CONTROLLING OFFICER'S REPLY

(Question Serial No. 0064)

Head: (60) Highways Department

Subhead (No. & title): (-) Not Specified

Programme: (2) District and Maintenance Works

Controlling Officer: Director of Highways (YAU Kwok-ting)

Director of Bureau: Secretary for Transport and Logistics

Question:

It was mentioned in the "Matters requiring Special Attention in 2026-27" that the Highways Department (HyD) would strive to make use of innovative technologies and to digitalise the work processes to enhance efficiency. This item has been mentioned in the past few years. Please advise this Committee on the following:

(1) Over the past 3 years, what specific measures of digitalisation the workflows has the HyD implemented in terms of road maintenance and management? What are the actual outcomes of these efficiency-enhancing measures?

(2) In 2026-27, what are the estimated expenditures used for implementing the digitalisation of workflows and application of innovative technologies?

(3) Did the HyD plan to further integrate the Excavation Permit Management System with the data of the Water Supplies Department, Drainage Services Department and other departments etc. to minimise the impacts of repeated road openings on the public?

Asked by: Hon LAM Siu-lo, Andrew (LegCo internal reference no.: 31)

Reply:

(1) The Highways Department (HyD) has been striving to use innovative technologies and digitalise workflows in the maintenance of public road to enhance work efficiency. The measures developed and implemented by the HyD for the application of innovative technologies and digitalization of workflows over the past 3 years are as follows:

At present, the Road Maintenance Monitoring System (RMMS) has been used in all road maintenance contracts. RMMS fully digitalises the monitoring and administrative work of road maintenance. In the past, whenever the HyD's personnel identified defects in road facilities during inspections, they were required to fill in and send the relevant physical form to the contractors upon completion of the inspections. With the RMMS, the personnel can now log on to the system during on-site inspections, capture the information on damaged facilities and notify the contractors through

electronic means, so that contractors can receive the relevant data promptly and arrange for repair works accordingly. After completion of repair works, the contractors can also use RMMS to report the work done and submit maintenance records. The adoption of RMMS can reduce complicated paperwork and transmission time to enhance work efficiency and facilitate the HyD's personnel to monitor the progress of maintenance works which resulting in better record keeping. The HyD is now developing the second phase of RMMS, which will incorporate more monitoring and management functions, such as automatic alerts or warnings to contractors with unsatisfactory maintenance progress, as well as digitalised checking procedures, etc., to further enhance the efficiency and effectiveness of road maintenance. The second phase of the system has been implemented in 7 road maintenance contracts in early 2026 and aims to implement in all road maintenance contracts by mid-2026

Furthermore, the HyD has adopted the Road Defect Detection System (RDDS) to conduct daily road inspections. The system utilises high-definition cameras installed on patrol vehicles to capture images of road conditions and global satellite positioning technology to record the corresponding image locations. It then uses artificial intelligence (AI) technology to automatically identify road surface cracks and discoloured road markings, instead of conducting the visual inspections by road inspectors in the past to ensure that the detection results are objective and accurate. In the past, road inspectors had to conduct visual inspection and measurement on the road surface after road closures, which only covered a few hundred meters of carriageways per day at most. Currently, the contractors can obtain a comprehensive overview of the latest road conditions without the need of road closures. This enables more effective planning of road maintenance and minimises the impacts on traffic. With the full adoption of the RDDS, the average time taken by the contractors from completion of road detection works to submission of the relevant detection reports has been substantially reduced from 48 hours to within 24 hours.

The HyD commenced the RDDS upgrading works in 2025, introducing advanced AI algorithms to significantly enhance the accuracy and processing speed of image recognition. In addition to the existing detection of road cracks and discoloured road markings, the system’s detection function will be expanded to identify faded, deformed, or traffic signs obstructed by vegetation, excessive weed growth, damaged gullies and manhole covers etc. The relevant system upgrading works is expected to be completed in the fourth quarter of 2026.

The HyD has also employed service contractors since 2024 to conduct researches and development on the Road Condition Assessment System (RCAS), which uses patrol vehicles equipped with laser scanning equipment and global satellite positioning technology to drive on a carriageway at normal speed, and can automatically identify and accurately record various types of defects on road surfaces such as potholes, rutting etc. It calculates a Pavement Condition Index for every 100 meters which provides reference to relevant road maintenance personnel to determine the priority of road reconstruction or resurfacing works.

The RCAS can inspect approximately 200 kilometers of carriageways daily. In the past, the road inspectors had to conduct visual inspections and measurements, which only covered a few hundred meters of carriageways per day at most. The RCAS allows

maintenance team to have a more comprehensive overview of the latest road conditions, and enables more efficient resource utilisation for planning road repair works. The RCAS conducts detection and measurement of road defects without road closures which reduces the resources and time required as compared with conventional road inspection method and minimizes the impact on traffic. The HyD will start incorporating the technology into new road maintenance contracts in phases starting from this year.

(2) In 2026-27, the estimated operating expenditure for taking forward workflow digitalisation and innovative technology in public road maintenance under Programme (2) is approximately $11.73 million.

(3) Since 2009, the HyD has launched the web-based Excavation Permit Management System (XPMS) to coordinate and control public road excavation works electronically, replacing the traditional paper-based excavation permit application process. In order to obtain a more comprehensive overview of all proposed excavation works plans for better coordination, thereby reducing repeated road openings and minimising the impact on the public and traffic, the XPMS identifies potential conflicts amongst different proposed road excavation plans based on relevant input data (such as overlapping of excavation areas or in proximity that may lead to conflicts in temporary traffic arrangements) upon registration of proposed road excavation plans by the works proponents. The system then requires the relevant works proponents (such as utility undertakings and government works departments, including the Water Supplies Department, Drainage Services Department, etc.) to communicate and submit coordination reports for further consideration of their applications. Furthermore, the system determines whether proposed road excavations comply with the Road Opening Restriction (where newly constructed carriageways and footpaths are generally prohibited from excavation for 5 years and 1 year respectively) and the Repeated Opening Restriction (which prohibits the same works proponent and other works proponents from re-excavating the same road section within 6 months and 3 months upon completion respectively), so as to reduce impacts of repeated road openings on road users.

Under appropriate circumstances, the HyD would proactively encourage works proponents to group excavations by adopting a common trench approach that meets the needs of all road opening works. Upon all works being completed in an orderly manner, the entire road surface would be reinstated by the last permittee. This approach can strengthen coordination of road excavation works and minimise repeated openings.

Furthermore, following the HyD's optimisation of the XPMS in 2019, the system can automatically identify those applications that require coordination and adjust their works schedules to be staggered by 3 to 6 months from other works proponents. These cases do not involve any violation of the Repeated Opening Restriction but do not adopt common trench approach. To encourage the use of common trench and avoid repeated openings, the HyD may consider rejecting an application if the works proponent fails to provide a reasonable justification for not adopting a common trench.

The HyD is currently considering to develop new programme and interface to facilitate the works proponents to directly download the data of the proposed excavation areas from XPMS and upload them to the Underground Utilities Information System (UUIS) which is being optimised with the assistance of the Lands Department. The UUIS will

display integrated underground utility information within the proposed excavation areas, including water mains, stormwater drains, sewers, gas pipes, electric cables, etc. This allows works proponents to analyse the alignments and depths of underground utilities, thereby facilitating the development of more effective engineering details and construction methodologies, and reducing the impact on the public arising from repeated road openings caused by alignment changes due to unforeseen underground utilities. The aforesaid optimised function of the UUIS is expected to be launched in the first half of 2027.

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