated in **Figure 10**. Based on the projected future funding level a Facilities Condition Index (FCI) is calculated. **To maintain the facilities in a “Fair” state of repair (based on a 10% FCI rating), approximately \$1.5 million will need to be applied annually for the next 30 years** (in today’s dollars – non-inflated / not escalated).



**Figure 10: FCI and Funding Required to maintain City of Plymouth Assets**

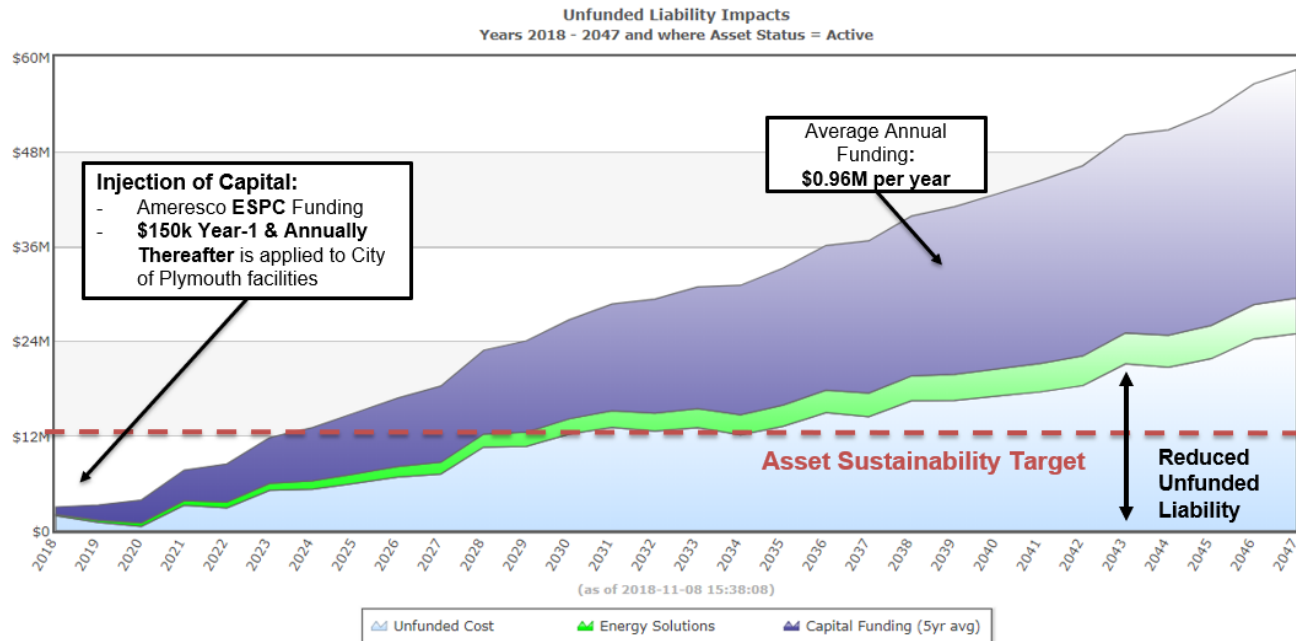
These levels of funding for capital and repair will ensure the building stock will be maintained at an acceptable level of risk preserving the initial capital investment. If the level of facility renewal funding is reduced, the exposure to risk will increase and the probability of **premium renewal expenditures** will increase. However, at current funding levels, a funding gap of **\$0.57 million** per year exists and will need to be addressed to achieve Asset Sustainability.

## Capital Creation Strategies

To solve this funding challenge and mitigate building risk (FCI), a significant amount of capital is required to support future year renewal needs. In addition, **Capital Creation Strategies™** may be considered to help fill the funding gap by leveraging a series of alternative funding strategies including enhanced maintenance management, asset optimization, energy performance and procurement, renewable solutions, tax leveraging and depreciation strategies, real estate strategies, etc. Intersecting **Capital Creation Strategies™** with life cycle renewal needs can represent a significant impact and reduce the funding gap and future need for Capital dollars.

A unique opportunity to leverage funding and create capital exists where building systems have reached the end of their useful life and many of these same systems are energy and operationally inefficient. For the entire portfolio, the City of Plymouth has a unique opportunity to capture the benefits of intersecting life cycle needs and associated operating savings.

To highlight the effect of leveraging *Capital Creation Strategies*<sup>™</sup> (using benchmarking only), Ameresco has conservatively estimated an Energy Performance Contract of **\$0.15 million** (representing only one Capital Creation Strategy). The impact of this investment on the entire portfolio is illustrated in **Figure 11** below, with the funding gap (i.e. the difference between the unfunded liability and asset sustainability target), reduced to **\$0.42 million**.



**Figure 11: Unfunded Liability Reduction to City of Plymouth due to Capital Creation Strategies**

Additional *Capital Creation Strategies*<sup>™</sup> should be explored in detail to help solve this funding challenge and reduce the funding gap. These strategies could include the following:

- Real estate strategies – Purchase, Sale, Leasing
- Energy conservation strategies (i.e. ESPC, Street Lighting, CHP)
- Renewable solutions (i.e. Solar, Microgrids,)
- Maintenance optimization strategies
- Asset redevelopment strategies
- Community partnership strategies

Following on from the benchmarked example above, the Energy Performance based Capital Creation Strategy improves the condition of the facilities by providing an **alternative funding source** thereby reducing the Unfunded Liability and improving the corresponding FCI rating, as shown in **Figure 12**. The additional annual funding from the Capital Creation Strategy helps extend the useful life of the portfolio, delaying the migration of the FCI to the “**Poor**” range until **2035**. This represents a 6-year extension to useful life for significant components that make up the assets and facilities.



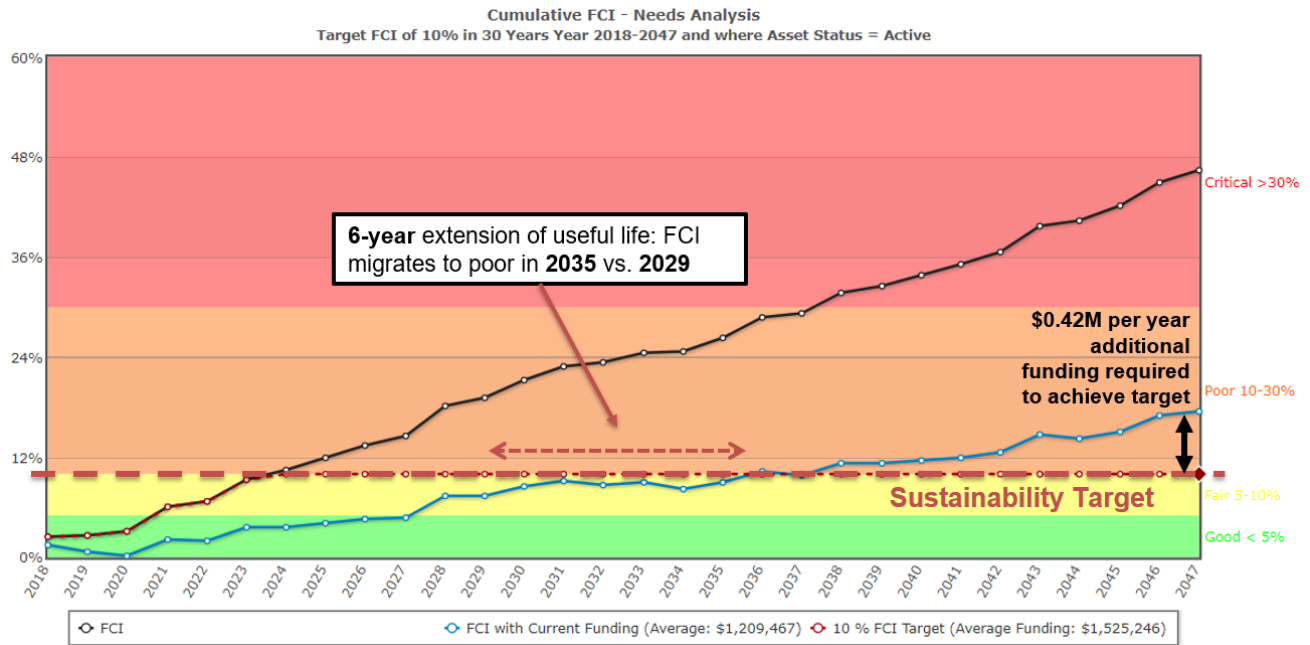


Figure 12: Extension to useful service life of portfolio due to Capital Creation Strategies

## Recommendations

The development of an “Asset Sustainability” plan is an important step when it comes to preservation of vital building assets and the portfolio. As facilities continue to age, it is important to:

- Maintain their condition in a good state of repair;
- Mitigate risk and reduce liability;
- Apply *Funding Appropriation* policies to manage the long-term preservation of the portfolio; and
- Establish Capital Creation Strategies™ to further reduce liability and leverage funds resourcefully.

To preserve the assets and maintain a healthy “Asset Sustainability” level, a few key recommendations are presented herein for consideration:

### 1. Establish and Maintain an FCI Target

An Asset Sustainability Target should be established and maintained to ensure the condition of the facilities and preserve the alignment to the portfolio investment strategy. A **10% FCI** (“**Fair**” FCI range) is recommended to achieve these goals and minimize risk.

## 2. Apply an Adequate Annual Funding Level to Maintain the FCI Target

To maintain the facilities in a “**Fair**” state of repair (based on **10%** FCI rating), the City of Plymouth portfolio will require approximately **\$1.5 million per year**.

This higher level of funding for capital and repair will ensure the building stock will be maintained at an acceptable level of risk preserving the initial capital investment. If the level of facility renewal funding is reduced, the exposure to risk will increase and the probability of **premium renewal expenditures** will increase.

An increase in the amount of capital funding will need to be considered along with solutions that create further operational savings ensuring the savings are re-applied to capital renewal and deferred maintenance projects (referred to herein as “Capital Creation Strategies”. Additional process planning strategies can also be applied to further increase the effectiveness of the Capital Planning Process.

## 3. Enhance the Capital Planning Process and apply the Decision Development Framework™

Enhancing existing capital renewal planning strategies and methods should also be considered to further increase the effectiveness of the Capital Planning Process. The strategies should include a business process map that lays out best practices related to maintaining and sustaining assets including the establishment and measurement of: metrics and targets; funding appropriation policies; and internal business procedures that map to best practices associated with the prioritization, approval, and management of capital investments.

The data that currently resides in *AssetPlanner*™ (a robust capital planning software system that houses the life cycle data and important decision-making criteria and measurements for those assets considered part of this assignment) can be used to enhance Decision Making and allow for dynamic data management.

## 4. Execute *Capital Creation Strategies* to help offset the need for future capital investments

Once a comprehensive long-term Capital plan has been created, it is possible to integrate this capital planning data with operational data to create alternative funding options referred to as Capital Creation Strategies. These creative solutions can be explored to uncover operational savings which can be re-applied to capital renewal and deferred maintenance projects.

We recommend a follow on engagement with Ameresco to review the following opportunities:

- Energy conservation strategies (i.e. Energy Conservation, Street Lighting, CHP);
- Renewable solutions (i.e. Solar, Microgrids, etc.);
- Maintenance optimization strategies;
- Asset redevelopment strategies;
- Real estate strategies – Purchase, Sale, Leasing;
- Community partnership strategies.

## 5. Establish Executive Dashboards

Communication of success is sometimes overlooked due to busy schedules. Establishment of “graphical” Executive Level dashboards are an effective way to highlight the on-going progress that is made by implementing an “Asset Sustainability” plan and framework. Use of graphical tools and dashboards will visually assist in maintaining sustainable assets. A quick win would be to utilize the reports and dashboards available within AssetPlanner™, as shown below in **Figure 13**, including our mobile reporting tool, eDashboard™.

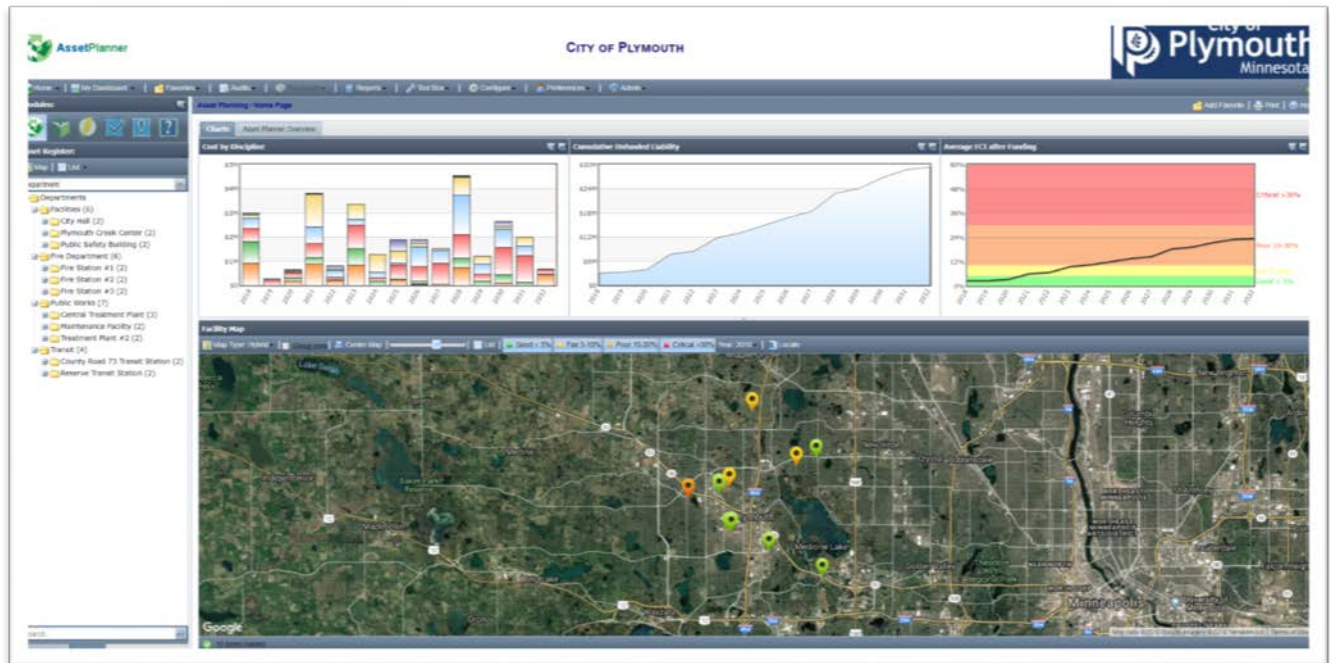


Figure 13: Representative Dashboard for City of Plymouth

## Appendix A: Decision Development Framework™

A *Decision Development Framework*™ is used to capture multiple streams of criteria that aid in effective decision making. For example, Physical Criteria (FCI, Unfunded liability) and Financial Criteria (CapEx, OpEx) and Environmental Criteria (carbon footprint, conservation, etc.) can be blended together. Multiple criteria are used to enhance the decision-making process through various methods, including impact analysis utilizing *AssetPlanner*™. A *Decision Development Framework*™ allows you to make informed, optimized and data-driven decisions.

The steps for establishing and utilizing a *Decision Development Framework*™ include:

- Establish the Criteria;
- Gather (and maintain) the data for the criteria; and
- Conduct analysis using data-driven criteria; and
- Make informed, optimized decisions

We are proposing the below criteria as an initial *Decision Development Framework*™ for City of Plymouth, based on the data we have collected to date for this engagement. In fact, our analysis of the proposed Capital Creation Strategies™ included in this report utilizes both *AssetPlanner*™ and the *Decision Development Framework*™.

Criteria	Use
<b>Unfunded Liability</b>	Quantifies capital renewal needs in terms of financial risk (dollars). Used to identify opportunities for bundling / economies of scale when used with Cost by Discipline.
<b>Asset Sustainability Target</b>	A funding target (based on risk tolerance) that can be benchmarked. Defines the amount of Unfunded Liability that should be addressed from a risk-based perspective.
<b>FCI</b>	Industry Standard metric. Quantifies Infrastructure risk, driven by building condition. Used to identify facilities that require more detailed performance analysis. Provides context for long-term decision making. Used for impact analysis of investment scenarios.
<b>Useful Service Life</b>	Interprets FCI into years. Provides context for long-term decision making. Used for impact analysis of investment scenarios.