

PLANNING AGAINST NOISE IN HONG KONG

Sam W. H. WONG
Aaron S. W. LUI
K. K. LAU

Noise Policy Group
Environmental Protection Department
Hong Kong Government
46/F., Revenue Tower, 5 Gloucester Road,
Wan Chai, HONG KONG

ABSTRACT The impacts of road traffic noise in Hong Kong are pervasive. About one million people are affected by road traffic noise at levels higher than a standard recommended for planning of new developments. The Environmental Protection Department of Hong Kong has promulgated a set of planning standards and guidelines for reference of planners, engineers and architects in their preparation of land use proposals which include road projects and residential developments. This paper will describe, in connection with road traffic noise in Hong Kong, the planning objectives, the various practicable mitigation measures available to a high density modern city, and the achievements through conscientious planning efforts made over the past years.

1. INTRODUCTION

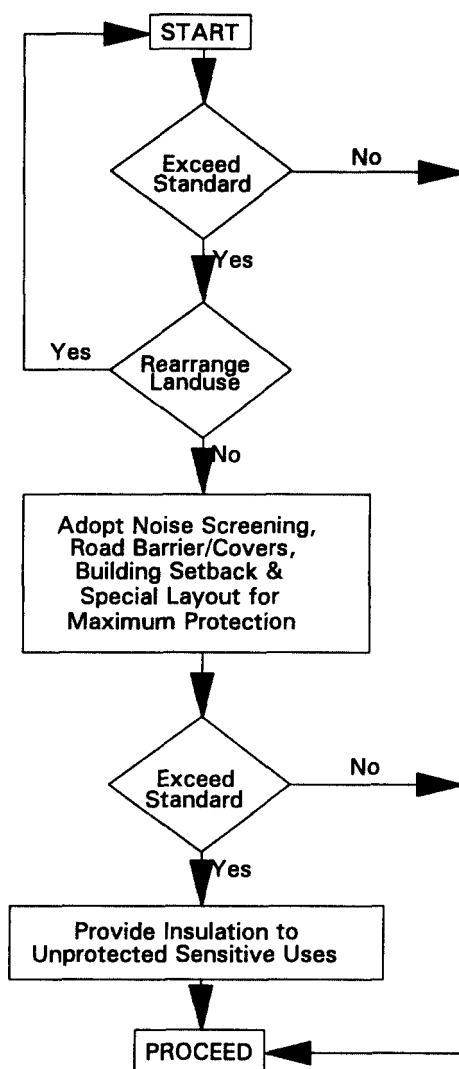
Hong Kong's small urban built-up area (about 10% of 1070 sq.km total area); rapid economic growth requiring rapid, massive and efficient surface transportation network; and past neglect of proper land use planning issues are the main reasons for the present road traffic noise problems facing the six million population.

2. POLICY OBJECTIVES

The Government's policy objectives for environmental planning, which are also relevant to road traffic noise [Ref. 1], are :

- o to avoid creating new environmental problems by ensuring the consequences for the environment are properly taken into account in site selection, planning and design of all new development; and
- o to seize opportunities for environmental improvement as they arise in the course of urban redevelopment.

The Environmental Protection Department (EPD) is the principal executive agent on environmental matters in Hong Kong. To achieve Government's environmental planning policy objectives, EPD observes closely the Hong Kong Planning Standards and Guidelines (HKPSG) [Ref. 2] which not only reflect currently approved policy objectives but also planning practices appropriate to Hong Kong conditions.



The HKPSG is a Government document, published in 1985 and updated in 1990 having regard to the release of the 1989 environment White Paper. The HKPSG is used principally by town planners within Government, but also by engineers, architects and other professionals involved in planning of both public and private developments. Although the standards and guidelines in the HKPSG do not form part of the statutory ordinances, they have been applied conscientiously by all the professionals, wherever practicable, in land use planning.

The principal framework for planning against noise and a complete list of noise sensitive uses are contained in the HKPSG. Residential premises and schools are, among the listed uses, highly susceptible to road traffic noise impact in a vibrant metropolis like Hong Kong. The maximum permissible noise levels for planning purposes at the external facade of the two noise sensitive uses are :

- o residential premises - 70 dB(A) L10 (1 hr) of the peak hour traffic flow
- o schools - 65 dB(A) L10 (1 hr) of the peak hour traffic flow

Figure 1 is the flow chart to show the steps required for the planning of land uses against road traffic noise.

3. NOISE IMPACT ASSESSMENT

In order to ensure that noise standards contained in the HKPSG will be met, requirements for the project proponents to carry out a Noise Impact Assessment (NIA) are often stated in lease conditions.

It is essential that the NIA not only predicts the noise impact but, in the process, interacts with the design of the development concerned, so that mitigation measures are incorporated into the design to help in minimizing the noise impact. These mitigation measures must be implemented by the project proponents and EPD will ensure that all practicable mitigation measures have been implemented before recommending for the issue of any compliance certificates.

4. PRACTICAL NOISE MITIGATION MEASURES

A range of measures are available to mitigate impact of road traffic noise in Hong Kong. Local experience indicates that the following individual measures or a combination of the measures [Ref. 3,4] would be effective for noise amelioration.

4.1 Screening by noise tolerant buildings

Multi-storey car parks and commercial centres can serve effectively as a noise barrier if placed in between the road and the noise sensitive components of a development, such as highrise residential buildings or schools.

4.2 Setback of buildings

For a typical line source, a setback which doubles the distance between the road and receiver can provide a 3 dB(A) reduction. Though it is often not practicable to use setback alone to achieve the required attenuation due to insufficient space in Hong Kong, setback arrangements can be usefully combined with other noise mitigation measures to produce the desired results in many developments.

4.3 Decking over

For a high density development involving highrise buildings contiguous to or sandwiching a road, placing a deck over the road, with development located on top of the deck, will provide noise reduction up to 15 dB(A). Ventilation, reverberation and maintenance within the deck should be considered at an early stage of planning to ensure that these environmental concerns will not be compromised. A residential development in Hong Kong carrying a deck over a busy 6-lane high speed road with 17 highrise buildings on top of the landscaped deck of over 4000 dwellings is in Figure 2.

4.4 Extended podium

Where the development flanks a major road and a full deck cannot be provided, useful noise reductions can be achieved through an extended podium which effectively covers part of the road.

4.5 Building orientation

This technique calls for special building designs where noise tolerant portions of a building such as blank facade, kitchens, toilets, stairwells, lift cores and storage rooms are strategically placed to face the road. In some situations, balcony or bay windows with skewed window openings faced away from the road will also help for noise amelioration.

4.6 Treatment at source

It is possible that direct remedies, such as noise covers or barriers alongside roads, can yield cost-effective results. Past experience in Hong Kong indicates that if such measures are considered at an early stage of planning, highly satisfactory results can be achieved by integrating the measures into the road contracts. Figure 3 shows a road cover on a viaduct protecting nearby highrise dwellings.

4.7 Provision of acoustic insulation to affected receivers

The warm and humid weather condition in Hong Kong requires air-conditioning if residential premises are required to close windows to shut out road traffic noise. The provision of window and air-conditioning is a mitigation measure of last resort and is applicable only for units which cannot be protected satisfactorily through any other means.

A high density residential development, by the side of a trunk road and on top of the proposed airport railway, has applied the above measures from the outset of land use planning. The concerted effort of noise conscious architects, engineers and acoustical professionals in planning against noise is best illustrated in Figure 4.

5. PLANNING ACHIEVEMENT

Having promulgated the HKPSG for 7 years, a study [Ref.5] was carried out by EPD in 1992 to review the degree of success in implementing the planning steps outlined in Figure 1, and in achieving the planning standards. This is done by comparing the road traffic noise levels at residential premises with the maximum permissible level. The study analysed more than 140,000 residential premises in development proposals that were submitted for consideration of EPD over a number of years. The study found that substantial improvements in noise exposure were actualized in cases where there were noise planning input in accordance with the HKPSG. The planning effort has resulted in a reduction from an average of 21% of residential premises exposed to road traffic higher than 70 dB(A) L10 (1 hr) to less than 6%. Figure 5 summaries the achievements of EPD in planning of land uses against road traffic noise impact.

6. REFERENCES

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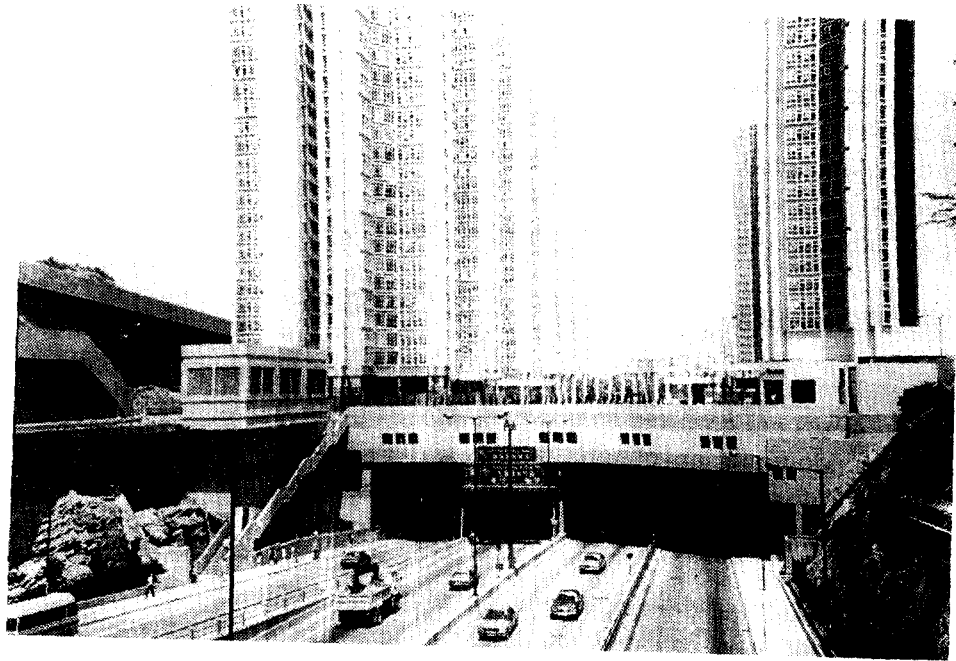


Figure 2 - Landscape deck for traffic noise amelioration



Figure 3 -
A road cover protecting
nearby highrise sensitive
uses

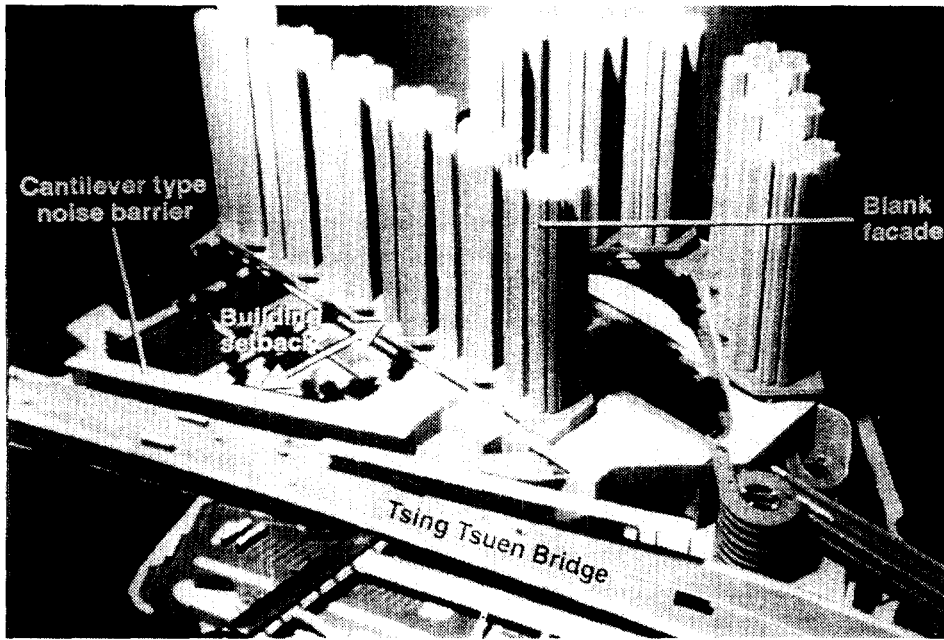


Figure 4 - A combination of noise mitigation techniques in planning against road traffic noise

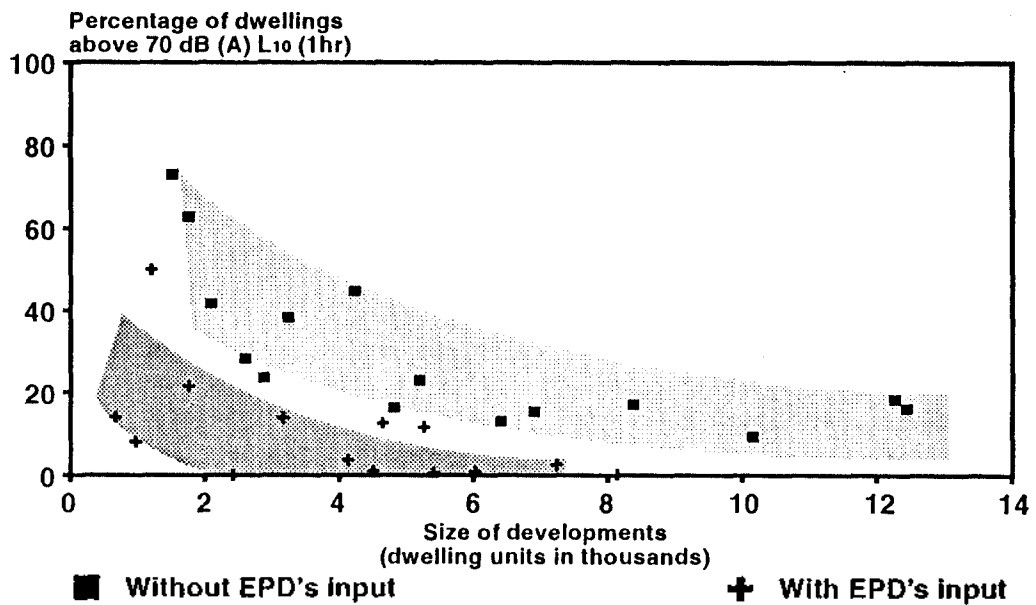


Figure 5 - Gains in noise planning against traffic noise