

For discussion
26 May 2014

Legislative Council Panel on Transport
Maintenance of Road Pavements in Hong Kong

Purpose

This paper briefs Members on the maintenance of road pavements in Hong Kong by the Highways Department (HyD).

Background

2. With the growth of Hong Kong's economy, the transport demand of the public is on the rise. In addition to improving the safety and efficiency of Hong Kong's road network, the Government considers it important to ensure the proper and timely maintenance of the roads.

3. HyD is responsible for the maintenance of public roads in Hong Kong. In recent years, whilst a number of new highways are being constructed, some of our existing highways have started to show signs of aging, highlighting the importance of maintenance works. HyD is committed to maintaining a quality, safe and reliable road network in order to meet the increasing public expectation.

4. HyD's total expenditure on maintenance of road pavements for 2013-14 was about \$390 million. The budget for 2014-15 was comparable to the total expenditure for 2013-14.

Regular Road Inspections

5. At present, the total length of Hong Kong's road network is approximately 2 000 kilometres. About three-quarters of the roads are paved with bituminous material while the remaining roads are paved with concrete. Generally speaking, concrete is suitable for use in roads under

frequent stop and go or sharp manoeuvring of heavy vehicles due to its inert property and high material strength. Bituminous material can bring enhanced comfort to passengers due to its certain extent of elasticity and high flexibility. Moreover, the road maintenance works of bituminous material bring relatively less impact to the traffic. More than 200 kilometres of roads in the road network belongs to expressways. In order to reduce the potential for vehicles to aquaplane during wet weather, HyD has adopted porous friction course as the standard surfacing material for all expressways when choosing the type of bituminous material. Apart from improving road safety, porous friction course can serve the function of reducing noise generated by vehicle tyres.

6. To keep the road network in a safe and serviceable condition, HyD conducts regular inspections and carries out maintenance works of various scales. “Safety Inspections” regularly conducted by HyD aim to identify road defects that are posing an imminent danger to the public such that rectifications can be carried out as soon as possible. The frequencies of “Safety Inspections” mainly depend on road types: expressways carrying high-speed traffic and those with high traffic throughout are inspected daily; trunk roads are inspected weekly; other roads are inspected once every one to three months. HyD also conducts “Detailed Inspections” for all road types once every six months to check the surface and structural conditions of the roads. The collected data are used for planning and prioritising the respective road maintenance works such that they can be done in an organised manner for preventive purpose. The above maintenance works are carried out by contractors engaged and supervised by HyD.

Corrective Repairs and Planned Maintenance

7. Road facilities are prone to daily wear and tear, and the rate of deterioration is closely related to the usage rate of the road. Whilst some defects may cause inconvenience to road users, major defects may undermine road safety. HyD’s primary duty in road maintenance is to ensure timely rectification of identified road defects and prevent them from occurring so that our roads are always kept in a safe and serviceable condition for use by the public. Road maintenance works can be broadly classified as corrective repairs and planned maintenance.

8. Corrective repair works cover rectification of defects identified through road inspections or reports by the public or relevant Government

Departments, particularly for those defects posing an imminent danger to motorists and pedestrians. Corrective repair works usually involve works of relatively small scale, such as patching of pot holes or repair of damaged traffic signs. To minimise disruption to traffic due to the repair works, HyD adopts methods that can quickly rectify the defects. This involves, for example, the use of light construction plant and rapid-setting materials.

9. Planned maintenance works are preventive in nature, the priorities and programmes of which are determined on the basis of current conditions of individual road facilities, the anticipated rate of deterioration and impacts to road users. The objective of these maintenance works is to bring long lasting improvements after the facilities show signs of wear and tear, but before serious defects emerge.

10. Planned maintenance works are usually of a larger scale requiring longer time to complete. These involve road resurfacing of the top layer of bituminous material for road sections of considerable length, or reconstruction of the whole depth of bituminous pavement structure, so as to achieve longer lasting improvement. Such works will have a higher standard of quality control than corrective repairs, and will involve larger construction plant (e.g. concrete mixers, concrete cutters, asphalt millers, or pavers).

Challenges

11. Hong Kong is one of the most densely populated cities in the world. For planning and implementation of road repair and maintenance, HyD endeavours to carry out road reinstatement works promptly with minimum impact on traffic. To cater for road maintenance works, HyD liaises closely with related Government Departments, including the Transport Department and Hong Kong Police Force, in formulating a feasible temporary traffic arrangement (TTA) which would bring minimum impact to the public.

12. Within such a dense road network, any lane closure and the associated TTA would inevitably cause disruption to traffic. Therefore, HyD has to discuss with the relevant Government Departments at length to agree on the TTA, and the extent and duration of lane closure involved. For certain road sections in busy and narrow streets or road junctions in urban areas, it is not uncommon that temporary lane closure for road works

would only be allowed during the non-peak hours from 10:00am to 4:00pm. However, it might not be feasible to meet such a time constraint when deploying the traditional pavement reconstruction method, which involves excavation of existing defective pavement, laying of the new bituminous pavement material or concrete, compaction and curing.

13. To cope with high traffic demand and site constraints, particularly in urban areas, some road maintenance works are now carried out on public holidays or at nighttime in order to minimise disruption to daily traffic. Nonetheless, with the close proximity of our road network to the residential areas in urban districts, nighttime works will inevitably generate noise causing nuisance to nearby residents. HyD has to strike a balance between traffic management and noise control in carrying out road maintenance works.

Solutions

14. HyD has committed to maintaining the riding quality of road pavements at a satisfactory level. In view of the constraints arising from traffic and construction noise impact mentioned above, HyD has carried out trials on the use of thermal patcher to repair bituminous road pavement defects and the use of precast concrete panel to rectify concrete road pavement defects. These techniques have now been adopted as some of the methods for maintenance of road pavements at road sections where the site conditions are suitable.

Thermal Patcher (Figures 1, 2 and 3)

15. Thermal patcher adopts an engineering principle known as “Hot-in-place recycling”, and comprises a truck-mounted equipment to heat up and soften the surfacing layer of the deteriorated bituminous pavement. The softened material is then mixed with an appropriate amount of new bituminous material followed by compaction to form a uniform and seamless repaired road surface.

16. “Hot-in-place recycling” promotes the re-use of existing bituminous material to reduce the generation of construction waste when compared with the traditional milling and resurfacing method. “Hot-in-place recycling” has also been used in various countries for road maintenance.

17. In addition, another advantage in adopting “Hot-in-place recycling” is that less noise is generated during the construction process. For the traditional method, one of the noisiest operations is the break-up of the existing pavement materials. With thermal patcher, the existing bituminous material will be softened without deploying mechanical breaking equipment. As such, nighttime works for repairing pot holes and small scale resurfacing will generate less construction noise, thus abating nuisance to nearby residents.

18. Whilst the use of thermal patcher is more environmentally friendly and will generate less noise, its productivity is however comparatively low as the heating process takes more time than the traditional milling and resurfacing method. For this reason, under the circumstances of Hong Kong, such as busy and narrow roads in urban areas as well as limited time for temporary lane closure, this technology is limited to be used for small scale resurfacing of an area not exceeding 100 m², and cannot totally replace the traditional milling and resurfacing method.

Precast Concrete Panels (Figures 4, 5 and 6)

19. The traditional concrete pavement repairing method deploys mechanical breakers to break up the defective pavement materials, followed by casting of concrete or rapid hardening concrete as the new road pavement. Due to the process of casting of concrete and the operation of compaction, this method inevitably generates construction noise. In addition, it usually requires a relatively long period for concrete setting and curing.

20. To tackle the above problems, HyD has adopted a method for replacement of defective road pavement with precast concrete panels. The new concrete road pavement is divided into small precast panel sections and cast in the contractor’s casting yard. After the break-up of the defective road pavement, the precast concrete panels are lifted and placed on-site with fast hardening concrete to fill up the gaps underneath and surrounding the new panels. After relaying the road marking, the road section can be re-opened to traffic without the need of waiting for setting and curing of concrete, so that the repair works can be completed within a relatively shorter period of time.

Looking Ahead

21. To cope with the ever increasing demand for road maintenance and to alleviate the traffic and environmental impacts during the course of the works, HyD will continue to keep abreast of the latest technological developments and identify room for further improvement in undertaking road maintenance works.

Highways Department
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Figure 1: Pavement condition before repair works



Figure 2: Pavement resurfacing by thermal patcher



Figure 3: Photo of road resurfaced by thermal patcher

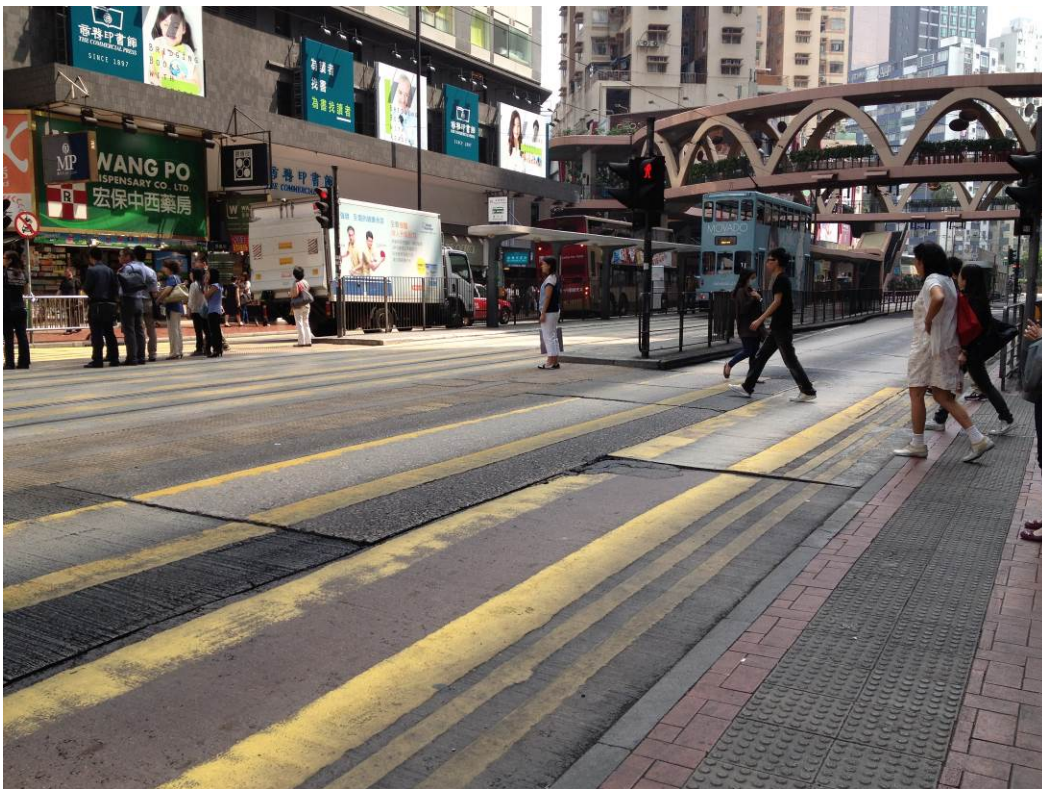


Figure 4: Pavement condition before repair works



Figure 5: Placing precast concrete panel on-site



Figure 6: Photo of road surface repaired by precast concrete panel