

CHAPTER 4

**Development Bureau
Highways Department
Lands Department**

**Government's efforts in
managing excavation works on public roads**

**Audit Commission
Hong Kong
3 April 2018**

This audit review was carried out under a set of guidelines tabled in the Provisional Legislative Council by the Chairman of the Public Accounts Committee on 11 February 1998. The guidelines were agreed between the Public Accounts Committee and the Director of Audit and accepted by the Government of the Hong Kong Special Administrative Region.

Report No. 70 of the Director of Audit contains 8 Chapters which are available on our website at <http://www.aud.gov.hk>

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GOVERNMENT'S EFFORTS IN MANAGING EXCAVATION WORKS ON PUBLIC ROADS

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GOVERNMENT'S EFFORTS IN MANAGING EXCAVATION WORKS ON PUBLIC ROADS

Executive Summary

1. Apart from carrying vehicular and pedestrian traffic, most of the 2,107 kilometres of public roads in Hong Kong also provide underground space for accommodating utility services. Road works are necessary from time to time for the installation, maintenance, repair and improvement of road sections and/or the public utilities underneath. According to the Transport Advisory Committee's Report of December 2014, road works were a major cause of road traffic congestion. Under the policy directives of the Development Bureau (DEVB), the Highways Department (HyD) coordinates and controls road openings through issuing excavation permits (XPs) to the works proponents, including government works departments and other utility undertakings (UUs). According to the Land (Miscellaneous Provisions) Ordinance (LMPO — Cap. 28), a person has to obtain an XP from the HyD for making or maintaining an excavation on streets maintained by the HyD over unleased government land (hereinafter referred to as public roads) and a land licence from the Lands Department (LandsD) for installing utility facilities. As an incentive for permittees to complete their works within the approved timeframe, the Government has imposed XP fees with special charging mechanism (an administration fee of \$650 and a daily fee of \$35 plus economic cost based on the traffic impact an excavation can cause) for permit extension since April 2004. In 2016-17, XP fees of \$180 million were collected. The costs associated with the coordination and control of road openings were incorporated in the HyD's 2016-17 expenditure of \$1,433.4 million on the programme area of district and maintenance works. Of the 1,011 staff working under the programme area in December 2017, 113 staff were responsible for matters relating to administration of road opening works. The Audit Commission (Audit) has recently conducted a review of the Government's efforts in managing excavation works on public roads with a view to identifying areas for improvement.

Management and monitoring of road excavation works

2. The two Regional Offices (i.e. Urban and New Territories) of the HyD are responsible for processing and issuing XPs using a web-based Excavation Permit Management System (XPMS). In 2016, the HyD issued 21,822 XPs comprising

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8,911 normal excavation permits (NXPs — for planned openings with a diameter of 450 metres (m) or less), 10 capital works excavation permits (CWXPs — for planned openings with a diameter exceeding 450 m), emergency excavation permits (EXPs) for 11,171 emergency incidents and 1,730 small-scale works excavation permits (SSWXPs — for areas of excavation each not exceeding 4 square metres and length of excavation not exceeding 6 m). If a permittee of an NXP or CWXP cannot complete the works within the specified XP period, it needs to apply for an extension. Extension is not normally allowed for an EXP or SSWXP. A permittee needs to complete excavation works within 7 days for each emergency incident under an EXP, and within 24 hours for each job affecting carriageway or within 48 hours for each job not affecting carriageway under an SSWXP (paras. 1.6, 2.2 and 2.3).

3. ***Need to remind government works departments to strengthen investigation of underground conditions before applying for XPs.*** While the total number of NXPs and CWXPs decreased from 13,297 in 2010 to 8,921 in 2016, the number of XPs with extension increased by 78% from 727 in 2010 to 1,293 in 2016. As a result, the number of XPs with extension as a percentage of NXPs and CWXPs authorised increased from 5% to 14%. The average extension period also increased by 90% from 48 days to 91 days during the period. Based on an analysis of the XPMS records as of November 2017, of the 1,061 XPs issued in 2016 which were granted extensions, 517 XPs (49%) were related to government departments, 348 (33%) to other UUs and 196 (18%) to infrequent applicants (i.e. ad hoc applicants). According to the HyD, obstruction by existing underground utilities, difficult underground conditions and inclement weather are common grounds for the extension of XP period. In view of the large percentage of extended XPs involving government projects, the DEVB should remind works departments to make greater efforts to ascertain the underground conditions before applying for XPs (paras. 2.3 to 2.5).

4. ***Need to improve the coordination of road openings in close proximity.*** In processing NXP applications for proposed works, the Regional Offices would check whether there are other proposed works plans within 30 m, and if so, the concerned applicants would be requested to coordinate their works (e.g. to group the excavations using a common trench) to avoid repeated openings. The HyD in general will not issue an XP on the same road section within three months (for other applicants) or six months (for the same applicant), except for emergency cases. Audit examination revealed that the HyD had not compiled statistics on the coordination work to evaluate the effectiveness of such a measure in reducing road openings. For ungrouped excavation works at the same location, the HyD would issue an XP if an applicant revised the works schedules to include a time break of three months or more but there

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was no requirement on the applicant to provide the justifications for failing to use a common trench for the proposed works. In these cases, the concerned excavation works were only deferred without any reduction in the number of road openings. Audit also noted that of 8,909 proposed works plans requiring coordination as of November 2017, 4,093 plans (46%) had remained uncoordinated for over two years. However, the XPMS did not keep information on whether these long-outstanding plans had become obsolete or had been abandoned. Audit's sample check revealed that in some cases, the HyD had required the applicants to coordinate their proposed works with other proposed works which were unlikely to have any conflicts among them, e.g. works located outside the 30-m boundary. This might affect the efficiency of coordination work (paras. 1.8(b) and 2.7 to 2.11).

5. ***Audit Inspection Team (AIT) inspections during excavation works.*** The HyD has established an AIT under its Research and Development Division to inspect XP sites for monitoring compliance with the XP conditions by permittees and their nominated permittees. Demerit points will be assigned to a permittee for any non-compliant items and sanction will be imposed if the overall demerit point is at 4 or above (paras. 1.8(e) and 2.19). Audit examination has revealed the following areas for improvement in AIT inspections:

- (a) ***Need to improve the inspection coverage of NXP and CWXP sites.*** According to the HyD, all XPs should be subject to at least one checking after commencement of works. Audit examination of the XPs issued in 2016 revealed that the overall coverage of the AIT inspection on active permit sites up to December 2017 was only 43%. Audit understands that there may be practical difficulty to cover all EXPs and SSWXPs given the large number of active permit sites and the short duration of these sites. However, there is a need to improve inspection coverage of NXPs and CWXPs for which the excavation works generally last longer, to ensure that the XP conditions have been complied with (paras. 2.20 and 2.21); and
- (b) ***Need to enhance compliance with XP conditions.*** While the compliance rate of XP conditions from 2013 to 2016 was 98.9% in general, the four frequently observed non-compliant items (viz. no continuous barriers to fence off obstruction or excavation from pedestrian flow; minimum clear footway width not provided and maintained for pedestrians; permit not displayed; and signs not provided in accordance with the approved temporary traffic arrangement) had remained at the same level over the period. Audit noted that among the permittees, the average number of the

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non-compliant items per permit in 2017 was higher for infrequent applicants (2.68) than for government departments (0.16) and for other UUs (0.3). The HyD needs to take measures to enhance compliance with the four frequently observed non-compliant items, e.g. considering stepping up publicity efforts with a view to promoting compliance with XP conditions, especially by infrequent applicants (para. 2.22).

6. ***Checking completion of works.*** When an XP expires or upon receipt of a Completion Notice (CN), the responsible Regional Office will arrange a CN inspection within seven working days to confirm works completion and acceptance of road reinstatement. If the reinstatement does not comply with the relevant requirements/specifications, the HyD will reject the permanent reinstatement (hereinafter referred to as “rejected CN”) and request the permittee to rectify the problem (para. 2.23). Audit examination has revealed the following areas for improvement:

- (a) ***Increase in substandard reinstatement works.*** While the number of XPs authorised decreased over the years, the number of rejected CNs was generally increasing (from 5,294 in 2011 to 6,191 in 2017), indicating an increase in substandard reinstatement works carried out by contractors (para. 2.24(a));
- (b) ***Long-outstanding rectification works.*** Of the 6,779 rejected CNs pending rectification of the reinstatement works as at December 2017, 2,581 (38%) had remained outstanding for over two years. There is safety concern for road users if substandard reinstatement works cannot be rectified in a proper and timely manner (para. 2.24(b));
- (c) ***Inspections for CNs not timely conducted.*** Of the 2,019 CN cases under processing as at the end of December 2017, the CN inspections and acceptance in respect of 1,297 (64%) cases were overdue by 1 month on average (5 months for the longest overdue case) (para. 2.24(c)); and
- (d) ***Delays in submitting and processing site photographs and test reports.*** Permittees are required to submit site photographs and test reports for the HyD to determine whether the standard of their reinstatement works is up to its satisfaction. However, as of December 2017, 3,618 site photographs and 2,441 test reports had not been submitted to the HyD, of which 483 (13% of 3,618) photographs and 771 (32% of 2,441) test reports had

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been outstanding for over three years. On the other hand, of 15,626 site photographs and 7,486 test reports submitted, 4,842 (31% of 15,626) photographs and 2,523 (34% of 7,486) test reports had not been reviewed by the Regional Offices for over three years (para. 2.24(d) and (e)).

7. ***Enforcement actions.*** According to the LMPO, any person who carries out road excavations without an XP/EXP or breaches any conditions of XP/EXP shall be guilty of an offence. Since 2009, the HyD has adopted a compliance-led approach to encourage permittees to rectify non-compliance with the XP conditions promptly by issuing an advisory letter if any contravention is found by the AIT. For non-compliance with the same inspection items after an advisory letter has been issued, the AIT refers the case to the Enforcement Team (ET) for conducting an independent investigation. If sufficient evidence is collected, the ET will make recommendations to the Department of Justice for instituting prosecutions. From 2013 to 2016, of the 4,338 cases referred to the ET for enforcement actions, only 162 (4%) cases proceeded to prosecutions. According to the HyD, as many non-compliant items had been rectified before the ET's inspections and the majority of the public complaint cases turned out to be invalid, no prosecutions had been taken for the remaining 4,176 cases (paras. 2.27 and 2.28). Audit examination has revealed the following areas for improvement:

- (a) ***Need to step up enforcement actions against serious and repeated non-compliant cases.*** The AIT only referred cases of serious and repeated non-compliance with permit conditions to the ET for taking enforcement actions. The number of such cases increased from 902 in 2013 to 1,446 in 2017, indicating an increasing trend in serious and repeated non-compliant cases. However, the number of cases proceeded to prosecutions totalled 209 from January 2013 to November 2017 because the permittees had been informed of the non-compliant results before the cases were referred to the ET and the bulk of the non-compliance had been rectified before the ET's inspections. There is a need to review the referral mechanism from the AIT to the ET for conducting prompt investigations and consideration of prosecution actions against serious and repeated non-compliant cases (para. 2.29); and
- (b) ***Need to review the referral mechanism on suspected breaches of the safety-related provision of the LMPO for conducting prompt investigations by the ET.*** Under section 10T of the LMPO, any contravention of the statutory provision to protect the safety of public or

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workers when making or maintaining an excavation would be liable to a maximum fine of \$200,000. From 2015 to November 2017, the HyD had not taken any prosecution actions on 84 cases of suspected breaches of section 10T of the LMPO. Audit's sample check of 10 such cases detected by the AIT's inspections revealed that the ET could not obtain sufficient prosecution evidence because: (i) in 4 cases, the cases were referred to the ET after the permittees had notified the AIT of the completion of the rectification works; and (ii) in 5 cases, the AIT referred the suspected-breach cases to the ET through advisory letters 3 to 6 days after its inspections, and there was a time gap of 6 to 8 days between the AIT's inspections and the ET's inspections (paras. 2.31 to 2.33).

Control of underground utility installation and space occupation

8. *Problems caused by congested utilities.* As of December 2017, there were 18 major UUs (12 telecommunications UUs and 6 other UUs) installing their utility services beneath public roads, up from 10 (4 telecommunications UUs and 6 other UUs) in 1995, mainly due to the increase in the number of UUs providing fixed telecommunications services. According to the HyD's consultancy report of December 2017, there was no standard mechanism to manage space occupation by UUs underneath public roads. Ineffective underground space management might cause improper use of space, damage to existing utilities, and delays in emergency repairs and excavation works (paras. 3.2 and 3.3).

9. *Need to improve control of underground utility installation.* Audit examination has revealed the following areas for improvement:

- (a) *Non-compliance with minimum-depth requirements.* In 2011 and 2012, the HyD received over 500 complaints relating to the breach of minimum-depth requirements of the XP condition. After investigation, the HyD found that in 203 cases involving six fixed network operators, the installation works did not meet the minimum-depth requirements. Up to January 2018 (about 4 years later), 3 non-compliant cases had not been rectified (para. 3.9); and
- (b) *Need to strengthen control over alignment and disposition of underground utility installation.* In 2010, the LandsD and the HyD received complaints

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on the erection of telecommunications poles on public pavements by a UU. The HyD found that 487 poles had been erected using the SSWXP procedures inappropriately and the CNs of 180 poles had been approved by the HyD. The HyD subsequently withdrew the approvals and upon the LandsD's request, the UU removed the poles. The unauthorised works in this case suggested inadequate checking of the completed works and some control weaknesses under SSWXP (i.e. without a requirement on UUs to provide details of proposed installations). While the HyD revised the SSWXP procedures in 2011 requiring works proponents to obtain the HyD's consent before carrying out non-standard works items (e.g. poles and other above-ground installations), there was no similar requirement for underground utility installations. According to the land licence condition, for utility installation, detailed alignment and disposition of the system in, on, over, along, across and under any public road or within any future road reserve shall be to the satisfaction of the Director of Highways. However, as shown in this case, the HyD did not check whether such alignment and disposition were up to its satisfaction. This situation is unsatisfactory as it is difficult to check the alignment and disposition of underground utility installations after reinstatement of road surface (paras. 3.11 and 3.12).

10. ***Need to improve management and control of underground space occupation.*** Both the master plan submitted by a UU upon land licence application and the road-opening plan submitted upon XP application do not show detailed records of the underground utility installations. As such, the HyD does not possess sufficient underground utility information to determine whether excavation works should be allowed. The HyD has therefore established forums to improve coordination among various government departments and UUs. As shown in paragraph 9 above, there is no assurance that the alignment and disposition of underground telecommunications systems have been installed to the satisfaction of the HyD because the Government does not maintain as-built records on such installations beneath public roads/unleased government land. While the HyD had commissioned a consultancy study in March 2013 to identify an effective system to tighten control over excavation works in areas with congested underground utilities, participating UUs found it difficult to add/modify their alignment plans and questioned the accuracy of the trial system. The HyD needs to, in collaboration with the LandsD, the DEVB and other bureaux with policy responsibilities on utilities, explore the development of an effective management and control system over underground space occupation (paras. 3.13 to 3.16).

Exploring the use of common utility enclosures

11. *Long time taken in exploring the possible use of Common Utility Enclosures (CUEs).* The conventional approach of opening trenches in carriageways/footways for laying utility services is simple but has the disadvantages of causing disruption to vehicular/pedestrian traffic, and resulting in adverse environmental and social impacts. Internationally, a common approach to minimising the problems associated with utility provision in urban areas is to accommodate multiple utilities within a single structure beneath carriageways/footways. The different ways of housing underground utility services within single structures are collectively referred to as CUEs. Using CUEs to accommodate underground utility services has the advantage of reducing the need for road openings, thereby reducing traffic delays and nuisance to the public. The HyD's consultancy study of 2002 confirmed the technical viability of CUE though its implementation would be limited to new town development and subject to cost-and-benefit analysis. While the 2002 study recommended that some pilot schemes should be carried out in the Kai Tak Development to test and refine the implementation arrangements, only two trial CUEs were constructed in Yau Ma Tei and Chung Hom Kok in 2006. In 2011, the HyD decided not to construct trial CUEs in the Kai Tak Development because of limited benefit. The issue on the possible use of CUE was only revived in August 2017 after the publication of the Report of "Consultancy Study on Smart City Blueprint for Hong Kong" in June 2017 to support the smart city planning and development in Hong Kong. After obtaining the DEVB's policy support in August 2017, the HyD planned to conduct another consultancy study in 2018 on adopting CUEs in new development areas (paras. 4.2 to 4.4 and 4.12). Audit examination has revealed that the HyD could draw on the experience in constructing/planning trial CUE schemes to improve the installation of CUEs in new development areas:

- (a) *Low utilisation of trial CUEs and no evaluation of trial results.* The HyD had not consulted the relevant UUs on the selection of locations before constructing the two trial CUEs in 2006. While the trial CUE in Yau Ma Tei was close to the West Kowloon development area, the one in Chung Hom Kok was located in a low-density residential area. Up to January 2018, there were only two UUs utilising the trial CUE in Yau Ma Tei and one UU utilising the trial CUE in Chung Hom Kok. The HyD only planned to evaluate the trial results of the two CUEs in the 2018 consultancy study (paras. 4.5 and 4.15); and

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- (b) ***Proposed trial CUEs in Kai Tak Development not timely planned.*** While the 2002 consultancy study proposed to implement trial CUEs in the Kai Tak Development, the HyD had kept the planning of the proposed trial in abeyance until August 2009 when the Civil Engineering and Development Department (CEDD) sought the HyD's view of putting some pilot CUE facilities to trial in the Kai Tak Development. In November 2010, when the CEDD provided the HyD with a list of 14 road junctions for consideration of implementing trial CUEs, the construction works had already commenced, i.e. 8 road junctions under construction, leaving only 6 road junctions with potential for constructing the trial CUEs. In the event, the HyD decided in February 2011 not to construct any trial CUEs because of the limited benefit (para. 4.16).

Audit recommendations

12. **Audit recommendations are made in the respective sections of this Audit Report. Only the key ones are highlighted in this Executive Summary. Audit has *recommended* that the Government should:**

- (a) **remind works departments to make greater efforts to ascertain the underground conditions, particularly in locations of potential conflicts between utilities and the permanent works before applying for XPs (para. 2.13);**
- (b) **compile statistics on coordination work, and periodically review and clear long-outstanding obsolete/abandoned plans in the XPMS (para. 2.12(a) and (c));**
- (c) **make greater efforts to improve the AIT inspection coverage for NXP and CWXP sites, and take measures to enhance the compliance with XP conditions (para. 2.25(a) and (b));**
- (d) **take measures to improve the permittees' reinstatement works and expedite actions to address the problem of long-outstanding rectification works (para. 2.25(c));**
- (e) **take appropriate improvement measures to ensure that CN inspections are carried out in a timely manner (para. 2.25(d));**

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- (f) **review the referral mechanism from the AIT to the ET for conducting prompt investigations and consideration of prosecution actions on cases of serious and repeated non-compliance with XP conditions, and suspected breaches of the safety precautions and support provisions under section 10T of the LMPO (para. 2.34);**
- (g) **expedite action to rectify the three outstanding non-compliant cases of minimum-depth requirement (para. 3.17(a));**
- (h) **consider enhancing the procedures and requirements on checking the alignment and disposition of underground utility systems (para. 3.17(c));**
- (i) **in collaboration with the LandsD, the DEVB and other bureaux with policy responsibilities on utilities, explore the development of an effective management and control system over underground space occupation (para. 3.17(e));**
- (j) **closely monitor the conduct of the consultancy study in 2018 and upon its completion, take timely follow-up actions on its findings and recommendations (para. 4.17(a)); and**
- (k) **draw on the experience in conducting/planning the trial CUE schemes to improve the installation of CUEs in new development areas and evaluate the effectiveness of the trial CUEs in a timely manner (para. 4.17(b) and (c)).**

Response from the Government

13. The Government agrees with the audit recommendations.

PART 1: INTRODUCTION

1.1 This PART describes the background to the audit and outlines the audit objectives and scope.

Background

1.2 Hong Kong has an extensive road network connecting various districts in the territory. As of September 2017, there were over 2,107 kilometres (km) of public roads in Hong Kong (442 km on Hong Kong Island, 472 km in Kowloon and 1,193 km in the New Territories). Apart from carrying vehicular and pedestrian traffic, most of the roads also provide underground space for accommodating utility services (e.g. water pipes, drainage pipes, gas pipes, power cables and telecommunications facilities — Note 1).

1.3 Road works are necessary for the installation, maintenance, repair and improvement of the road sections or the public utilities underneath. Road construction, major infrastructure projects initiated by different government departments such as the Highways Department (HyD) and the Civil Engineering and Development Department (CEDD), and the associated road works for railway development are vital for maintaining Hong Kong as a world-class city. Additionally, for the safety of road users, routine road maintenance and periodic road rehabilitation are required. Besides, utility undertakings (UUs — Note 2) including government departments have to carry out road works to maintain and expand their utility networks in order to provide a reliable and high quality utility service to the public.

Note 1: *According to the Highways Department, there are on average about 50 km of underground pipes/cables installed with utility services per km of public road.*

Note 2: *UU means any person, undertaking, company, organisation or government department which supplies or provides utilities (including electricity, lighting, traffic control, telecommunications, cable television, gas, water, drainage, sewerage and tramway) and engages in any associated work. As of December 2017, there were 18 major UUs which had applied for excavation permits for road works from the HyD (see para. 1.6).*

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1.4 However, road works carry a cost to society, as they pollute the environment, cause disruption to traffic and affect the well-being of the public. According to the Report on “Study of Road Traffic Congestion in Hong Kong” published by the Transport Advisory Committee (Note 3) in December 2014:

- (a) road works were a major cause of road traffic congestion. Better coordination among different road works was the key to minimising disruption caused to road users; and
- (b) road traffic congestion not only affected individual motorists, but also resulted in inconvenience and costs in both tangible and intangible terms to Hong Kong as a whole. These included an increase in travel time and cost in terms of economic production and impact on the business sectors, and in particular on those involved in delivery services and road-based public transport operators.

Given that road works are demand driven, the HyD has put in place a permit system (see para. 1.6) to manage road works. Photograph 1 shows a road section with road opening works.

Note 3: *The Transport Advisory Committee comprises 14 non-official members including the chairman and three ex-officio members, i.e. the Permanent Secretary for Transport and Housing (Transport) or his representative, the Commissioner for Transport and the Commissioner of Police or his representative. Its function is to advise the Chief Executive-in-Council on transport matters.*

Photograph 1

A road section with road opening works



Source: Photograph taken by Audit staff in January 2018

1.5 Under the policy directives of the Transport and Housing Bureau, the HyD is responsible for the planning, design, construction and maintenance of public roads in Hong Kong. In addition, under the policy directives of the Development Bureau (DEVB), the HyD also coordinates and controls road openings on streets under its maintenance responsibility over unleased government land (hereinafter referred to as public roads) through issuing excavation permits (XPs) to the works proponents including UUs. For unleased land other than streets maintained by the HyD, the works proponents are required to apply for permits from the Lands Department (LandsD) for carrying out excavation works. According to its Controlling Officer's Report (COR), the HyD spent a total of \$1,433.4 million in 2016-17 on the programme area of district and maintenance works, including the coordination and control of utility openings on public roads. Of the 1,011 staff working under the programme area in December 2017, 45 staff in the Research and Development Division and 68 staff of the two Regional Offices (i.e. Urban and New Territories) were responsible for matters relating to administration of road opening works (see para. 1.6). Table 1 shows the performance indicators related to road excavations reported by the HyD in its 2010 to 2016 CORs. During the period, while the number of excavation/road works permits authorised decreased by 28% from 30,540 to 22,030, the number of permits with extension increased by 78% from 727 to 1,293.

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Table 1
Performance indicators in CORs
(2010 to 2016)

	2010	2011	2012	2013	2014	2015	2016
(a) Number of excavation/road works permits authorised (Note)	30,540	25,826	24,847	24,407	23,769	21,797	22,030
(b) Average duration per permit (days)	71	73	88	79	77	73	66
(c) Number of inspections carried out on sites	95,822	99,120	94,731	97,423	97,030	97,410	98,400
(d) Items of non-compliance with XP conditions per total number of items inspected (%)	2.0	2.0	1.4	1.1	1.1	1.1	1.1
(e) Incidents of unattended sites per total number of XP (%)	0.7	0.8	0.6	0.6	0.6	0.6	0.6
(f) Incidents of damage to underground utilities by utility excavations and road works per total number of XP (%)	0.3	0.3	0.5	0.3	0.2	0.1	0.1
(g) Number of permits with extension	727	894	1,219	1,237	1,322	1,281	1,293

Source: HyD records

Note: Under the Land (Miscellaneous Provisions) Ordinance (Cap. 28), there are two types of XPs, namely emergency XPs and non-emergency XPs. For administrative purpose, the HyD further classifies non-emergency XPs into normal XPs, capital works XPs and small-scale works XPs. These four types of XPs accounted for some 99% of the total permits issued in a year (e.g. 21,822 out of 22,030 in 2016). The remaining 1% included expressway works permits and road works permits governed under other ordinances (e.g. Road Traffic (Expressway) Regulations — Cap. 374Q), which did not involve excavation works (e.g. cleaning of road drains). For simplicity, XPs referred to in this report includes both emergency XPs and non-emergency XPs, unless otherwise stated.

1.6 **Issue of XPs.** Most of the road works require excavation. According to Part III of the Land (Miscellaneous Provisions) Ordinance (LMPO — Cap. 28), a works proponent needs to acquire an XP from the HyD for making or maintaining an excavation on public roads (Note 4). Under that part of the LMPO, the HyD is the authority for issuing XPs for road excavation works on streets maintained by the HyD over unleased land (i.e. public roads — see para. 1.5). Each XP stipulates the conditions to be complied with by the works proponent (Note 5). For road works not involving excavation (e.g. maintenance of road side trees and cleaning of road drains), there is no need to obtain an XP. Any non-compliance with XP conditions constitutes an offence under sections 10(3), 10(4) and 10(5) of the LMPO (Note 6). Under the HyD, the Research and Development Division is responsible for developing and maintaining a web-based Excavation Permit Management System (XPMS — see para. 1.8) for administering and controlling road opening works through issuing XPs, and the two Regional Offices are responsible for processing and issuing XPs. An extract of the organisation chart of the HyD is at Appendix A.

1.7 **Issue of land licences.** Under Part II of the LMPO, a person needs to obtain a land licence (an individual or block licence), a deed or a memorandum of appropriation (which are different forms of giving permission to use the land) from the LandsD for occupying unleased government land. UUs are required to apply for a licence (normally a block licence) from the LandsD for the purpose of installing utility facilities. The LandsD imposes conditions in the licence, which include obtaining XPs before carrying out the related road excavation works or before erecting

Note 4: *A person making or maintaining an excavation without obtaining an XP or emergency XP shall be guilty of an offence and liable on conviction to a maximum fine of \$50,000 and to imprisonment for six months. Most of the XP applications come from UUs (including works departments such as the Water Supplies Department and the Drainage Services Department). Ad-hoc applicants (hereinafter referred to as infrequent applicants) include private developers and private property owners.*

Note 5: *For excavation on unleased land other than a street maintained by the HyD, the works proponent shall acquire an XP from the LandsD. The issue of such XPs by the LandsD is not covered in this audit.*

Note 6: *Any person who makes or maintains an excavation in unleased land in contravention of any condition of an XP shall be guilty of an offence and shall be liable on conviction to a maximum fine of \$50,000. A non-compliant department with the XP conditions would be subject to a reporting mechanism to the Secretary for Development.*

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utility installation, and submitting master plans of such installation at no cost to the Government if so required.

Monitoring of road excavation works

1.8 Since 2009, the HyD has implemented the web-based XPMS to administer and control road excavation works electronically (Note 7). The HyD has published an Excavation Permit Processing Manual (XPPM) specifying the procedures on application and administration of XPs as well as the site audit inspection procedures and standards. The procedures for issuing a non-emergency XP (see Note to Table 1 in para. 1.5) for planned road excavation works are as follows:

- (a) ***Registration of proposed excavation works plan.*** A works proponent is required to register its proposed road opening works with the HyD one to six months in advance of the planned commencement dates. After registering the proposed works plan for an XP application, the responsible Regional Office will assess the time required for carrying out the proposed works on site. Based on the assessment outcome, a reasonable time period will be allotted to the applicant for completing the road works to avoid unnecessary taking up of road space;
- (b) ***Coordination of road works.*** The Regional Offices are responsible for checking possible conflicts with other proposed road openings in the vicinity. If there are other proposed plans for carrying out road works in close proximity to each other, the concerned XP applicants will be requested to participate in a coordination process before their XP applications can be approved. This process ensures that any potential conflict amongst road works of different applicants can be identified and resolved as early as possible. It can also facilitate the coordination of concurrent or sequential implementation of the road works on the same road section. To avoid repeated openings on the same road section, the HyD in general will not issue an XP on the same road section within a period of three months (for other applicants) or six months (for the same applicant),

Note 7: *Before the launch of the XPMS, a Utility Management System (rolled out in October 1997) was used for applicants to submit textual data in text files. In September 2002, a web-based system known as Internet Interface to Utility Management System was rolled out to enable applicants to submit applications via the Internet. The data in the two separate systems were synchronised twice a day.*

except for emergency cases. Furthermore, road openings will not normally be allowed within a period of five years for newly constructed carriageways and one year for newly constructed footways as all excavation works, such as laying utilities and road paving, should have been coordinated and completed by relevant parties during the construction stage of the new carriageways/footways. However, XP applicants may apply for waivers to such restrictions under special circumstances (Note 8);

- (c) ***Traffic advice from the Transport Department (TD) and the Hong Kong Police Force (HKPF).*** Apart from registering the proposed excavation works plan with the HyD, an XP applicant needs to seek agreement from the TD and the HKPF for traffic advice relating to the excavation works and prepare a temporary traffic arrangement (TTA) proposal. The TD and the HKPF will scrutinise the proposal submitted by the applicant to ensure that traffic impact is acceptable. Where appropriate, specific TTA requirement from the TD and the HKPF may be included as part of the XP conditions. For road opening works which affect the vehicular flow in sensitive areas, the TD and the HKPF may require the XP applicant to conduct a traffic impact assessment to substantiate its TTA proposal. Furthermore, the HKPF also requires the XP applicant to apply for a “Road Works Advice” before the works commence on site. The HKPF will process the application having regard to the latest traffic conditions and impose specific TTA requirement where necessary, in consultation with the TD;

- (d) ***Issue of XP.*** Upon completion of the coordination and obtaining the support from the TD, the HKPF and other relevant authorities (e.g. the Leisure and Cultural Services Department for works in the vicinity of trees), the XP applicant can submit an application to the HyD for issuing an XP. The HyD will normally issue an XP within 10 working days upon receipt of an application and payment of a permit fee (see para. 1.10). A permittee needs to carry out the excavation works in accordance with the XP conditions; and

- (e) ***Research and Development Division’s audit inspection.*** The HyD has established an Audit Inspection Team (AIT) under the Research and

Note 8: *For XPs authorised from 2010 to 2017, the number of XPs or jobs with approved waivers for road opening restriction and repeated opening restriction decreased from 476 to 90 and 1,249 to 989 respectively.*

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Development Division to carry out audit inspections on XP sites to monitor permittees' and nominated permittees' (i.e. the contractor nominated to carry out the works) compliance with the XP conditions (i.e. recording "C" for compliance and "NC" for non-compliance). The common NC items include failure to provide minimum clear footway for pedestrians, failure to display permits on site, and unattended sites without a display board stating the reasons for leaving the site idle. While the HyD will notify a non-compliant permittee to rectify the problems on the same day, the permittee and its nominated permittee could be held liable to prosecutions under the LMPO for not executing the road excavation works in a manner complying with the XP conditions.

For emergency works (Note 9) covered by an emergency excavation permit (EXP), applicants (EXP may be issued to UUs, including government departments which have a genuine need to carry out emergency works) are required to obtain an EXP (a block permit valid for six months), and to report the emergency works (not exceeding 7 days — see Table 2 in para. 2.2) before carrying out any excavation works. While applicants are not required to go through the permit period assessment and the roadworks coordination process (see (a) and (b) above), they are still required to seek agreement from the TD and notify the HKPF before commencement of the emergency excavation.

1.9 To improve coordination among government departments and the major UUs for carrying out road excavation works, coordination forums are established for the top management, middle management and working-level, as follows:

- (a) ***Top management forum: Joint Utilities Policy Group (JUPG).*** With members comprising the Assistant Director (Technical) of Highways, representatives of the TD, the Water Supplies Department (WSD) and the Drainage Services Department (DSD), and senior representatives of other UUs, the JUPG meets quarterly to discuss the policy in relation to utility works and road openings. Representatives of the UUs take turns to chair the JUPG;

Note 9: *Emergency road openings may be required consequential upon the occurrence of emergency incidents as defined in section 2 of the LMPO. This is to facilitate urgent repair works on underground utilities by UUs, so that the essential utility services can be resumed within a short period.*

- (b) ***Middle management forum: Utilities Technical Liaison Committee (UTLC).*** The UTLC also meets quarterly to discuss technical and administrative matters in relation to utility openings. It is chaired by the Deputy Director of Highways and comprises management-level representatives of the HyD's Regional Offices and the Research and Development Division, and the UUs; and

- (c) ***Working-level forum: Road Opening Coordinating Committee.*** A Road Opening Coordinating Committee is set up in each of the HyD's Regional Offices to monitor the utility openings. Each committee comprises working-level representatives of the HyD, UUs and relevant government departments such as the TD and the HKPF. Meetings are held monthly and chaired by the Chief Highway Engineer of the respective Regional Office.

Imposition of XP fees

1.10 Before April 2004, XPs were issued free of charge. In order to provide an incentive for permittees to complete their works within the approved timeframe, the Government introduced legislative amendments to impose XP fees, which took effect from April 2004. Since then, a works proponent who carries out road excavation works has been required to pay an XP fee under the Land (Miscellaneous Provisions) Regulations (Cap. 28A). The current prescribed fees are as follows:

- (a) ***XP period.*** An administration fee of \$2,050 plus a daily fee of \$35 per day is levied for excavation works carried out during the approved XP period; and

- (b) ***Extended period.*** A special charging mechanism (an administration fee of \$650 and a daily fee of \$35 plus economic cost as explained below) is in place to encourage the completion of road works within the approved period. Under this mechanism, a permittee who anticipates that the road works cannot be completed on time should submit an application to the HyD for extending the permit period. In addition to the administration fee and daily fee for permit extension, the permittee is required to pay an additional permit fee which is the economic cost based on the traffic impact

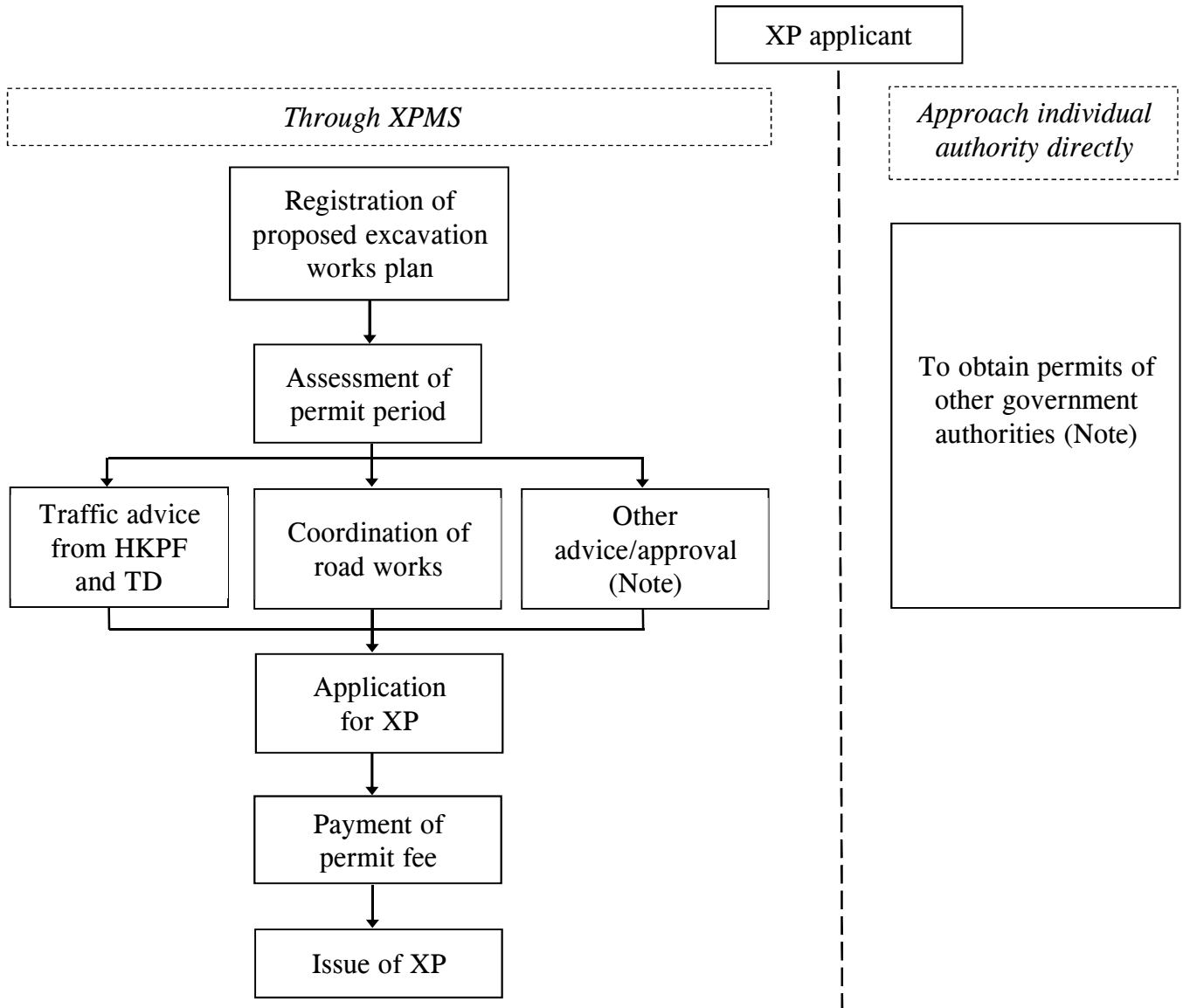
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an excavation can cause (i.e. \$21,800 per day for a “strategic street”, \$8,540 per day for a “sensitive street” and \$1,710 per day for a “remaining street” — Note 10).

In 2016-17, XP fees of \$180 million were collected. Figure 1 shows the workflow for issuing a non-emergency XP as mentioned from paragraphs 1.6 to 1.10.

Note 10: *According to the LMPO, the Director of Highways may, by notice published in the Gazette, designate any street or part of a street as a strategic street, a sensitive street or a remaining street after taking into consideration the economic costs of traffic delay in a carriageway caused or likely to be caused by an excavation carried out on the street. According to the HyD, the notice was prepared based on the TD’s regular updating on classification of roads in Hong Kong. As of January 2018, there were 109 strategic streets (e.g. Harcourt Road, Nathan Road and Tolo Highway) and 70 sensitive streets (e.g. Pedder Street, Kowloon Park Drive and Sha Tin Centre Street) in Hong Kong.*

Figure 1
Issue of a non-emergency XP



Source: HyD and LandsD records

Note: Before applying for an XP, pertinent UUs (excluding government departments) should have obtained a land licence from the LandsD. When processing an XP application, other authorities' advice and approval may be required on various occasions (e.g. works affecting any roadside tree require consent from the maintenance authorities such as the Leisure and Cultural Services Department, the Agriculture, Fisheries and Conservation Department and the Landscape Unit of the HyD).

Control of underground utility installation and space occupation

1.11 Recurring road opening works leading to road traffic congestion and disruption to the public (see para. 1.4) have been a major cause of concern for decades. According to a review report of the administration of XPs issued by the then Efficiency Unit (now the Efficiency Office — EffO) in July 2009 (Note 11):

- (a) the problems arising from road excavation works could be attributed to the absence of a government policy on the planning of underground space usage and the limit of utility services proliferation. Land was not exclusively reserved for the laying of utility services but most of the utility services were directly buried beneath the road network, which also carried pedestrian and vehicular traffic on the ground surface; and
- (b) the continual installation of new utility services to cope with developments, the opening up of the telecommunications services and the maintenance of existing services created a frequent need for road excavation, which competed with road works and the busy traffic for the limited road space.

At present, the Government does not maintain a database of underground utility installation in unleased government lands. There is also no standard mechanism to manage the space occupation by the UUs underneath public roads. As a result, the HyD does not possess sufficient underground utility information to determine whether excavation works should be allowed. Over the years, the HyD has been using the coordination forums (see para. 1.9) to coordinate underground utility excavation works among different major UUs for the purposes of regulating and controlling road opening works under Part III of the LMPO.

Note 11: *In response to the HyD's request, the EffO completed the review with recommendations aiming to improve the administration and monitoring of XPs to ensure safety of road users and pedestrians, and to minimise inconvenience and nuisance caused to the public.*

Exploring the use of common utility enclosures

1.12 Utility services in Hong Kong are normally buried underground with new or additional services very often being laid in parallel to the existing ones in response to a higher demand or the existing services becoming obsolete. At present, utility services are normally installed using the conventional approach of opening trenches in carriageways/footways for laying pipes, ducts and cables. This conventional approach causes disruption to pedestrian/vehicular traffic. In cases of congested underground utilities or the absence of feasible TTA for the proposed road works, UUs may consider adopting the trenchless excavation method (i.e. with most excavation works conducted underground) for installing utilities though it is more expensive. In March 2002, the HyD commissioned a consultant (Consultant A) to study the feasibility of implementing common utility enclosures (CUEs), which could organise and accommodate various utility pipes/ducts/cables in a single underground structure, with a view to reducing road openings by UUs. The study completed in 2003 considered that while adopting CUEs would be a feasible approach to reduce road openings for new development areas, retrofitting CUEs in built-up areas would be very difficult. In 2006, two trial CUEs were constructed for evaluating the effectiveness of using CUEs. In August 2017, the DEVB gave policy support for the HyD to conduct another consultancy study to take stock of the latest developments of CUEs and address the related implementation issues, such as the construction, management, maintenance, operation, security, liability and legal issues.

Audit review

1.13 Between 1991 and 2001, the Audit Commission (Audit) completed three reviews on road opening works, namely:

- (a) a review entitled “Measures to reduce the incidence of delays in the completion of utility works on Hong Kong roads” and the result was included in the Director of Audit’s Report No. 17 of October 1991;
- (b) another review entitled “The lane rental trial and other measures to reduce the incidence of delays in the completion of utility works on Hong Kong roads” and the result was included in the Director of Audit’s Report No. 24 of March 1995; and

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- (c) a further review entitled “Follow-up review on control of utility openings” and the result was included in Chapter 1 of the Director of Audit’s Report No. 36 of March 2001.

1.14 In November 2017, Audit commenced a review of the Government’s efforts in managing excavation works on public roads. The review focuses on the following areas:

- (a) management and monitoring of road excavation works (PART 2);
- (b) control of underground utility installation and space occupation (PART 3);
and
- (c) exploring the use of CUEs (PART 4).

Audit has found room for improvement in the above areas and has made a number of recommendations to address the issues.

Acknowledgement

1.15 Audit would like to acknowledge with gratitude the assistance and full cooperation of the staff of the HyD and the LandsD during the course of the audit review.

PART 2: MANAGEMENT AND MONITORING OF ROAD EXCAVATION WORKS

2.1 This PART examines the HyD's efforts in managing and monitoring road excavation works through the issue of XPs and the imposition of XP conditions, focusing on:

- (a) managing road excavation works (paras. 2.2 to 2.15);
- (b) monitoring compliance with XP conditions (paras. 2.16 to 2.26); and
- (c) enforcement actions (paras. 2.27 to 2.35).

Managing road excavation works

Different types of XPs

2.2 To facilitate proper management of road excavation works, works proponents are required to obtain XPs issued by the HyD before commencing any excavation works. Under the LMPO, there are two types of permits, namely EXP for excavation works to cater for occurrence of an emergency incident and non-emergency XP for planned excavation works (see para. 1.8). For administrative reasons, the HyD classifies XPs into one-off XPs for excavation works in a location specified therein and block XPs for excavation works where the locations are unknown at the time of issue but are within a region or district (see Table 2 for the different types of one-off XPs and block XPs).

Management and monitoring of road excavation works

Table 2

Types of XPs

Type	Scope	Duration	Number of XPs issued in 2016
One-off XP			
Normal excavation permit (NXP)	Planned road openings in an area with a diameter of 450 metres (m) or less	On a case-by-case basis	8,911 (Note 1)
Capital works excavation permit (CWXP)	Site area of works project with a diameter exceeding 450 m Works are continuous rather than a collection of individual works Project involves many interface issues which are difficult to be coordinated before the commencement of proposed works	On a case-by-case basis	10 (Note 1)
Block XP			
EXP	Excavation works to cater for occurrence of an emergency incident	6 months for block permit and 7 days for each emergency incident	11,171 (Note 2)
Small-scale works excavation permit (SSWXP)	Area of excavation does not exceed 4 square metres (m ²) and length of excavation does not exceed 6 m	184 days for block permit and 24 hours for each job affecting carriageway or 48 hours for each job not affecting carriageway	1,730
Total			21,822

Source: HyD records

Note 1: Most of the road excavation permits for capital works projects are NXPs. Only large-scale capital works require the issue of CWXPs.

Note 2: The number of EXPs authorised referred to the number of emergency incidents reported.

Extension of XP period

2.3 An XP applicant is required to plan and register its proposed excavation works at least one to six months before the works commencement date (see para. 1.8(a)). According to the “Guideline on Permit Period Assessment for Road Excavation Works” which sets out principles and criteria on approving XPs and procedures for applicants to follow during the permit period assessment, the applicant needs to indicate in its application the works duration category of its proposed works (Note 12). The respective Regional Office will assess the permit period proposed by the applicant, and may accept or amend the proposed period with reasons. An XP is valid for the period specified therein with a view to controlling the time of excavation and minimising disturbance to traffic network and road users. If a permittee cannot complete the works within the specified period, it needs to apply for an extension and pay the prescribed fee (see para. 1.10 and Note 13). According to the HyD’s records, of the four types of XPs mentioned in Table 2 of paragraph 2.2, extension is allowed for one-off XPs only, the number of which decreased from 13,297 (44% of 30,540) in 2010 to 8,921 (40% of 22,030) in 2016. In terms of the total number of permit-days per year, there was a decrease from 2,168,340 ($30,540 \times 71$) in 2010 to 1,453,980 ($22,030 \times 66$) in 2016 (see Table 1 in para. 1.5). However, Audit noted that the number of XPs with extension increased by 78% from 727 in 2010 to 1,293 in 2016. As a result, the number of XPs with extension as a percentage of the one-off XPs authorised increased from 5% in 2010 to 14% in 2016. Moreover, the average extension period had also increased by 90% from 48 days in 2010 to 91 days in 2016.

2.4 According to the HyD, the increase in the number/percentage of XPs extended for the years might be attributed to a number of factors, including uncharted underground utilities, unanticipated obstructions, unforeseen rectification works, change in construction methods, delay in material delivery, new site constraints identified and accidents causing works suspension and/or adverse weather conditions.

Note 12: *There are three works duration categories, namely: (a) short duration works with works period not exceeding 14 working days; (b) standard works with the works period to be computed using a standard template for each commonly undertaken activity for each trade; and (c) non-standard works with the works period to be substantiated by the applicant.*

Note 13: *A permittee can apply for an extension without any charge if it is unable to have access to a reasonably substantial portion of the street before the commencement of works, or can apply for refund of economic cost if the extension is caused by any reasons other than the fault of the permittee, its contractors and employees.*

Management and monitoring of road excavation works

Audit analysis of the XPMS records as at November 2017 showed that, of the XPs issued in 2016, 1,061 were granted extensions of permit periods, comprising 517 XPs (49%) to government departments, 348 (33%) to other UUs and 196 (18%) to infrequent applicants (e.g. private developers — see Note 4 to para. 1.6). Audit selected five cases with the longest extensions for examination (involving two government departments and two infrequent applicants). The reasons for granting extensions in these cases are as follows:

Case	Permittee	Extended day	Reason for granting XP period extension
A	WSD	502	<ul style="list-style-type: none"> • change in construction method to avoid congested underground utilities and concrete block • hard material encountered during trenchless work and unforeseen structures • additional Traffic Impact Assessment for counting traffic flow for implementation of 24-hour works to catch up the delay • inclement weather
B	Housing Department	462	<ul style="list-style-type: none"> • difficulties in locating existing water mains, realignment of proposed water mains and location of connection points • additional coordination with another excavation plan nearby to maintain a 30-m buffer zone • congested underground utilities leading to difficulties in locating existing water mains at footpath • inclement weather
C	WSD	446	<ul style="list-style-type: none"> • change in construction method to maintain vehicular access to a nearby residential building • hard material encountered during tunnelling works • additional Traffic Impact Assessment for main-laying works at road junctions resulting in realignment of proposed water mains and construction of additional connection points • inclement weather

Management and monitoring of road excavation works

Case	Permittee	Extended day	Reason for granting XP period extension
D	An infrequent applicant	440	<ul style="list-style-type: none"> • obstruction by congested underground utilities
E	An infrequent applicant	437	<ul style="list-style-type: none"> • obstruction of existing underground utilities • modification of drainage scheme • difficult underground condition (granite encountered) • obstruction of concurrent construction works at an adjacent street

2.5 *Need to remind government works departments to strengthen investigation of underground conditions before applying for XPs.* As shown in paragraph 2.4, obstruction by existing underground utilities, difficult underground conditions and inclement weather are common grounds for the extension of excavation period. According to Environment, Transport and Works Bureau Technical Circular (Works) No. 17/2004 entitled “Impossibility/Unforeseen Ground Conditions/Utility Interference” (which is still in force):

- (a) project officers should arrange to carry out all necessary site investigations and satisfy themselves that sufficient ground information has been made available prior to commencement and during the detailed design. The extent of ground investigation and/or geotechnical analysis should be adequate for estimating construction cost and duration to an acceptable degree of accuracy; and
- (b) before the completion of the detailed design, project officers should satisfy themselves that the utility records obtained from UUs or other sources are reasonably accurate. Depending on the scale and nature of the contract, project officers should conduct desk search and, if necessary, site inspection for the purposes of verifying the utility records (e.g. checking against other available records and checking on site that the manholes do exist at the locations indicated on the utility records). In areas of potential conflicts between utilities and the permanent works, which might have serious impact on the works, project officers should consider carrying out suitable investigations (e.g. trial pits) to verify the exact locations of these utilities.

Management and monitoring of road excavation works

The Technical Circular provides guidelines on risk management of undertaking underground works applicable to works departments including the HyD, the WSD, the Housing Department, the DSD and the CEDD. In view of the large percentage (49%) of XPs with extensions involving the government projects, the DEVB should remind works departments to make greater efforts to ascertain the underground conditions particularly in locations of potential conflicts between utilities and the permanent works as mentioned in the Technical Circular before applying for XPs.

Coordination of road openings in close proximity

2.6 According to the DEVB's reply to a question on the coordination of road excavation works raised by a Legislative Council Member in February 2013:

- (a) in processing XP applications, the HyD would consider the works in terms of their necessity and in particular, whether applicants had coordinated with other excavation works promoters, including government departments and other UUs, to reduce the chances of repeated road openings. For better management and coordination of road excavation works, the HyD provided a one-stop service for XP applications through a computerised management system to further enhance coordination and management of such works; and
- (b) as one of the permit application requirements, applicants should plan and register their proposed excavation works at least one to six months, depending on the category of streets and expected duration of the works, before the works commencement date. Through the computerised management system, the HyD could identify other proposed excavation works within 30 m of the proposed works site under application and assign an applicant among them to take the lead in coordinating with the other applicants concerned. For instance, the applicants concerned might jointly draw up a coordinated works programme to ensure that the trench opening could accommodate all the works of the applicants concerned and that the one last to complete its works according to the coordinated programme would reinstate the whole road surface once and for all after the orderly completion of all the works concerned. This arrangement would reduce the need for repeated openings in the same area. In case the applicants concerned could not draw up a coordinated plan to the satisfaction of the HyD, their road excavation applications might be rejected.

Management and monitoring of road excavation works

2.7 According to the XPPM (see para. 1.8), when a proposed works plan (which may have more than one excavation item) is registered, the HyD through the XPMS identifies any other proposed NXP works (Note 14) within 30 m of the site under application. Conflicting plans identified will be grouped into an uncoordinated case and the HyD will assign one of the applicants to take the lead in coordinating with the other applicants concerned. This applicant shall work out an agreed coordinated programme with other applicants so that all concerned applicants shall amend their plans to reflect the coordinated programme. After acceptance of the coordinated reports submitted by the applicants, the uncoordinated case will be updated as coordinated in the XPMS. For a plan with no conflict found, a new case should be formed to contain the plan and the case status in the XPMS will also be set as coordinated as this is a system rule of the XPMS before an XP can be issued. Audit scrutiny of the coordination reports of the 8,911 NXPs issued in 2016 revealed the following circumstances under which they were accepted by the HyD:

- (a) among those cases with conflicting plans identified for coordination, the HyD would accept the coordination reports submitted by XP applicants showing that:
 - (i) two or more excavations at the same location had been grouped into a single excavation (i.e. using a common trench); or
 - (ii) two or more excavations at the same location which had not been grouped together into a single excavation without documented justifications, but the concerned schedules had been revised after coordination to include a time break of three months or more; or
 - (iii) the proposed works did not overlap though they were located within 30 m from each other. The concerned works had been revised to be carried out in a coordinated manner (i.e. by coordinating the works programme to minimise the disturbance to the public); or
- (b) no conflicting plans were identified within 30 m of the proposed works during the periods concerned and hence no coordination was required.

Note 14: *The coordination procedures apply to NXPs only as CWXP-related works involve many interface issues which are difficult to coordinate before commencement of the proposed works. For the block XPs, the locations for excavation works are unknown at the time of issuing XPs.*

Management and monitoring of road excavation works

2.8 *Need to compile statistics on coordination work to evaluate the effectiveness of coordination arrangements in reducing road openings.* Audit noted that the HyD had not made use of the XPMS to compile statistics showing the breakdown of coordinated plans by categories as listed in paragraph 2.7(a) and (b). Without such statistics, the HyD was unable to ascertain the number of cases which had been grouped into a single excavation (see para. 2.7(a)(i)) to evaluate the effectiveness of the coordination arrangements in reducing road openings. In Audit's view, the HyD needs to make improvement in this regard.

2.9 *Need to tighten control over coordination work.* According to the XPPM, the primary objective of coordination is to implement the potentially conflicting works in an efficient and effective manner to ensure that nuisance caused to the public is kept to a minimum. As reported to the Legislative Council in February 2013 (see para. 2.6), the coordination arrangement (using a common trench — see para. 2.7(a)(i)) would reduce the need for repeated openings in close proximity and in case the applicants concerned could not draw up a coordinated plan to the satisfaction of the HyD, their road excavation applications might be rejected. Upon Audit's enquiry, in February and March 2018, the HyD said that:

- (a) most of the road works identified for coordination could not be grouped into a single excavation (see para. 2.7(a)(i)) for operational reasons (e.g. different works methods); and
- (b) the XP applicants would change the works programme in a coordinated manner to minimise the disturbance to the public (see para. 2.7(a)(ii) and (iii)).

Audit noted that for excavation works at the same location which had not been grouped together, the HyD did not require justifications from applicants which had included a time break of three months or more in their works schedules (see para. 2.7(a)(ii)) instead of adopting a common trench approach. In these cases, the concerned excavation works were only deferred and there was no reduction in the number of road openings. In this regard, the HyD needs to tighten the control by requiring such applicants to give reasons for failing to adopt a common trench approach, and consider rejecting their XP applications if no valid reasons are given (see para. 2.6(b)).

2.10 *Need to periodically review and clear long-outstanding obsolete/abandoned plans.* Audit examination of XPMS records showed that, as of November 2017, there were 5,303 cases involving 8,909 plans requiring case coordination. Of these 8,909 plans, 4,093 plans (46%) had remained uncoordinated for over two years. Audit noted that the XPMS did not maintain information on whether the long-outstanding cases/plans had become obsolete or had been abandoned due to unresolved difficulties. Given the long lapse in time, some of the proposed road opening works might no longer be required. Audit considers that the HyD needs to periodically review and clear long-outstanding obsolete/abandoned plans in the XPMS.

2.11 *Need to improve the identification of conflicting plans for coordination.* According to the Guidelines on Case Formulation and Case Coordination in the XPPM, a case for coordination should comprise a number of plans with locations in close proximity and the scheduled implementation timeframes are close to each other. The HyD officers should try to restrict the maximum number of plans to less than 10 (Note 15) and should not cover a road length longer than 1 km in a case requiring applicants to conduct coordination. According to the XPMS records, as of November 2017, there were 44 cases each consisting of 10 to 93 outstanding plans requiring coordination (involving a total of 893 plans). Audit conducted sample checks on the coordination reports of four XPs issued before November 2017. According to these coordination reports (P1, P2, P3 and P4), the number of plans identified for coordination were 166, 158, 154, 120 respectively. However, as shown in Table 3, 34 to 44 plans to be coordinated were submitted more than two years ago (i.e. they were likely to be obsolete plans) and 99 to 158 were located outside the 30-m boundary (i.e. they were unlikely to have any conflicts with the plans under application). These cases suggest room for improvement in the identification of conflicting plans for coordination.

Note 15: *According to the HyD, the “10-plan restriction” is not intended to be a restriction to be strictly followed. If there is a genuine need to coordinate more than 10 plans, such coordination will also be carried out to minimise disturbance to the public.*

Table 3

Summary of coordination reports submitted for four XPs
(November 2017)

Coordination report	Number of plans identified for coordination (a)	Number of plans which had been submitted more than two years ago (b)	Number of plans with works sites located outside 30-m boundary (c)
P1	166	43	153
P2	158	44	158
P3	154	44	152
P4	120	34	99

Source: *Audit analysis of HyD records*

Remarks: *Some of the plans submitted more than two years ago are also those with works sites located outside the 30-m boundary and hence the sum of them (i.e. (b) + (c)) is greater than the number of successfully coordinated plans (i.e. (a)).*

Audit recommendations

2.12 **Audit has recommended that the Director of Highways should:**

- (a) **compile statistics on coordination work in order to evaluate its effectiveness in reducing road openings;**
- (b) **for ungrouped excavation works proposed by applicants who have revised the works schedules to include a time break of three months or more instead of adopting a common trench approach for their proposed works on the same road section, require them to give reasons for such arrangements;**
- (c) **periodically review and clear long-outstanding obsolete/abandoned plans in the XPMS; and**

- (d) take measures to improve the identification of conflicting plans for coordination.

2.13 Audit has also *recommended* that the Secretary for Development should remind government works departments to make greater efforts to ascertain the underground conditions, particularly in locations of potential conflicts between utilities and the permanent works before applying for XPs as mentioned in Environment, Transport and Works Bureau Technical Circular (Works) No. 17/2004.

Response from the Government

2.14 The Director of Highways agrees with the audit recommendations in paragraph 2.12.

2.15 The Secretary for Development agrees with the audit recommendation in paragraph 2.13.

Monitoring compliance with excavation permit conditions

2.16 *AIT inspections.* A permittee or a nominated permittee (e.g. a contractor) is required to comply with the XP conditions. Before commencing works, a permittee or a nominated permittee is required to submit an Advance Notification (AN) not more than 14 working days but not less than 2 working days. Upon receipt of an AN, the AIT (Note 16) carries out audit inspections of the excavation site regularly and records NC items identified. For those permit sites with NC items, the AIT will notify the permittees/nominated permittees the inspection results for their rectification. For those safety-related items (e.g. providing continuous barrier to fence off excavation from pedestrian flow and adequate support to trench excavation to protect workers' safety) or repeated NC items, the AIT will refer the cases to the

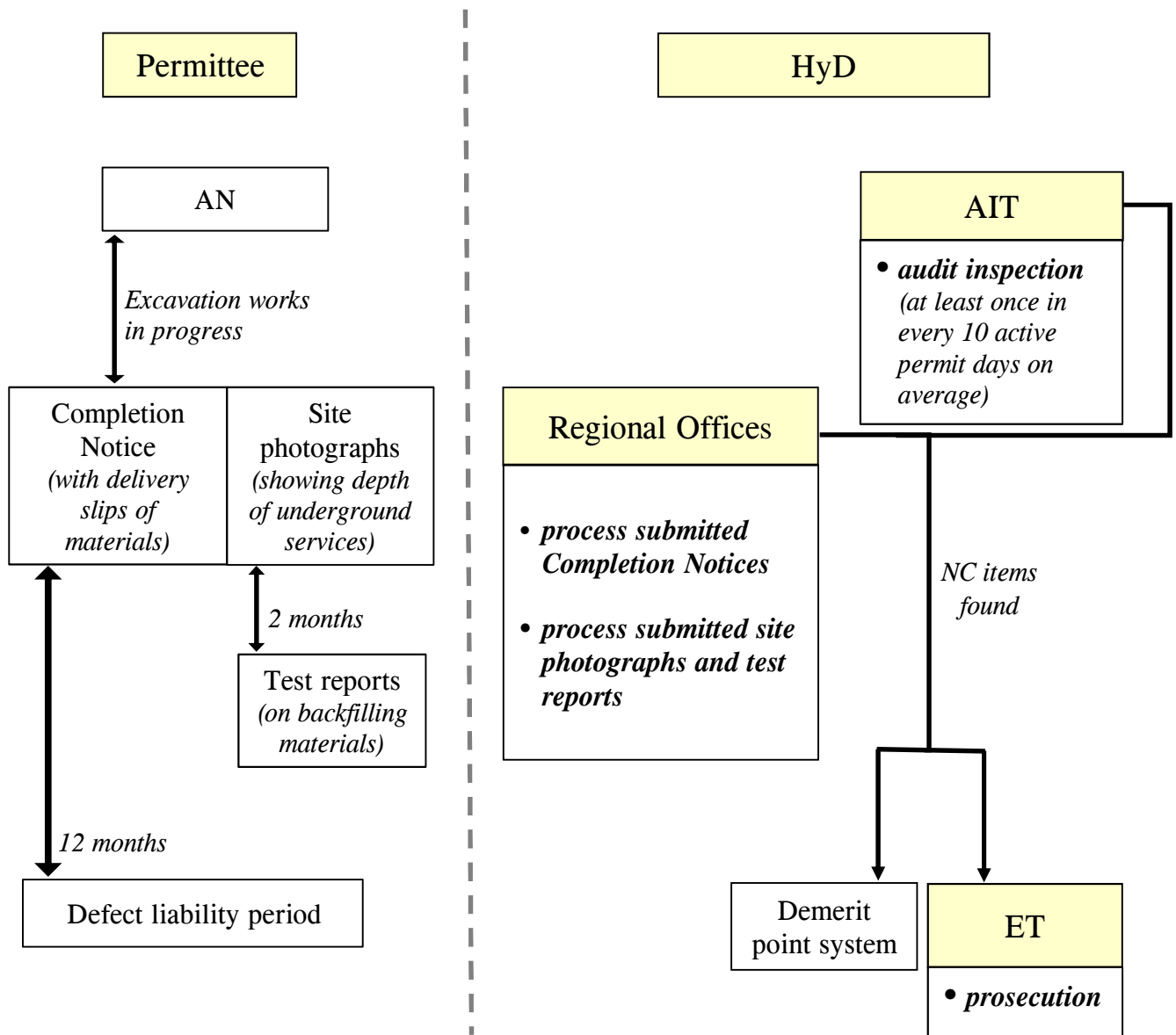
Note 16: *As of December 2017, the AIT established under the Research and Development Division had 40 staff, including professional and technical grade staff.*

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Enforcement Team (ET — Note 17) for prosecution actions. The ET subsequently conducts inspection visits to collect evidence and ascertain with the Department of Justice (DoJ) whether it is sufficient for prosecutions. Figure 2 shows the workflow on the monitoring of XP conditions.

Figure 2

Workflow on the monitoring of XP conditions



Source: Audit analysis of HyD records

Note 17: As of December 2017, the ET established under the Quality Management Unit had 12 staff, including professional and technical grade staff.

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2.17 ***Checking completion of works by Regional Offices.*** On completion of road excavation and reinstatement works, a permittee is required to submit a Completion Notice (CN) to the HyD. XP conditions also require the permittee to submit:

- (a) upon CN submission, delivery slips showing quantity of the bituminous materials delivered to the site;
- (b) upon CN submission, site photographs showing depth of the underground services (Note 18); and
- (c) test reports on the backfilling materials (e.g. soil compaction test) and other materials within two months from CN submission.

On receipt of CNs, officers of the respective Regional Office will arrange site inspections (i.e. CN inspections) within seven working days to confirm completion of works and acceptance of road reinstatement.

2.18 ***Defect liability period.*** In case of deterioration in the permanent reinstatement within 12 months from the submission date of an accepted CN, the permittee shall carry out necessary remedial works at its own expense, unless the permittee can prove that the defect is caused by a third party. The respective Regional Office would arrange inspection to identify any defects associated with the reinstatement before the end of the liability period.

2.19 ***Demerit point system.*** In August 2012, the HyD implemented a demerit point system with sanctioning measures to enhance control on road opening works. An NC item identified during audit inspection will attract a demerit point, amplified with appropriate multiplying factors assigned in accordance with pre-determined risk weightings (which are related to severity, repetition and promptness of rectifying NC item). In addition, demerit points will be assigned to a permittee which fails to comply with relevant permit condition due to delayed rectification of rejected permanent reinstatement, failure to submit site photographs and overdue test reports.

Note 18: *If the permittee fails to provide photograph submission to the satisfaction of the HyD, the permittee will be required to provide certified as-built records with clearly presented depth of services laid as supplement.*

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Sanctioning measure will be imposed on a party combination (i.e. permittee/work office/contractor) if its overall demerit point is at 4 or above. Starting from 30 September 2017, when a party combination is being sanctioned, the relevant contractor will not be approved as a nominated permittee in any new application for at least three months and until its overall demerit point level drops below 4 (Note 19).

AIT inspections during excavation works

2.20 The AIT inspects excavation works sites regularly according to schedules generated by the Audit Inspection Management System (AIMS) which are based on a set of prioritisation rules (see Appendix B), where priority is accorded to sites with poor performance records and sites not inspected in the past ten days (see (b)(ii) in Appendix B). According to the HyD, all XPs should be subject to at least one checking after commencement of works, and that for active permit sites, once in ten days. The inspection frequency of one-off XP (NXP and CWXP) sites is monitored bi-monthly by the HyD's Maintenance Working Group (Note 20). According to the bi-monthly reports, the target inspection frequency was met in 73 (90%) months of the 81 months from 2011 to 2017 (up to September).

2.21 *Need to improve the inspection coverage of NXP and CWXP sites.* While according to the HyD, all XPs should be subject to at least one checking, Audit examination of the XPs issued in 2016 revealed that the overall coverage of the AIT inspection on active permit sites up to December 2017 was only 43% (see Table 4). Audit understands that given the large number of active permit sites under the block XPs (i.e. EXPs and SSWXPs) and the short duration of works for these sites (see Note 20 to para. 2.20), there may be practical difficulty to visit all such active permit

Note 19: *Before 30 September 2017, any party combination whose demerit point level was at 4 or above would enter into a one-month abstention period. If the demerit point level remained at 4 or above throughout the period, the XPMS would suspend the contractor's pre-approved status, if it was on the pre-approved contractor list, until its demerit point level dropped below 4.*

Note 20: *The Maintenance Working Group is chaired by the Assistant Director (Technical) of Highways and comprises senior staff from the Research and Development Division and other maintenance divisions. According to the HyD, inspections for emergency openings under EXP and jobs under SSWXP were excluded from the calculation of inspection frequency because the short duration of excavation works of less than 2 days for SSWXP sites and a maximum of 7 days for EXP sites might have caused distortion.*

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sites. However, for NXP and CWXP sites for which the excavation works generally last longer, the HyD needs to make greater efforts to improve the inspection coverage to ensure that the XP conditions, especially the safety-related ones (see para. 2.16), have been complied with.

Table 4

**AIT inspections conducted
for XPs authorised in 2016
(as at December 2017)**

Type of XP sites (see Table 2 in para. 2.2)	Number of active permit sites (Note)	Number of sites with AIT's inspections (Inspection coverage)
<i>One-off XP site</i>		
NXP site	8,880	7,942 (89%)
CWXP site	37	35 (95%)
Sub-total	8,917	7,977 (89%)
<i>Block XP site</i>		
EXP site	11,171	2,723 (24%)
SSWXP site	26,755	9,505 (36%)
Sub-total	37,926	12,228 (32%)
Overall	46,843	20,205 (43%)

Source: Audit analysis of HyD records

Note: The number of active permit sites for NXP refers to the number of XPs authorised while those for EXP, CWXP and SSWXP refer to the number of emergency incidents, number of sections and number of jobs registered respectively.

2.22 Need to enhance compliance with XP conditions. The AIT devises an inspection checklist, in which each checklist item corresponds to a requirement

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specified in a clause or sub-clause of XP conditions, for AIT staff to follow in carrying out audit inspections. The HyD has adopted a compliance-led approach (see para. 2.27(b)) where permittees are requested to rectify an NC item observed during AIT inspection (Note 21). From 2013 to 2016, the compliance rate of XP conditions was 98.9% in general (see Table 1 in para. 1.5). However, Audit noted that the four frequently observed NC items had remained at the same level from 2013 to 2017 (see Table 5), indicating that there is a need to take measures to address the issue. Audit examination revealed that:

- (a) of the 20,099 XPs issued in 2017, 12,827 (64%) were related to government departments, 6,674 (33%) to other UUs and 598 (3%) to infrequent applicants (see Note 4 to para. 1.6);
- (b) in 2017, the total number of the four frequently observed NC items was 5,600 (see Table 5), of which 2,005 (36%) was related to government departments, 1,993 (35%) to other UUs and 1,602 (29%) to infrequent applicants; and
- (c) the average number of the four frequently observed NC items per permit in 2017 was 0.16 ($2,005 \div 12,827$) for government departments, 0.3 ($1,993 \div 6,674$) for other UUs and 2.68 ($1,602 \div 598$) for infrequent applicants. The compliance with XP conditions by infrequent applicants was less satisfactory than that of government departments and other UUs.

The HyD needs to take measures to enhance the compliance with the four frequently observed non-compliant XP conditions. Since the sanction under the demerit point system is not applicable to infrequent applicants, the HyD should also consider stepping up publicity efforts with a view to promoting their compliance with the pertinent XP conditions.

Note 21: *According to the HyD, of the 68,074 NC items identified by the AIT inspection from 2013 to 2017 (up to September), 46,048 (68%) had subsequently been rectified, of which 29,615 (64% of 46,048) had been rectified within 48 hours.*

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Table 5

**Four frequently observed NC items during AIT inspections
(2013 to 2017)**

NC item	Number					
	2013	2014	2015	2016	2017 (Note)	Total
<i>(a) No continuous barriers to fence off obstruction/excavation from pedestrian flow</i>						
Government departments	702	638	556	538	537	2,971
Other UUs	311	393	490	506	481	2,181
Infrequent applicants	429	453	451	610	539	2,482
Total	1,442	1,484	1,497	1,654	1,557	7,634
<i>(b) Minimum clear footway width not provided and maintained for pedestrians</i>						
Government departments	506	374	242	288	556	1,966
Other UUs	393	520	519	576	967	2,975
Infrequent applicants	159	152	194	281	305	1,091
Total	1,058	1,046	955	1,145	1,828	6,032
<i>(c) Permit not displayed</i>						
Government departments	418	474	438	405	469	2,204
Other UUs	176	190	223	359	298	1,246
Infrequent applicants	224	235	295	276	414	1,444
Total	818	899	956	1,040	1,181	4,894
<i>(d) Signs not provided in accordance with the approved TTA</i>						
Government departments	637	518	348	363	443	2,309
Other UUs	225	195	184	217	247	1,068
Infrequent applicants	238	218	269	265	344	1,334
Total	1,100	931	801	845	1,034	4,711

Source: Audit analysis of HyD records

Note: The four NC items totalled 5,600 in 2017, comprising 2,005 for government departments, 1,993 for other UUs and 1,602 for infrequent applicants.

Checking completion of works

2.23 The XPMS reports a CN automatically when an XP expires if no CN is submitted by the permittee upon XP expiry (see para. 2.17). In case of early completion of works, the permittee is required to report completion immediately after completion of works. The responsible Regional Office will arrange a CN inspection within seven working days to confirm works completion and acceptance of road reinstatement. After a CN inspection, the Regional Office will consider whether the reinstatement works should be accepted. If the reinstatement does not comply with the relevant requirements/specifications, the HyD will reject the permanent reinstatement (hereinafter referred to as “rejected CN”) and request the permittee to rectify the problem. The Regional Office is also responsible for inspecting and reviewing site photographs and test reports submitted by permittees in relation to CN submissions (see para. 2.17(b) and (c)). If defective reinstatement is found, the permittee is required to rectify the reinstatement works.

2.24 Audit examined the work of the Regional Offices on checking the completion of excavation and reinstatement works by extracting relevant records from the XPMS. Audit analysis of such records has revealed the following areas for improvement:

- (a) ***Increase in substandard reinstatement works.*** While the number of XPs authorised decreased over the years, the number of rejected CNs was generally increasing (see Table 6), indicating an increase in substandard reinstatement works carried out by contractors. This was unsatisfactory because permittees were required to obtain new XPs for carrying out rectification works, which would bring additional administrative work for HyD staff and further inconvenience to the public. For example, in 2016, 821 NXPs were authorised for carrying out rectification works involving 51,342 permit-days. The HyD needs to take measures to improve the permittees’ reinstatement works (e.g. issuing advisory letters to permittees and tightening the demerit point system);

Table 6

**Number of rejected CNs
(2011 to 2017)**

Permit type	2011	2012	2013	2014	2015	2016	2017
NXP	3,138	2,247	2,215	2,422	2,545	2,962	3,065
EXP	790	757	917	987	1,066	1,885	1,197
CWXP	48	0	0	0	0	0	12
SSWXP	1,318	1,204	992	694	750	2,351	1,917
Total	5,294	4,208	4,124	4,103	4,361	7,198	6,191

Source: HyD records

Remarks: To exclude repeated rejected cases, only the first rejected CN of a case was selected for audit analysis.

- (b) **Long-outstanding rectification works.** Table 7 shows that as of December 2017, of the 6,779 rejected CNs pending rectification of the reinstatement works, 2,581 (38%) had remained outstanding for over two years. In this connection, the HyD introduced measures by introducing risk weighting in the demerit point system (i.e. longer duration would attract higher demerit points) in September 2016. In September 2017, the HyD further enhanced these measures (Note 22). However, there is safety concern for road users if substandard reinstatement works cannot be rectified in a proper and timely manner. Moreover, the defect liability period may not be enforceable given the lapse of long time after CN submission. The HyD needs to expedite actions in implementing the enhanced measures to address the problem of long-outstanding rectification works;

Note 22: *The risk weighting will be increased progressively in six stages in 15 months and relevant contractors will not be approved as nominated permittees in any new application if the party combination has any rejected CN pending rectification for over two years with effect from 2019.*

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Table 7

Analysis of outstanding rejected CNs (December 2017)

Year of rejection	NXP	EXP	CWXP	SSWXP	Total
2010 or before	159	45	8	1,123	1,335
2011	135	1	26	114	276
2012	111	9	0	35	155
2013	130	10	0	40	180
2014	202	15	0	43	260
2015	298	21	0	56	375
2016	555	120	0	279	954
2017	1,763	451	5	1,025	3,244
Total	3,353	672	39	2,715	6,779

} 2,581

Source: Audit analysis of HyD records

- (c) **Inspections for CNs not timely conducted.** According to the HyD, of the 67,988 CNs received by the Regional Offices in 2017, CN inspections and acceptance in respect of 54,686 (80%) were completed within its internal target. However, Audit examination of the 2,019 CN cases under processing by the Regional Offices as at the end of December 2017 revealed that the CN inspections and acceptance in respect of 1,297 (64%) cases were overdue by 1 month on average (5 months for the longest overdue case). As explained by the HyD in February 2018, it had undergone some exercises in late 2017 which affected the number of CNs under processing as at the end of 2017 (e.g. the enhancement in the XPMS to cater for automatic reporting of CN for new SSWXP jobs in August 2017 had created additional workload and the Regional Offices had to take time to adapt to the new arrangement). In Audit's view, the HyD needs to monitor the situation and take appropriate improvement measures to ensure that CN inspections for confirming the completion of works and the acceptance of the reinstatement works (see para. 2.23) are carried out in a timely manner;

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- (d) *Late submission of site photographs and test reports.* As mentioned in paragraph 2.17(b) and (c), permittees are required to submit site photographs and test reports for the HyD to determine whether the standard of their reinstatement works is up to the HyD's satisfaction. However, as shown in Table 8, as of December 2017, 3,618 site photographs and 2,441 test reports had not been submitted to the HyD, of which 483 (13%) site photographs and 771 (32%) test reports had been outstanding for over three years respectively. The HyD needs to remind XP permittees to submit site photographs and test reports for checking in a timely manner. The HyD also needs to use the demerit point system to tackle those permittees with repeated records of late submission of such documents; and

Table 8

**Number of site photographs and test reports not submitted
(December 2017)**

Time lapse since submission of CNs	Number of CNs
(a) Site photographs (Note 1)	
One year or less	2,446
Over one year and up to two years	364
Over two years and up to three years	325
Over three years	483
Total	3,618
(b) Test reports	
Two months or less (Note 2)	349
Over two months and up to one year	879
Over one year and up to two years	232
Over two years and up to three years	210
Over three years	771
Total	2,441

Source: Audit analysis of HyD records

Note 1: Cases with outstanding site photographs included those with outstanding as-built records (see Note 18 to para. 2.17(b)).

Note 2: Test reports are required to be submitted within two months after CN submission.

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- (e) *Delay in processing submitted site photographs and test reports.* As shown in Table 9, as of December 2017, 15,626 site photographs and 7,486 test reports submitted had not been reviewed by the Regional Offices. These included 4,842 (31%) photographs and 2,523 (34%) test reports which had been pending review for over three years respectively. The HyD needs to expedite its processing work so as to ensure that the excavation works are completed up to the HyD's satisfaction.

Table 9

**Ageing analysis of site photographs and test reports pending review
(December 2017)**

Time lapse since submission of records	Number of CNs
(a) Site photographs (Note)	
One year or less	3,223
Over one year and up to two years	3,886
Over two years and up to three years	3,675
Over three years	4,842
Total	15,626
(b) Test reports	
Two months or less	523
Over two months and up to one year	1,610
Over one year and up to two years	1,290
Over two years and up to three years	1,540
Over three years	2,523
Total	7,486

Source: Audit analysis of HyD records

Note: Cases with site photographs pending review included those with as-built records (see Note 18 to para. 2.17(b)).

Audit recommendations

2.25 **Audit has recommended that the Director of Highways should:**

AIT inspections during excavation works

- (a) **make greater efforts to improve the AIT inspection coverage for NXP and CWXP sites;**
- (b) **take measures to enhance the compliance with the four frequently observed non-compliant XP conditions as mentioned in paragraph 2.22 (e.g. consider stepping up publicity efforts to promote the compliance, especially by infrequent applicants);**

Checking completion of works

- (c) **take measures to improve the permittees' reinstatement works, including issuing advisory letters to permittees and tightening the demerit point system, and expedite actions in implementing the enhanced measures to address the problem of long-outstanding rectification works;**
- (d) **monitor the situation of overdue CN inspections and take appropriate improvement measures to ensure that CN inspections for confirming the completion of works and acceptance of the reinstatement works are carried out in a timely manner;**
- (e) **remind XP permittees to submit site photographs and test reports for checking in a timely manner and use the demerit point system to tackle those permittees with repeated records of late submission of such documents; and**
- (f) **expedite the Regional Offices' processing of site photographs and test reports to ensure that the excavation works are completed up to their satisfaction.**

Response from the Government

2.26 The Director of Highways agrees the audit recommendations.

Enforcement actions

2.27 According to the LMPO (see para. 1.6), any person who carries out road excavations without an XP/EXP or breaches any conditions of XP/EXP shall be guilty of an offence. According to the HyD, on the recommendation of the EffO in 2009, the HyD adopted a compliance-led instead of an enforcement-focus approach in order to address the problem of large number of NC cases referred for enforcement actions. According to the EffO, the compliance-led approach (rather than an enforcement-focused approach) in regulatory checking and direct communication with the excavation permittees aimed to trigger immediate rectification as prolonged non-compliance situation might extend the existence of danger to public. The compliance-led approach included the implementation of administrative measures (e.g. demerit point system) to improve the permittees'/nominated permittees' compliance with XP conditions. According to the HyD's enforcement guidelines issued in 2009 (which are still in force):

- (a) **Enforcement authority.** The Director of Highways is empowered under sections 10A and 10C of the LMPO to issue XPs and EXPs, and under section 10 of the LMPO to exercise controls over all excavations in unleased land which is a street maintained by the HyD. Offences defined in the LMPO are classified into the following categories:
 - (i) excavation without valid XP/EXP (sections 10(1) and 10(2));
 - (ii) inadequate safety precautions and support (sections 10T(1), 10T(2) and 10T(3)); and
 - (iii) contravention of permit conditions (sections 10(3), 10(4) and 10(5));
- (b) **Compliance-led approach.** Having regard to the fact that the XP system was new to many UUs or works proponents (in 2009), the HyD aimed at promoting their awareness on requirements of the amended Ordinance and the permit conditions and encouraging them to rectify NC items promptly so as to minimise inconvenience to the public. For serious contraventions

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of LMPO provisions (e.g. excavation without a valid permit and inadequate provision of safety precautions and support) or XPs with a short remaining period or public complaints, the ET will carry out investigations as soon as possible (Note 23); and

- (c) ***Enforcement process.*** The AIT shall issue an advisory letter to the permittee/nominated permittee (i.e. the contractor), informing it of the contraventions found and the possible liability to prosecutions with a copy to the ET. For non-compliance with the same audit inspection checklist items after an advisory letter has been issued, the AIT should directly refer the case to the ET without further issuing another advisory letter. Upon receipt of case referrals from the AIT, the ET conducts an independent investigation (including carrying out site inspections as soon as possible) on the referred cases and if sufficient evidence is collected, the ET will make recommendations to the DoJ for instituting prosecutions. The DoJ will approve recommendations where appropriate and conduct prosecutions in court.

2.28 ***Prosecution actions.*** Table 10 shows the statistics on enforcement cases from 2013 to November 2017. Audit examination of the cases from 2013 to 2016 (Note 24) revealed that of the 4,338 cases referred to the ET for enforcement actions, 162 (4%) cases proceeded to prosecutions. According to the HyD, as many NCs had been rectified before the ET's inspections and the majority of the public complaint cases turned out to be invalid, no prosecutions had been taken for the remaining 4,176 (4,338 less 162) cases.

Note 23: *According to the HyD, the enforcement guidelines are intended for internal use of the AIT and ET only.*

Note 24: *Some of the 2017 cases were still under investigation.*

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Table 10

**Statistics on enforcement cases
(2013 to November 2017)**

	2013	2014	2015	2016	Total (2013 to 2016)	2017 (up to November)
(a) Number of cases opened (based on referral receipt date) (Note 1)	972	930	1,050	1,386	4,338	1,591
(b) Number of cases under processing	0	0	0	0	0	293
(c) Number of cases proceeded to prosecutions (based on summons issue date)						
(i) Contravention of XP conditions	8	12	57	53	130	37
(ii) Trench safety	0	0	0	0	0	0
(iii) Illegal excavation	7	5	8	12	32	10
Total	15	17	65	65	162	47
(d) Number of cases with convictions (based on judgement date)						
(i) Contravention of XP conditions (Note 2)	17	12	49	53	131	44
(ii) Trench safety	0	0	0	0	0	0
(iii) Illegal excavation	6	3	7	11	27	12
Total	23	15	56	64	158	56

Source: HyD records

Note 1: This included AIT referral cases and public complaint cases.

Note 2: The number of convicted cases was greater than the number of prosecution cases mainly because some prosecution cases in 2012 were concluded in 2013.

Need to step up enforcement actions against serious and repeated non-compliant cases

2.29 The compliance-led approach in handling NC items adopted by the HyD in 2009 was to promote awareness of the XP system and encouraged permittees to rectify NC items at an early opportunity (see para. 2.27(b)). With a lapse of nine years, most of the UUs and their contractors should have been familiarised with the requirements of the amended LMPO. Audit noted that under the compliance-led approach, besides serious contraventions of the LMPO provisions (e.g. excavation without a valid permit or inadequate provision of safety precautions and support), the AIT only referred cases of serious and repeated non-compliance with permit conditions to the ET for taking enforcement actions. According to the HyD, the number of such referral cases increased from 902 in 2013 to 1,446 in 2017, indicating an increasing trend in serious and repeated non-compliant cases. However, the number of cases proceeded to prosecutions totalled 209 from January 2013 to November 2017 because the permittees had been informed of the non-compliant results before the cases were referred to the ET and the bulk of the non-compliance had been rectified before the ET's inspections (Note 25). To step up enforcement actions against serious and repeated non-compliant cases, the HyD needs to review the referral mechanism from the AIT to the ET for conducting prompt investigations and consideration of prosecution actions.

Need to take stringent enforcement actions against NC cases involving construction safety

2.30 **Failure of trench excavation.** The Government attaches great importance to construction safety. In 2001, the Geotechnical Engineering Office (GEO) of the then Civil Engineering Department (now the CEDD) completed a study entitled "A study on past failures of trench excavations" and found that between 1986 and 2000, there were 15 reported failures associated with trench excavations, resulting in 10 deaths and 4 injuries. The Study concluded that the risk from trench excavation was not low and that the collapse of trenches was attributed to inadequate shoring and

Note 25: *In the 2009 review report issued by the EffO (see para. 1.11), it was recommended that part of the AIT be redeployed to the ET to form a new Compliance Team to bring synergy and benefits such as removing case referrals and reducing the time lags in taking prosecution actions. However, the HyD had reservation on the proposed merging of the two teams because: (a) there was a need to maintain the independence of the two teams; and (b) Works Supervisors in the AIT would not have the expertise to carry out enforcement duties.*

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improper drainage provisions to prevent water ingress into trenches. Figure 3 shows some past cases of failure of trench excavation.

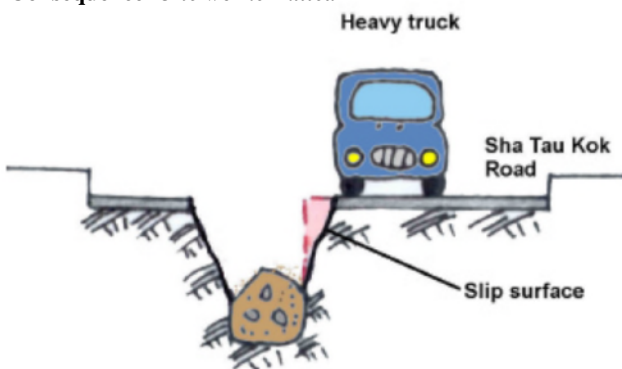
Figure 3

Cases of failure of trench excavation

Date: 11 January 1990

Probable causes of failure: *Absence of shoring and/or a heavy vehicle parked on the side of the trench*

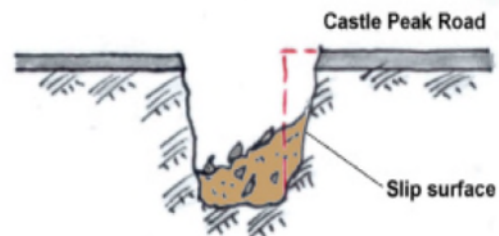
Consequence: *One worker killed*



Date: 26 February 1993

Probable causes of failure: *No shoring and/or poor groundwater control*

Consequence: *One worker killed and one injured*



Date: 6 May 1993

Probable cause of failure: *Inadequate shoring support*

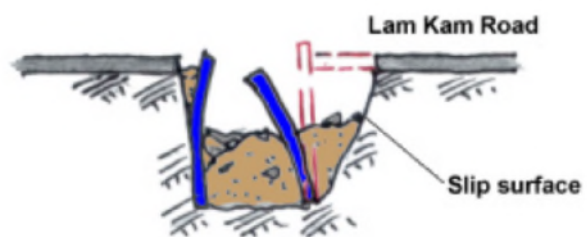
Consequence: *One worker killed*



Date: June 1992

Probable causes of failure: *Poor groundwater control and inadequate shoring*

Consequence: *Traffic disruption*



Source: *CEDD records*

2.31 **2003 Guideline.** In 2003, the GEO and the HyD published a guideline entitled “Guide to Trench Excavations (Shoring Support and Drainage Measures)” which provided guidance on good practice of shoring support and drainage measures

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for trench excavation. Under section 10T (Note 26) of the LMPO, any contraventions of the statutory provision of safety precautions and support would be liable to a maximum fine of \$200,000, which is higher than the maximum fine of \$50,000 for contraventions of permit conditions (see Note 6 to para. 1.6).

2.32 ***No prosecution under section 10T of the LMPO.*** As shown in Table 10 of paragraph 2.28, from 2013 to November 2017, while the HyD had taken prosecution actions on cases of contraventions of XP conditions and illegal excavation without obtaining a permit, it had not taken any prosecution actions on trench safety under section 10T of the LMPO. In February 2018, the HyD informed Audit that:

- (a) of the 4,027 cases referred to the ET for action in the past three years from 2015 to November 2017, 84 (2%) cases were related to section 10T and the ET had taken prompt actions upon receipt of referral cases. In fact, these NC items had been rectified before the ET's inspections; and
- (b) with the promotion of construction safety by the Government, the industry had been vigilant in addressing the safety of trench works. The HyD was not aware of any serious casualties in recent years on trench excavation works in XP sites.

2.33 ***Need to review the referral mechanism on suspected breaches of section 10T for conducting prompt investigations by the ET.*** Audit sample checked 10 cases of suspected breaches of section 10T of the LMPO detected by the AIT's inspections. In these cases, after the AIT's inspections revealing that there was insufficient support to the trench excavation works, the AIT notified the permittees of the inspection results through electronic means on the same inspection day requiring the permittees to carry out rectification works. Under existing procedures, the AIT also issued advisory letters to the permittees with copies sent to the ET for investigations. Audit noted that:

Note 26: *According to section 10T of the LMPO, the permittee/nominated permittee shall adopt all necessary safety precautions to protect the public or any person making or maintaining an excavation to which the permit relates from any danger or injury.*

Management and monitoring of road excavation works

- (a) in 4 cases, the cases were referred to the ET after the permittees had notified the AIT of the completion of the rectification works (which often took place one or two days after AIT's inspections). In the event, no breach of section 10T could be observed during the ET's site inspections; and
- (b) in 5 cases, the AIT referred the suspected-breach cases to the ET through advisory letters 3 to 6 days after its inspections. In the event, there was a time gap of 6 to 8 days between the AIT's inspections and the ET's inspections. In this regard, the ET could not obtain sufficient evidence of the suspected breaches for taking prosecution actions.

The HyD needs to review the referral mechanism from the AIT to the ET for conducting prompt investigations and consideration of prosecution actions on serious and repeated breaches of permit conditions and suspected breaches of section 10T of the LMPO.

Audit recommendations

2.34 **Audit has *recommended* that the Director of Highways should review the referral mechanism from the AIT to the ET for conducting prompt investigations and consideration of prosecution actions on:**

- (a) **serious and repeated non-compliance with XP conditions; and**
- (b) **suspected breaches of the safety precautions and support provisions under section 10T of the LMPO.**

Response from the Government

2.35 The Director of Highways agrees with the audit recommendations.

PART 3: CONTROL OF UNDERGROUND UTILITY INSTALLATION AND SPACE OCCUPATION

3.1 Insufficient underground space and congested utilities beneath public roads, particularly in old urban areas, often cause delays to excavation works and hence traffic disruption to the public. This PART examines the Government's work on:

- (a) control of underground utility installation (paras. 3.6 to 3.12); and
- (b) management and control of underground space occupation (paras. 3.13 to 3.16).

Problems caused by congested utilities

3.2 As of December 2017, there were 18 major UUs installing their services beneath public roads for providing different public utility services in Hong Kong. While the number of UUs providing water, drainage, tramway, power and gas services/supplies remained at 6 (Note 27) in the past 20 years, the number of UUs providing fixed telecommunications services licensed by the Communications Authority (CA — Note 28) under the Telecommunications Ordinance (Cap. 106) with land licences granted by the LandsD for utility installation under the LMPO increased from 4 in 1995 to 12 in 2017 because of the deregulation and liberalisation of the

Note 27: *Water supply and drainage services are provided by the WSD and the DSD respectively. Tramway, power and gas supplies are provided by four different UUs.*

Note 28: *The CA, comprising not less than 5 and not more than 10 non-officials appointed by the Chief Executive and two public officers as members, is an independent statutory body established on 1 April 2012 under the Communications Authority Ordinance (Cap. 616) as the unified regulator of both the telecommunications and broadcasting sectors in Hong Kong.*

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local fixed telecommunications services market in 1995 and 2003 respectively (Note 29). Coupled with the continuous developments in the territory, the amount of underground utilities installed beneath public roads increased significantly. In particular, for the telecommunications services, the estimated length of telecommunications cables increased from 26,000 km in 2006 to 49,000 km in 2011 (Note 30). With the continual development and installation of the underground utility facilities including the telecommunications utilities, the underground space will be increasingly occupied and utilised, resulting in congestion of underground facilities beneath public roads in some districts, especially in urban areas developed in early years (Note 31). Photographs 2 and 3 show some congested utilities beneath a public road.

Note 29: *In 1995, the local fixed telecommunications services market was deregularised by introducing three new operators into the market in addition to the former monopoly operator. In the same year, the LandsD granted land licenses to the four operators. In 2003, the local fixed telecommunications services market was fully liberalised by introducing further market competition. As of December 2017, 27 licensees had been permitted to provide local fixed telecommunications services, of which 12 had obtained land licences granted by the LandsD for utility installation and 1 had applied for such licence.*

Note 30: *According to the HyD, the length of telecommunications cables was estimated based on data provided by UUs. Updated figures after 2011 were not available.*

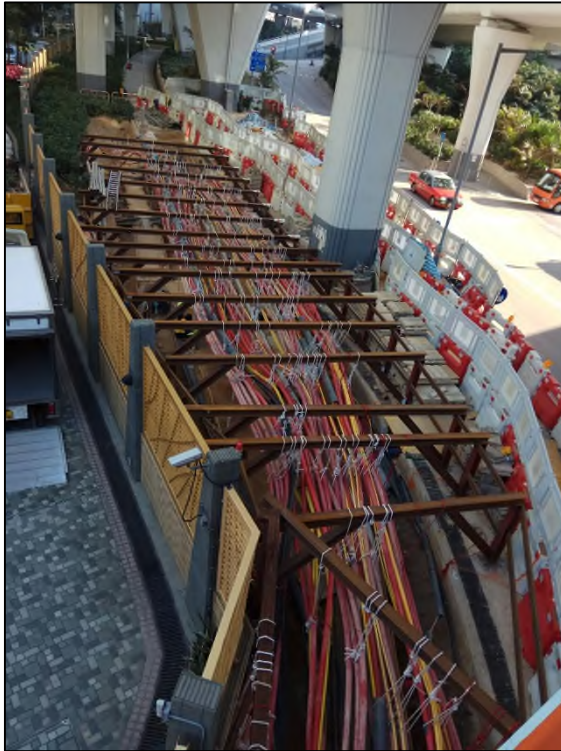
Note 31: *According to the HyD, telecommunications cables were mainly laid under footpaths, with cross-road ducts provided where necessary.*

Control of underground utility installation and space occupation

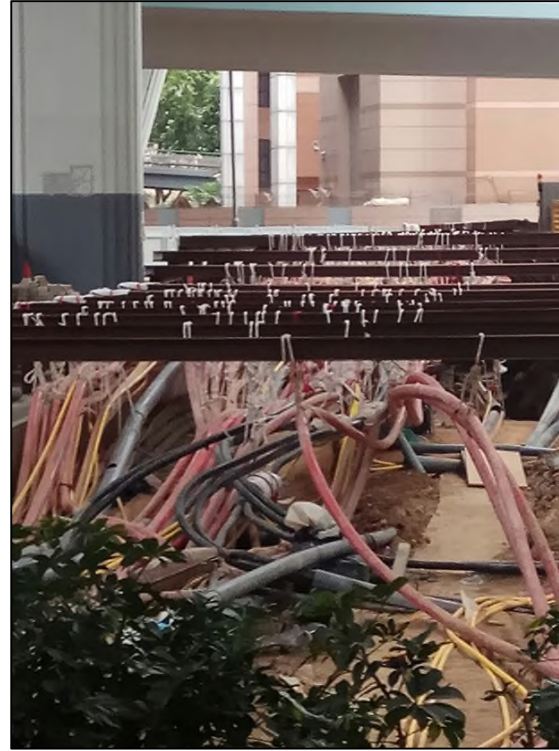
Photographs 2 and 3

Congested utilities beneath a public road

Photograph 2



Photograph 3



Source: Photographs taken by Audit staff in January 2018

3.3 According to the Final Report of a consultancy study commissioned by the HyD on the management of space occupation of December 2017 (see para. 3.15), there was currently no standard mechanism to manage space occupation by UUs underneath public roads. According to the HyD, the congested utilities beneath public roads often caused the following problems in carrying out road excavation works:

- (a) ***Conflicts among different utilities.*** UUs were generally self-regulatory to conduct planning of the alignment and level of their proposed underground services before application for the necessary XPs and carrying out their utility installation works. Ineffective underground space management might cause improper use of space, damage to existing utilities, and delays in emergency repairs and excavation works (see Cases A to E in para. 2.4);

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- (b) ***Difficulties encountered in laying new cables/pipes.*** Difficulties in laying works might result in delay in completing the road excavation works. In some extreme cases, when encountering problem of insufficient underground space for laying the services on site, some UUs' contractors might choose expedience over due regard to XP condition requirement, e.g. laying the cables/pipes at a depth not complying with the minimum-depth requirement (Note 32) in order to complete the installation works on time and within budget;

- (c) ***Fierce competition and strategic needs among different utilities.*** Some UUs might not fully consider whether underground space of the planned alignment of their utility services was sufficient to accommodate the utility services before carrying out the excavation/installation works. The HyD did not possess sufficient information to determine whether the related excavation works should be allowed on grounds of underground space availability; and

- (d) ***Risk of damaging buried utilities.*** Congested utilities might increase the risk of damaging buried utilities when carrying out road excavation works. In 2016, the JUPG issued a review report on "Measures for prevention of damage to utilities and procedures for reporting damage to utilities during excavation". According to the report:
 - (i) while the number of damage cases had reduced from 2007 to 2015, taking into account the fact that the report of damage incidents by UUs to the HyD was on a voluntary basis, the actual number of damage might be more than the reported figures;

 - (ii) a working group of the JUPG recommended enhancing the education and monitoring of contractors, and promoting Electronic

Note 32: *As required under the XP condition, a permittee shall ensure that underground services and installations be laid or placed in accordance with the minimum-depth requirement (i.e. 1 m below finished surface of a carriageway and 0.45 m below that of a non-carriageway). The minimum-depth requirement aims to avoid adverse effects on the structural integrity of road pavement, protect underground services from damage, and maximise use of underground space for accommodation of services while ensuring that sufficient space is reserved for installation of surface drainage system for proper operation of a highway.*

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Mark Plant Circulation System (Note 33) for obtaining marked plant drawings from other UUs before works commencement; and

- (iii) the working group also suggested introducing appropriate legislations for protection of telecommunications infrastructures (similar to electricity and gas supply infrastructures) and encouraging contractors to report all damage immediately.

3.4 ***Prolonged XP extensions.*** Audit examination on prolonged XP extension cases revealed that some extensions of excavation works were caused by congested underground utilities and insufficient underground space (see Cases A to E in para. 2.4). Under such circumstances, the contractors may need to temporarily lift or provide support to the existing utilities and find space to carry out construction/installation works which would lengthen the works process (see Photograph 3 in para. 3.2 for an example).

3.5 In February 2018, the HyD informed Audit that:

- (a) in Cases A to E, one of the reasons for extension of the XP periods was congested underground utilities leading to insufficient underground space. Other situations that might result in the need to extend the XP periods included uncharted underground utilities, unanticipated obstructions, unforeseen rectification works, delay in material delivery, new site constraints identified and accidents causing works suspension and/or adverse weather conditions; and
- (b) in view of the unforeseen factors, carrying out of excavation works on public roads might inevitably encounter delay beyond the permittees' control or their reasonable contemplation, resulting in extension of XP periods.

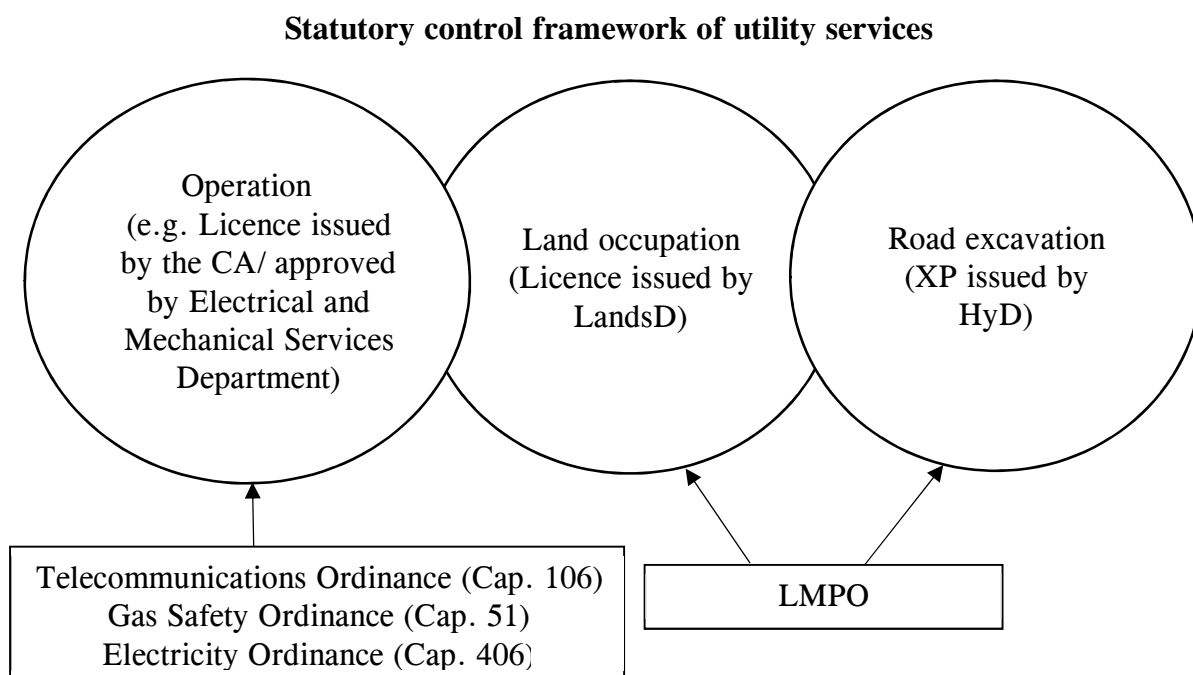
Note 33: *The Electronic Mark Plant Circulation System, launched in 2002, was jointly developed by major UUs and government departments to facilitate the speedy transfer of underground utility information for carrying out road excavation. Users of the system make requests and obtain plans of existing and/or proposed utility services from other UUs and government departments for planning of road excavation.*

Control of underground utility installation

Statutory control framework of underground utility installation

3.6 As shown in Figure 4, the installation (i.e. land occupation and road excavation — see paras. 1.6 and 1.7) and operation of underground utilities of UUs are regulated by different government departments. Water supply and drainage systems are under the responsibilities of the WSD and the DSD respectively whereas power and gas supplies are provided by three different UUs. For the telecommunications industry, as of December 2017, there were 12 UUs providing local fixed telecommunications services with land licences granted for utility installation.

Figure 4



Source: HyD records

Remarks: According to the Electrical and Mechanical Services Department, only gas pipes operating at high pressures as defined in the Gas Safety Ordinance or liquefied petroleum gas pipes under public roads require its approval. The two UUs supplying power are required to meet the protection requirements for underground electricity supply cable installation, and the UU supplying gas is required to meet the relevant standards/code of practice for underground gas pipes installation. Besides, the Electricity Ordinance and the Gas Safety Ordinance regulate the works carried out in the vicinity of underground electricity cables and gas pipes to ensure that the works do not prejudice electrical/gas safety or the continuity of the electricity/gas supply.

Licences and permits issued for installation and operation of underground facilities for provision of local fixed telecommunications services and related road excavation works

3.7 Various authorities are responsible for issuing licences and permits for the installation and operation of underground facilities for the provision of local fixed telecommunications services and related road excavation works:

- (a) ***Unified carrier licence (UCL — Note 34).*** Under the Telecommunications Ordinance, a UCL is issued by the CA for the provision of facility-based public telecommunications services. The CA may grant authorisation to a relevant licensee to place and maintain a telecommunications line in, over, or upon public roads and unleased government land subject to consent in writing of the Director of Lands. Office of the Communications Authority (OFCA — Note 35), as the CA’s executive arm and secretariat, has promulgated the “Guidelines for Application of Road Opening Authorization and Procedure for Road Opening Works”, which set out the principles and criteria of the CA for granting of road opening authorisations and the procedures to be followed by authorised licensees when they carry out road opening works. These include the requirements on the submission of initial implementation plans and justifications such as information on the technology used for providing wireline-based fixed service that demands road opening and schedule of road opening activities for the initial three years;

- (b) ***Land licence.*** The LandsD may issue a land licence to UUs (Note 36) for occupying unleased government land associated with utility installation and operation. A UU with an appropriate UCL issued by the CA may apply to the LandsD for a land licence. If support from the concerned bureau is

Note 34: *Since 2008, the UCL has been introduced as a single licensing vehicle for both fixed and mobile telecommunications services to replace fixed carrier licence and mobile carrier licence. Fixed carrier licence and mobile carrier licence issued prior to introduction of UCL would be valid until their expiry dates.*

Note 35: *The role and functions of the CA are executed by its executive arm and secretariat, i.e. OFCA, which is a trading fund department headed by the Director-General of Communications.*

Note 36: *Installation of utilities by government departments (i.e. water mains by the WSD and sewage-mains by the DSD) does not require a land licence.*

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secured and no objection from the relevant departments is received, the LandsD would issue a land licence to the UU on the basis of the relevant policy directions and departmental advice. According to the land licence conditions:

- (i) the licensee will be allowed to place and maintain facilities on public roads and unleased government land as specified in the land licence and in accordance with the land licence conditions and master plans initially authorised by the CA (i.e. initial implementation plans — see (a) above), which may from time to time be amended pursuant to the land licence conditions;
- (ii) the licensee should obtain an XP before commencement of any excavation in public roads or before erecting any installations thereon;
- (iii) detailed alignment and disposition (Note 37) of the utility system (Note 38) in, on, over, along, across and under any public road or within any future road reserve shall be to the satisfaction of the Director of Highways;
- (iv) the licensee shall not alter, vary, modify, substitute, or make any addition to the system as indicated in the master plans without the prior written approval of the Director of Lands (Note 39); and
- (v) the licensee shall maintain and update the master plans to show all approved amendments and provide access and assistance to the Government as may be required to make search and enquiry on the master plans, and if so required by the Director of Lands, to supply

Note 37: *Alignment includes the meaning of “route” and “course” and disposition includes the meaning of “depth” and “position”.*

Note 38: *For the purpose of the land licence, installations such as cables, ducts, pipes, poles, and joint boxes installed under the licence, are referred collectively as the “system”.*

Note 39: *For land licences issued since 2015, the LandsD has specified in this condition that “the issue of XP” shall be regarded as the Director of Lands’ prior written approval.*

Control of underground utility installation and space occupation

copies of the plans and relevant documents at no cost to the Government; and

- (c) **XP.** According to the HyD, the issue of an XP mainly controls conducting or maintaining road excavation. Permittees need to comply with the XP conditions (e.g. on conducting excavation, reinstatement of roads and minimum-depth requirement — see Note 32 to para. 3.3(b)) to conduct a proper excavation during the XP validity period.

3.8 **Submission of plans.** For the purposes of granting the licences/permits, the authorities require UUs to submit different documents for examination and approval:

- (a) **UCL.** A UU is required to seek the CA's road opening authorisation by submitting, inter alia, an initial implementation plan to the CA showing the proposed routes of their telecommunications facilities such as telecommunications cables for the provision of local fixed telecommunications services. The UUs should submit updates of the plan to the CA thereafter as necessary or when required by the CA. Since 2008, there has been no requirement for seeking the CA's prior approval on any road opening works (after the CA's endorsement of the initial implementation plan) on a case-by-case basis before making an XP application;
- (b) **Land licence.** A UU is required to submit a set of master plan i.e. the implementation plan endorsed by the CA (see (a) above) in support of the land licence application. The intrinsic nature of the master plan is to control routes, levels (i.e. indicating whether installations are either underground or above-ground) and the area (i.e. indicating the installations are not exceeding 12 m² in area as required under the land licence) of utility installation over public roads and unleased government land. The master plans, which may cover installations over the whole territory, are not intended to show details such as the detailed design and exact locations of the installations. At present, although the land licence condition empowers the LandsD to require UUs to provide updated master plans of utility installation (see para. 3.7(b)(v)), only the two power and one gas supply UUs are required to submit updated master plans on strategic installations

Control of underground utility installation and space occupation

to the LandsD annually (Note 40). Other UUs providing telecommunications services are not required to submit such updated master plans to the LandsD. According to the LandsD, with the issue of an XP by the HyD, the LandsD's approval on the amendment of the master plan shall be deemed to have been obtained (see Note 39 to para. 3.7(b)(iv)); and

- (c) **XP.** A UU is required to submit a road-opening plan in the application of an XP showing the proposed location of the excavation and the period of road openings. Road-opening plans submitted by telecommunications operators only provide information on UU's installations in a piecemeal fashion. Such road-opening plans are different from the master plans which mainly furnish the Government with an overview of UU's proposed road excavation for their installations of services.

The level of details of utility information requirements varies because of the different purposes for granting approval of licences/permits by the CA, the LandsD and the HyD. Apart from requiring the two power and one gas supply UUs to submit updated master plans of strategic installations (see Note 40 to (b) above) annually, the LandsD has not required UUs to submit updated master plans of underground utility installed.

Need to improve control of underground utility installation

3.9 ***Non-compliance with minimum-depth requirements.*** As mentioned in paragraph 3.3(b), when contractors encountered insufficient underground space on site, some might choose to complete their utility installation works at a depth not complying with minimum-depth requirement (at shallow depth). This could result in adverse effects on the structural integrity of road pavements and inadequate protection of the underground services from traffic loadings and subsequent road opening works (see Note 32 in para. 3.3(b)). According to a UTLC paper of 2017:

- (a) in 2012, the HyD received complaints on shallow depth services from practitioners of the industry and media enquiries (see Case F). These complaints included locations scattered over the territory; and

Note 40: *The LandsD has since 2000 required only the two power and one gas supply UUs to provide updated master plans of strategic installation (which will take more than six months to divert). According to the LandsD, provision of updated master plan aims to allow more efficient planning for land disposal/development programmes.*

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- (b) this incident showed that some of the permittees had not exercised adequate supervision on their contractors to ensure compliance with the requirements. As of the end of 2016, there were 16 non-compliant cases of minimum-depth requirement not yet been rectified.

Case F

Non-compliance with minimum-depth requirement

1. Between October 2011 and October 2012, the HyD received over 500 complaints relating to the breach of minimum-depth requirement by various fixed network operators. After investigation, the HyD found that in 203 cases involving six fixed network operators, the installation works did not meet the minimum-depth requirements of the XP condition and the then telecommunications licence condition applicable to fixed network operators (Note). Between February 2012 and September 2014, the HyD requested the concerned fixed network operators to rectify the NC item and referred the cases to the OFCA (see Note 35 to para. 3.7(a)) for follow-up actions. Although the CA is not the enforcement agency for road opening requirements, taking into account the circumstances of the cases referred by the HyD and the nature of the breach and the number of non-compliant cases of each of the concerned operators, the CA issued a warning letter to one operator on 162 non-compliant cases and advisory letters to the remaining five operators on 1 to 26 non-compliant cases requiring them to comply with the minimum-depth requirement as determined by the HyD. Up to January 2018, the operator with 162 non-compliant cases had rectified all except 3 cases.

Audit comments

2. Audit noted that in order to tackle the non-compliance with the minimum-depth requirement, the HyD had since 2012 required permittees to submit record photographs to show whether the utility services have been installed at sufficient depth. However, it was unsatisfactory that after a lapse of about 4 years, 3 of the 203 non-compliant cases remained unrectified. The HyD needs to expedite rectification actions in this regard.

Source: Audit analysis of HyD records

Note: According to the telecommunications licence condition which was later removed in 2015 (in light of similar requirements already imposed in XPs issued under the LMPO), the network, or any part of it, if installed under, in, over or upon any public road, shall be at such depth, course, route and position as may be determined by the Director of Highways.

Control of underground utility installation and space occupation

3.10 According to the HyD, in relation to Case F:

- (a) owing to the intense competition in the telecommunications market and the incentive to establish the network infrastructure as fast as possible, there might be non-compliance with the minimum-depth requirement especially when laying their underground cable facilities in congested locations; and
- (b) underground space of public roads was indeed highly congested and there was a physical limit on the amount of underground facilities that could be accommodated in the underground space of public roads. It might not always be possible for new telecommunications licensees to have enough space under a particular road to install their own underground facilities.

Audit noted that the non-compliant cases with minimum-depth requirements might be partly attributed to congested underground space.

3.11 *Unsatisfactory alignment and disposition of underground utility systems.* According to the land licence condition, for utility installation, detailed alignment and disposition of the system in, on, over, along, across and under any public road or within any future road reserve shall be to the satisfaction of the Director of Highways (hereinafter referred to as the “alignment and disposition clause” — see para. 3.7(b)(iii)). However, according to the HyD, under the existing control mechanism, there is no documented standard on checking of the detailed alignment and disposition of the system, and it does not require the XP applicants to ascertain and confirm whether the related alignment and disposition of the proposed installations will be in conflict with other existing installations or proposed installations. In the event, the HyD does not check whether such alignment and disposition are up to its satisfaction, as illustrated in Case G.

Case G

Unauthorised installation of 487 poles

1. In January and February 2010, the LandsD and the HyD received complaints on the erection of telecommunications poles on public pavements by a telecommunications operator (Company A). According to the HyD, its investigations confirmed that 487 poles had been erected on roadside between January and February 2010 by inappropriately using the SSWXP procedures, and the CNs of 180 poles had been approved by the HyD inadvertently. The approvals were subsequently withdrawn upon further investigations.

2. In May and August 2010, the HyD and the LandsD requested Company A to remove the poles as they considered the detailed alignment and disposition of the installations were not to the satisfaction of the HyD under the land licence. By way of a judicial application, Company A challenged the LandsD's and the HyD's basis for requesting removal of the poles. In August 2011, the Court ruled that:

- (a) the alignment and disposition clause did not require the licensee to obtain prior consent or approval from the Director of Highways as to the alignment or disposition of the system or any part thereof before its installation;
- (b) the clause did not prescribe any point of time in which such satisfaction had to be obtained or met; and
- (c) the Director of Highways was entitled if he so wished to reconsider whether he was satisfied with the alignment and disposition of the poles either individually or as a whole.

3. In June 2012, the HyD confirmed that the alignment and disposition of the poles were unsatisfactory. Upon HyD's request, the LandsD issued a letter requesting Company A to remove the poles. In March 2013, Company A informed the HyD and the LandsD that it had removed all poles and reinstated the pedestrian pavements.

Case G (Cont'd)

Audit comments

4. The SSWXP was introduced for UUs to arrange their small-scale excavation works more efficiently. Under the SSWXP, an applicant was not required to provide details of proposed installation (e.g. disposition, alignment, and dimensions). The observed unauthorised works in this case suggested inadequate checking of the completed works and some control weaknesses under the SSWXP. According to the HyD, in 2011, it revised the SSWXP procedures (Note) requiring works proponents to obtain the HyD's consent before carrying out non-standard works items (e.g. poles and other above-ground installations). To strengthen the detective control under the SSWXP, the HyD needs to enhance its guidelines on the checking of completed works.

Source: Audit analysis of HyD and LandsD records

Note: When a UU registers its proposed works in the XPMS, it can choose from a list of pre-set standard works items (which differs from one UU to another), including duct/pipe laying and construction of associated structures. For pre-set standard works items in the XPMS, the HyD's consent on the proposed installation is not required. As regards non-standard works items, the UU is required to provide additional information on the installation works and obtain the HyD's consent before proceeding to apply for an XP.

3.12 ***Need to strengthen control over alignment and disposition of underground utility installation.*** According to the HyD, the statutory authorities bestowed upon the Director of Highways under the LMPO are to issue an XP which mainly controls conducting or maintaining road excavation to ensure that permittees comply with the XP conditions such as minimum-depth requirement (see para. 3.7(c) and Note 41) during the XP validity period. The revised SSWXP procedures put in place in 2011 (see para. 4 in Case G of para. 3.11) are only applicable to above-ground installations. As the works proponents are not required to obtain the HyD's consent for their underground utility installations, there is no assurance that the alignment and disposition would be up to the HyD's satisfaction. This situation is unsatisfactory as it is difficult to check the alignment and disposition of underground utility installations

Note 41: *Permittees are required to submit photograph records to show that the minimum-depth requirement of underground installation has been complied with.*

Control of underground utility installation and space occupation

after reinstatement of road surface. In Audit's view, there is a need to strengthen control on the alignment and disposition of underground utility installations, including the following:

- (a) in accordance with the land licence condition (see para. 3.7(b)(iii)), the HyD may consider enhancing the procedures and requirements on checking the alignment and disposition of the underground utility systems;
- (b) the HyD may consider exploring with the LandsD and other bureaux/departments with responsibilities on utilities the need to require UUs to submit as-built records and updated master plans (see para. 3.7(b)(v)) of underground utility systems for strategic locations (e.g. at road junctions/locations with busy vehicular traffic or pedestrian flow) to facilitate checking and controlling road excavation; and
- (c) as regards the two power and one gas supply UUs which provide updated master plans on strategic installations to the LandsD annually, the utility information collected has only been uploaded onto its Land Information System (Note 42) for internal use and not for sharing with the HyD. In this connection, the HyD needs to consider exploring with the LandsD the feasibility of sharing the annual updated master plans on strategic installations submitted by the power and gas supply UUs to better control road excavations.

Management and control of underground space occupation

3.13 *Need to develop an effective system on managing and controlling underground space occupation.* As mentioned in paragraph 3.8(b) and (c), both the master plan submitted upon land licence application and the road-opening plan submitted upon XP application do not show detailed records of the underground utility installations. As a result, the HyD does not possess sufficient underground utility information to assess whether sufficient underground space is available and determine whether excavation works should be allowed. According to the HyD, when exercising

Note 42: *The LandsD operates a Land Information System for maintaining updated digital maps and cadastral databases (i.e. computerised maps showing property boundaries) and hence providing a foundation geospatial data framework in Hong Kong.*

Control of underground utility installation and space occupation

its authority under Part III of the LMPO on controlling road excavation works, it often encounters problems of insufficient underground space for UUs to lay new services. The HyD has therefore established forums to improve coordination among various government departments and UUs (see para. 1.9) and the Electronic Mark Plant Circulation System (see Note 33 to para. 3.3(d)(ii)) to facilitate them to obtain existing underground utility information and avoid conflicts as far as possible before carrying out road excavation works. As illustrated in Case F in paragraph 3.9 and Case G in paragraph 3.11, there is no assurance that the alignment and disposition of underground telecommunications systems have been installed to the satisfaction of the HyD because the Government does not maintain as-built records on such installations beneath public roads/unleased government land. Audit considers that the HyD needs to, in collaboration with the LandsD, the DEVB and other bureaux with policy responsibilities on utilities, explore the development of an effective management and control system over underground space occupation.

Collaboration Study on Management of Space Occupation by Utilities Underneath Public Roads

3.14 To address the underground space occupation problems when the HyD is exercising the power under Part III of the LMPO on controlling road excavation works, in March 2013, the HyD commissioned a consultant (Consultant B) to conduct a “Collaboration Study on Management of Space Occupation by Utilities Underneath Public Roads” at a cost of \$1.3 million. The objective of the study was to explore and carry out trials on any proposed methodology with a view to identifying an effective instrument to tighten control over excavation works on public road sections with congested underground utilities. Three government departments and 13 major UUs participated in the study on a voluntary basis (Note 43). According to the consultancy agreement, Consultant B was required, among others, to carry out the following tasks:

- (a) to study on methods being adopted by other metropolises for managing the occupation of underground space and recommend a viable framework and methodology for strengthening road opening control in Hong Kong;

Note 43: *The three government departments were the WSD, the DSD and the HyD, and the 13 UUs were 2 power and 1 gas supply UUs and 10 local fixed-network operators.*

Control of underground utility installation and space occupation

- (b) to develop a computerised system to support the proposed methodology and administration measures, namely Consolidated Utility Installation Modelling System (CUIMS); and
- (c) to conduct a trial of a proposed methodology and a developed computerised system.

3.15 ***Final Report.*** In December 2017, Consultant B submitted the Final Report of the Collaboration Study with the following major conclusions and recommendations:

- (a) ***Planned methodology.*** A planned methodology (using the CUIMS — see Appendix C) was developed for trials in three selected areas (in the vicinities of Leighton Road, Hoi Bun Road and Wan Po Road). During the trial period, UUs were required to conduct detailed planning of the alignment and level of their proposed underground services within the trial areas. If it was demonstrated that sufficient space was available and conflicts with other proposed services were resolved, planning recommendation would be granted to the concerned underground services for application of XP. Upon completion of works, UUs were required to update the as-built records accordingly. However, in view of UUs' criticism on the user-friendliness of CUIMS (e.g. applicants found it difficult to add/modify their alignment plans) and doubts on the accuracy of the 3-dimensional models based on their own records, other more efficient and acceptable means/approach of methodology might be required;
- (b) ***Modelling underground utilities in 3-dimensional format.*** The idea of modelling the underground utilities in 3-dimensional format should be able to assist UUs to better plan their new installations by avoiding the areas congested with underground utilities. The utilisation of underground space could then be optimised to support continuous growth of public services, and unnecessary excavation works and/or prolonged opening up of the footpath surface could be prevented due to insufficient underground space to accommodate the utilities. However, such objective was difficult to achieve due to the following constraints:
 - (i) discrepancy between the 3-dimensional model and as-built locations of the underground utilities rendered the analysis under the CUIMS

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for identifying an alignment without conflict not too meaningful;
and

- (ii) a 3-dimensional model built by a third party would easily become outdated even with very accurate records provided by UUs at the beginning as as-built records were kept and owned by the respective UUs. Frequent updating of the records and verification of the accuracy of model would be required;

- (c) **Way forward.** In the long run, it would be necessary for the existing 2-dimensional record systems adopted by most UUs to be upgraded to 3-dimensional digital records so as to meet the rising expectation and demand for more accurate underground utility records by the public. In order to facilitate efficient building up of a 3-dimensional database/model, the standard and form of record kept by UUs should be aligned. A common platform for storing and viewing of all the 3-dimensional as-built records of UUs was recommended to be built. UUs should be responsible for uploading, updating and maintaining their own utility records shown in such platform; and

- (d) **Extending trial of the CUIMS.** Since the data obtained from the first 2-year trial of the CUIMS was limited, the trial should be extended for a longer period to gather more data for future analysis and determination on the way forward.

In November 2016, the HyD awarded a service contract to another consultant to maintain the CUIMS and extend the trial period to December 2018.

3.16 **Need to seek the LandsD's assistance in developing the CUIMS.** While the HyD had commissioned a consultancy study to identify an effective instrument to tighten control over excavation works in areas with congested underground utilities, feedback from participating UUs of the proposed CUIMS was that the trial CUIMS was not user friendly. In addition, the study also found that the format and standard of the as-built records kept by UUs were different. As the LandsD's Land Information System maintains records of updated master plans on strategic installations submitted by the two power and one gas supply UUs (see para. 3.8(b)), its experience may be useful for the development of the CUIMS. The HyD needs to seek the LandsD's assistance in developing the CUIMS for better utilisation of underground space in areas with congested underground utilities.

Audit recommendations

3.17 **Audit has recommended that the Director of Highways should:**

Control of underground utility installation

- (a) **expedite action to rectify the three outstanding non-compliant cases of minimum-depth requirement as mentioned in Case F in paragraph 3.9;**
- (b) **enhance the guidelines on the checking of completed works under SSWXP to detect unauthorised works;**
- (c) **consider enhancing the procedures and requirements on checking the alignment and disposition of underground utility systems before the road surface is reinstated;**
- (d) **consider exploring with:**
 - (i) **the LandsD and other bureaux/departments with responsibilities on utilities the need to require UUs to submit as-built records and updated master plans of underground utility systems for strategic locations (e.g. at road junctions/locations with busy vehicular traffic or pedestrian flow) to facilitate checking and controlling road excavation; and**
 - (ii) **the LandsD the feasibility of sharing the annual updated master plans on strategic installations submitted by the power and gas supply UUs to facilitate the HyD to better control road excavation;**

Management and control of underground space occupation

- (e) **in collaboration with the LandsD, the DEVB and other bureaux with policy responsibilities on utilities, explore the development of an effective management and control system over underground space occupation; and**

Control of underground utility installation and space occupation

- (f) **seek the LandsD's assistance in developing the CUIMS for better utilisation of underground space in areas with congested underground utilities.**

Response from the Government

3.18 The Director of Highways agrees with the audit recommendations in paragraph 3.17.

3.19 The Secretary for Development agrees with the audit recommendation in paragraph 3.17(e).

3.20 The Director of Lands agrees with the audit recommendations in paragraph 3.17(d), (e) and (f). He has said that:

- (a) regarding the audit recommendation in paragraph 3.17(d), on request by the HyD, the LandsD can require the licensees under the pertinent licence condition to share the information with the HyD. In addition, the relevant bureaux/departments under the licensing regime (e.g. the OFCA for telecommunications installations) should also be approached to assist in soliciting such information; and
- (b) regarding the recommendation in paragraph 3.17(f) on the development of the CUIMS, subject to the availability of resources, the Survey and Mapping Office will render support to the HyD in developing the system.

3.21 The Commissioner for Efficiency has said that the Government is in the progress of developing the Common Spatial Data Infrastructure by 2023 to enable sharing of geo-spatial data across sectors which would initially deal with information within the Government and specifically focusing on data relating to planning, land and infrastructure development and management. It will be progressively extended to different sectors of participants, such as professionals, property developers, utilities sector and the general public. The HyD may be able to make use of more comprehensive information to plan for and improve its monitoring of excavation works.

PART 4: EXPLORING THE USE OF COMMON UTILITY ENCLOSURES

4.1 By accommodating utility services within single structures beneath carriageways/footways, CUE has the potential for reducing road opening works. This PART examines the Government's efforts in exploring the use of CUEs.

Installation of underground utility services

4.2 In the installation of underground utility services (such as water, drainage, gas, power and telecommunications systems), the conventional approach is normally adopted in Hong Kong. Under this approach, workers excavate a trench in a carriageway/footway and either lay the utility apparatus (e.g. water pipes) directly within the trench on bedding materials or ducts within the trench for later installation of cables (e.g. power or telecommunications cables). After the utility installation works, the surface of carriageway/footway will be reinstated. This conventional approach is simple but has the disadvantages of causing disruption to vehicular/pedestrian traffic, and resulting in adverse environmental and social impacts. If underground utilities are congested or the implementation of TTA cannot be worked out at the concerned road section for the proposed road opening, UUs may adopt trenchless excavation (i.e. use of tunnels) to install utility services though this is more expensive. Trenchless excavation does not require an XP except for the end shaft chambers of the tunnels located within public roads. In recent years, the increase in the number of service providers in the telecommunications industry has led to the increase in underground utility services, resulting in a higher risk of damaging adjacent facilities when excavating for a particular utility system. Furthermore, with the continuous increase of such services, the underground space near the surface (especially for footpath) will eventually be saturated with cables/ducts making it very difficult, if not impossible, to go into the deeper sub-surface space for utility installation.

4.3 Internationally, a common approach to minimising the problems associated with utility provision in urban areas is to accommodate multiple utilities within a single structure beneath carriageways/footways. The different ways of housing underground utility services within single structures are collectively referred to as

Exploring the use of common utility enclosures

CUEs (Note 44). In general, CUEs are single utility corridor structures built underneath carriageways/footways to accommodate different types of utilities. According to the HyD, using CUEs to accommodate underground utility services has the following advantages:

- (a) substantially reducing the need for road openings to install and maintain utility services, thereby reducing traffic delays and nuisance to the public;
- (b) extending the service life of pavements by reducing the number of road excavations and lowering the recurrent highway maintenance costs;
- (c) improving urban streetscape by reducing the number of patched up road surfaces;
- (d) making more effective use of sub-surface spaces for potential underground space saving and accommodating long-term development needs more easily; and
- (e) enhancing safety of underground utility works and helping reduction of air and noise pollution caused by road works and machinery.

Photographs 4 and 5 show a conventional underground utility installation by trench excavation in 2018 and a trial CUE of single utility corridor constructed at Horizon Drive, Chung Hom Kok in 2006 (see para. 4.5).

Note 44: *Generic designs of CUEs include transfer type (trunk or tunnels), distribution type (troughs or ducts) and cross-road type (culverts or ducts).*

Photograph 4

**Conventional underground
utility installation by trench excavation
(2018)**



Source: Photograph taken by Audit staff in January 2018

Photograph 5

**A trial CUE constructed at Chung Hom Kok
(2006)**



Source: HyD records

Remarks: According to the HyD, the corridor is a cross-road type (culvert).

Developments of common utility enclosures

CUE Study in 2002

4.4 With the policy approval of the then Transport Bureau (Note 45) in September 2001, the HyD appointed Consultant A in March 2002 to conduct a study (the 2002 Study) on the feasibility of implementing CUEs in Hong Kong with an objective of reducing road openings by UUs. The 2002 Study was completed in December 2003 at a cost of \$1.74 million. The 2002 Study analysed road opening statistics to identify and assess the key problems associated with conventional utility installation, reviewed international and local experience in CUE implementation and studied the logistics of local utility services provision in the form of CUE. The 2002 Study concluded that:

- (a) CUE implementation would be limited to new town developments and wholesale redevelopment projects in older urban areas and subject to the evaluation of overall benefits. The Government should lead the implementation of CUEs in Hong Kong;
- (b) overall, the CUE options were considered technically feasible and provide particular benefits for UUs, Government and the public. The implementation of CUEs should be subject to cost-and-benefit analysis due to substantial capital costs required. If adopting CUE was found to be both technically feasible and financially sustainable, other issues such as the management, maintenance, operation, security, liability and legal issues had to be addressed; and
- (c) a trial on CUEs was considered necessary and conducive to ascertaining the way forward. Some pilot schemes on using the CUEs should be carried out in the South East Kowloon Development (subsequently retitled as Kai Tak Development) in order to test and refine the arrangements for implementation of CUEs.

Note 45: *Before July 2002, the then Transport Bureau was responsible for the policy portfolio on transport matters. In July 2002, the then Environment, Transport and Works Bureau was set up and took over the policy portfolio on transport matters from the then Transport Bureau. In July 2007, the Environment Bureau, the Transport and Housing Bureau and the DEVB were formed to take over the environment, transport and works policy portfolios respectively from the then Environment, Transport and Works Bureau.*

Two trial CUEs constructed in 2006

4.5 In 2004, the then Environment, Transport and Works Bureau gave policy support to the HyD for providing trial CUEs in order to evaluate the effectiveness of CUEs in various locations in Hong Kong. In 2006, the HyD constructed two trial cross-road type CUEs (see Note 44 to para. 4.3), one at Yan Cheung Road, Yau Ma Tei in Kowloon at a cost of \$1.8 million and the other one at Horizon Drive, Chung Hom Kok on Hong Kong Island at a cost of \$0.72 million (Note 46) with a total annual maintenance cost of about \$10,000. Gas mains, water mains and drainage pipes were excluded from the CUEs after taking into account the possible gas leakage problem and other design requirement. In 2007 and 2008, the HyD and the LandsD discussed and agreed the logistics, legal and contractual arrangements as follows:

- (a) for better control, a UU should apply for a works permit for using CUEs. A set of CUE works permit operation procedures had been prepared;
- (b) the existing land licences (see para. 3.7(b)) should cover the installation of utilities inside CUEs, and a separate supplementary agreement would not be required; and
- (c) the HyD had confirmed that the related CUEs were culverts (underground channels for electrical cables) and not tunnels. The fees under the Land (Miscellaneous Provisions) Regulations should not be imposed (Note 47).

Up to January 2018, two UUs had installed underground utility services inside the CUE at Yan Cheung Road and one UU had installed such services inside the CUE at Horizon Drive.

Note 46: *A CUE with a length of 26 m, width of 2.4 m and height of 2.8 m was built at Yan Cheung Road and another one with a length of 12 m, width of 2.6 m and height of 2.9 m was built at Horizon Drive.*

Note 47: *Under the Regulations, any pipes or cables laid through government tunnels should be charged at \$6 per 10-millimetre diameter per m per annum.*

No trial CUEs constructed in Kai Tak Development in 2011

4.6 In May 2009, the HyD discussed internally on whether CUEs would be suitable for further development and considered that:

- (a) the tunnel type CUE would not be suitable for existing urban areas but might be acceptable in new development areas such as the Kai Tak Development; and
- (b) for the Kai Tak Development, there were other more viable options such as providing a wider road reserve to accommodate the utilities. While the provision of CUEs (i.e. common utility troughs) could be considered, the costing and future maintenance responsibilities had to be addressed.

4.7 In August 2009, the CEDD as the works department responsible for the Kai Tak Development consulted the HyD on the latest position of adopting CUEs and sought its initial view of putting some pilot CUE facilities to trial at new road junctions in the Kai Tak Development. In the same month, the HyD informed the CEDD that policy support from the DEVB in installing trial CUEs in Kai Tak Development should be sought first. However, in September 2009 the CEDD replied that there was a decision not to pursue trial CUEs in Kai Tak Development. In September 2010, the HyD and the CEDD held a meeting to discuss the possible use of common utility trough in Kai Tak Development. After the meeting, the CEDD pointed out that the project design had allowed adequate space for laying utilities along footpaths and the benefits of implementing CUEs in the Kai Tak Development might be limited to reducing inconvenience to pedestrians only. With the support of the JUPG (see para. 1.9), the HyD and the CEDD explored the feasibility of constructing trial CUEs at road junctions provided that the development progress would not be affected. In November 2010, the CEDD provided the HyD with a list of 14 road junctions, setting out the opportunities and constraints of the trial works. Among the 14 junctions, 8 were already under construction according to the approved works programmes and only 6 had potential for installing CUEs. In this connection, the CEDD said that:

- (a) works for the section of the ring road at the former north apron serving the housing sites in the vicinity of a residential area had already commenced and the CEDD was under a very tight timeframe to complete the works by mid-2013 to tie in with the public housing developments; and

- (b) other sections of the ring road were also programmed to commence in phases to tie-in with the delivery of other housing sites and the Sha Tin to Central Link railway development.

4.8 In February 2011, after an internal discussion, the HyD informed the CEDD in a memorandum that:

- (a) after taking account of all relevant factors including the programme and other constraints, the HyD decided not to pursue the trial CUE proposals in the Kai Tak Development project because of limited benefit;
- (b) without the provision of cross-road CUEs, adequate reserve cross-road ducts should be installed during construction of the roads to minimise road openings in future; and
- (c) the CEDD should encourage UUs to adopt joint utilities manholes as far as possible to make the best use of the precious road space and to avoid proliferation of manholes at ends of critical crossings or road bends.

As a result, the recommendation of the 2002 Study on constructing trial CUEs in the Kai Tak Development had not materialised.

4.9 Up to January 2018, only two trial cross-road type CUEs had been installed at Yau Ma Tei and Chung Hom Kok in 2006 (see para. 4.5). In response to Audit's enquiry in February 2018, the HyD said that:

- (a) given that two trial CUEs had already been implemented, it was reckoned at that time that benefit to implement the third trial would be limited; and
- (b) according to a technical report of July 2006 on "Planning Department: South East Kowloon Development Comprehensive Planning and Engineering Review Stage 1: Planning Review – Feasibility Study", application of CUE in Kai Tak Development was technically feasible but there were issues that remained unresolved including maintenance responsibility, legal matter for land and the financial feasibility of investment in CUE. A utility corridor of 5 to 6 m wide was recommended

Exploring the use of common utility enclosures

to be reserved along footpath. Therefore, the CUE implementation in Kai Tak Development was not pursued at that stage.

Revival of CUEs in 2017

4.10 In June 2017, the Office of the Government Chief Information Officer published the Report of “Consultancy Study on Smart City Blueprint for Hong Kong” (The Smart City Consultancy Report — Note 48). According to the Smart City Consultancy Report, using a utility tunnel, utility corridor (known as utilidor) or other forms of CUEs to carry utility lines such as electricity cables, water supply pipes, sewer pipes and communications utilities (i.e. fibre optics, cable television and telephone cables) will reduce the overall encumbrance on surrounding developments by providing common access points and reducing the number of excavations. The Smart City Consultancy Report said that:

- (a) the feasibility of deploying CUEs in planned new development areas should be assessed as one of the short-term (2017 - 2020) objectives; and
- (b) as a medium-term (2021 - 2025) initiative, utilidors should be deployed in the planned new development areas where feasible.

In view of the latest experience on the extensive use of CUEs in overseas countries and the Mainland (e.g. Qianhai), the DEVB and the HyD considered it worthwhile to revive the CUE implementation.

4.11 In August 2017, the DEVB gave policy support for the HyD to conduct another consultancy study in 2018 (2018 Study) on adopting CUEs in new development areas. The objectives were to review the findings of the 2002 Study, report on the applicability of CUEs in new development areas and develop technical requirements for implementing CUEs in Hong Kong. Tenders for the consultancy

Note 48: *The objective of this report is to advise and provide recommendations to the Government on formulating a blueprint for long-term smart city planning and development in Hong Kong. The document provides Hong Kong with suggestions for governance arrangement, digital framework (including relevant technical standards), development plans, legal framework, public-private partnership, and possible pilot projects.*

study were invited in February 2018 with a view to completing the study in 2019. Extracts of the study brief is shown in Appendix D.

Long time taken in exploring the possible use of CUEs

4.12 Using CUEs to accommodate underground utility services has the advantage of reducing the need for road openings, thereby reducing traffic delays and nuisance to the public (see para. 4.3(a)). In fact, the CUE technology has been widely used in many overseas cities and Mainland cities. In Hong Kong, the 2002 Study had confirmed the technical viability of implementing CUEs and recommended that some pilot schemes should be carried out in the Kai Tak Development to test and refine the implementation arrangements. However, only two trial CUEs were constructed in Yau Ma Tei and Chung Hom Kok in 2006 and the HyD decided in 2011 not to construct trial CUEs in the Kai Tak Development because of limited benefit (see para. 4.8(a)). The issue on the possible use of CUE was only revived in August 2017 after the publication of the Smart City Consultancy Report in June 2017 (see para. 4.10) to support the smart city planning and development in Hong Kong. After obtaining the DEVB's policy support in August 2017, the HyD planned to conduct another consultancy study on adopting CUEs in new development areas in 2018 (see para. 4.11).

4.13 In February 2018, the HyD informed Audit that:

- (a) CUEs involved substantial capital cost. The implementation of CUEs should be pursued in new development areas subject to the evaluation of benefits on a case-by-case basis;
- (b) no further CUE trial was implemented in 2011 since the two trial CUEs were completed in 2006. The review on implementation of CUEs in new development areas revived in August 2017 shortly after the publication of the Smart City Consultancy Report in June 2017; and
- (c) the decision on the implementation of CUEs in new development areas was taken by the pertinent works departments. The detailed cost-and-benefit analysis would be carried out by the pertinent project offices.

Exploring the use of common utility enclosures

4.14 Audit considers that the HyD needs to closely monitor the conduct of the 2018 Study and upon its completion, in consultation with the DEVB, take timely follow-up actions on its findings and recommendations. In this connection, Audit notes that the new development programmes (Note 49) under planning may be suitable for CUE implementation. Audit has also found that there are lessons to be learnt in constructing/planning the trial CUE schemes after the 2002 Study, as elaborated in paragraphs 4.15 and 4.16.

Need to improve the planning of trial CUEs

4.15 ***Two trial CUEs in 2006.*** The objective of constructing the two trial CUEs in 2006 was to evaluate the technical viability, the contractual arrangement and the effectiveness of the CUEs before their widespread adoption. Audit has identified the following areas for improvement:

- (a) ***No consultation with UUs on selection of location for constructing trial CUEs.*** As far as Audit could ascertain, the HyD had not consulted the relevant UUs on the selection of locations before constructing the two trial CUEs in 2006;
- (b) ***Low utilisation of trial CUEs.*** Up to January 2018, only two UUs installed underground utility services in the trial CUE at Yan Cheung Road, Yau Ma Mei and one UU installed such services in the trial CUE at Horizon Drive, Chung Hom Kok (see para. 4.5). In this connection, Audit noted that:
 - (i) while Yan Cheung Road was close to the West Kowloon development area, the Horizon Drive was located in a low-density residential area; and
 - (ii) in June 2004, the Chief Highway Engineer (Bridges and Structures) of the HyD commented that, given the short length of the proposed CUE at Horizon Drive and the need to construct large access

Note 49: *The Hong Kong 2030: Planning Vision and Strategy promulgated in 2007 by the DEVB and Planning Department recommended proceeding with the development of new development areas at Kwu Tung North, Fanling North and Ping Che/Ta Kwu Ling and Hung Shui Kiu. The planning and implementation of the areas were in progress.*

chambers, it appeared that the proposed location was not a good location for the trial scheme; and

- (c) *No evaluation of trial results.* In October 2004, when the then Environment, Transport and Works Bureau gave policy support to the HyD for the two trial CUEs, it had requested the HyD to review the operation and users' comments on the CUEs, and report the condition in a year. Subsequently, in a JUPG meeting in May 2010, the HyD said that it would prepare a report after reviewing the result of the trial CUEs. However, the HyD could not produce records of the above report or any review results for Audit's examination. In January 2018, the HyD informed Audit that the effectiveness of the two trial CUEs would be evaluated in the forthcoming consultancy study to be carried out in 2018 (see para. 4.11).

Audit considers that the HyD needs to maintain records of the implementation results of the trial CUEs and evaluate their effectiveness in a timely manner. The pertinent works department should identify, in consultation with the relevant UUs, suitable locations for constructing trial CUEs in future with a view to obtaining representative trial results.

4.16 *Proposed trial CUEs in Kai Tak Development not timely planned.* As regards the trial CUEs proposed by the 2002 Study to be provided in the Kai Tak Development, Audit noted that the HyD had kept the planning of the proposed trial in abeyance in view of the 2006 planning review (see para. 4.9(b)) until August 2009 when the CEDD sought the HyD's view of putting some pilot CUE facilities to trial in the Kai Tak Development. In November 2010, when the CEDD provided the HyD with a list of 14 road junctions for consideration of implementing trial CUEs, the construction works had commenced, i.e. 8 road junctions had been under construction and only 6 road junctions had potential for constructing the trial CUEs. In the event, the HyD decided in February 2011 not to construct any trial CUEs because "it was reckoned that benefit would be limited notwithstanding the substantial resources and effort required" (see paras. 4.7 and 4.8). Audit considers that there is a need to conduct detailed cost-and-benefit analysis and improve the planning for implementing CUEs in future so as to dovetail with the construction programme of a new development area.

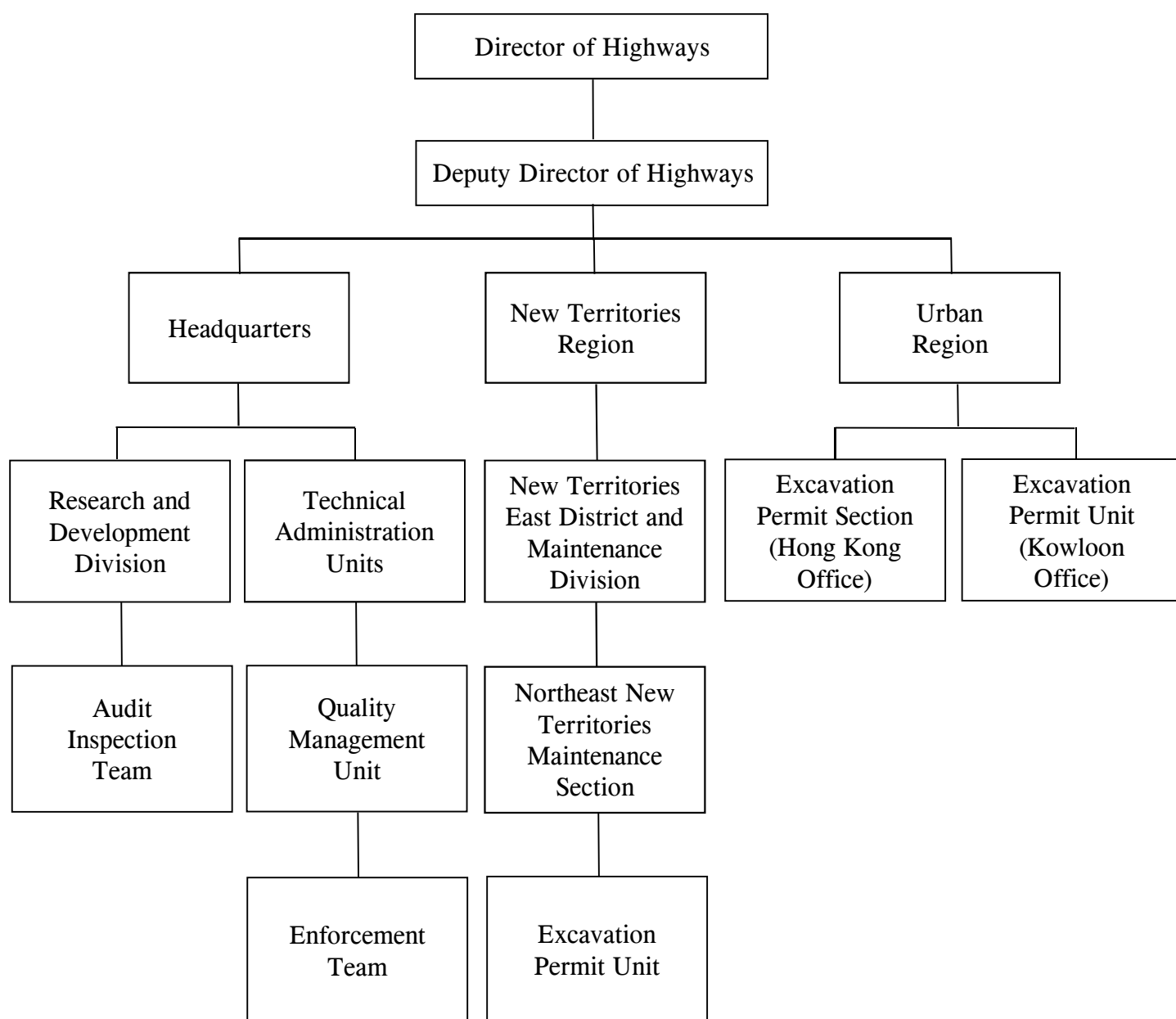
Audit recommendations

- 4.17 **Audit has recommended that the Director of Highways should:**
- (a) **in consultation with the Secretary for Development, closely monitor the conduct of the consultancy study in 2018 and upon its completion, take timely follow-up actions on its findings and recommendations with a view to reaping the benefits of using CUEs in new development areas as early as possible;**
 - (b) **draw on the experience in conducting/planning the trial CUE schemes to improve the installation of CUEs in new development areas by establishing procedures on:**
 - (i) **identification of suitable locations in consultation with the relevant UUs for constructing trial CUEs in future with a view to obtaining representative trial results;**
 - (ii) **planning of CUEs to dovetail with the construction programme of a new development area; and**
 - (iii) **conduct of detailed cost-and-benefit analysis; and**
 - (c) **maintain records of the implementation results of the trial CUEs and evaluate their effectiveness in a timely manner.**

Response from the Government

- 4.18 **The Director of Highways agrees with the audit recommendations.**

**Highways Department
Organisation chart (extract)
(31 December 2017)**



Source: HyD records

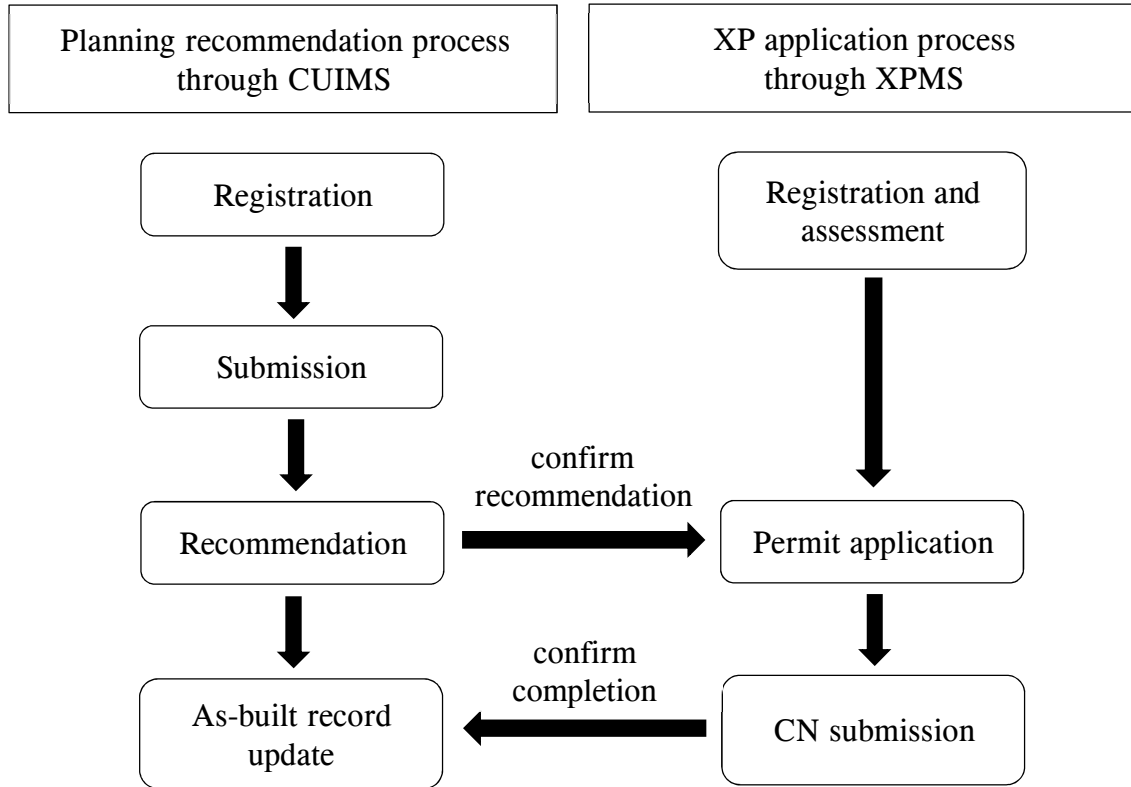
Inspection priority of the Research and Development Division's Audit Inspection Team

The AIT inspects excavation sites regularly in accordance with schedules generated by the AIMS which are based on a set of prioritisation rules:

- (a) a daily list of active permit sites from the XPMS would be compiled with the following criteria:
 - (i) any permit sites with permit commencement date elapsed (including those just to commence on the day of audit inspection);
 - (ii) EXP sites with emergency incidents number registered in the XPMS;
 - (iii) SSWXP sites with job registered in the XPMS; and
 - (iv) any permit sites with CN not yet submitted or just submitted on or after the previous working day, or with CN rejected by relevant Regional Offices; and
- (b) Inspectors of the AIT select permit sites from the daily list of active permit sites with the following order of priority:
 - (i) permit sites with poor performance records;
 - (ii) permit sites not inspected in the past ten active permit days, with the following order of priority:
 - new permit sites (those without previous inspections) with AN submitted; and
 - existing permit sites and new permit sites without AN submitted; and
 - (iii) permit sites with consistently good performance records.

Source: HyD records

Planned methodology in determining the alignment of utility systems



Source: HyD records

**Extracts of study brief of
the 2018 Common Utility Enclosure Study**

According to the tender study brief:

- (a) given the rising public concern about road openings and the quest for a better living environment, it was anticipated that the Government would be asked to explain why CUEs could not be introduced in Hong Kong, particularly in new development areas;
- (b) Tokyo in Japan and some other European cities such as London, Paris, Madrid and Brussels had established the use of CUEs and had their own approaches in initiating, planning and implementing CUEs while the Mainland had recently adopted the use of CUEs in some new development areas (such as Qianhai). In view of the latest experience on the extensive use of CUEs in overseas countries and the Mainland, it was considered worthwhile to review the results and findings of the 2002 Study in order to take into account new factors, such as advancement in technology, recent overseas/Mainland experience, increasing social need to control road openings, more stringent environmental requirements and any special circumstances of new development areas; and
- (c) the Consultant would be required to:
 - (i) review the applicability of installing CUEs in new development areas after taking account of findings/recommendations in the 2002 Study, the effectiveness of the two trial cross-road type CUEs installed at Horizon Drive and Yan Cheung Road, the experience of other CUEs installed in Hong Kong and the latest experience in overseas countries and the Mainland. This included Qianhai and the experience of the CEDD in implementing of Common Utility Tunnel in their pilot new development areas projects;
 - (ii) develop assessment criteria and methodology with sufficient details so that it can be determined, at planning stage and design stage, whether CUEs shall be adopted in a new development area;

Appendix D
(Cont'd)
(para. 4.11 refers)

- (iii) consult the relevant stakeholders including the UUs and the relevant government departments for the study; and
- (iv) review the construction, management, maintenance, operation, security, liability and legal issues of CUEs in new development areas based on the 2002 Study and recommend an implementation framework for subsequent construction, maintenance, management and operation of CUEs in new development areas. Among other things, the study should include evaluating the social and economic benefits of implementing CUEs, the ownership arrangements and the cost-recovery mechanism.

Source: HyD records

Acronyms and abbreviations

AIMS	Audit Inspection Management System
AIT	Audit Inspection Team
AN	Advance Notification
Audit	Audit Commission
CA	Communications Authority
CEDD	Civil Engineering and Development Department
CN	Completion Notice
COR	Controlling Officer's Report
CUE	Common utility enclosure
CUIMS	Consolidated Utility Installation Modelling System
CWXP	Capital works excavation permit
DEVB	Development Bureau
DoJ	Department of Justice
DSD	Drainage Services Department
EffO	Efficiency Office
ET	Enforcement Team
EXP	Emergency excavation permit
GEO	Geotechnical Engineering Office
HKPF	Hong Kong Police Force
HyD	Highways Department
JUPG	Joint Utilities Policy Group
km	kilometres
LandsD	Lands Department
LMPO	Land (Miscellaneous Provisions) Ordinance
m	metres
m ²	square metres

Appendix E
(Cont'd)

NC	Non-compliance
NXP	Normal excavation permit
OFCA	Office of the Communications Authority
SSWXP	Small-scale works excavation permit
TD	Transport Department
TTA	Temporary traffic arrangement
UCL	Unified carrier licence
UTLC	Utilities Technical Liaison Committee
UU	Utility undertaking
WSD	Water Supplies Department
XP	Excavation permit
XPMS	Excavation Permit Management System
XPPM	Excavation Permit Processing Manual