Annex A

Summary of Report on Construction of the Trunk Road Tunnel in Causeway Bay Typhoon Shelter and ex-Wan Chai Public Cargo Working Area

1. Background

In the light of the Court of First Instance (CFI)'s judgment in a judicial review on 20 March 2008 that the PHO applies to the proposed temporary reclamations referred to in the road scheme of the Trunk Road, we engaged the consultants to examine the overriding public need for the temporary reclamation that is required for constructing the Trunk Road tunnel as well as its compliance with the Protection of the Harbour Ordinance (PHO) and to consult the public about the findings.

2. Temporary Reclamation for Tunnel Construction

2.1 The consultants have critically examined various currently available construction techniques for constructing the Trunk Road tunnel beneath the seabed in the Causeway Bay Typhoon Shelter (CBTS) and ex-Wan Chai Public Cargo Working Area (ex-PCWA), including "Immersed Tube Tunnel Construction", "Bored Tunnel Construction" and "Cut-and-cover Tunnel Construction". These alternatives encompass the range of possible forms of construction based on well proven and reliable techniques commonly adopted for tunnel construction.

Immersed Tube Tunnel Construction

2.2 Immersed tube tunnel ("IMT") involves floating precast concrete units to the site and then sinking them into place just below the seabed level. Before sinking the precast units, excavation of a deep trench (up to 30m deep as required by the alignment of the Trunk Road) and removal of soft materials from the seabed are required to provide a firm foundation. Due to the close proximity, excavation of this deep trench will affect roads and services behind the southern seawalls (e.g., Victoria Park Road and intakes of the cooling systems), typhoon shelter breakwater, operation of the CBTS and the Cross Harbour Tunnel (CHT) structure may also be damaged, thus paralysing one of the most vital road links in Hong Kong. Floating of precast units into the CBTS would also require dredging of

the seabed from –4mPD to about –10mPD along the transit route of precast units. This would seriously affect the continual operation of the typhoon shelter.

Bored Tunnel Construction

2.3 This method involves boring circular tunnel section through the soil and rock under the existing seabed using Tunnel Boring Machine (TBM). For the dual 3-lane carriageways tunnel configuration, two separate circular tunnel bores of at least 15.5m in diameter would be required. For the soft seabed sediments in the CBTS, this construction method would require a minimum soil cover of at least 1.5 times the diameter of the bored tunnel above the tunnel to ensure ground stability in the vicinity. Throughout the CBTS, the soil cover would not be sufficient to allow construction by TBM. The extent of permanent reclamation along the Wan Chai and North Point shorelines would also be increased due to greater separation required between eastbound and westbound bored tunnels to ensure ground stability.

Cut-and-Cover Construction

2.4 For cut-and-cover construction using diaphragm walls, the diaphragm walls would be constructed first to form an enclosure. The soil inside the diaphragm walls would then be excavated to the required bottom level for construction of tunnel. Upon completion, the space above the tunnel would then be backfilled to the original seabed level. Diaphragm wall construction is a reliable method used as retaining wall systems and foundations. The advantage is that they can be installed in close proximity to existing structures and provide effective retaining functions for soil and underground water behind the diaphragm walls. This method is well-suited to the construction of the deep Trunk Road tunnel with varying depths and complex tunnel and connection layout at the CBTS. This form of construction will not cause any disturbance to the existing adjacent infrastructure, does not have any minimum ground cover or clearance restrictions and requires the minimum extent of permanent reclamation at the adjoining areas.

2.5 In view of the above, it can be concluded that the only safe, feasible and practicable method of construction for the Trunk Road tunnel sections at the CBTS and ex-PCWA is by cut-and-cover method using diaphragm walls.

The Need for Temporary Reclamations

2.6 Construction of diaphragm walls by cut-and-cover method requires a dry working platform with safe working environment on which the contractor's construction plant could safely operate. It is not feasible to construct diaphragm walls through water. Therefore, when constructing the Trunk Road tunnel through the CBTS, a working platform would need to be formed first by temporary reclamation. This construction method would also enable staged construction works in the CBTS and ex-PCWA to minimize the mooring area to be affected at any one time; to maintain acceptable water quality standards; and to ensure uninterrupted seawater supply from the CBTS to the existing cooling systems for the adjacent buildings. It is evident that cut-and-cover method using diaphragm walls is the only safe, feasible and practicable approach for constructing the Trunk Road tunnel through the CBTS and the ex-PCWA although it will require temporary reclamation.

Minimum Extent of Temporary Reclamation

2.7 The minimum overall extents of temporary reclamation required to facilitate the construction of the Trunk Road tunnel beneath the seabed of the CBTS and the ex-PCWA are 6.4ha and 1.9ha respectively. Through a staged construction approach, it is estimated that the affected area of the Harbour in respect of temporary reclamation at any one time in the CBTS will range from 1.8ha to 3.7ha, whilst at the ex-PCWA the area of temporary reclamation will range from 0.7ha to 1.2ha. The durations of the individual temporary reclamation areas will vary from around 1 year to just over 3 years. The overall duration from the first stage up to the removal of the final stage of temporary reclamation will be around 6 years. These areas are the minimum extents of temporary reclamation required to meet the overriding public need for the construction of the Trunk Road tunnel.

Removal of Temporary Reclamation

2.8 The Government has committed in the road scheme gazetted on 27 July 2007 under the Roads (Works, Use and Compensation) Ordinance that the temporary reclamation works will be removed after construction of the Trunk Road tunnel and the existing sea-bed reinstated. Strict provisions will be added to the contract documents ensuring that the temporary reclamation works to be carried out by the contractor will be the minimum extent of temporary reclamation, the temporary reclamation will be removed after the completion of the tunnel construction, and seabed will be reinstated.

3. Public Engagement for Tunnel Construction

3.1 Since April 2008, the professional bodies, contractor association, relevant District Councils (DCs), the Harbour-front Enhancement Committee and the public have been engaged on the method of construction for the Trunk Road tunnel in the CBTS and the ex-PCWA as well as the associated temporary reclamation. The recommended method of cut-and-cover construction of the Trunk Road in temporary reclamation was generally received as the only safe, feasible and practicable method of construction.

Professional Institutes and Contractors

3.2 The concerned professional institutes and contractors expressed strong support for the project and agreement to the consideration that cut-and-cover construction is the only safe, feasible and practicable method in view of the various constraints and maintenance of operation in CBTS and ex-PCWA. They pressed for early implementation of the project. Some of them indicated concerns on the impact to the operation of the CBTS, precautionary measures against damaging the CHT, interface with the proposed Shatin-to-Central Link (SCL), dredging in CBTS and marine construction traffic arrangement within the CBTS.

District Councils

3.3 The four DCs of Hong Kong Island were consulted in July 2008. Members of the Central and Western DC, Wan Chai DC and Southern DC supported early implementation of the project and raised no objection to the proposed construction method. As the typhoon shelter falls within the boundary of Eastern DC, members decided to set up a Working Group to help foster the public engagement process. Through the Working Group, interested Eastern DC members could seek more detail information on the technical issues relating to the construction methods and related issues. Members of the Working Group were concerned about the re-provisioning arrangement for the CBTS and the environmental impacts of the project. We addressed these concerns at the working group meetings.

Public Forums

3.4 Two public forums were held on 19 July and 25 October 2008 respectively. The purpose of the public forum held on 19 July 2008 was to brief the public on our consultants' findings and to gauge public views. Public views were also collected through Internet. In general, the public did not indicate any strong objection to the proposed temporary reclamation for the Trunk Road tunnel construction. However, there were questions concerning matters of details, including the need for temporary reclamation for temporary typhoon shelter and the associated consultation plan, construction method of the Trunk Road tunnel beneath the CHT, whether a combination of the different methods for constructing the sections of CWB tunnels in CBTS and ex-PCWA can be considered, staging arrangement of the temporary reclamation, associated environmental impacts and impacts on the operation of the CBTS, marine construction traffic arrangement within the CBTS as well as the interface with the SCL, etc. The major concerns were addressed further at the public forum held on 25 October 2008. The public raised no further question and generally agreed the method of cut-and-cover construction of the Trunk Road tunnel in temporary reclamation as the only safe, feasible and practicable method of construction.

Harbour-front Enhancement Committee

3.5 Members were briefed on 18 August 2008 on the proposed temporary reclamation for the Trunk Road tunnel construction. There was support from members for the Trunk Road project and acknowledgement of the need for temporary reclamation. Their concerns include operation of the CBTS during construction of the Trunk Road; potential interfaces with SCL; the potential of alternative tunnel boring techniques or mixed construction methods; arrangement of dredging works and treatment of the dredged marine mud. These concerns were responded to at the meeting, with further elaboration on why alternative construction methods were not feasible. Members also suggested that consideration should be given to improve connectivity to the harbour-front and further shorten the overall construction period and hence the impacts during construction. Members also requested early consultation with the CBTS users in order to arrive at a recommended reprovisioning arrangement.

3.6 Most of the comments received in the public engagement have been addressed or our responses have been further elaborated in the report namely "Construction of the Trunk Road Tunnel in Causeway Bay Typhoon Shelter and ex-Wan Chai

Public Cargo Working Area". However, some of the questions concern matters of details and would be addressed either in detailed design stage or construction stage.

4. Conclusion

Cut-and-cover method using diaphragm walls is the only safe, feasible and practicable method of construction for the Trunk Road tunnel at the CBTS and ex-PCWA, although it will require temporary reclamation. Without temporary reclamation, the Trunk Road tunnel cannot practically be constructed. There is consequently on technical ground an overriding public need for the temporary reclamation in the CBTS and the ex-PCWA for the Tunnel Option. The above findings and the public views gathered will form the basis of the cogent and convincing materials for the temporary reclamation for constructing the Trunk Road tunnel in the CBTS and the ex-PCWA. Through staged construction, temporary reclamation will be kept to the minimum and be removed and the seabed reinstated after construction of the Trunk Road tunnel.

Highways Department
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