

SHA TIN SECTION OF ROUTE 8

Executive Summary

1. Route 8 links Sha Tin with North Lantau via Cheung Sha Wan and Tsing Yi. In order to alleviate traffic congestion at the then existing road links between Kowloon and Sha Tin, and meet the future traffic demand, the Government commenced the construction of Sha Tin Section (between Sha Tin and Cheung Sha Wan) of Route 8 in 2002. The construction was implemented through awarding three works contracts, namely Contracts A, B and C, and a traffic control and surveillance system (TCS System) contract (Contract D). The project works under Contracts A, B and D were implemented by the Highways Department (HyD) while those works under Contract C were entrusted to the Civil Engineering and Development Department (CEDD) for implementation. The design and construction supervision work of Sha Tin Section were conducted under Consultancy X (for Contracts A and B by Consultant X) and Consultancy Y (for Contract C by Consultant Y).

2. Between March 1997 and June 2002, the Finance Committee of the Legislative Council (LegCo) approved funding of \$7,083.9 million in total for the investigation, detailed design and construction of Sha Tin Section. After the substantial completion of the main works, Sha Tin Section was commissioned in March 2008. As of December 2017, the Government had incurred \$6,179.1 million for the Sha Tin Section project, \$904.8 million (13%) below approved funding.

3. Sha Tin Section (a 5.6 kilometre (km) dual three-lane expressway), together with Tsing Yi Section (a 7.6 km dual three-lane expressway between Cheung Sha Wan and Tsing Yi) of Route 8, form the Tsing Sha Control Area (TSCA). The management, operation and maintenance (MOM) of the TSCA has been outsourced to an operator through open tender since commissioning of Sha Tin Section. The Transport Department (TD) is responsible for handling the tendering of management contract, and for overseeing and monitoring the performance of the contractor for the TSCA. The Audit Commission (Audit) has recently conducted a review of Sha Tin Section of Route 8, covering mainly Contracts A to C (Contract D involved the implementation of the TCS System for both Sha Tin Section and Tsing Yi Section, and an audit review of Tsing Yi Section in 2014 had covered this contract).

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Administration of Contract A

4. Contract A mainly involved the construction of Lai Chi Kok (LCK) Viaduct. In September 2003, the HyD awarded Contract A to Contractor A at a contract sum of \$1,066.2 million. The contract works were completed in November 2009 (about 24 months later than the original completion date of November 2007) and the total contract expenditure was \$1,445 million (an increase of \$378.8 million (36%) over the original contract sum of \$1,066.2 million). In the construction of LCK Viaduct, there were disputes under Contract A and disputes under Consultancy X. The disputes under Contract A mainly consisted of two key issues, namely adequacy of the design for viaduct structure and erection, and measurements and valuations of additional or varied works (a majority of which were related to the viaduct design). In October 2012, the HyD and Contractor A agreed to settle all the disputes under Contract A at an extra-contractual settlement sum of \$273 million on a “without admission of liability” basis. The disputes under Consultancy X were mainly in respect of the viaduct design issues. In November 2016, Consultant X, also on a “without admission of liability” basis, agreed to pay an extra-contractual settlement sum of \$133.1 million to settle all the disputes under Consultancy X (paras. 2.2 to 2.4, 2.7, 2.9 and 2.11 to 2.14).

5. ***Need to strengthen vetting of consultant’s design.*** One of the key issues in the disputes between the HyD and Contractor A related to the design for viaduct structure and erection. According to the HyD, this issue concerned, for example, whether the design for the permanent structure of the viaduct envisaged to be built by the balanced cantilever method should have taken into account the temporary loadings during construction. In the course of disputes resolution, having considered legal opinion and views of an engineering expert on the design for the permanent structure of LCK Viaduct, the HyD noted that: (a) the construction and erection loadings did not appear to have been properly considered in the design; (b) the contract drawings only showed the use of balanced cantilever method of construction but did not indicate the need for certain requisite construction systems; and (c) Consultant X’s response to a tender query requesting clarification of the temporary loads used in Consultant X’s design could lead to confusion that construction and erection loadings had been considered in Consultant X’s design. In implementing a works project in future, there is a need for the HyD to take measures to strengthen vetting of a consultant’s design, including carrying out appropriate level of independent checking on the design of highway structures (paras. 2.15, 2.16 and 2.21).

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6. *Need to strengthen measures in handling responses to tender queries.*

Audit noted that Consultant X's response to the tender query could lead to confusion (see para. 5(c)) and could give rise to grounds for claims on the design for viaduct structure and erection. In view of the possible significant implications of responses to tender queries, there is a need for the HyD to strengthen measures in handling responses to tender queries (paras. 2.22 and 2.24).

7. *Need to consult Financial Services and the Treasury Bureau (FSTB) earlier regarding extra-contractual settlement of claims.*

The Stores and Procurement Regulations set out requirements for contract negotiation. In July 2012, the HyD discussed with Contractor A and reached a non-committal consensus (which was subject to the Government's internal approval and the execution of a formal settlement agreement) to settle all the disputes under Contract A at an extra-contractual settlement sum of \$273 million. Audit noted that the HyD had not sought the FSTB's prior agreement before discussing with Contractor A and reaching such consensus (paras. 2.30 and 2.31).

Administration of Contract B and Contract C

8. Contract B mainly involved the construction of Eagle's Nest (EN) Tunnel. In September 2003, the HyD awarded Contract B to Contractor B at a contract sum of \$1,836 million. In the event, the contract works were completed in February 2009 (about 15 months later than the original completion date of November 2007). The total contract expenditure was \$2,317.1 million (an increase of \$481.1 million (26%) over the original contract sum of \$1,836 million). Contract C mainly involved the construction of Sha Tin Heights (STH) Tunnel and Approaches. The HyD entrusted the works to the CEDD which awarded Contract C to Contractor C in November 2002 at a contract sum of \$1,073.8 million. The contract works were completed in September 2008 (about three months later than the extended completion date). The total contract expenditure was \$1,199.6 million (an increase of \$125.8 million (12%) over the original contract sum of \$1,073.8 million) (paras. 3.2 to 3.4, 3.27 and 3.28).

9. *Discrepancy between contract clause and contract drawing in Contract B.*

Contract B was a remeasurement contract under which the costs of works are based on the actual quantities of works done to be remeasured and the prices of different works items as priced by the contractor in the Bills of Quantities (BQ) according to the contract. Under Contract B, a contract clause on tunnelling works required that

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a layer of smoothing shotcrete should be applied outside the extrados of the permanent concrete lining of EN Tunnel. However, the thickness of smoothing shotcrete was stated at a maximum of 100 millimetres (mm) in the contract clause and 170 mm in the contract drawing. According to Consultant X's assessment, the thickness of the smoothing shotcrete should have been 170 mm. The 170 mm smoothing shotcrete was omitted in the BQ. In the event, the thickness of smoothing shotcrete measured 170 mm and the HyD paid \$43.7 million to Contractor B for the works item omitted in the BQ (paras. 2.2, 3.2, 3.6 and 3.8).

10. *Unclear contract clauses for measurement of tunnelling works.* A contract clause on tunnelling works of Contract B required the adoption of controlled blasting techniques for the formation of the tunnel perimeter. Contractor B contended that such a works item was omitted in the BQ for excavation in tunnel. Consultant X agreed that the BQ for excavation in tunnel had not included controlled blasting as a works item and it was desirable to expand the BQ for excavation in tunnel to cover controlled blasting. In the event, the HyD paid \$54.6 million to Contractor B for its claims (paras. 3.10 to 3.12).

11. *Scope for conducting more thorough preliminary site investigations.* At the tender stage of Contract B, drawings showing the ground investigation information obtained at the design stage would be provided to tenderers for reference upon request. Audit noted that total prolongation costs of \$34.5 million were awarded under Contract B due to extensions of time for additional works at three slopes at which actual site conditions were undetected in earlier site investigations. There is merit for the HyD and its consultants to conduct more thorough preliminary site investigations for works at critical locations with a view to incorporating more accurate information on site conditions for design and tender purposes as far as practicable (paras. 3.22 and 3.24).

12. *Shortened facilitation period arising from an error in drafting of Contract C.* The scope of works entrusted to the CEDD (implemented under Contract C) did not include electrical and mechanical (E&M) works and TCS System works which had to be performed by the HyD contractors under Contracts B and D respectively. After the substantial completion of certain sections of works in Contract C, the HyD contractors' follow-on works would commence. Under Contract C, Contractor C would provide the necessary facilitation works (e.g. temporary ventilation and lighting) to enable the HyD contractors to carry out

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follow-on works at the site areas of such sections for a period of nine months (facilitation period). However, due to a processing error during the drafting of Contract C, the facilitation period was defined to be about 7.5 months instead of the agreed duration of 9 months. Audit considers that the processing error could have been avoided with more diligence and care (paras. 3.29, 3.31 and 3.32).

Usage and management of Sha Tin Section

13. Since commissioning of Sha Tin Section in March 2008, the MOM of the TSCA has been outsourced to an operator through open tender. The TD awarded the current MOM contract in June 2013 to an operator at a fixed lump-sum management fee of \$964.4 million for six years from 19 September 2013 to 18 September 2019. The operator is responsible for the proper MOM of the TSCA. According to the current TSCA MOM contract: (a) a Government Monitoring Team (GMT), comprising officers from the TD, the HyD, the Electrical and Mechanical Services Department (EMSD) and the Architectural Services Department, is responsible for monitoring the TSCA operator's performance; (b) the operator shall at all times provide and maintain sufficient number of competent personnel at all levels for safe, effective and efficient MOM of the TSCA in accordance with the staff plan specified in the contract; and (c) if the operator fails to employ the required number of staff at certain ranks, the operator shall pay the Government, as liquidated damages (LD), the sum for shortfall of staff at each rank (paras. 4.10 to 4.12).

14. *Need to make better use of spare capacity of Sha Tin Section.* In 2002, the Transport and Housing Bureau informed LegCo that the construction of Sha Tin Section of Route 8 was needed to alleviate the traffic congestion at the then existing road links between Kowloon and Sha Tin, in particular Lion Rock Tunnel and Tate's Cairn Tunnel. However, Audit noted that as of April 2017, during weekday peak hours, EN Tunnel and STH Tunnel of Sha Tin Section still had spare capacity while Lion Rock Tunnel and Tate's Cairn Tunnel had exceeded their respective design capacities. For example, in the AM peak hours, EN Tunnel and STH Tunnel were at 79% of their tunnel design capacity with no observable traffic queue, while Lion Rock Tunnel and Tate's Cairn Tunnel reached 135% and 138% of their respective tunnel design capacities and with traffic queues of 1.8 km and 1.9 km respectively (para. 4.4).

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15. ***Responsibilities of GMT members not clearly set out.*** According to the TD, the GMT members monitor the performance of the operator under their respective purview. However, Audit noted that the respective responsibilities among the GMT members were not specified in the TSCA MOM contract or documented in other records (paras. 4.13 and 4.14).

16. ***Manning level requirements for some types of staff not monitored.*** According to the TD, for different types of staff specified in the TSCA MOM contract, the GMT members are responsible for monitoring the staff manning level and imposing LD for any staff shortfall. Audit noted that, as of December 2017, the manning level of administrative and supporting staff and that of building maintenance staff had not been monitored since the commencement of the TSCA MOM contract in September 2013 (paras. 4.15 and 4.16).

17. ***Staff manning level requirement not met.*** According to the TD, the TSCA operator is required to deploy a total of 403 staff, of which 343 staff are subject to LD for any shortfall. However, the operator was not able to continuously maintain the required staff manning level since the commencement of the contract in September 2013 and, as a mitigation measure, had arranged its staff to work overtime to fill the vacancies as far as possible. Audit found that, for the period from January to September 2017, out of the required manning level of 343 staff subject to LD for any shortfall, there was a shortfall of about 25 staff on average (around 7% of the required manning level of 343 staff), mostly attributed to the shortfall of about 24 E&M staff (around 20% of the required manning level of 122 E&M staff) (paras. 4.25 to 4.27).

18. ***Delay in imposing LD.*** The TD initiated action to impose LD for staff shortfall on the TSCA operator in October 2014. However, due to unclear methodology set out in the MOM contract, it took 27 months (from November 2014 to January 2017) for discussing and agreeing with the operator the methodology for calculating the amount of LD. Audit noted that, as of December 2017: (a) for E&M staff, in respect of the operator's staff shortfall for about 51.5 months from 19 September 2013 to 31 December 2017, the TD had only imposed LD of about \$5.7 million for about 14.5 months, and the TD and the EMSD had not yet ascertained the amount of LD for the remaining 37 months; and (b) for building maintenance staff, as the manning level of such staff had not been monitored since the commencement of the TSCA MOM contract, information on staff shortfall remained

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to be checked and hence no LD had been imposed up to December 2017 (paras. 4.32 and 4.33).

Audit recommendations

19. **Audit recommendations are made in the respective sections of this Audit Report. Only the key ones are highlighted in this Executive Summary. Audit has recommended that the Government should:**

Administration of Contract A

- (a) **in implementing a works project in future, take measures to strengthen vetting of a consultant's design, and strengthen measures in handling responses to tender queries (para. 2.25(a) and (b));**
- (b) **strictly follow the Stores and Procurement Regulation requirements for contract negotiation and seek the relevant authority's prior agreement to the strategy or bottom line for the contract negotiation before entering into negotiation with contractors or consultants in future (para. 2.40(a));**

Administration of Contract B and Contract C

- (c) **in preparing documents for a works contract in future, take measures to strengthen the checking of consistency between contract clauses and contract drawings, and strengthen the vetting of tender documents regarding contract clauses for the measurement of works (para. 3.18(a) and (b));**
- (d) **consider conducting more thorough preliminary site investigations for works at critical locations with a view to incorporating more accurate information on site conditions for design and tender purposes as far as practicable (para. 3.25);**
- (e) **in preparing documents for a works contract in future, take measures to ensure that contract clauses for time programmes are carefully checked to ensure their accuracy and consistency (para. 3.38(a));**

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Usage and management of Sha Tin Section

- (f) **explore measures to make better use of the spare capacity of EN Tunnel and STH Tunnel of Sha Tin Section to alleviate the traffic congestion at the existing road links between Kowloon and Sha Tin (para. 4.8(a));**
- (g) **set out clearly the responsibilities of each member of the GMT in monitoring the TSCA operator's performance (para. 4.36(a));**
- (h) **take measures to ensure that the TSCA operator complies with the manning level requirement in the MOM contract for all staff, and take timely actions to monitor the staff manning level of the TSCA operator (para. 4.36(b), (c) and (f)); and**
- (i) **take timely actions in calculating and imposing LD for the TSCA operator's shortfall of E&M staff and building maintenance staff (para. 4.36(g)).**

Response from the Government

20. The Government agrees with the audit recommendations.