

# CANADIAN CONSULTING ENGINEERING AWARDS TRANSLINK ASSET MANAGEMENT PROJECT

SPECIAL PROJECTS

APRIL 2013



Metro Vancouver Regional Map

## PROJECT INFORMATION

Project Name:	TransLink Asset Management Project
Location:	Burnaby, BC
Year Completed:	2012
Entering Firm:	AECOM Canada Ltd.
Role of Firm:	Prime Consultant
Project Leader:	Chris Lombard, P.Eng., MBA

# PROJECT SUMMARY

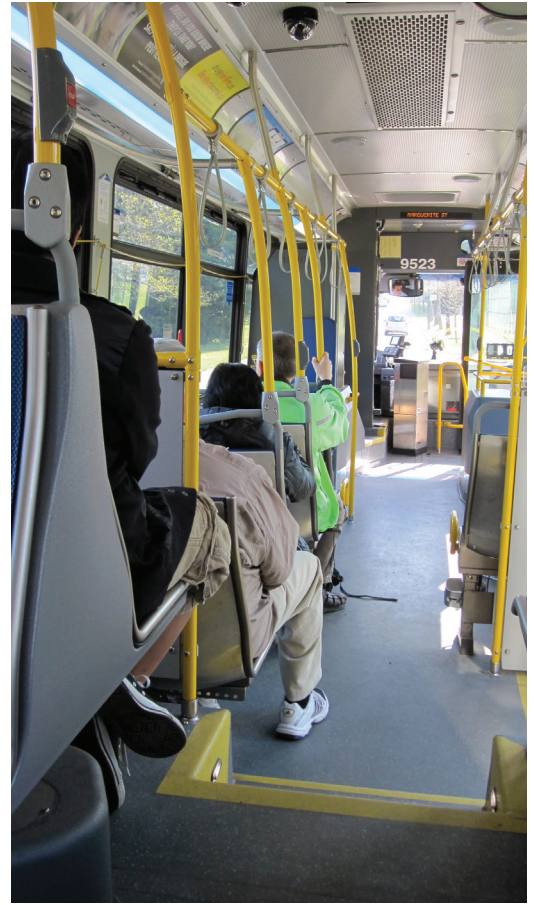
TransLink is responsible for managing and maintaining \$10.2 billion worth of assets including bridges, guideways, vehicles and facilities. In support of TransLink's Regional Transportation Strategy, AECOM was commissioned to undertake a series of projects to thoroughly assess the current state of infrastructure. Through diligent data gathering, analysis and model simulations, the project assisted TransLink in achieving two specific goals:

- To take a detailed account of all assets owned and maintained by TransLink
- To develop a model to evaluate strategies in maintaining these assets in a state of good repair with consideration of financial, social, climate change and seismic vulnerability impacts

By utilizing a software first developed by AECOM and the Massachusetts Bay Transportation Authority and refined through partnerships with various transportation authorities in North America, TransLink was first in Canada to use this software embedded with the latest data and best practices.

The model projected the timing and extent of annual spending required to maintain, renew or replace TransLink's assets, resulting in thousands of calculations based on service dates, useful lives, and replacement costs given in each asset record. To further increase the accuracy of these models, local climate change and seismic vulnerability variables were embedded to identify projects that will have a major impact on our region.

The project resulted in an up-to-date and detailed asset inventory and a calibrated engineering and financial model to guide TransLink's Regional Transportation Strategy's discussion on decision-making and the funding needed to maintain and sustain TransLink's assets.



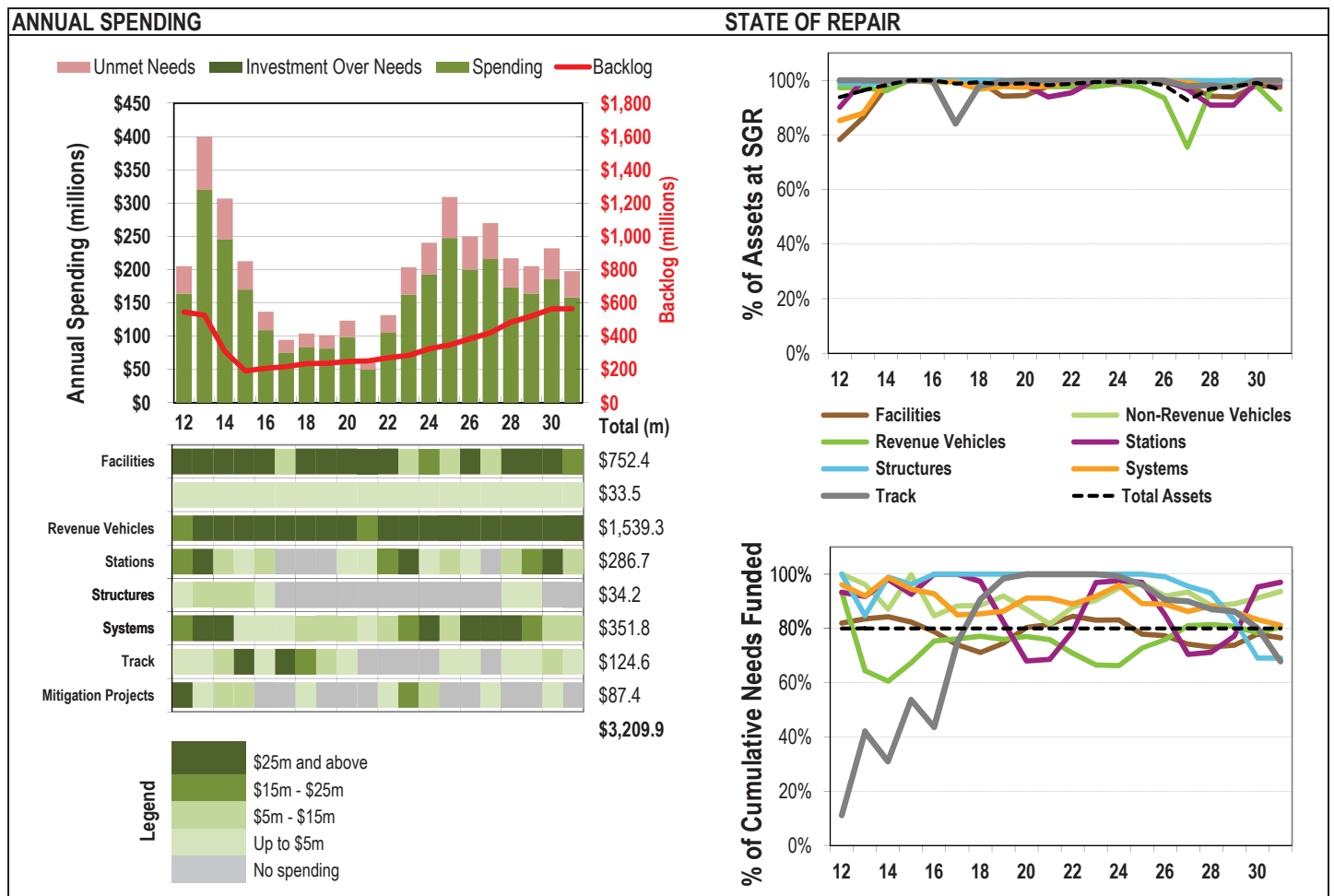
Passengers on a Bus Operated by the Coast Mountain Bus Company

**AECOM's engineers combined management, financial, economic, engineering and other practices to define the investment needs, vulnerabilities and associated risks for effectively managing all of TransLink's assets in a sustainable manner.**

# PROJECT DESCRIPTION

Asset management is the systematic, coordinated activities and practices of an organization to optimally and sustainably deliver on its objectives through the cost-effective lifecycle management of assets.

This project demonstrated the ability of AECOM's engineers to combine management, financial, economic, engineering and other practices to define the investment needs, vulnerabilities and associated risks for effectively managing all of TransLink's assets in a sustainable manner. AECOM is the first consultant to draw a correlation between funding for asset renewal and replacement and the overall state of good repair of TransLink's assets.



Example of SGR Model Dashboard:  
Scenario Where 80% of Spending Needs are Met

# AECOM'S INNOVATIVE APPROACH

In this project, AECOM utilized a software first developed by AECOM and the Massachusetts Bay Transportation Authority (MBTA) and refined through partnerships with various transportation authorities in North America. The TransLink Asset Management Project is Canada's first ever application of this model for the evaluation of different replacement options and the generation of asset management strategies.

In our process, the following questions were addressed:

- What is the extent and value of all assets that TransLink owns and maintains?
- What condition are the assets in?
- When and how does TransLink need to intervene, renew or replace assets?
- Beyond asset age and ridership, what impact does climate change and seismic vulnerability have on project prioritization?
- What risks and consequences are there if no or inadequate actions are taken?
- What level of funding is needed to maintain TransLink's assets in a state of good repair over the next 20 years?

In addition, we defined the climate change and seismic vulnerability of all TransLink's assets and used these outputs to develop a multi-criteria project ranking framework to prioritize capital renewal and replacement projects using the SGR model.



Detailed Diagram of TransLink's Asset Management Project



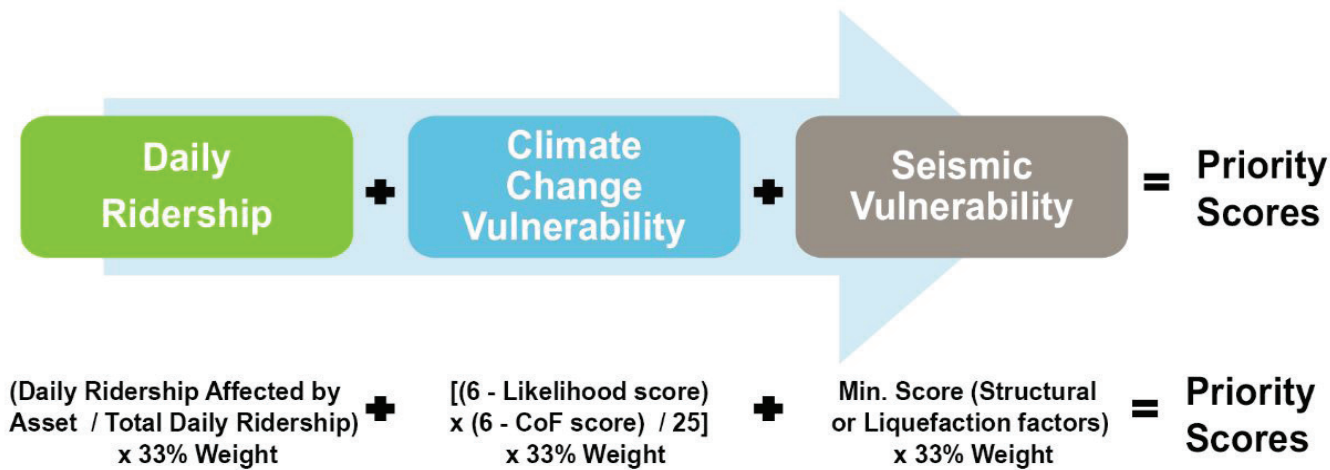
# VULNERABILITY ASSESSMENT

## Climate Change Vulnerability

AECOM assessed the vulnerability of all of TransLink’s assets to climate change using a risk based approach and developed a strategy for improving the resiliency of TransLink’s assets to climate change and other causes of extreme weather.

## Seismic Vulnerability

AECOM developed a seismic vulnerability rating scale and classified all of TransLink’s 207 structures into five categories between 0 (High risk) and 5 (Low Risk). The seismic vulnerability is specifically tailored to the Pacific Northwest seismic zone. In addition, the same scale was applied for the analysis of the major two components within seismic vulnerability; namely, structural vulnerability and liquefaction vulnerability.



Project Prioritization Framework

# COMPLEXITY

AECOM created the first ever consolidated inventory of TransLink's assets. This inventory included almost 1,300 individual assets, each with asset attributes related to asset type, location/co-ordinates, line, mode, quantity, install date, 2012 replacement value and vulnerability to seismic and climate change impacts.

This initial stage was completed through interviews and follow-up with representatives from TransLink's subsidiaries and groups: British Columbia Rapid Transit Company Ltd. (BCRTC); Coast Mountain Bus Company (CMBC); AirCare; Greater Vancouver Transportation Authority Police Service (GVTAPS); TransLink Roads and Bridges; TransLink Properties; TransLink Business Technology Services (BTS); ITBC (InTransit British Columbia)/Protrans; TransLink contracted services (e.g., HandyDART); Finance; TransLink Project Management; and TransLink Risk Management.

In the process, AECOM implemented a complex engineering and financial model by applying asset age, ridership, climate change and seismic vulnerability as criteria in developing a range of asset management alternatives for evaluation against different possible future scenarios. The model identifies the current "backlog" of assets needing replacement that are beyond their useful lives and presents estimated future annual asset replacements needs. The model also examines the implications on asset conditions from not fully funding those needs given a range of constrained funding alternatives and prioritization approaches.

TransLink now has a detailed asset inventory and a calibrated engineering and financial model to guide future decision making on the funding needed to maintain its assets in a sustainable state of good repair. The outputs of this study are currently being used as part of the funding discussion in TransLink's Regional Transportation Strategy dialogue.



The Golden Ears Bridge

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# SOCIAL AND ECONOMIC BENEFITS

AECOM defined the long-range average annual funding required to maintain all of TransLink's assets in a state of good repair. The results from the model developed in this project directly impact TransLink's customers who make an estimated 1.2 million trips on transit every day to and from work, school and/or recreation and all residents in the Metro Vancouver region who use TransLink's roadways and bridges.

The findings support the financial sustainability of existing and future transit infrastructure and by enumerating the risks related to the seismic and climate change vulnerability of these assets.

The development of the model is the first step to increasing transparency and consistency in prioritizing capital funding dollars across TransLink's \$10.2 billion worth of assets. Finally, the project as a whole sets a solid foundation for future asset management work to support TransLink in optimally and sustainably deliver on its objectives through the cost-effective lifecycle management of assets.

# ENVIRONMENTAL IMPACT

The project helped to define which of TransLink's assets are the most vulnerable to environmental impacts such as climate change and seismic events, and developed a strategy for improving the resiliency of the assets to climate change and other causes of extreme weather.



Passengers Awaiting for SkyTrains at the Metrotown SkyTrain Station Platform.



# MEETING CLIENT'S NEEDS

The project's beneficial effects are numerous and include providing TransLink with its first ever consolidated asset inventory; understanding the vulnerabilities to TransLink assets as a result of climate change and seismic impacts; and defining the amount of annual funding required for renewal and replacement projects to maintain TransLink's assets in a state of good repair (the "SGR value"). Above all, the project created a solid basis for TransLink to proceed with further work including the development of an asset management framework and putting in place an enterprise-wide asset management system.

## Project Management is Key to Our Success

AECOM's Project Manager co-ordinated the project team based in AECOM's Burnaby and Arlington offices. Ample use was made of technology including conference calls, webinars and electronic communication to reduce the need for travel while keeping the project team in regular and productive contact with one another. Our Project Manager helped to ensure that the project was delivered on time and on budget, while remaining responsive to TransLink's requirements as other parts of the Regional Transportation Strategy was being developed and incorporated into the asset management project.

The approved budget was met and the project was completed in relative short timeframe of ten months, which included adding the scope of the climate change and seismic vulnerability projects, and in time for input to the Regional Transportation Strategy.

## Overcoming Site Problems, Scheduling Difficulties, and Other Elements

AECOM team members collected detailed asset information from TransLink and its operating subsidiaries. Close to 50 project meetings were held with stakeholders representing the range of assets managed by TransLink, and approximately 170 documents, spreadsheets and drawings were reviewed to obtain the necessary data to compile the consolidated asset inventory.

## Leveraging AECOM's Network of Internal Resources, Experience and Expertise

The project team was led out of AECOM's Burnaby office with responsibilities including local client liaison, asset inventory data collection, and the climate change and seismic vulnerability portions of the study. Once the asset inventory was completed and signed off, the transit specialists in AECOM's Arlington office imported the inventory data into the SGR model, ran the various scenarios and generated the tabular and graphical outputs needed by TransLink. Ample use of technology such as conference calls, webinars and electronic communication helped to limit the need for travel while keeping the project team members in regular and productive contact with one another and with TransLink.



SeaBus Travelling between Downtown Vancouver and the North Shore.

The state of good repair value from the Asset Management project is currently being carried forward into the analysis being performed as part of the long-range financial plan to support TransLink's Regional Transportation Strategy.

