CITY OF VANCOUVER

ADMINISTRATIVE REPORT

Report Date:	July 10, 2007
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Meeting Date:	July 24, 2007

A19

TO:	Vancouver City Council
FROM:	General Manager of Engineering Services
SUBJECT:	Marine Drive Trolley Overhead Extension - Direct Current Feeder Wire Placement

CONSIDERATION

A. THAT Council continue with its policy goal to underground all overhead services in the long term and require TransLink to place the direct current feeder wires (power supply wires) underground for the Marine Drive Trolley Overhead Extension.

OR

B. THAT, given City policy to support the maintenance and expansion of trolley buses and the high cost of undergrounding direct current feeder wires (power supply wires), Council make a one time exception to its policy goal to underground all overhead services in the long term and allow TransLink to place the direct current feeder wires overhead for the Marine Drive Trolley Overhead Extension.

CITY MANAGER'S COMMENTS

This report puts the choice between undergrounding the DC feeder wires along Marine Drive forward for Council's consideration. Strictly speaking, based on Council policy, staff should be recommending undergrounding the wires. However, acknowledging the very high cost of this requirement, it is appropriate for Council to make this decision. Given the alternative uses that could be made of the funding, to support transit improvements, and the fact that the funding is not available in the TransLink budget for this work, the City Manager recommends that Council approve CONSIDERATION Item B.

COUNCIL POLICY

In 1993, Council declared a policy goal to underground all overhead services in the City over the long term. Within the related report, it was explained that overhead wiring and its associated poles, cross arms, platforms, and transformers are considered a visual nuisance. It was also noted that from a technical or safety perspective, the advantages of undergrounding are not overwhelming, and the benefits are mainly aesthetic.

The Vancouver Transportation Plan (1997) supports the continued use of the trolley bus fleet as the basic transit service within the city.

In 2005, Council supported the Vancouver-UBC Area Transit Plan which recommended that the #17 Oak, #10 Granville, and the #3 Main bus routes be extended at their south ends to the future Marine Drive RAV (now Canada Line) station.

PURPOSE

This report discusses the implications of two considerations staff have put forward regarding the placement of direct current feeder wires (power supply wires) for TransLink's Marine Drive Trolley Overhead Extension project.

BACKGROUND

In 2005, Council supported the Vancouver-UBC Area Transit Plan which recommended that the #17 Oak, #10 Granville, and #3 Main bus routes be extended at their south ends to the future Marine Drive RAV (now Canada Line) station.

On July 19th, 2006 the TransLink Board of Directors approved funding of \$8,795,000 for the Marine Drive Trolley Overhead Extension. This project involves the installation of new trolley poles and bases complete with overhead wires along Marine Drive between Oak Street and Victoria Drive as well as a rectifier substation located south of Marine Drive between Cambie St. and Yukon Street.

The benefits of this project include:

- Alleviation of the low voltage power conditions which prevents the new electric trolley buses from operating on Main Street (Main Street Showcase);
- Expansion of TransLink's environmentally friendly electric trolley network;
- Connection of the south ends of the #17 Oak, #10 Granville, #8 Fraser, and #3 Main bus routes to the future Marine Drive Canada Line station;
- A more direct connection between the new Vancouver Transit Centre (VTC) and trolley routes east of Oak Street resulting in annual cost savings for the Coast Mountain Bus Company (CMBC) of approximately \$710,000 (per estimate from the report approved by the GVTA Board on July 19th, 2006); and,
- Meeting a commitment made to the Marpole community during the development of the VTC to build a trolley overhead network on Marine Drive.

Under its current scope, this project is 100% financed by TransLink. A project summary produced by TransLink, can be found in Appendix A.

DISCUSSION

The Marine Drive Trolley Overhead Extension will greatly improve the efficiency and connectivity of the trolley bus network in the south of Vancouver. However, TransLink's current project plans place the direct current feeder wires (power supply wires) in the overhead. This is inconsistent with the City's policy goal to underground all overhead services.

Should Council support Consideration A of this report, there are significant cost and scheduling implications. Cost estimates prepared by TransLink indicate that there will be approximately \$10.5 million in extra costs associated with placing the direct current feeders underground as well as a 12 month project schedule impact. Potential impacts to the City of Vancouver include:

- Possible loss of transit funding to other transit services within the City;
- Possible delay to the completion of the Main Street Showcase project; and
- Possible delay to the completion of trolley bus connections to the Marine Drive Canada Line Station.

Previous overhead trolley locations where direct current feeder wires have been undergrounded include the Stanley Park S-Curve and Cambie Street between 2nd Avenue and Broadway. Both of these unique locations are gateways in and out of Vancouver's downtown core. The cost of undergrounding the direct current feeder wires near the Stanley Park S-Curve was shared by several levels of government, including TransLink, whereas the cost of undergrounding the direct current feeder wires on Cambie Street was covered solely by the City as part of the Cambie Bridge project. Photos of locations where direct current feeder wires have been undergrounded near the Stanley Park S-Curve can be found in Appendix B.

Should Council support Consideration B, there will be visual impacts to Marine Drive between Hudson Street and Victoria Drive since the direct current feeder wires (3.4 cm in diameter) will be placed on the trolley poles on the north side of the street. This would be a one time exception to current City policy. It should be noted that most of the existing direct current feeder wires within the City are overhead. Methods to mitigate the visual impact of direct current feeder wires include the planting of trees close in proximity to the feeder wires.

A recent overhead trolley extension where the direct current feeder wires were not placed underground is the connection to the new Vancouver Transit Centre. Much of this extension is located underneath the north end of the Arthur Laing Bridge. Photos of these direct current feeder wires as well as existing direct current feeder wires near 41st Avenue and Oak Street can be found in Appendix B.

The number of direct current feeders required is expected to vary along Marine Drive as follows:

Segment of Marine Drive	Number of Direct Current Feeder Wires
Hudson Street to Oak Street	10 (4 existing and 6 new)
Oak Street to Main Street	6
Main Street to Fraser Street	4
Fraser Street to Victoria Street	2

FINANCIAL IMPLICATIONS

If the City requires the direct current feeder wires to be placed underground, TransLink has estimated that their project cost would increase from \$8.8 million to approximately \$19.3 million. There are currently no TransLink funds identified to cover this additional cost. If undergrounding proceeds, there is a chance that TransLink may seek to offset the project cost increase by reallocating funds that would normally be used to cost-share road related transit improvements within the City.

CONCLUSION

Staff have put forward two considerations regarding the placement of direct current feeder wires (power supply wires) for TransLink's Marine Drive Trolley Overhead Extension project. Consideration A states that Council continue with its policy goal to underground all overhead services in the long term and request TransLink to place the direct current feeder wires (power supply wires) underground for the Marine Drive Trolley Overhead Extension. However, given the significant cost impacts of this action and current city policy regarding the support and maintenance of trolley buses, staff have also put forward Consideration B which, allows TransLink to place the direct current feeder wires overhead as a one time exception to this policy goal.

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January 19, 2007

MARINE DRIVE TROLLEY OVERHEAD EXTENSION PROJECT SUMMARY

PURPOSE

On December 6, 2006, TransLink and City of Vancouver staff met to discuss TransLink's, Marine Drive Trolley Overhead Extension Project. The purpose of the meeting was to review and discuss the:

- · Status, scope and schedule of the project.
- · City of Vancouver (CoV) permitting requirements,
- Coordination requirements with CoV infrastructure (utilities, traffic signals, street lighting etc.)
- Project funding.

The intent of this project summary is to document some of the items listed above that were discussed at the meeting.

PROJECT DESCRIPTION

The Marine Drive Trolley Overhead Extension Project (MDTE) received Specific Project Approval from the TransLink Board of Directors on July 19th, 2006 in the amount of \$8,795,000. The scope of the project includes the design, installation and construction of a new:

 trolley overhead (TOH) network in South Vancouver along Marine Drive between Oak Street and Victoria Drive. (See Figure 1.) The network includes new trolley poles and bases complete with overhead wires in both the East and West directions along Marine Drive.

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4 MVA rectifier substation to power the new trolley network. The substation will be located on a portion of the old ICBC site. (South of Marine Drive between Cambie St. and Yukon St.)

The project carries great significance to the Regional Transportation Strategy, the Vancouver Area Transit Plan and the seamless startup of the Canada Line Rapid Transit Project. The Marine Drive Trolley Extension project will:

- alleviate a low voltage power condition on Main Street between 41st Avenue and • Marine Drive. The power upgrade is required in order to operate the new electric trolley buses on Main Street as part of the CoV and TransLink's Main Street Show Case Project. The newly delivered trolley buses will not be able to operate on Main Street between 54th Avenue and Marine Drive without the additional voltage feeder boost described above.
- continue to fulfill TransLink's and the CoV's long term objective of growing and proliferating the environmentally friendly electric trolley buses.
- reduce the number of buses that currently use the Granville and Oak Street corridors. Presently all buses are routed North from the Vancouver Transit Centre (VTC) on these two corridors. The new network will allow buses to be routed East on Marine Drive which will provide additional pre- and post-peak service along new corridors to transit customers. An added benefit is that the new network reduces the deadhead and relief costs for Coast Mountain Bus Company (TransLink subsidiary) operations out of the new Vancouver Transit Center (VTC).
- connect TransLink's "North-South" Vancouver bus routes (#10 Granville, #17 -Oak, #3-Main and #8 -Fraser) to the new Canada Line Marine Drive Station.
- meet a commitment made to the Marpole community during the development of the VTC. TransLink and the CoV made a commitment to the Marpole community to develop and build a trolley overhead network East on Marine Drive in order to reduce bus traffic in their community.

SCHEDULE

The project has three distinct phases of trolley overhead construction work. (See Figure 1) The three phases, and associated completion dates, are as follows:

- Phase 1: Main Street Power Boost November 2007.
- Phase 2: Trolley Overhead Extension, Oak Street to Main Street and New Rectifier . Substation - June 2008
- Phase 3: Trolley Overhead Extension, Main Street to Victoria Drive June 2009 •

Phase 1

The scope of work includes the installation of trolley overhead poles, bases, feeders (six 3.4cm diameter conductors) and running wires on the North side of Marine Drive between Oak Street and Main Street.

The schedule for the Main Street Feeder Boost is:	
Completion of Design	December 200
Revise Design to Support Lighting/Signals requirements	January 2007

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Project (Permit) Approval	February 2007
Pole Base Construction	February to May 2007
Pole Fabrication	February to May 2007
Pole Installation	May to July 2007
Overhead Feeder Wire Installation	July to October 2007
Testing and Commissioning	November 2007
Main Street Showcase Project Opening	December 2007**

**As discussed earlier, Phase 1 work is critical to the successful launch of the Main Street Showcase Project in December 2007.

Phase 2

The scope of work includes the installation of trolley overhead poles, bases and running wires on the South side of Marine Drive between Oak Street and Main Street.

The schedule for Phase 2 is: U/G Utility Investigation and Detailed Locate Foundation Engineering and Project (Permit) Approval Pole Base Construction Pole and Wire Installation

February to April 2007 May to July 2007 July to December 2007 January to June 2008

Phase 3

The scope of work includes the installation of trolley overhead poles, bases and running wires on the North and South sides of Marine Drive between Main Street and Victoria Street.

The schedule for Phase 3 is: U/G Utility Investigation and Detailed Locate Foundation Engineering and Project (Permit) Approval Pole Base Construction Pole and Wire Installation

Sept. to November 2007 Dec. 2007 to Feb. 2008 March to November 2008 Dec. 2008 to June 2009

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Figure 1.

TROLLEY OVERHEAD NETWORK

The trolley overhead network is a unique system. Typically, trolley running wires and hardware are supported by either:

- a) cross street span wires, which span from two trolley poles on either side of the street, or
- b) a cantilever beam which is cantilevered from the trolley poles.

The Marine Drive extension project will primarily use the cantilever system for all locations, except at street intersections where the span wire system will be used.

The trolley overhead system also requires feeder wires, which provide power from the substation to the network at various points along the network. Traditionally, the trolley network feeder wires are located overhead (ie: supported linearly along the trolley route by hardware on the poles). Trolley feeder wires are classified as low voltage (> 750V); hence, they are allowed to be low in height (compared to BC Hydro's 12.5KV wires) and in close proximity to and almost hidden within the streetscape trees. Feeders are usually located above ground due to the significant capital and maintenance costs associated with locating them below grade. The capital cost of underground feeder cable is eleven times higher (See Appendix A) than traditional above ground feeder due primarily to the:

- a) requirement to use a premium copper conductors
- b) higher civil/infrastructure works

Similarly, ongoing maintenance costs are higher for underground feeders, because the feeders require a regular replacement program due to contact with water in the ground. On average, the underground cables need to be replaced every 20 years to prevent electrical short circuits where this is not required if the feeders are located above ground.

PROJECT FUNDING

TransLink is funding 100% of the capital cost of the project based on the TransLink Board approved scope of constructing the infrastructure required to operate trolley buses. It should be noted that there is currently no funding in place to provide enhancements to the project, for example, street lighting and/or traffic signals. While required enhancements are best incorporated into the project at the early stages (to minimize future cost and effort), additional funding from external sources is required to meet the project budget.

PUBLIC CONSULTATION

TransLink would welcome the opportunity to partner with the City of Vancouver in a public consultation process, if it is deemed beneficial to the approval process of the project. At this time, no open houses have been scheduled.

APPENDIX A - Cost Comparison of Overhead Feeders

Overhead feeders costs for the MDTE project:	
1.) Overhead Feeder Cable (27km@\$21/m)	\$567,000
2.) Overhead Feeder Installation (450spans=27km)	\$278,000
3.) Overhead feeder arms & installation	\$119,000
Total	\$964,000
Underground feeder costs for the MDTE project:	
1.) Underground Feeder Cable (27km@\$135/m)	\$3,645,000
U/G Feeder cable Installation (from PVK)	\$2,403,000
 Concrete encased duct bank (5km@\$600/m) 	\$3,000,000
4.) Qty. 55 manholes (90m sep.) @ \$10,000 each	\$556,000
5.) Sidewalk repair b/c trenching (5km@\$300/m)	\$1,500,000
6.) Trenchless digging & steel casing pipes to cross	impassable
intersections or U/G utility (est. 10 @\$30,000)	\$300,000
Total \$	\$11,404,000

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PHOTOS OF TROLLEY WIRES WITH AND WITHOUT EXISTING DIRECT CURRENT FEEDER WIRES

Photo 1 - Four Direct Current Feeder Wires on 41st Ave. East of Oak St.



Photo 2 -Direct Current Feeder Wires Undergrounded near Stanley Park S-Curve

Photo 3 - Four Direct Current Feeder Wires on 41st Ave. West of Oak St.

Photo 4 - Direct Current Feeder Wires Undergrounded Near Stanley Park S-Curve

Photo 5 - Six Direct Current Feeder Wires on Oak St. South of 41st Ave.

Photo 6 - Four Direct Current Feeder Wires Adjacent to Trees on 41st Ave. West of Oak St.

Photo 7 - Four Direct Current Feeder Wires Adjacent to Trees on 41st Ave. West of Oak St. -Side View

Photo 8 - Four Direct Current Feeder Wires on Marine Dr. Near Osler St. (NEAR VTC)

Photo 9 - Six Direct Current Feeder Wires on Marine Dr. Near Hudson St. (NEAR VTC)