

**For discussion  
on 28 March 2011**

## **Legislative Council Panel on Transport**

### **Structural Safety of Hing Fat Street Slip Road to Island Eastern Corridor**

#### **PURPOSE**

This paper seeks to explain to Members the structural safety condition of the Hing Fat Street slip road of the Island Eastern Corridor (IEC), the incident of the Central-Wanchai Bypass and Island Eastern Corridor Link (CWB project)<sup>1</sup> allegedly affecting the structure of the slip road, and the follow up actions taken by the Administration in respect of the incident.

#### **BACKGROUND**

##### ***Monitoring mechanism for the IEC Bridge Structures***

2. The IEC, running along the north-eastern shoreline of Hong Kong Island, is an expressway of about 9 kilometres (km) long connecting Causeway Bay to Chai Wan. Most sections of the IEC are in the form of viaducts. The IEC was completed and commissioned in phases since 1984, with the section from Causeway Bay to Tai Koo Shing commissioned in 1984 and the remaining section from Tai Koo Shing to Chai Wan commissioned between 1985 and 1989. The Hing Fat Street slip road connecting to the IEC, located near the ex-Tung Lo Wan Fireboat Station, was completed in 1984, and is an important slip road connecting the Tin Hau area to the IEC.

3. Since the commissioning of the IEC, the Highways Department (the Department) has been carrying out regular inspections

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<sup>1</sup> The proposed CWB is a 4.5 km long dual three-lane trunk road (with a 3.7 km long tunnel) linking up the Rumsey Street Flyover at Central with the IEC. The trunk road can help ease the east-west traffic along the existing Gloucester Road - Harcourt Road - Connaught Road Central corridor, alleviate the traffic congestion conditions along the corridor and existing road network within the area, and cater for the anticipated increase in traffic.

for the IEC, its slip roads and accesses in accordance with the established arrangements for safety inspection for bridge structures : including 6-monthly regular inspections and 2-yearly general inspections. Regular inspections aim to identify any structural damage on the IEC and arrange for repair works instantly; general inspections seek to examine in detail the conditions of all structural components and plan ahead for maintenance works based on the outcome of inspection, and arrange for timely maintenance and renewal works for the bridge concerned, so as to ensure that the bridge structure is sound and safe.

4. According to the Department's records, a 6-monthly regular inspection and a 2-yearly general inspection of the IEC took place in August 2010 and August 2009 respectively. Outcome of the inspections indicated that the IEC (including its road surface materials, bridge structure, stability of bearings, joints of the bridge surface, etc.) was structurally safe. A new round of regular inspection has been underway since February 2011 and will be completed in April 2011. As regards general inspection, it has been scheduled for the third quarter of this year.

#### ***Risk management of the CWB project***

5. Before the commencement of the CWB project, systematic risk management (including systematical planning, identification, analysis, evaluation and handling of risks) was implemented in accordance with the established policy of the Government. For instance, as the alignment of CWB runs along the reclaimed area of the northern shore of Hong Kong Island, we have especially put in place a series of management measures to identify the potential complexities in the area concerned (such as abnormal settlement, variation of geological and ground water conditions, and collapse during excavation, etc.), and mapped out different measures to reduce the potential risks of such conditions to nearby facilities. In addition, we would also require the contractors concerned to install appropriate monitoring measures commensurate with the nature of the works under the contracts and the potential risks to be encountered, carefully monitor the implementation of the works accordingly, submit regular reports on the monitoring results, and provide speedy reports when incidents occur so as to enable the Administration to assess the situation and take appropriate follow up actions (if necessary). In the case of a special incident, the Administration can exercise its authority to instruct the contractor to conduct detailed investigation and submit investigation report, and carry out follow up actions as necessary.

6. The implementation of the concerned Food, Environment and Hygiene Department (FEHD) Whitfield Depot reprovisioning works contract follows the above arrangement. In fact, prior to the commencement of the works, we had required the contractor to establish special monitoring measures to closely monitor the impact of the works on the IEC. The mechanism indeed performed its intended purpose in giving an early alert when an abnormal situation arose (see paragraph 9).

***Incident involving alleged impacts of the construction of CWB on the slip road structure***

7. Funds for the CWB project were approved by the Legislative Council in July 2009 and the construction of CWB commenced by the end of the same year. The construction works being carried out in North Point include the following : North Point reclamation, the tunnel works at the Causeway Bay Typhoon Shelter, the reprovisioning works for the FEHD Whitfield Depot, the tunnel works at North Point and construction of the link to IEC.

8. The IEC Hing Fat Street slip road abutment is situated near the work site of the FEHD Whitfield Depot reprovisioning works (see **Annex 1**). The works commenced in February 2010 and are expected to complete in 19 months. The works involve the conversion of part of the existing Whitfield Depot into an underground car park for use by FEHD so that space at ground level can be released for construction of the CWB.

9. When planning the CWB, the Department had already carefully considered the potential impacts on the IEC due to the works. The engineering consultant employed by the Department had assessed the potential impacts of the construction works of the CWB on the existing IEC structures and found that the impacts (including the extra loading on, and movement of, the existing structures of the IEC) were within an acceptable range. In order to ensure safety during the construction of the CWB, the Department has adopted the recommendations of the engineering consultant to include a condition in the relevant contracts to require the contractors to closely monitor the impact of the works on the IEC, including the installation of monitoring markers<sup>2</sup> on a number of structural components of the IEC. In this incident, the monitoring markers have effectively detected the movement of the abutment in a

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<sup>2</sup> As far as the Whitfield Depot Reprovisioning Works are concerned, in accordance with the contractual requirement, tilt markers were already installed on the IEC structures within the site. In addition, settlement markers for monitoring settlement of the ground and structures were installed around the perimeter of the future basement carpark and at the IEC pile caps within the site.

timely manner.

10. Furthermore, the Department has been taking stringent measures to monitor the construction works concerned and the possible structural reaction of the IEC due to the construction works. We also take corresponding measures to ensure the stability of the IEC. In late January 2011, the Department noted from the monitoring reports that there was a slight movement of the bridge abutment of the concerned slip road, and also observed some more-than-expected widening of the movement joint above the abutment<sup>3</sup>.

11. For safety consideration, the Department carried out a series of follow up measures in early February 2011. First, the Department instructed the contractor of the FEHD Depot reprovisioning works to temporarily suspend underground excavation and carry out soil stabilization measures such as grouting and backfilling. The Department also arranged engineers and the bearing supplier's experts to conduct thorough inspections. The inspection results confirmed that there was only slight deformation of the bridge bearings, but the abutment structure remained safe. Notwithstanding that the results of the inspection by the experts confirmed that the abutment was safe, the Department carried out further temporary measures to better ensure safety :

- (a) temporarily suspended the underground excavation nearby to prevent further movement of the abutment;
- (b) increased the monitoring frequency of the abutment to once per hour;
- (c) temporarily closed the road<sup>4</sup> for changing the movement joint sealant within the movement joint<sup>5</sup>; and
- (d) following the advice of the expert of the bearing supplier, added supporting steel plates between the bridge and the abutment to enhance the stability of the structure.

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<sup>3</sup> The allowable movement of a movement joint depends on the structural design of the bridge deck. The span of the bridge deck of the concerned slip road abutment is under 10 metres while the designed width of the movement joint is 25mm.

<sup>4</sup> The starting section of the slip road has two traffic lanes. The fast and slow lanes were closed alternately for replacing and repairing the movement joint sealant. As the two lanes of the slip road eventually merge into one lane at the end section of the slip road, the alternate lane closure for the starting section had not caused traffic congestion.

<sup>5</sup> Movement joint sealant is for sealing the gap of the movement joint to prevent dripping or falling of object through the gap. Movement joint sealant will age and break up, and thus requires regular maintenance.

12. The monitoring reports since early February all indicated that the movement of the bridge abutment has stabilised after implementing the soil stabilisation works like grouting and backfilling. Although the underground excavation under the FEHD Whitfield Depot reprovisioning works contract has been suspended, other works processes (including piling and grouting at other locations) have resumed.

## **FOLLOW UP ACTIONS**

13. After the incident, we have separately requested the contractor and the engineering consultant to conduct thorough investigation and submit reports on the incident. It is expected that the investigation results will be available in late March the earliest. The Administration will confirm the cause of the incident and the contractual liability on the basis of the reports, and then decide on the need for other follow up actions or arrangements.

14. Although the movement of the abovementioned IEC slip road abutment is minor and the bridge remains structurally stable and safe, the risk of the construction works is higher than originally anticipated, given that the abutment lies in the old reclamation area with highly variable soil stratum. Having regard to the above, and the fact that the deep tunnel under the Causeway Bay Typhoon Shelter section will soon commence works near the abutment, HyD has thus requested the engineering consultant to thoroughly review the possible impact of the deep tunnel works on the slip road bridge taking into account the latest available information. The engineering consultant recommends additional stabilisation measures for the slip road bridge foundation and adjacent structures to enhance safety.

15. In view of the above, HyD has required the contractor for the tunnel works at Causeway Bay Typhoon Shelter to carry out stabilisation works for the foundation of the abutment prior to the deep tunnel works. The main task will be to grout and thus strengthen the soil stratum underneath the slip road abutment. To facilitate the grouting works, temporary struts will be installed to provide additional support to the bridge deck near the abutment in order to reduce the loading on the abutment.

16. Moreover, we have also required the contractor for the Whitfield Depot reprovisioning works and the engineering consultant to

review the construction method of the pipe piles. After the abovementioned detailed investigation reports have confirmed the cause of the incident, we shall decide whether the measures taken are adequate to enable the excavation work for the underground basement car park to resume safely.

**Transport and Housing Bureau  
Highways Department**

**March 2011**



中環灣仔繞道  
食環署威菲車房重置工程

Central - Wan Chai Bypass — FEHD Whitfield Depot Reprovisioning Works

