

ENVIRONMENTAL PROTECTION DEPARTMENT

**AN IN-HOUSE REVIEWING STUDY
ON EXISTING FLYOVERS
FOR RETROFITTING WITH NOISE BARRIER**



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1. BACKGROUND

- 1.1 In the Second Review of the 1989 White Paper issued in January 1994, the Government has indicated the intention to complete a study to investigate the practicability of reducing the adverse traffic noise impacts brought about by existing roads. A "Scoping Study for Providing Retroactive Road Traffic Noise Measures" was completed in 1995 to define the scale of the traffic noise problem in the territory and to identify roads with the potential for retroactive noise mitigation. The second stage study was commissioned in 1996 to investigate in details the engineering, safety, environmental, cost and maintenance aspects of the direct technical remedies for the road sections identified in the Scoping Study.
- 1.2 Flyovers were specifically excluded from both of these studies. Since the majority of flyovers are located in densely populated areas and sit above other roads, independent structures were at the time considered impractical. The Highways Department therefore advised that all direct technical remedies were to be independent of flyovers. In October 1996, ERM-Hong Kong was commissioned by the EPD to carry out a separate study known as "Scoping Study for Providing Direct Technical Remedies on Existing Flyovers" and a total of 188 existing flyovers were examined. The Scoping Study recommended eleven flyovers for further investigation after a screening procedure.
- 1.3 In view of programme and resources considerations, three of these flyovers (Ap Lei Chau Bridge, Tsing Tsuen Bridge and Kwai Chung Road Flyover) were selected for a detailed assessment of engineering feasibility in providing direct technical remedies. The selected flyovers were investigated in "Feasibility Study for Providing Noise Mitigation Measures on Existing Flyovers" (the "Feasibility Study"), commissioned in June 1998 under Agreement No. CE95/97. The study concluded that it is feasible to retrofit Ap Lei Chau Bridge and Tsing Tsuen Bridge with independently supported barriers and enclosures. Kwai Chung Road was found not feasible for retrofitting due to constraints of fire fighting, space and social impacts (disruptions to street level commercial

activities and pedestrian movement). The study also developed a “Working Tool” for systematic reviewing the feasibility of retrofitting existing flyovers.

- 1.4 This study reviewed the feasibility of providing retroactive noise mitigation for the 188 existing flyovers according to the Working Tool and procedures devised in the Feasibility Study.

2. REVIEW METHODOLOGY

- 2.1 Noise sensitive receivers (NSRs) in this review study refer to all existing domestic premises, including temporary housing accommodation. Court of law, hotels and education institutions were excluded since they were either fully air-conditioned for the former or they were included in the territory-wise “School Insulation Programme”.
- 2.2 Following directly from an analogy of the HKPSG noise criterion, the peak-hour noise level $L_{10}(1\text{-hour})$ of 70 dB(A) for domestic premises was adopted for consideration for retrofitting with noise barrier.
- 2.3 The Feasibility Study showed that the feasibility of providing noise mitigation measures depended largely on site conditions. The need for a re-visit of all existing flyovers was recognised during the Feasibility Study and a set of “Working Tool” was developed in order to provide a systematic screening of all existing flyovers (Appendix A).
- 2.4 The broad approach to this study was to carry out a review of the existing flyovers using the “Working Tool” and to identify any potential technical difficulties by reference to complicated actual site conditions. The study also recommended and listed all identified flyovers with priority for which practicable direct technical remedies can be provided.
- 2.5 The Working Tool was applied systematically to:
 - Identify the noise problem;
 - Select the noise barrier form;
 - Consider the practicality of emergency access and fire fighting;
 - Identify road safety problems such as visibility and obstruction of vehicular access;

- Identify the site constraints for noise mitigation measures, e.g. availability of space;
- Ascertain the acoustic effectiveness of the identified barrier form.

3. FINDINGS OF THE REVIEW STUDY

- 3.1 A total of 188 flyovers in the territory were subjected to a multi-factor screening process. Flyovers that have been subjected to an EIA or with barriers provided were excluded from the review study.
- 3.2 The 188 flyovers in the Hong Kong territory were reviewed using the 1:1000 scale survey maps produced by Lands Department. Each flyover section was systematically tested using the assessment procedures (“Working Tool”). Only those sections that were identified as noisy roads would be analysed further. The appropriate noise barrier form and site constraints including fire fighting, road safety and availability of space were identified.
- 3.3 Ap Lei Chau Bridge and Tsing Tsuen Road have already been short-listed for detailed assessment of engineering feasibility (discussed in the Feasibility Study) and thus not repeated in this report. Apart from these two flyovers, five flyovers (including one where the identified section is on an embankment and hence considered as an at-grade road) were identified feasible for providing direct noise mitigation measures. They include three flyovers in Kowloon Peninsula, and one flyover and at-grade road in the New Territories: Kwun Tong Bypass, West Kowloon Corridor, Tseung Kwan O Road, Sha Tin Road and Yuen Shin Road.
- 3.4 As local roads generally have low traffic flow and hence insignificant noise impacts, they would unlikely be noisy roads and were not considered for noise mitigation measures.
- 3.5 Preliminary Evaluation of Engineering Feasibility
 - (a) Engineering feasibility for the provision of noise barrier proposals should aim to produce a safe and economical structure that requires minimal maintenance. For this reviewing study, a brief assessment of engineering feasibility was conducted in terms of the following aspects:
 - compliance with road safety requirements as stipulated in the Traffic

Planning & Design Manual (TPDM)

- compliance with the fire fighting and emergency access requirements of the Fire Services Department and other government departments
 - compatible with pedestrian and vehicular access
 - compatible with existing structure
- (b) The West Kowloon Corridor is a strategic road link between Cheung Sha Wan and Sham Shui Po. This review identified that noise mitigation is possible for part of the flyover, namely the section between Tonkin Street and Willow Street near Nam Cheong Estate. 3m barrier is recommended to protect Nam Cheong Estate. Part of Tung Chau Street Park would be occupied by the supporting structure of the barriers and the barrier support needed to be site backed from Yen Chow Street to meet the sightline requirements.
- (c) Kwun Tong Bypass is an expressway parallel to Wai Yip Street, running along Kwun Tong Typhoon Shelter and joins Wai Fat Road. This review revealed that direct noise mitigation may also be feasible for the section near Laguna City. 5m cantilevered barrier is recommended in order to protect the sensitive receivers in Laguna City.
- (d) Tseung Kwan O Road is a district distributor joining the Kwun Tong Bypass in Kwun Tong. The elevated section of Tseung Kwan O Road is located near South Tsui Ping Estate and over the junction between Kwun Tong Road and Lei Yue Mun Road. The main sensitive receivers are residents of South Tsui Ping Estate. A partial enclosure is also recommended to protect these receivers.
- (e) The elevated section of Sha Tin Road runs from City One Shatin to join Tai Po Road (Shatin) across Shing Mun River Channel. This review indicated that direct noise mitigation is possible for the section. Full-enclosure is recommended and sensitive receivers in City One Shatin and Belair Garden would be benefited.
- (f) Yuen Shin Road is a primary distributor joining the Tolo Highway in Tai Po. The identified section of Yuen Shin Road which in fact sits on an embankment is located near Yuen Chau Tsai. Partial enclosure is recommended to protect sensitive receivers in Wang Fuk Court and Kwong Fuk Estate.
- (g) Layout of the proposed mitigation measures for the identified flyovers are

shown in Figures 1 to 5. More details including noise reduction and number of dwellings being protected by the proposed mitigation measures etc. are summarized in Table 1. A database containing all the existing flyovers reviewed is provided in Appendix B.

- 3.6 Each identified mitigation option should further be subjected to a comparative evaluation during engineering design stage to develop the most optimum option for implementation. The evaluation includes the following :

Engineering Consideration

Buildability

Safety

Traffic Management during Construction

Detailed Cost Evaluation

Environmental Considerations

Noise Impact

Air Quality Impact

Landscape Impact

Visual Impact

4. RECOMMENDATION

- 4.1 To include the four flyovers into the list of existing roads that have potential for retrofitting and for consideration including priority, implementation scheme, etc.

5. CONCLUSION

- 5.1 This study reviewed the existing flyovers on the basis of the Working Tool developed from the CE95/97 Feasibility Study and identified four flyovers that are feasible to provide mitigation measures in the form of noise barriers or enclosures.

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