

Legislative Council Panel on Transport

Replacement of the High Voltage and Low Voltage Switchboards and Transformers of the Power Supply System in the Aberdeen Tunnel

PURPOSE

This paper seeks Members' views on the proposal to replace the high and low voltage switchboards, transformers and associated equipment in the Aberdeen Tunnel (ABT).

BACKGROUND

2. The existing electricity supply and distribution system in the ABT comprises high and low voltage switchboards, transformers and associated power supply equipment (e.g. generators, cables, etc). The system was installed when the tunnel was commissioned in 1982. Most of the core components of the system are reaching the end of their serviceable life. It is necessary to replace the system to ensure a stable and reliable power supply for safe, efficient and cost-effective tunnel operation.

PROPOSAL

3. We propose to replace the existing electricity supply and distribution system of the ABT at an estimated cost of \$24.6 million.

JUSTIFICATION

4. The existing electricity supply and distribution system in question was put in use when the ABT was opened in 1982. Most of the core components of the system are reaching the end of their serviceable life. The switchboards and transformers have deteriorated to a state which is beyond economic repair, and it has become increasingly difficult to maintain them in good operating conditions. In addition, as these switchboards and transformers are mostly of an old design, most of their spare parts have already become obsolete. For example, the oil circuit breakers of the high voltage switchboard are currently not available in the market.

5. To ensure efficient and safe tunnel operation during power failure, we also propose to retrofit the essential electricity supply system. Instead of using no-break generators, we propose to use two uninterruptible power supply systems with emergency generators¹. This complies with the latest design requirements of the Transport Department and Highways Department, and will provide a more reliable power supply in cases of emergency operation.

6. Any fault of the electricity supply and distribution system will directly affect the normal operation of the tunnel. If the service of the ABT has to be suspended due to power failure, there will be serious traffic congestion on the roads linking Aberdeen and the city area of Hong Kong Island. We therefore consider the proposed replacement essential.

IMPLEMENTATION PROGRAMME

7. We plan to start the replacement project in late-2005, which will take about thirty months to complete. A work programme is set out at the **Annex**. The first ten months are for preparations including detailed investigation, system design and tendering. The latter twenty months are for equipment manufacturing and delivery, system installation, testing and commissioning.

8. During the project implementation, we will ensure minimal disruption to the tunnel traffic as far as possible. Most of the works will be carried out at night during the routine tube closure for maintenance with the other tube adopting the one-tube-two-way operation.

FINANCIAL IMPLICATIONS

9. We estimate the capital cost of the project to be \$24.6 million, made up as follows -

¹ The major function of the essential power supply system is to provide emergency lighting for the tunnels to allow for evacuation during power failure. It is specified in the Public Lighting Design Manual published by the Highways Department that the essential power for the tunnel lighting shall be fed by uninterruptible power supply connected to generators. This would be more reliable than a no-break generator system. Besides, the uninterruptible power supply plus emergency generators system provides a smoother transition in case of power interruption.

| | | \$ million |
|-----|--|-------------------------|
| (a) | Replacement of | 16.2 |
| | (i) two high voltage switchboards | 5.5 |
| | (ii) six low voltage switchboards | 4.0 |
| | (iii) six transformers | 3.8 |
| | (iv) high voltage cables | 1.2 |
| | (v) low voltage cables | 1.4 |
| | (vi) cable tray and other mounting accessories | 0.3 |
| (b) | Improvements to the essential power supply system (two uninterruptible power supply systems with two emergency generators) | 3.6 |
| (c) | Electrical and Mechanical Services Trading Fund (project management charges) | <hr/> 2.8 |
| (d) | Contingency (10% of (a) and (b)) | <hr/> 2.0 |
| | Total | <hr/> 24.6 <hr/> |

10. Regarding paragraphs 9(a) and (b), the total cost of \$19.8 million will cover the supply, installation, testing and commissioning of all high voltage switchboards, low voltage switchboards, transformers and associated power supply equipment (e.g. generators, cables, etc).

11. As for paragraph 9(c), the Electrical and Mechanical Services Department will carry out the project's feasibility study, prepare the

specifications, design and project programme, oversee the tendering process, undertake site inspection, installation supervision, testing and commissioning of the system, and monitor the defect rectification during the defect liability period.

12. We intend to phase the expenditure as follows -

| Year | \$ million |
|--------------|-------------------|
| 2005-2006 | 0.25 |
| 2006-2007 | 1.25 |
| 2007-2008 | 16.0 |
| 2008-2009 | 7.1 |
| Total | 24.6 |

13. Since this is a replacement of the existing equipment, there will not be any additional recurrent expenditure.

14. The above proposal will have no impact on the level of the tolls of the ABT.

WAY FORWARD

15. We will seek the approval of the Finance Committee on 27 May 2005 for funding the replacement of switchboards, transformers and associated equipment in the ABT.

ADVICE SOUGHT

16. Members are invited to comment on the proposal.

Environment, Transport and Works Bureau
February 2005

Work Programme for Replacement of High Voltage Switchboards, Low Voltage Switchboards and Transformers in the Aberdeen Tunnel

| | Task Name | Duration (months) | 2005 | 2006 | | 2007 | | 2008 |
|---|--|-------------------|------|------|------|------|------|------|
| | | | 7-12 | 1-6 | 7-12 | 1-6 | 7-12 | 1-6 |
| 1 | System Engineering Study | 4 | ■ | | | | | |
| 2 | Detailed Design | 4 | | ■ | | | | |
| 3 | Tendering | 3 | | ■ | | | | |
| 4 | Equipment Manufacture, Installation, Testing & Commissioning | 21 | | | ■ | ■ | ■ | ■ |