

BACKGROUND

April 28, 2006

Ministry of Transportation

TUNNEL COSTING COMPARISONS

A number of factors influence the cost of a tunnel. These include:

- Geography and terrain
- Rock and soil conditions
- Ventilation requirements
- Traffic volumes
- Clearances.

For example, the 24.5-km tunnel Laerdal Tunnel in Norway was built over a five-year period (1995–2000) for a cost of \$180 million US. This tunnel was built in very different geotechnical conditions and was designed to accommodate one fourteenth the volume of the proposed tunnel at Eagleridge Bluffs.

Another example is the Beacon Hill Tunnel in Seattle that is currently under construction. This 1.6-km tunnel is expected to cost approximately \$292 million US to complete.

When considering the tunnel option for the Eagleridge Bluffs section of the Sea-to-Sky Highway Improvement Project, the Province established a process to determine an accurate cost estimate for a two-lane, two-way tunnel of approximately one kilometre.

November 2002 – SNC-Lavalin, one of the leading groups of engineering and construction companies in the world, engaged Hatch Mott MacDonald (HMM) to prepare an independent capital and operating costing study of tunnel concepts.

December 2002 – The HMM costing study included a review of existing geotechnical information, as well as tunnel alignments and tunnel cross sections prepared by McElhanney Consulting Services Ltd. (MCSL). As part of their assignment, MCSL engaged Klohn Crippen Berger to update and validate assumptions and cost estimates for tunnel concepts developed for the 1992 Sea to Sky Highway study completed by Klohn Leonoff.

The purpose of the costing study was to provide a direct comparison to an updated cost estimate prepared by others, and to recommend and provide a cost estimate for any design refinements. Capital cost items specifically related to a tunnel included excavation, drill and blast, concrete lining, ventilation, fire suppression, control centre, lighting and safety evacuation tunnel.

April 2004 – MCSL used the Elemental Parametric cost estimation method to establish cost estimates for the various alignment options to develop full project costs.

This cost of a one-km, two-lane, two-way tunnel \$170 million. That includes:

- engineering and construction of structural elements
- cut and fill features
- surface roadways, and
- property acquisition

Other costs included in this \$170-million total include:

- Nelson Cr. Interchange
- Connection of tunnel to existing/improved highway
- Property acquisition costs
- Engineering and project supervision

April 2006 – With the rapid escalation in the cost of construction, engineering services and materials, especially concrete and steel – the main materials used in construction of a tunnel – the costs for a tunnel option today would be significantly higher than the original 2004 estimates.

Engineering credentials

SNC-Lavalin

Having been in business for almost 100 years, SNC-Lavalin is widely recognized as a top company in the areas of ownership and management of infrastructure. The company has offices across Canada and is currently involved in projects in more than 100 countries around the world. They are engaged in a number of other high-profile projects in B.C., including the Canada Line rapid transit line and the new William R. Bennett Bridge in Kelowna.

Other engineering firms involved in developing the tunnel option included:

Hatch Mott MacDonald

Hatch Mott MacDonald is an award-winning full service consulting engineering firm offering more than 100 years of experience in tunnelling solutions. As a recognized leader in this industry, their involvement began in the development of the London underground more than a century ago as well as road and rail systems and Toronto's subway system more than 50 years ago.

Klohn Crippen Berger

Klohn Crippen Berger is an engineering and environmental consulting firm with specific skills in transportation services such as bridge engineering, highway design, tunnel engineering and geotechnical investigations and analysis. For over 50 years, they've earned a reputation as an innovator in their field.

McElhanney Consulting Services Ltd

McElhanney Consulting Services Ltd. provides consulting engineering, surveying, mapping and planning services in the fields of transportation, structures, land development, drainage, water supply and treatment, sewage treatment and disposal, and resource development.

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