CHAPTER 9

Water Supplies Department

Tai Po Water Treatment Works Project: contract administration

Audit Commission
Hong Kong
31 March 2006

This audit review was carried out under a set of guidelines tabled in the Provisional Legislative Council by the Chairman of the Public Accounts Committee on 11 February 1998. The guidelines were agreed between the Public Accounts Committee and the Director of Audit and accepted by the Government of the Hong Kong Special Administrative Region.

Report No. 46 of the Director of Audit contains 9 Chapters which are available on our website at http://www.aud.gov.hk.

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TAI PO WATER TREATMENT WORKS PROJECT: CONTRACT ADMINISTRATION

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PART 1: INTRODUCTION

1.1 This PART describes the background to the audit and outlines the audit objectives and scope.

Tai Po Water Treatment Works Project

1.2 In 1994, the Water Supplies Department (WSD) forecasted that the Shatin group of water treatment works, with a capacity of supplying 1,700,000 cubic metres of treated water daily to Hong Kong Island, Kowloon and north-eastern New Territories, would be inadequate to meet demand by 2000. Therefore, the WSD planned to implement the Tai Po Water Treatment Works Project for supplying additional 250,000 cubic metres of treated water daily to the areas. The capacity of this new water treatment facility could be expanded to meet future increase in demand.

1.3 Between 1994 and 1996, the Finance Committee of the Legislative Council approved a total funding of $4.6 billion for carrying out the Tai Po Water Treatment Works Project. In November 1995, a consultant (hereinafter referred to as the Consultant) was employed for carrying out the design and supervision of the construction works for the Project, which comprised three capital works contracts (see Table 1).

Table 1

The three capital works contracts

Contract	Major works	Final contract sum ($ million)	
Contract A (Contractor A)	Construction of two aqueducts for carrying raw water and treated water between Tai Po and the Butterfly Valley (see para. 2.2)	1,016	
Contract B (Contractor B)	Construction of a primary service reservoir, with site formation and ancillary works, at the Butterfly Valley (see para. 3.2)	325	
Contract C (Contractor C)	Construction of water treatment works and a treated water pumping station in Tai Po	1,941	(Note)
		3,282	

Source: *WSD records*

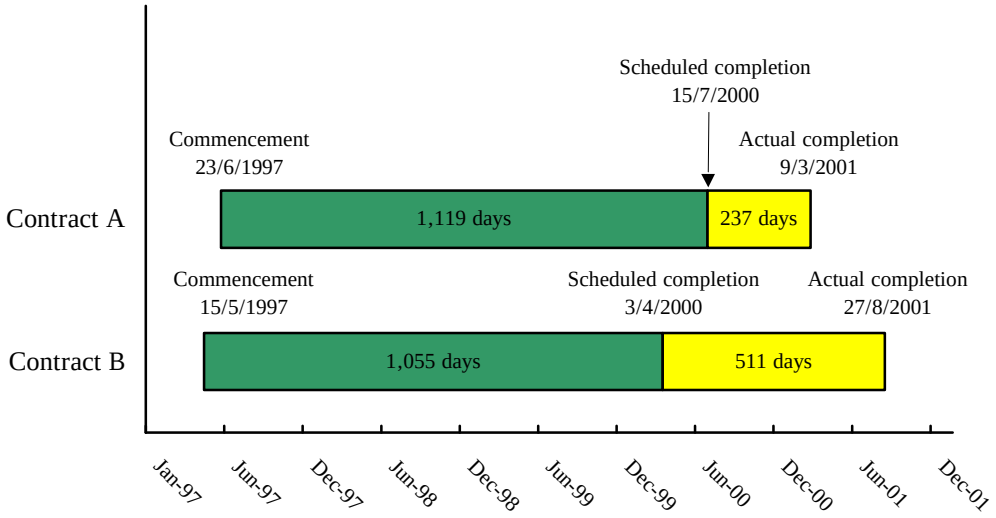
Note: *Up to February 2006, the payment for Contract C had not been finalised. This amount was the original contract sum for Contract C.*

1.4 The Tai Po Water Treatment Works commenced operation in June 2003. Payments for Contract A and Contract B were finalised in September 2003 and March 2004 respectively. For Contract C, up to February 2006, the contract sum had not been finalised as there were outstanding claims to be resolved. Therefore, this review did not cover Contract C.

1.5 There were delays in the completion of the major works under Contract A and Contract B (see Figure 1).

Figure 1

Completion of major works under Contract A and Contract B



Source: *WSD records*

Remarks: *Major works under the capital works contracts referred to those works of which delay in completion could affect the commencement of operation of the Tai Po Water Treatment Works. According to the Conditions of Contract A, Contractor A was not entitled to an extension of time due to inclement weather. According to the Conditions of Contract B, Contractor B was entitled to an extension of time due to inclement weather, and 88 days were granted.*

1.6 The WSD made additional payments to Contractor A and Contractor B for settling claims. The major claims are summarised in Table 2.

Table 2

Major claims under Contract A and Contract B

Contract	Major claims
Contract A	Claim for additional costs due to excessive inflows of ground water during the construction of the treated-water aqueduct
Contract B	Claim for prolongation cost due to the need for conducting blasting assessments after the commencement of the works
Contract B	Claim for additional cost of excavation works using mechanical method instead of blasting prior to obtaining the blasting permits
Contract B	Claim for cost over the provision of toolbox training (safety training on the use of facilities and equipment)

Source: WSD records

Audit review

1.7 The Audit Commission (Audit) has recently conducted a review to examine the administration of Contract A and Contract B by the WSD. The audit review focused on the following areas:

(a) the administration of a claim under Contract A (see PART 2);

(b) the conduct of blasting assessments under Contract B (see PART 3); and

(c) the payment for toolbox training under Contract B (see PART 4).

Audit has found that there are areas where improvements can be made by government departments in the administration of works contracts.

Acknowledgement

1.8 Audit would like to acknowledge with gratitude the full cooperation of the staff of the WSD, the Geotechnical Engineering Office (GEO) of the Civil Engineering and Development Department (CEDD – Note 1) and the Environment, Transport and Works Bureau (ETWB) during the course of the audit review.

Note 1: *The CEDD was formed on 1 July 2004 by merging the then Civil Engineering Department and the Territory Development Department. Before the merger, the GEO was an office under the Civil Engineering Department.*

PART 2: ADMINISTRATION OF A CLAIM UNDER CONTRACT A

2.1 This PART examines the WSD's administration of a claim under Contract A.

Works under Contract A

2.2 In May 1997, the WSD awarded Contract A which mainly involved the design and construction (Note 2) of:

(a) a 1.3 kilometre raw-water aqueduct for carrying raw water from Tai Po Tau Pumping Station to the new water treatment plant; and

(b) a 12 kilometre treated-water aqueduct for carrying treated water from the new water treatment plant in Tai Po to the Butterfly Valley Service Reservoir in Lai Chi Kok (see Figure 2).

The construction of the two aqueducts involved substantial tunnelling works, during which a contractor might encounter ground water inflows to the workplace.

Note 2: *Contract A was a design-and-build contract under which Contractor A was required to prepare the detailed design and to carry out the construction works.*

Figure 2

Works under the Tai Po Water Treatment Works Project

Source: WSD records

Claim for additional costs due to excessive inflows of ground water

Notice of excessive ground water inflows

2.3 In January 1999, Contractor A gave the Supervising Officer (hereinafter referred to as Supervising Officer A – Note 3) a notice of:

(a) delays to the works, due to excessive ground water inflows during the construction of the treated-water aqueduct; and

(b) his intention to claim an additional payment for the measures taken to deal with the excessive ground water inflows.

Granting of extension of time

2.4 Supervising Officer A granted Contractor A an extension of time (EOT) of 122 days for constructing the treated-water aqueduct on the grounds that the Contractor could not have contemplated the excessive ground water inflows at the tender stage. The EOT comprised:

(a) 71 days for the delay to the works up to the tunnel breakthrough in May 1999; and

(b) 51 days for the delay to the works after the tunnel breakthrough.

Claim for additional costs

2.5 In April 2000, Contractor A submitted a claim for additional costs relating to the measures taken to deal with the excessive ground water inflows before the tunnel breakthrough.

Note 3: *Under a design-and-build contract, the Supervising Officer is the person, company or firm appointed by the Employer and notified in writing to the contractor for the purposes of the contract. The Consultant employed by the WSD for the Project (see para. 1.3) was the Supervising Officer of Contract A. He was also the Engineer of Contract B (see para. 3.16).*

2.6 In December 2000, Supervising Officer A submitted to the WSD his assessment (including claim analysis and evaluation) of Contractor A's claim. He made a recommendation to the WSD that a variation order in the sum of $9.7 million should be granted to the Contractor. In February 2001, the WSD considered that it might not be valid to issue a variation order to the Contractor. Subsequent to further discussions with the WSD, in March 2003, the Supervising Officer rejected the Contractor's claim on the following grounds:

(a) neither the Supervising Officer nor the WSD had added, altered or omitted any obligation or restriction to the works in association with the excessive ground water inflows;

(b) by taking the mitigation measures, it was possible for the Contractor to overcome the problems caused by the excessive ground water inflows; and

(c) according to the Conditions of Contract, no claim by the Contractor for additional payment should be made on the grounds of unforeseen ground conditions.

2.7 On 12 April 2003, Contractor A claimed for further additional costs incurred to deal with the excessive ground water inflows after the tunnel breakthrough. On 17 April 2003, the Contractor disputed Supervising Officer A's rejection of his claim for additional costs incurred before and after the tunnel breakthrough. The Contractor requested that his claim for costs be resolved by mediation.

Settlement of the dispute

2.8 In June 2003, having considered the advice of the Legal Advisory Division (Works) of the ETWB, the WSD decided to negotiate with Contractor A about his claim instead of resolving the issue by mediation.

2.9 In July 2003, after obtaining the agreement of Contractor A and the approval of the Financial Services and the Treasury Bureau (FSTB), the WSD commenced negotiation with him. Between July and August 2003, the WSD and the Contractor exchanged views at meetings. The Contractor also made submissions to substantiate his claim. In September 2003, with the approval of the FSTB, the WSD agreed with the Contractor to pay him a sum for settling the dispute.

Audit observations

Need for clear guidelines for disclosing information to contractors

2.10 Audit's examination revealed that:

(a) **under the consultancy agreement with the WSD, Supervising Officer A had a contractual obligation to seek the WSD's views before he reached a decision on a claim;** and

(b) during the negotiations in July and August 2003, in one of his submissions to the WSD (see para. 2.9), Contractor A used information similar to the Supervising Officer's claim assessment (including claim analysis and evaluation) made in December 2000 (see para. 2.6) to substantiate his claim.

2.11 Regarding the disclosure of claim-assessment information to contractors, Audit notes that, in March 2000, in a memorandum issued to works departments, the then Works Bureau (Note 4):

(a) noted that some correspondences of a sensitive nature related to claims were not filed in a confidential manner; and

(b) set out guidelines (Note 5) to the effect that documents/correspondences related to the Engineer/Supervising Officer's assessments of claims (including claim analysis and evaluation), that were not going to be disclosed to the contractor, should be classified as confidential.

2.12 As indicated in paragraphs 2.10(b) and 2.14(a), Contractor A had been provided with the claim-assessment information (including claim analysis and evaluation) before the WSD gave its views on the assessment. Supervising Officer A subsequently (in March 2003) changed his assessment after considering the WSD's views (see para. 2.6).

2.13 In February 2006, in response to Audit's observations in paragraphs 2.10 to 2.12, the WSD said that:

Note 4: *On 1 July 2002, the Works Bureau merged with other related bureaux to form the Environment, Transport and Works Bureau.*

Note 5: *In February 2004, the guidelines were incorporated into the CEDD's Project Administration Handbook for Civil Engineering Works.*

(a) the Supervising Officer had a duty to assess claims submitted by Contractor A; and

(b) in the process, the Supervising Officer needed to communicate with Contractor A on his evaluation. This would help avoid misunderstanding and minimise possible contractual disputes.

2.14 In February 2006, in response to Audit's observations in paragraphs 2.10 to 2.12 (Note 6), Supervising Officer A said that:

(a) the assessment information (see para. 2.10(b)) provided to Contractor A was on the basis of a proposal to the WSD for a variation order (Note 7). According to the General Conditions of Contract, the Supervising Officer and the contractor needed to reach an agreement on the rate of a variation order. Therefore, it was necessary for him to disclose his assessment to Contractor A;

(b) if a contractor was entitled to a payment relating to a claim under the contract conditions, the Supervising Officer needed to at least make his general evaluation known to the contractor because the two parties had to reach an agreement on the payment. The contractor needed to know whether all the matters he had raised were addressed; and

(c) the wording of the then Works Bureau's guidelines in paragraph 2.11(b) did not carry the meaning that claim assessments, analyses and evaluations were to be kept confidential. It was possible that the wording of the guidelines was ambiguous. The General Conditions of Contract did not state that some information should be kept confidential in the day-to-day dealings between the Supervising Officer and the contractor (Note 8).

2.15 **Audit considers that there is scope for improvement in the ETWB's guidelines (see para. 2.11) on the issue.**

Note 6: *In January 2006, at the request of Audit, the WSD provided Supervising Officer A with a copy of the draft audit report and invited his comments.*

Note 7: *Audit notes that, in February 2001, the WSD considered that it might not be valid to issue a variation order to Contractor A (see para. 2.6).*

Note 8: *Audit notes that, under the consultancy agreement with the WSD, Supervising Officer A had a contractual obligation to seek the WSD's views before he reached a decision on a claim (see para. 2.10(a)).*

Audit recommendations

2.16 **Audit has *recommended* that the Secretary for the Environment, Transport and Works should:**

(a) **take action to remind works departments that their consultants should, before the works departments have given their views on claim assessments, refrain from disclosing the results of such assessments to contractors (see paras. 2.10(a) and 2.12); and**

(b) **provide elaboration of the guidelines on the classification of confidential documents with a view to avoiding inappropriate disclosure of information to contractors (see paras. 2.11(b) and 2.15).**

Response from the Administration

2.17 The **Secretary for the Environment, Transport and Works** agrees with the audit recommendations in paragraph 2.16. She has said that:

(a) during the normal course of claim assessments of a contract, a two-way communication between the Supervising Officer and the contractor would help avoid the escalation of disputes. This two-way communication may include discussions on claim principles, analyses and evaluations; and

(b) it is important that the Supervising Officer must avoid committing himself prior to obtaining the Employer's views on the claim as required under the consultancy agreement.

2.18 The **Director of Water Supplies** has said that:

(a) under the consultancy agreement, Supervising Officer A was required to seek the WSD's views before he reached a decision on a claim, and Contractor A was made aware of this requirement; and

(b) the WSD would work with the ETWB on a practical way to improve the claim assessment submission process in consultancy agreements.

PART 3: BLASTING ASSESSMENTS UNDER CONTRACT B

3.1 This PART examines the administration of blasting assessments for excavation works under Contract B by the WSD and the GEO of the CEDD.

Works under Contract B

3.2 In December 1996, the WSD invited tenders for Contract B. In April 1997, Contract B was awarded. The contract involved the construction of a primary service reservoir at Butterfly Valley in Lai Chi Kok (see Figure 2 in para. 2.2). The contract involved substantial excavation works for:

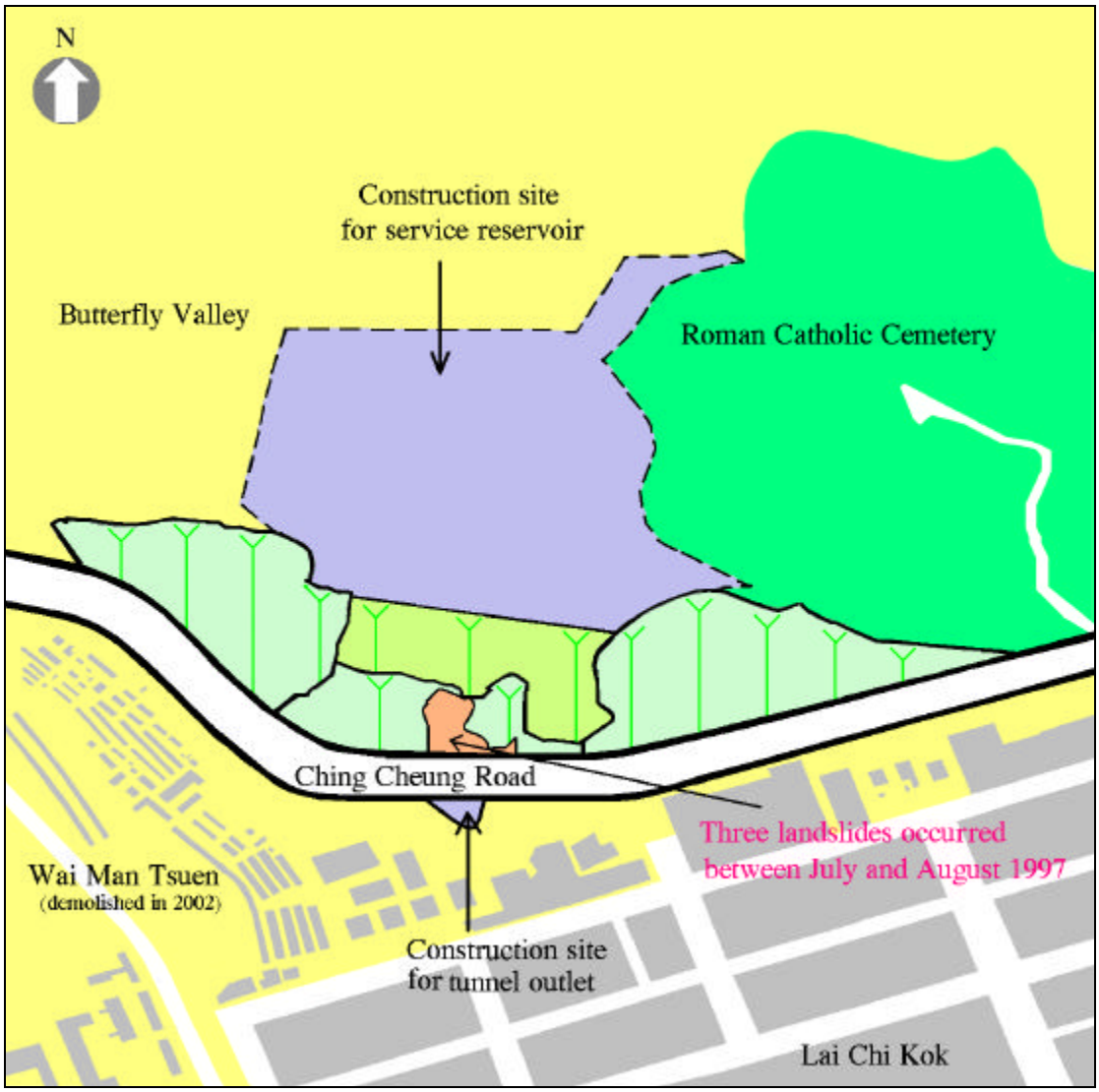
(a) site formation for constructing the service reservoir (see Figure 3 and Photograph 1);

(b) constructing a central valve chamber for housing pipeworks and valves; and

(c) constructing tunnels and a shaft for housing the inlet and outlet pipelines.

Figure 3

Butterfly Valley Service Reservoir construction site



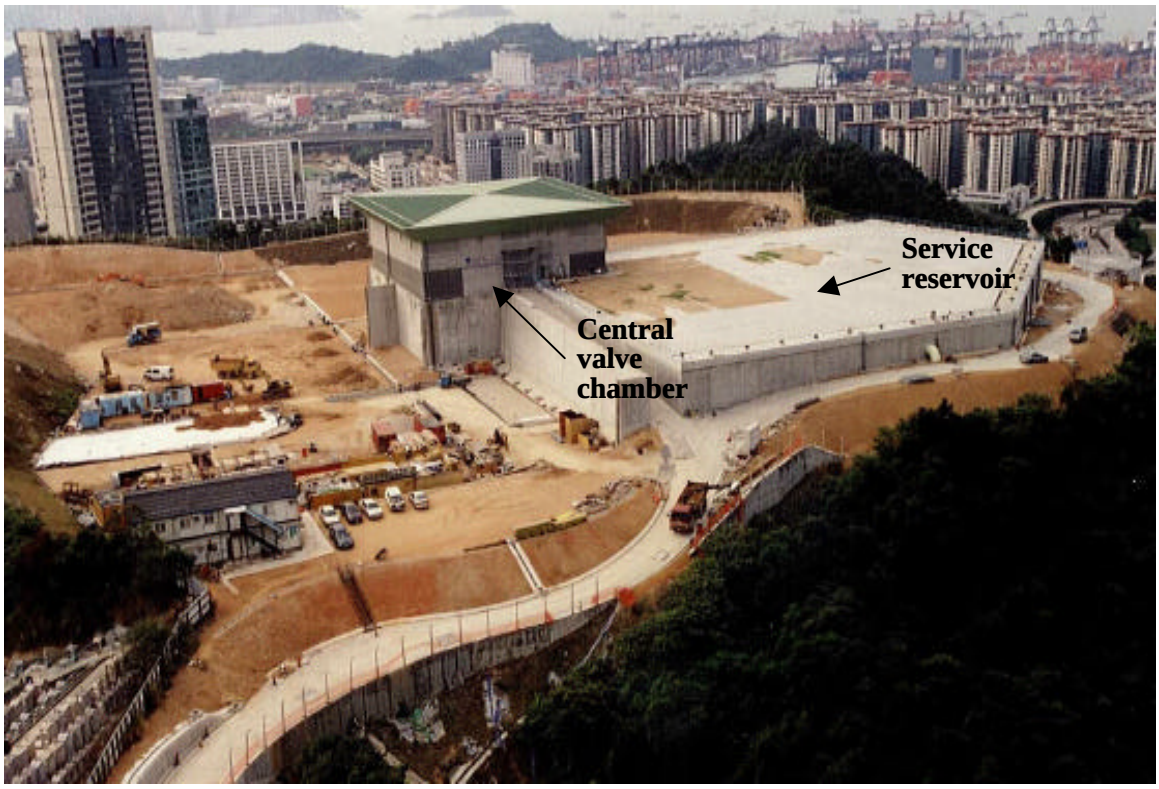
Legend: Formed Slope

Natural Slope

Source: *GEO records*

Photograph 1

Butterfly Valley Service Reservoir construction site



Source: WSD records

3.3 Regarding the excavation works, Contract B provided that:

(a) there would be 800,000 cubic metres of excavation, of which 240,000 cubic metres would involve excavation in rock;

(b) the blasting method was permitted for excavation in rock; and

(c) the contractor had to obtain blasting permits for the blasting works.

3.4 The WSD employed the Consultant (see para. 1.3) to carry out the detailed design of the Contract B works. The Consultant specified the contract period based on the assumption that blasting could start within a reasonable period after the commencement of the works.

GEO's role in monitoring geotechnical works

3.5 To ensure public safety, the GEO has two main duties, namely:

(a) as the government geotechnical adviser, advising departments on any adverse effects that public works projects may have on the stability of slopes; and

(b) regulating blasting activities under the Dangerous Goods Ordinance (Cap. 295).

Guidelines on geotechnical submission issued prior to Contract B design stage

3.6 ***Government guidelines of January 1988.*** **Lands and Works Branch Technical Circular No. 3/88** of January 1988 (which was in force at Contract B design stage) stated that:

(a) any department responsible for public works projects should ensure that the proposed designs of all permanent geotechnical works were submitted to the GEO for checking where this was warranted in the interest of public safety;

(b) geotechnical works included earthworks, deep excavation works, and works on slopes, embankments and retaining walls, and the installation, testing and monitoring of prestressed ground anchors;

(c) when, from public safety considerations alone, there was no need to submit a geotechnical design, the responsible department was encouraged to submit the design to the GEO for appraisal if it considered the works were of sufficient cost significance. As part of its advisory service, the GEO would review the design;

(d) the department should make a submission at an early stage since additional submissions might be required to resolve outstanding issues;

(e) after receiving a submission, the GEO should reply to the department as quickly as possible and always within 28 days, either agreeing to the proposals or stating the reasons for not agreeing;

(f) a department should not invite tenders for geotechnical works except when the GEO had given its written consent; and

(g) **when a department envisaged that geotechnical works would be necessary, the GEO should be consulted at an early stage in order that the appropriate assistance was given to prevent unnecessary work, duplication of efforts or delays.**

3.7 ***GEO internal guidelines of 1992*. GEO Circular No. 14/92** of November 1992 stated that GEO staff should monitor the submission of geotechnical designs by works departments as required by Lands and Works Branch Technical Circular No. 3/88. According to GEO Circular No. 14/92:

(a) the GEO should, at the project planning stage, remind the project offices concerned that if there was any blasting proposal which could cause slope or retaining wall instability affecting the public, a blasting assessment should be submitted to the GEO for checking; and

(b) the GEO would, at the project design stage, attempt to identify projects involving geotechnical works requiring a submission to the GEO, and request the Controlling Officers concerned to make the submission.

3.8 ***GEO internal guidelines of 1994*. GEO Circular No. 1/94** (Note 9) of February 1994 stated the procedures for ensuring the safety of slopes and structures where blasting was to be carried out on construction sites. According to this GEO Circular:

General provisions

(a) blasting on construction sites could affect the stability of slopes, retaining walls and structures, due to ground vibrations and other effects;

(b) in checking geotechnical submissions involving blasting, the GEO District Divisions should liaise with the GEO Mines Division, which was charged with protecting public safety in the use of explosives;

(c) **if it was apparent from the geotechnical assessments that blasting (with significant effects outside the site) was likely to be carried out, a blasting assessment, prepared by a professional engineer qualified and experienced in blasting design and in assessing the effects of blasting, had to be submitted for approval at the site formation submission stage;**

(d) the blasting assessment should be carefully considered along with comments from the GEO Mines Division;

(e) the GEO advice to the departments involved should be copied to the Mines Division;

Note 9: *In July 2004, the GEO issued GEO Circular No. 27/2004 which superseded GEO Circular No. 1/94.*

(f) the arrangements laid down under GEO Circular No. 14/92 (see para. 3.7) should be used to alert the departments involved of the need for the inclusion of a blasting assessment, where appropriate, in their geotechnical submissions to the GEO;

(g) if the GEO received no early notification, its District Divisions should, on receiving the first submission for a new project, inform the department concerned of the need for a blasting assessment, so that the assessment could be commenced without delay;

(h) the contents of a blasting assessment should include those given in an appendix to the circular (see Appendix A);

Granting of blasting permits

(i) under the Dangerous Goods Ordinance, engineers of works involving blasting had to apply for a blasting permit from the GEO Mines Division. In granting the permit, the Mines Division exercised control by imposing safety measures; and

(j) as a last resort, a blasting permit might be withheld until a blasting assessment had been submitted.

Guidelines on geotechnical submission issued after Contract B design stage

3.9 ***Government guidelines of February 1997.*** The CEDD's **Project Administration Handbook for Civil Engineering Works,** revised in February 1997, provided that:

(a) where designs involved rock excavation, the designer should consider whether blasting on sites could affect the stability of slopes, retaining walls and structures, due to ground vibrations and other effects; and

(b) if rock blasting was to be carried out, a blasting assessment (see Appendix A), prepared by a professional engineer qualified and experienced in blast design and in assessing the effects of blasting, should be submitted to the GEO Mines Division for approval at the site formation submission stage.

3.10 ***Government guidelines of July 2002.*** **ETWB Technical Circular (Works) No. 29/2002** of July 2002 (which superseded Lands and Works Branch Technical Circular No. 3/88 (see para. 3.6)) stated that:

(a) project departments should approach the GEO for advice at an early stage in preparing the Technical Feasibility Statement of all proposed projects containing geotechnical contents. The Statement should include a preliminary geotechnical appraisal, which should identify geotechnical constraints and risks (affecting cost and programme), man-made slopes and retaining walls, and state whether geotechnical studies are required; and

(b) project departments should agree with the GEO the scope and the extent of all necessary geotechnical investigations and studies to be carried out as part of the project.

GEO publications on blasting assessment

3.11 In January 2006, in response to Audit's enquiry, the GEO informed Audit that:

(a) in 1979, the GEO published the Geotechnical Manual for Slopes. The Manual was a readily available industry-consensus document giving guidance on the standards of good practice for the design, construction and maintenance of slopes and site formation works. In its 1984 edition, the Manual stated that any loadings from blasting that could influence the stability of a slope must be included in the stability analysis of the slope. The Manual also gave guidance on the practice to limit ground vibration to certain values; and

(b) in September 1992, the GEO published GEO Report No. 15 which provided guidance on assessment of the stability of slopes subjected to blasting vibration. This report was readily available to the related profession.

GEO's monitoring of Contract B geotechnical works

3.12 In May 1996, the Consultant submitted the Contract B site formation design to the GEO for checking in accordance with Lands and Works Branch Technical Circular No. 3/88 (see para. 3.6(a)). Between May and August 1996, the GEO and the Consultant exchanged correspondence on the submission.

3.13 In May 1997, Contractor B commenced the works. In July and August 1997, three large-scale landslides, caused by severe rainfall, occurred at Ching Cheung Road (see Figure 3 in para. 3.2).

3.14 Contractor B applied to the GEO Mines Division for blasting permits on the following two occasions:

(a) in September 1997, applying for a blasting permit for the site formation works (see para. 3.2(a)); and

(b) in January 1998, applying for a blasting permit for the outlet tunnel excavation works (see para. 3.2(c)).

3.15 In January 1998, the GEO advised Contractor B that, before it could process his application for a blasting permit for the outlet tunnel excavation works, he had to submit a blasting assessment report on the existing slopes and any other potential sensitive receivers that could be affected by blasting (see para. 3.24(b)). In March 1998, the GEO required the Contractor to submit another blasting assessment report for the site formation works. In October 1998 and February 1999, the GEO granted the blasting permits for the site formation works and the outlet tunnel excavation works respectively.

3.16 In December 2000, the Engineer of Contract B (hereinafter referred to as Engineer B – Note 10) told the WSD that the reasons for the long time taken for Contractor B to complete the blasting assessments included:

(a) new requirements were added during the course of the works, creating serious problems to the Contractor in completing the works; and

(b) many of the new requirements were beyond the historical scope of such assessments.

Claims for additional costs due to the need for blasting assessments

Claims for EOT and prolongation cost

3.17 Between April 1998 and April 2002, Contractor B submitted EOT and prolongation cost claims for assessment by Engineer B due to the need for conducting blasting assessments after the commencement of the works.

Assessment of Contractor B's EOT and prolongation cost claims

3.18 In August 2002, after assessing Contractor B's claims, Engineer B concluded that the blasting assessments should be considered as a deemed variation to the contract for the following reasons:

Note 10: *The Consultant was employed for designing the works (see para. 3.4). He was also the Engineer of the Contract for supervising the works.*

(a) the blasting assessments were a prerequisite for the granting of the blasting permits. Blasting was allowed under the contract and was necessary for completing the earthworks where rock excavation was involved. As the Contractor could not proceed with blasting works without a valid blasting permit, the prerequisite blasting assessment for obtaining the permit was necessary for the satisfactory completion of the works;

(b) the contract provisions did not specifically require a blasting assessment. There was no specific item in the Bills of Quantities (BQ) for blasting assessment;

(c) the Contractor was not aware of the requirement for blasting assessment until the GEO asked for it, subsequent to the serious landslides which occurred at Ching Cheung Road (see Figure 3 in para. 3.2) shortly after contract commencement; and

(d) the Dangerous Goods (General) Regulations of the Dangerous Goods Ordinance governing the issue of the blasting permit did not contain the specific requirement for a blasting assessment. There was no precedent where the contractor was required to conduct a blasting assessment during their works.

3.19 In December 2002, Engineer B granted an EOT of 296 days to the Contractor due to the blasting assessment requirements. **As stated in the final payment certificate of March 2004, the prolongation cost relating to the blasting assessment requirements amounted to $12.5 million.**

Claim for additional cost of rock excavation by mechanical means

3.20 In January 1999, due to the delay in obtaining the blasting permits, Contractor B submitted a claim for payment for excavation in rock by mechanical means.

Assessment of Contractor B's claim for additional cost of rock excavation

3.21 In December 2000, after assessing Contractor B's claim for additional cost of rock excavation by mechanical means, Engineer B considered the claim justified. The Engineer said that:

(a) the delay which restricted the blasting works was unforeseen by all parties at the time when the contract was executed; and

(b) the Contractor had practically no choice but to carry out the excavation in rock by mechanical means if he wished to progress with the works and to mitigate the delay.

3.22 In accordance with Engineer B's assessment, the WSD paid Contractor B a sum for excavation in rock using mechanical means. **Audit estimates that the net additional sum paid to the Contractor for rock excavation by mechanical means prior to obtaining the blasting permits amounted to $24.1 million.**

Consultant's views on blasting assessment

3.23 In November 2001, the Consultant advised the WSD that there was no requirement for him to produce a blasting assessment at the detailed design stage for the following reasons:

(a) the brief for the consultancy agreement contained no requirement for a blasting assessment;

(b) he was not aware of the blasting assessment requirement under GEO Circular Nos. 14/92 and 1/94 during the design stage of the works. He only received the list of GEO circulars in July 1997 (Note 11);

(c) the revised Project Administration Handbook, issued in February 1997, incorporated for the first time a requirement for designers to submit blasting assessments as part of their GEO submissions (see para. 3.9). However, this was after the design stage of Contract B; and

(d) he submitted the site formation design to the GEO in May 1996 (see para. 3.12). This was followed by a series of comments and responses. The GEO made no further comments after his last letter of 28 August 1996. The GEO did not impose any requirement for the submission of a blasting assessment.

GEO's views on blasting assessment

3.24 In January and February 2006, in response to Audit's enquiry, the GEO informed Audit that:

Note 11: *In late 1995, the GEO established a GEO Consultative Forum for exchanging views among the GEO and works consultants. The Consultative Forum Meeting minutes of May 1996 said that the Technical Secretary/GEO had tabled a list of GEO circulars for members' information, and members might obtain copies of the circulars from him. The Consultant later said that he had no record of receiving the list of GEO circulars until July 1997. Upon Audit's enquiry, the GEO said that they could not locate any records to confirm or otherwise the date of sending the list of circulars to works consultants.*

(a) in submitting the design in 1996, the Consultant considered the adverse effects of blasting on the stability of boulders on the slopes, and recommended either removing or stabilising the boulders before the blasting. That was accepted by the GEO. The GEO inferred from this that, at that time, in the judgment of both the Consultant and the GEO, an assessment of the effects of blasting vibrations on nearby soil slopes (except the boulders) was not necessary. The GEO considered that this judgment was reasonable given the circumstances known and foreseeable at that time. A blasting assessment was required only in cases where blasting could cause slope or retaining wall instability, which might affect the public (see paras. 3.7(a) and 3.8(c));

(b) the landslides in July and August 1997, which were after the commencement of Contract B in May 1997 (see para. 3.13), entailed a major safety concern. These landslides would have invalidated the original design assumptions concerning the conditions of the soil slopes. One of the slopes had become highly unstable and susceptible to further large-scale failure, which might affect Ching Cheung Road and other nearby facilities if disturbed by blasting vibrations. As a result, the GEO required Contractor B to carry out a blasting assessment to take into account the changed site conditions. To ensure that public safety was not compromised, this requirement would have been necessary irrespective of whether or not a blasting assessment had been carried out at the design stage;

(c) with reference to the GEO Mines Division issuing the two blasting permits 13 months after Contractor B's applications (see paras. 3.14 and 3.15):

  (i) the time taken to process a blasting permit depended on whether the applicant met the technical requirements, including the satisfactory submission of blasting assessments where required. In this case, there was a critical ongoing concern about public safety consequent to the failure of the slope at Ching Cheung Road, requiring the exercise of the utmost caution and skills; and

  (ii) on 9 June 1998, a boulder-fall incident in Wai Man Tsuen (see Figure 3 in para. 3.2) affected a village hut. As a result, Contractor B was requested to assess the effect of blasting on the stability of boulders in that area. This further complicated the issue and prolonged the time needed for the blasting assessments; and

(d) with reference to the Consultant's remarks in paragraph 3.23(b), according to the standards of good practice published by the GEO (see para. 3.11), the need for assessing the effects of blasting vibrations on slope and retaining wall stability should have been considered at the design stage of Contract B.

Audit observations

3.25 Audit considers that:

(a) the GEO should have taken action to remind the WSD (and its Consultant) of the need for it to submit blasting assessments for the excavation works under GEO Circular Nos. 14/92 and 1/94 (see paras. 3.7 and 3.8) when examining the site formation design under Contract B (see para. 3.23(d));

(b) if the GEO had publicised the blasting assessment requirements under the two GEO Circulars soon after their promulgation within the GEO in 1992 and 1994, the Consultant could have known the requirements for blasting assessment during the design stage of the works (see para. 3.23(b)); and

(c) **where blasting assessments are required after the commencement of the works of a contract, the GEO and the department concerned need to make a concerted effort to finalise the blasting assessments within the shortest possible time to help minimise delays and additional costs.** Audit estimates that, due to the need for Contractor B to conduct the blasting assessments after the commencement of the works and to carry out rock excavation using mechanical method, the WSD paid an additional sum of $36.6 million to the Contractor, comprising:

(i) prolongation cost of $12.5 million (see para. 3.19); and

(ii) the net additional sum of $24.1 million (see para. 3.22).

3.26 As regards the inclusion of the blasting assessment requirement in consultancy agreements (see para. 3.23(a)), the issue had been addressed upon the revision of the Project Administration Handbook for Civil Engineering Works (see para. 3.9).

Audit recommendations

3.27 **With a view to minimising delays to the works and additional costs, Audit has *recommended* that the Director of Civil Engineering and Development should:**

(a) **remind GEO staff that they need to, in accordance with ETWB Technical Circular (Works) No. 29/2002, during the planning stage of projects that include geotechnical works:**

(i) **vigilantly examine the Technical Feasibility Statements submitted by works departments (and their consultants); and**

(ii) **agree with the works departments (and their consultants) the scope and the extent of geotechnical investigations and studies required (see paras. 3.10 and 3.25(a));**

(b) **provide works departments with new GEO works requirements as soon as possible, such as those which may affect the design and execution of geotechnical works (see para. 3.25(b)); and**

(c) **take action to ensure that GEO staff expedite the processing of blasting permit applications, if the works departments and/or contractors concerned have substantiated that there is urgency in commencing the blasting works (see para. 3.25(c)).**

3.28 **Audit has *recommended* that the Director of Water Supplies should:**

(a) **take action to ensure that, in accordance with ETWB Technical Circular (Works) No. 29/2002, WSD staff and consultants approach the GEO for advice at an early stage of preparing the Technical Feasibility Statement of projects that contain geotechnical contents, and agree with the GEO on the need for conducting blasting assessments (see paras. 3.10 and 3.25(a));**

(b) **where appropriate, in future consultancy agreements, require consultants to carry out important technical assessments (such as blasting assessments) at the design stage of the projects (see paras. 3.23(a) and 3.26); and**

(c) **if it is envisaged that the processing of a blasting permit application will take time, make a special request to the GEO that the processing of the application should be expedited, drawing the GEO's attention to the financial implications of any delays to the works (see para. 3.25(c)).**

Response from the Administration

3.29 The **Director of Civil Engineering and Development** agrees with the audit recommendations in paragraph 3.27. He has said that the GEO has implemented them.

3.30 The **Director of Water Supplies** agrees with the audit recommendations in paragraph 3.28. He has said that the WSD had included all the requirements known at that time in the consultancy agreement for Contract B, and had overseen that the Consultant discharged his duties accordingly.

PART 4: TOOLBOX TRAINING UNDER CONTRACT B

4.1 This PART examines the WSD's administration of the provision of toolbox training under Contract B.

Government measures to improve construction-site safety

Construction Site Safety Manual issued in 1993

4.2 In June 1993, the then Works Branch introduced the Construction Site Safety Manual (hereinafter referred to as the Safety Manual) under Works Branch Technical Circular (WBTC) No. 16/93 for improving construction-site safety (Note 12). Works departments were required to include the contractual provisions set out in the Safety Manual in capital works contracts.

Pay for Safety Scheme introduced in 1996

4.3 In March 1996, the then Works Branch introduced the Pay for Safety Scheme (PFSS) under WBTC No. 4/96 (Note 13). The objective of the Scheme was to remove the provision of site safety from the realm of competitive tendering. According to WBTC No. 4/96:

(a) all tenders should include a separate Site Safety section in the BQ, using the schedule of BQ items and method of measurement set out in the circular;

(b) all works contracts should state in the outside cover of the BQ that:

  (i) this BQ included a new Site Safety section;

  (ii) all items in the Site Safety section were pre-priced;

  (iii) the sums set out in the BQ for site safety would only be paid if the contractor demonstrated compliance with the specifications for these items; and

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Note 12: *Revisions to the Safety Manual were made in 1994, 1995, 1997, 1998, 1999 and 2000.*

Note 13: *Revisions to the PFSS were made in 1996, 1997, 1998 and 2000.*

(iv) tenderers were advised to study the requirements set out in the Safety Manual and all amendments to it included in or referred to in the tender documents; and

(c) all works contracts should incorporate the Particular Specification for Site Safety (which included toolbox training – Note 14) set out in the Safety Manual.

Provision of toolbox training under the Safety Manual

4.4 According to the Particular Specification for Site Safety set out in the Safety Manual (revised in May 1995 under WBTC No. 11/95):

(a) field safety talks should be arranged for each ganger and worker at least once every two weeks; and

(b) all workmen and supervisory staff should attend regular weekly toolbox refreshers.

Provision of toolbox training under WBTC No. 4/96

4.5 WBTC No. 4/96 of March 1996 stated that:

(a) the Safety Manual required induction and toolbox training. **This training should be paid on a "per person trained" basis.** The contractor should submit a monthly statement to the Site Safety Management Committee (SSMC – Note 15) giving the dates, numbers and trades of workers trained in the previous month. He should certify the accuracy of the statement. Payment for the training should be based on the certificate. The Engineer should be entitled to adjust the numbers if he was dissatisfied with the frequency, arrangements, quality of the training or the numbers certified;

Note 14: *According to the then Works Bureau, the purpose of providing toolbox training to workers was to raise their awareness of the hazards that a worker would encounter, and brief them of the precautionary measures while carrying out a job or when they were exposed to a particular hazard.*

Note 15: *As laid down in the Safety Manual, the Engineer of a contract should establish an SSMC to monitor the implementation of the Safety Plan. The SSMC, chaired by the Engineer or his representative, should meet once every month. Members of the SSMC should include the contractor's project manager, site agent and safety officer, and a representative of the Labour Department. The contractor should act without delay upon the decisions or recommendations made by the SSMC.*

(b) the provision of toolbox training should include training for Safety Supervisors (who were responsible for toolbox training activities), and should be based on the catalogue of talks of the Hong Kong Construction Association Limited;

(c) toolbox training should be provided for all labour teams **not less than once per month;** and

(d) the payment under the item for toolbox training should only be made **once per person,** subject only to any repeated training required by the contract.

4.6 WBTC No. 4/96 provided for guidance a sample BQ which included an item for toolbox training (see the second column in Table 3). It stated that works departments needed to make adjustments to the sample according to the works size and complexity. For comparison, the corresponding BQ item of Contract B is listed in the last column in Table 3.

Table 3

Toolbox training BQ item

	WBTC No. 4/96 sample BQ item (Note 1)	**Contract B BQ item (Note 2)**
Quantity	2,400	150
Unit	Number	Number
Rate	$40	$1,700
Amount	$96,000	$255,000

Source: WSD records

Note 1: The sample BQ given in WBTC No. 4/96 was based on a contract with a contract sum of $100 million and a contract period of two years.

Note 2: For Contract B, the original contract sum was $298 million and the scheduled contract period was three years and nine months.

Provision of toolbox training under Contract B

4.7 In mid-1996, the WSD instructed the Consultant to incorporate the safety measures promulgated in WBTC No. 4/96 (see para. 4.3), including toolbox training, into the Contract B tender documents. The Consultant accordingly prepared the tender documents, adopting the specifications on safety measures stated in the Safety Manual (see para. 4.4) and in WBTC No. 4/96 (see para. 4.5). The Consultant inserted a rate of $1,700 in the BQ for payment for each number of toolbox training on site, with an estimated quantity of 150 numbers (see the last column in Table 3). On 20 June 1997, the SSMC held its first meeting. As stated in the minutes of that meeting, a WSD representative (Note 16) said that toolbox training should be carried out twice a week.

4.8 In February 2006, in response to Audit's enquiry, the WSD said that:

(a) before the SSMC meeting in June 1997, toolbox talks were being held daily; and

(b) regarding the WSD representative's remarks given at the meeting that "toolbox training should be carried out twice a week", this referred to **two training sessions for the workers per week,** rather than for each worker per week.

Dispute over the payment for toolbox training

4.9 Regarding the payment for toolbox training, between June 1997 and December 1998, Contractor B and Engineer B had different views on two issues:

(a) the number of training sessions to be attended by a worker for the payment of $1,700 as stated in the contract (**the payment issue** – see para. 4.10); and

(b) how often was a worker required to attend toolbox training (**the training frequency issue** – see paras. 4.7 and 4.17(a)).

4.10 In early December 1998, Engineer B received Contractor B's notification of his dispute over the interpretation of the contract provisions regarding the payment for toolbox training. In late December 1998, the Engineer issued a written decision that he rejected the Contractor's interpretation of the measurement of toolbox training, stating that payment

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Note 16: *The WSD representative was a member of the SSMC who attended the SSMC meetings on an ad hoc basis. He gave advice on WSD work site safety.*

should be made on a **"per person fully trained"** basis rather than on a **"per person per session"** basis. The Engineer considered that the payment should only become due when a worker was fully trained through attending a course of training of 11 sessions based on the Hong Kong Construction Association Limited's catalogue of talks.

4.11 In March 1999, Contractor B served a notice of arbitration. In April 1999, the WSD sought advice from the Legal Advisory Division of the then Works Bureau on the issue. Between May and August 1999, the parties tried to resolve the dispute without going through the arbitration proceedings, but without success.

Agreement with Contractor B to settle the dispute

4.12 Before the arbitration proceedings commenced, in August 2000, after considering the merits of the claims, the arguments presented by the parties involved, the risk to and cost exposure of the Government and the legal advice obtained, the WSD proposed to settle the dispute by paying a lump sum to Contractor B.

4.13 In October 2000, with the support of the Legal Advisory Division of the then Works Bureau and the approval of the FSTB, the WSD agreed with Contractor B to pay him a lump sum for settling the dispute.

4.14 Subsequent to the settlement of the dispute between the WSD and Contractor B, a settlement agreement was made between the WSD and the Consultant on the dispute over the related liability issue.

Audit observations

Need to comply with WBTC No. 4/96 in specifying toolbox training rate

4.15 In the sample BQ provided for guidance under WBTC No. 4/96, it was indicated that **there should be 2,400 numbers of toolbox training at a unit rate of $40.** However, the Consultant inserted **150 numbers of such training at a unit rate of $1,700** in the BQ of Contract B (see Table 3).

4.16 **Audit considers that the WSD should have ensured that the Consultant drew up Contract B with reference to the sample BQ attached to WBTC No. 4/96. Audit estimates that, had this been done, the total sum payable for toolbox training under the**

contract could have been $312,000 (Note 17), which is much lesser than the lump sum paid for settling the dispute.

Need for clear specification for toolbox training in WBTC Nos. 11/95 and 4/96

4.17 In preparing the Contract B tender documents, with the exception of the sample BQ for toolbox training, the Consultant basically adopted the specifications on safety measures stated in WBTC Nos. 11/95 and 4/96 (see paras. 4.2 to 4.5). However, Audit notes that the contract specifications on payment of toolbox training had the following deficiencies:

(a) the various contract specifications on toolbox training contained inconsistencies. For example, some contract specifications stated a frequency of toolbox training of not less than once a month (see para. 4.5(c)), while other parts stated a frequency of at least once every two weeks (see para. 4.4(a)), or once a week (see para. 4.4(b)); and

(b) the contract did not make clear whether the term toolbox training referred to each training session, or was a generic term used to describe the training process.

Audit considers that there is room for improvement in this area.

4.18 ***Remedial action taken.*** In view of the potential ambiguities contained in WBTC Nos. 11/95 and 4/96, the then Works Bureau subsequently issued the following two Works Bureau Technical Circulars to clarify the situation:

(a) ***Works Bureau Technical Circular No. 11/97.*** This circular, issued in August 1997, stated that for toolbox training, the rate **per worker per talk** was to be **fixed at $40** and should not be adjusted upwards or downwards (Note 18); and

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Note 17: *According to WBTC No. 4/96, for a contract with a contract sum of $100 million and a contract period of two years, there should be 2,400 numbers of toolbox training at a unit rate of $40 (i.e. a total amount of $96,000). As the final contract sum of Contract B amounted to $325 million (see Table 1 in para. 1.3), Audit estimates that there should have been 7,800 numbers of toolbox training (2,400 ´ $325 million/$100 million) charged at a unit rate of $40. This gives a total amount of $312,000.*

Note 18: *In another works contract (Contract C – see Table 1 in para. 1.3) under the Tai Po Water Treatment Works Project, the Consultant adopted the unit rate of $40 for toolbox training for Contract C, as required under WBTC No. 11/97.*

(b) ***Works Bureau Technical Circular No. 30/2000.*** This circular, issued in November 2000, stated that:

(i) the contractor should provide toolbox talks at a frequency of **one talk per worker on site every two weeks** starting from the date of commencement of the works;

(ii) the contractor should ensure that the topic of every talk given to a worker was relevant to the work that he would perform;

(iii) a worker should attend no more than one talk on the same topic in any two-month period; and

(iv) payment for the item on toolbox training should be made on a **"per worker per talk" basis.**

Need for WSD to vigilantly examine draft contract documents

4.19 Audit considers that the causes leading to the dispute over the provision of toolbox training included the following:

(a) the Consultant did not make use of the WBTC No. 4/96 sample BQ which recommended a unit rate of $40 for each toolbox training (see Table 3); and

(b) the BQ for toolbox training included in Contract B, stating 150 numbers at a unit rate of $1,700 (see Table 3), did not clearly define the unit of training.

4.20 Audit notes that, in 1996, during the preparation of the Contract B tender documents, the Consultant submitted the draft documents to the WSD for comments. However, the WSD did not make any comments on the contract documents relating to toolbox training.

4.21 **Audit considers that, as the PFSS was a new scheme introduced in 1996 (see para. 4.3), the WSD should have vigilantly examined the draft contract documents submitted by the Consultant during the drafting stage of Contract B, with a view to ensuring that the terms in the contract had no ambiguity. This would have helped avoid contract claims.**

Need to take early action to resolve disagreement

4.22 **As the disagreement over the provision of toolbox training between Engineer B and Contractor B had significant ongoing cost implications for the remaining period of the contract, Audit considers that, soon after the Contractor had raised his disagreement over the issue in June 1997, the WSD should have sought legal advice with a view to resolving the disagreement as soon as possible.**

Audit recommendations

4.23 **With a view to minimising contract claims, Audit has *recommended* that the Secretary for the Environment, Transport and Works should:**

(a) **remind ETWB staff of the need to consult the relevant parties, including the Legal Advisory Division (Works) of the ETWB and contract advisors of the works departments, on draft technical circulars involving legal and contractual issues (see para. 4.17); and**

(b) **take action to ensure that new technical circulars are clear and precise (see para. 4.17).**

4.24 **With a view to minimising contract claims, Audit has *recommended* that the Director of Water Supplies should take action to ensure that:**

(a) **in drawing up future works contracts, WSD staff (and consultants) make reference to the sample BQ promulgated in government technical circulars (see para. 4.16);**

(b) **the terms included in tender documents (in particular those relating to new contract conditions) are clear and precise (see para. 4.21); and**

(c) **if a disagreement arises which has significant ongoing cost implications for the remaining period of a contract, WSD staff would seek legal advice as soon as possible (see para. 4.22).**

Response from the Administration

4.25 The **Secretary for the Environment, Transport and Works** agrees with the audit recommendations in paragraph 4.23. She has said that:

(a) the ETWB has an established practice of circulating draft technical circulars to the relevant parties including its Legal Advisory Division (Works), and the contract advisors of the works departments if the circulars involve legal and contractual matters; and

(b) this practice is indicated in ETWB Technical Circular (Works) No. 28/2002 "Procedure for the issue of a Technical Circular".

4.26 The **Director of Water Supplies** agrees with the audit recommendations in paragraph 4.24. He has said that:

(a) at the time of preparing the Contract B tender documents, WBTC No. 4/96 required the inclusion of the sample BQ on site safety in the tender documents. The BQ items needed to be pre-priced on the basis that the total value of the safety items was about 2% of the estimated contract sum. Though sample quantities and rates of these items were suggested in WBTC No. 4/96, these were not fixed and the Consultant had to insert the quantities and rates in the contract. WBTC No. 11/97, subsequently issued, fixed the rate per worker per talk relating to toolbox training at $40;

(b) the WSD has established procedures for checking consultants' submissions for compliance with policies, guidelines, procedures and standards promulgated by the ETWB and by the WSD. The WSD will remind its consultants to ensure that the terms relating to a new scheme to be included in draft tender documents are clear and concise. The WSD will also require consultants to highlight any deviations from laid down policies, guidelines, procedures and standards to facilitate the WSD's checking; and

(c) disagreements over contractual issues with ongoing cost implications are not unusual in contract administration, and there would be quite a large number of such cases. The WSD will take on board the recommendation in paragraph 4.24(c), with a view to focusing on those disagreements that would have significant cost implications.

Appendix A
(paras. 3.8(h) and 3.9(b) refer)

Contents of a blasting assessment

According to the GEO, a blasting assessment shall consist of the following:

(a) assessment of the site geology and the condition of existing structures, slopes, retaining walls and services;

(b) assessment of the stability of existing structures, slopes and retaining walls under the effects of blasting;

(c) proposals for preventive and precautionary measures to be implemented to ensure the stability and integrity of the affected structures, slopes, retaining walls and services both during blasting and in the long term;

(d) outline blast design to demonstrate the practicability of satisfying any constraints under (c);

(e) proposals for instrumentation and monitoring of the effects of blasting; and

(f) details of site supervision to ensure professional input during the blasting works by the professional engineer preparing the blasting assessment.

Source: GEO records

Appendix B

Chronology of key events

Administration of a claim under Contract A

May 1997	Contract A was awarded to Contractor A.
January 1999	The Contractor gave Supervising Officer A a notice of delays to the works and his intention to claim an additional payment due to excessive ground water inflows.
March 2000	The then Works Bureau set out guidelines on the classification of confidential documents/correspondences.
April 2000	The Contractor submitted a claim for additional costs relating to the measures taken to deal with the excessive ground water inflows.
December 2000	Supervising Officer A submitted to the WSD his assessment of the claim. He made a recommendation to the WSD that a variation order in the sum of $9.7 million should be granted to the Contractor.
February 2001	The WSD considered that it might not be valid to issue a variation order to the Contractor.
March 2003	Supervising Officer A rejected Contractor A's claim.
April 2003	The Contractor disputed the Supervising Officer's rejection of his claim.
July 2003	The WSD commenced negotiation with the Contractor.
July and August 2003	The Contractor used information similar to Supervising Officer A's claim assessment made in December 2000 to substantiate his claim.
September 2003	The WSD agreed with Contractor A to pay him a sum for settling the dispute.

Blasting assessments under Contract B

May 1996	The Consultant submitted the Contract B site formation design to the GEO for checking in accordance with Lands and Works Branch Technical Circular No. 3/88.

May to August 1996	The GEO and the Consultant exchanged correspondence on the submission.
December 1996	The WSD invited tenders for Contract B.
April 1997	Contract B was awarded to Contractor B.
July 1997	The Consultant received a list of GEO circulars. The list included GEO internal Circular Nos. 14/92 and 1/94 on blasting assessment requirements.
July and August 1997	Landslides occurred at Ching Cheung Road, below the site.
September 1997	The Contractor applied to the GEO Mines Division for a blasting permit for the site formation works.
January 1998	The Contractor applied to the GEO Mines Division for another blasting permit for the outlet tunnel excavation works.
January 1998	The GEO required the Contractor to submit a blasting assessment report for the outlet tunnel excavation works.
March 1998	The GEO required the Contractor to submit another blasting assessment report for the site formation works.
April 1998	The Contractor commenced submitting claims for EOT and prolongation cost due to the need to conduct blasting assessments.
October 1998	The GEO granted a blasting permit for the site formation works.
January 1999	The Contractor submitted a claim for payment for excavation in rock by mechanical means instead of by blasting.
February 1999	The GEO granted a blasting permit for the outlet tunnel excavation works.
December 2000	Engineer B considered that the Contractor's claim for additional cost of rock excavation by mechanical means was justified.
August 2002	The Engineer concluded that the blasting assessments should be considered as a deemed variation to the contract.

December 2002	The Engineer granted an EOT of 296 days to the Contractor due to the blasting assessment requirements. The related prolongation cost amounted to $12.5 million.

Toolbox training under Contract B

June 1993	The then Works Branch introduced the Safety Manual under WBTC No. 16/93.
March 1996	The then Works Branch introduced the PFSS under WBTC No. 4/96.
Mid-1996	The WSD instructed the Consultant to incorporate the safety measures promulgated in WBTC No. 4/96, including toolbox training, into the Contract B tender documents.
April 1997	Contract B was awarded to Contractor B.
June 1997	The SSMC held its first meeting.
June 1997 to December 1998	There were differences in views between the Contractor and Engineer B over the payment for toolbox training.
Early December 1998	The Engineer received the Contractor's notification of his dispute over the interpretation of the contract provisions regarding the payment for toolbox training.
Late December 1998	Engineer B issued a written decision rejecting the Contractor's interpretation of the measurement of toolbox training.
March 1999	The Contractor served a notice of arbitration.
May to August 1999	The WSD and the Contractor tried to resolve the dispute without going through the arbitration proceedings, but without success.
October 2000	With the approval of the FSTB, the WSD agreed with Contractor B to pay him a lump sum for settling the dispute.

Appendix C

Acronyms and abbreviations

Audit	Audit Commission
BQ	Bills of Quantities
CEDD	Civil Engineering and Development Department
EOT	Extension of time
ETWB	Environment, Transport and Works Bureau
FSTB	Financial Services and the Treasury Bureau
GEO	Geotechnical Engineering Office
PFSS	Pay for Safety Scheme
SSMC	Site Safety Management Committee
WBTC	Works Branch/Bureau Technical Circular
WSD	Water Supplies Department