

Code of Practice for Trial and Pilot Use of Autonomous Vehicles



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Transport Department

**CODE OF PRACTICE
FOR
TRIAL AND PILOT USE
OF
AUTONOMOUS VEHICLES**

**The Transport Department
The Government of the Hong Kong Special Administrative Region**

2024 Edition

Foreword

The Road Traffic (Amendment) (Autonomous Vehicles) Ordinance 2023 aims to make subsidiary legislation to establish a suitable regulatory regime for the wider trial and use of autonomous vehicles in Hong Kong which is commensurate with the evolvment in autonomous vehicle technology. In this connection, the Secretary for Transport and Logistics is empowered to make subsidiary legislation, i.e. the Road Traffic (Autonomous Vehicles) Regulation (Cap. 374AA), for achieving the objective.

The Commissioner for Transport is also empowered to issue a code of practice to illustrate to the industry the detailed technical and operational requirements for the trial and pilot use of autonomous vehicles. A failure by a person to observe a provision of the code of practice does not of itself make the person liable to any civil or criminal proceedings. Nevertheless, if in any legal proceedings the court is satisfied that the code of practice or any part of it is relevant to determining a matter that is in issue in the proceedings—

- (a) the code of practice or part is admissible in evidence in the proceedings; and
- (b) proof that the person contravened or did not contravene a relevant provision of the code of practice may be relied on by a party to the proceedings as tending to establish or negate that matter.

Throughout this Code of Practice for Trial and Pilot Use of Autonomous Vehicles, reference to relevant national and international safety standards or provisions have been made. However, if there are some other national or international standards or provisions which are equivalent, they may be acceptable alternatives.

In case of any discrepancy between the Code of Practice for Trial and Pilot Use of Autonomous Vehicles and the Road Traffic Ordinance (Cap. 374) and its subsidiary legislation, in all instances, the prevailing legislation takes precedence.

The Transport Department acknowledges the valuable suggestions made by the Technical Advisory Committee on the Application of Autonomous Vehicle Technologies in Hong Kong in preparing the Code of Practice for Trial and Pilot Use of Autonomous Vehicles which will be under regular review. The Transport Department welcomes suggestions for improving it.

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Part 1 Introduction

- 1.1 This Code of Practice for Trial and Use of Autonomous Vehicles is issued by the Commissioner for Transport, which includes general requirements, backup operator's requirements, vehicle requirements and infrastructure requirements in relation to the trial and pilot use of autonomous vehicles. For cases with special design concept, different requirements could be imposed.
- 1.2 The definition of autonomous vehicles has been provided in Section 2 of the Road Traffic Ordinance (Cap. 374). It means a motor vehicle equipped with an AV system that is capable of being operated at –
- (a) GB Level¹ 3, 4 or 5; or
 - (b) SAE Level² 3, 4 or 5,
- irrespective of whether any operation of the vehicle is being performed by the autonomous vehicle system.
- 1.3 Autonomous vehicle system means a system (including hardware, software and computer programmes) that enables the operation of a motor vehicle without the monitoring by, or control of, a natural person.
- 1.4 In accordance with Section 2 of the Road Traffic Ordinance (Cap. 374), the definition of autonomous vehicle does not include one that is constructed or adapted for use primarily on a road, or any part of a road, that is intended for use by pedestrians (including those parts for pedestrian crossing). For example, mobile service robots, such as those driverless delivery vehicles being operated on pavements, are –
- (a) not classified as autonomous vehicle under the Road Traffic Ordinance (Cap. 374); and
 - (b) not regulated by the autonomous vehicle regulatory regime.

¹ GB Level means level of driving automation as defined in China National Standards GB/T 40429-2021: Taxonomy of driving automation for vehicles, issued on 20 August 2021

² SAE Level means a level of driving automation as defined in SAE International Standard J3016: Taxonomy and Definitions for Terms Related to On-Road Motor Vehicle Automated Driving Systems, issued on 16 January 2014 (as amended as at 30 April 2021).

- 1.5 The Road Traffic (Autonomous Vehicles) Regulation (Cap. 374AA) stipulates that the use of an autonomous vehicle is permitted only if the autonomous vehicle is a pilot autonomous vehicle and the use conforms with the conditions of relevant pilot licence and autonomous vehicle certificate. It also stipulates the pilot proprietor or owner of an autonomous vehicle, who is issued with the pilot licence, can carry out the pilot scheme.

Part 2 Abbreviations and Definitions

2.1 Abbreviations

AV	Autonomous Vehicle
C for T	Commissioner for Transport
STL	Secretary for Transport and Logistics
TD	Transport Department
The Code	The Code of Practice for Trial and Use of Autonomous Vehicles
The Ordinance	Road Traffic Ordinance (Cap. 374)
The Regulation	Road Traffic (Autonomous Vehicles) Regulation (Cap. 374AA)

2.2 Definitions

The definitions provided in this part are replicated from section 2 and section 132 of the Ordinance and section 2(1) of the Regulation with a view to facilitating comprehension of the Code.

autonomous mode, in relation to an AV, means the mode under which the AV is being operated by its AV system;

AV certificate means a certificate issued under section 13(1) (and includes such a certificate as renewed under section 15(4)) of the Regulation;

AV equipment means any equipment (including hardware, software and computer programmes) that relates to the operation of an AV (whether or not installed in or on an AV);

AV scheme means a scheme under which AVs are operated on roads;

AV technology means a technology that relates to the design, construction or operation of AVs;

backup operator, in relation to an AV, means an in-vehicle backup operator or remote backup operator;

Cap. 272 insurance policy means a policy of insurance, or a security, in respect of third party risks as required by the Motor Vehicles Insurance (Third Party Risks) Ordinance (Cap. 272);

Cap. 374E means the Road Traffic (Registration and Licensing of Vehicles) Regulations (Cap. 374E);

conventional motor vehicle means a motor vehicle that is not an AV;

e-contact means, in relation to a person, means an electronic mail address or mobile phone number of the person;

electronic form means the form of an electronic record (as defined by section 2(1) of the Electronic Transactions Ordinance (Cap. 553));

identity document means—

- (a) an identity card issued under the Registration of Persons Ordinance (Cap. 177);
- (b) a passport furnished with a photograph of the holder, or some other travel document establishing to the satisfaction of an immigration officer or immigration assistant the identity and nationality of the holder for the purposes of the Immigration Ordinance (Cap. 115);
- (c) in the case of a body corporate, a certificate of incorporation relating to it; or
- (d) any other document of identity acceptable to the C for T for the purposes of this Regulation;

information system has the meaning given by section 2(1) of the Electronic Transactions Ordinance (Cap. 553);

in-vehicle backup operator, in relation to an AV, means a natural person in or on the AV or –

- (a) monitors the AV and its surrounding with a view to, if necessary, overriding the AV system of the AV by taking control (in whole or in part) of the AV; or
- (b) when the AV ceases to operate in autonomous mode, manually operates the AV;

passenger, in relation to an AV, means a person in or on the AV who has no role in monitoring or operating the AV other than summoning the AV or inputting a destination;

pilot AV means an AV for which there is a valid AV certificate;

pilot condition, in relation to a pilot AV under a pilot scheme, means a condition of the pilot licence of the scheme or a condition of the AV certificate of the AV;

pilot licence means a licence issued under section 4(1) (and includes such a licence as renewed under section 6(4)) of the Regulation;

pilot matter means –

- (a) a pilot scheme or type of pilot scheme;
- (b) a pilot participant or type of pilot participant;
- (c) a pilot AV or type of pilot AV;
- (d) a trailer towed or to be towed by a pilot AV or type of such a trailer;
- (e) a passenger in or on a pilot AV or type of such a passenger;
- (f) an AV system of a pilot AV or type of such an AV system; or
- (g) any AV equipment or type of AV equipment;

pilot object means the object of researching into, testing and evaluating

–

- (a) technologies that relate to the design, construction or operation of AVs; and
- (b) the use of AVs on roads;

pilot participant means –

- (a) a pilot proprietor; or
- (b) any other person participating in a pilot scheme, such as –
 - (i) the manufacturer of a pilot AV under the scheme or the manufacturer of the AV system of such a pilot AV; or
 - (ii) a backup operator of a pilot AV under the scheme;

pilot proprietor –

- (a) in relation to a pilot licence, means the person who is issued the licence; and
- (b) in relation to –
 - (i) a pilot scheme; or
 - (ii) a pilot AV under a pilot scheme or an AV certificate for such a pilot AV,means the person who is issued with the pilot licence to carry out the scheme;

pilot scheme means the AV scheme for which there is a valid pilot licence;

pilot use means

- (1) The use of an AV is a pilot use if—
 - (a) the AV is a pilot AV under a pilot scheme; and
 - (b) the use conforms with—
 - (i) the pilot licence of the scheme and the conditions of the licence; and
 - (ii) the AV certificate of the AV and the conditions of the certificate.
- (2) However, a pilot use does not include the towing of a trailer by a pilot AV unless—
 - (a) the registration mark of the trailer is specified in a condition of the AV certificate of the AV; and
 - (b) the towing conforms with—
 - (i) the pilot licence of the relevant pilot scheme and the

- conditions of the licence; and
(ii) the AV certificate and the conditions of the certificate;

remote backup operator, in relation to an AV, means a natural person who –

- (a) is not in or on the AV; but
- (b) remotely monitors the AV and its surrounding with a view to, if necessary, overriding the AV system of the AV by taking control (in whole or in part) of the AV;

road includes every highway, thoroughfare, street, lane, alley, court, square, car park, passage, path, way and place to which the public have access either continuously or intermittently, whether or not the same is the property of the Government, and includes the carriageway of the North-west Railway, but does not include any private road, or any part of the carriageway of the North-west Railway designated by the C for T for the purposes of this definition by notice in the Gazette. (In Part 15 Pilot Use of AVs of the Ordinance, **road** includes a private road);

traffic provision means a provision of the Ordinance or any of the following Ordinances—

- (a) the Tramway Ordinance (Cap. 107);
- (b) the Public Bus Services Ordinance (Cap. 230);
- (c) the Fixed Penalty (Traffic Contraventions) Ordinance (Cap. 237);
- (d) the Fixed Penalty (Criminal Proceedings) Ordinance (Cap. 240);
- (e) the Road Tunnels (Government) Ordinance (Cap. 368);
- (f) the Road Traffic (Driving-offence Points) Ordinance (Cap. 375);
- (g) the Tai Lam Tunnel and Yuen Long Approach Road Ordinance (Cap. 474)
- (h) the Tsing Ma Control Area Ordinance (Cap.498);
- (i) the Discovery Bay Tunnel Link Ordinance (Cap.520);
- (j) the Mass Transit Railway Ordinance (Cap. 556); and
- (k) the Tsing Sha Control Area Ordinance (Cap.594).

use in relation to an AV, has the meaning given by section 134 of the Ordinance; and

vehicle licence has the meaning given by section 2(1) of Cap. 374E.

Part 3 General Requirements

3.1 The Applicant's Self-assessment

Before applying for the trial and use of AV(s), the applicant should conduct a self-assessment to assess his/her own capabilities based on, including but not limited to, the following key elements to determine whether he/she has the ability to conduct the trial and use of AV(s):

- (a) Capabilities in controlling and managing the AV(s);
- (b) A clear objective of trial and use of AV(s);
- (c) Setting out how conducive of the trial and use of AV(s) to the development of AV technology and its subsequent adoption would benefit the public;
- (d) Compliance of roadworthiness with respect to the design, construction and performance of the AV(s);
- (e) Sufficient financial capability and insurance coverage for the trial and use of AV(s);
- (f) Availability of a public engagement plan and a contingency plan;
- (g) Ability of real-time monitoring of the AV(s);
- (h) Ability of recording, timely reporting, and investigating accidents/incidents of the AV(s);
- (i) Capabilities in network security assurance and software upgrade management of the AV(s);
- (j) Availability of maintenance and repair services of the AV(s);
- (k) Capability in providing operational service of AV(s) (for use); and
- (l) Competency of backup operator(s).

3.2 Proposal of AV Scheme

3.2.1 The applicant should submit a proposal for the AV scheme with its application for trial and use of AV(s) to TD for assessment. The proposal should include but not limited to the following information:

- (a) Description of the organisation intended to conduct the proposed

trial and pilot use of AV(s);

- (b) Objectives of the trial and pilot use of AV(s);
- (c) Proposed location, routing, timing and duration of the trial and pilot use of AV(s);
- (d) The vehicle make, model, design, construction, identification and registration mark (if the AV is/will be modified from conventional motor vehicle which has been registered);
- (e) Description of the AV technology and system such as level of automation, operating conditions under which the AV system is specifically designed to function; etc.; supporting information such as test certificate(s) and report(s) of the AV system for verification; as well as the proposed trial scenarios, procedures, requirements and acceptance criteria, particularly any operations considered vulnerable, such as steering, braking, acceleration, overtaking and merging, as well as any potential scenarios that may require manual takeover of control;
- (f) Designs and functions of the AV key components (e.g. sensors, cameras and data recording device, etc.);
- (g) An overview of vehicle integration, including the manufacturer, modification agent of the vehicle system/body/frame, hardware installation, electrical, and network architecture, etc.;
- (h) A description of remote operation, if applicable, particularly the technology involved, remote control platform, and location of control centre, etc.
- (i) A description of associated infrastructure, e.g. vehicle-to-everything (“V2X”), and road side infrastructure, etc.(if any);
- (j) Information of the AV backup operator(s) and participant(s) on board during the trial and use (e.g. quantity, shift pattern, working hours, rest days, etc.);
- (k) Competency of the AV backup operator(s) (e.g. driving licence, training plan and training record, etc.);
- (l) Temporary Traffic Management Scheme (if requested by TD);
- (m) Requirements of infrastructure and communication network as well

as the deployment scheme (if applicable):

- (n) Insurance coverage in accordance with section 32 of the Regulation;
- (o) Incident reporting mechanism;
- (p) Details of the software upgrade management system;
- (q) Details of the trial and use on the same AV model being used under other pilot licences and/or AV certificates (if any);
- (r) Safety management plan (including risk assessment and the mitigation measures);
- (s) Engagement plan;
- (t) Contingency plan;
- (u) Description of the inspection and maintenance scheme of the vehicle and infrastructure (if applicable) (including relevant information of inspection and maintenance team, inspection and maintenance plans and requirements, etc.);
- (v) Other relevant information about the trial and use of AV(s) as requested by C for T; and
- (w) Documentations on the compliance of the Air Pollution Control (Vehicle Design Standards) (Emission) Regulations (Cap. 311J) and the Noise Control (Motor Vehicles) Regulation (Cap. 400I) (details about relevant proof of compliance and test reports of any accrediting organizations could be found in Guidelines for Importation and Registration of Motor Vehicles in TD's webpage³).

3.2.2 While the applicant may propose an AV scheme with limited scale, interests of the existing service provider(s) should still be taken into consideration. The applicant should note that TD may evaluate the potential impact on the existing public service provider(s) and consider whether the proposed AV scheme is appropriate. Meanwhile, once the proposed scheme is approved, the applicant shall be required to obtain relevant licences or approvals from TD, whichever is appropriate and required, before the commercial operation of AV(s).

³ Website:

https://www.td.gov.hk/en/public_services/licences_and_permits/vehicle_first_registration/guidelines_for_importation_and_registration_of_mot/index.html

3.3 Engagement Plan

- 3.3.1 The pilot proprietor should engage with the public and relevant stakeholders (e.g. landlords, property management agents, District Council, trade, etc.) as part of the preparation work before conducting the trial and use to ensure that they are aware of the operation of AV on roads.
- 3.3.2 With the engagement with the public and relevant stakeholders, the pilot proprietor should ensure that:
- (a) relevant stakeholders should be informed of the proposed trial and pilot use, including the capability for safe operation of the AV(s);
 - (b) relevant stakeholders should be advised on the planned routes and potential benefits/impacts of the AV operation;
 - (c) relevant stakeholders should be informed of the necessary traffic arrangement (e.g. road closure);
 - (d) relevant stakeholders should be informed of the contact points of the pilot proprietor for enquiries and feedbacks; and
 - (e) relevant stakeholders should be informed of actions to be taken by the pilot proprietor in the event of an accident or incident.

3.4 Tests for Autonomous Driving

3.4.1 Tests

The pilot proprietor should conduct appropriate and adequate tests to ensure reliable and safe functioning of individual AV within the operating conditions under which the AV system of the AV is specifically designed to function.

3.4.2 Closed Road Test

- (a) Closed Road Test should be conducted on a road and restricted for access of other road users in order to allow an AV to be tested through a set of realistic scenarios to evaluate the performance of the vehicle automation before its Open Road Test. The test should be carried out in accordance with GB/T 41798-2022: Intelligent and Connected Vehicles – Track Testing Methods and Requirements for

Automated Driving Function, or equivalent national or international standards accepted by TD.

- (b) In addition to the above tests, **each AV should undergo at least 1,000 kilometres or 48 hours of trials** on the test track or within a designated testing area or facility being approved by TD. There should be no irregularity (e.g. violation of the Ordinance, traffic accident with responsibility or loss of vehicle control, etc.) during the test run in order to pass this Closed Road Test.
- (c) A test report for the above scenario tests and trial run (please refer to paragraphs 3.4.3(b) and (b)) endorsed by a third party testing organization recognized by local authority should be submitted to the TD.
- (d) If a batch of AVs, of same model, same AV system and same configuration, are proposed under the pilot scheme, at least 20% of the AVs shall be tested and trialed with submission of endorsed test reports to TD.
- (e) If additional AVs of the same model, the same AV system and the same configuration, are proposed to be included subsequently after the pilot scheme has commenced, at least 10% of the subsequent batches of AVs shall be tested and trialed with submission of endorsed testing reports to TD. The report should also confirm that the additional AVs are the same as those of the first batch (including the AV system, the motor vehicle and its configuration, etc.).

3.4.3 Open Road Test

- (a) After successful completion of the Closed Road Test, Open Road Test should be conducted on the designated route to test the performance of the AV(s) in real traffic conditions. In this paragraph, the cumulative trial mileage/duration of the Open Road Test means the accumulated mileage/duration of AV(s) of the same model, same AV system and same configuration certificated by a third party testing organization.
- (b) For AV(s) to be operated **with in-vehicle backup operator(s)** under the pilot scheme,
 - (i) the AV(s), manned by in-vehicle backup operator(s) **but not loaded with** any passenger or goods, should undergo a **cumulative trial mileage over 2,500 kilometres or a**

- cumulative trial duration over 120 hours** on the designated route (for a batch of AVs, each AV should undergo a cumulative trial mileage of at least 500 kilometres or a cumulative trial duration of at least 24 hours on the designated route), or subject to TD's imposed testing requirements based on risk assessment of individual case; and there should be no irregularity (e.g. violation of the Ordinance, traffic accident with responsibility or loss of vehicle control, etc.) during the test;
- (ii) after the successful completion of test stipulated in sub-paragraph (i) above, the AV(s), manned by in-vehicle backup operator(s) **and loaded with** passengers or goods, should undergo a **cumulative trial mileage over 2,500 kilometres or a cumulative trial duration over 120 hours** on the designated route (for a batch of AVs, each AV should undergo a cumulative trial mileage of at least 500 kilometres or a cumulative trial duration of at least 24 hours on the designated route), or subject to TD's imposed testing requirements based on risk assessment of individual case; and there should be no irregularity (e.g. violation of the Ordinance, traffic accident with responsibility or loss of vehicle control, etc.) during the test; and
 - (iii) after completion of sub-paragraph (ii) above, the AV(s) may be considered for commercial use, but subject to the successful application of relevant licences or approvals required after the trial tests, whichever is appropriate and required, before the commercial operation of AV(s).
- (c) For AV(s) to be operated **with remote backup operator(s)** (i.e. no in-vehicle backup operator) under the pilot scheme,
- (i) the AV(s), manned by **in-vehicle backup operator(s) but not loaded with** any passenger or goods, should undergo a **cumulative trial mileage over 2,500 kilometres or a cumulative trial duration over 120 hours** on the designated route (for a batch of AVs, each AV should undergo a cumulative trial mileage of at least 500 kilometres or a cumulative trial duration of at least 24 hours on the designated route), or subject to TD's imposed testing requirements based on risk assessment of individual case; and there should be no irregularity (e.g. violation of the Ordinance, traffic accident with

responsibility or loss of vehicle control, etc.) during the test;

- (ii) after successful completion of test stipulated in sub-paragraph (i) above, the AV(s), manned by **in-vehicle backup operator(s) and loaded with** passengers or goods, should undergo a **cumulative trial mileage over 27,500 kilometres or a cumulative trial duration over 1,320 hours** on the designated route (for a batch of AVs, each AV should undergo a cumulative trial mileage of at least 500 kilometres or a cumulative trial duration of at least 24 hours on the designated route), or subject to TD's imposed testing requirements based on risk assessment of individual case; and there should be no irregularity (e.g. violation of the Ordinance, traffic accident with responsibility or loss of vehicle control, etc.) during the test to ensure that the AV(s) would perform without any irregularities;
- (iii) after successful completion of test stipulated in sub-paragraph (ii) above, the AV(s), manned by **remote backup operator(s) but not loaded with** any passenger or goods, should undergo a cumulative trial mileage over 5,000 kilometres or a cumulative trial duration over 240 hours on the designated route (for a batch of AVs, each AV should undergo a cumulative trial mileage of at least 500 kilometres or a cumulative trial duration of at least 24 hours on the designated route), or subject to TD's imposed testing requirements based on risk assessment of individual case; and there should be no irregularity (e.g. violation of the Ordinance, traffic accident with responsibility or loss of vehicle control, etc.) during the test.
- (iv) after successful completion of test stipulated in sub-paragraph (iii) above, the AV(s), manned by **remote backup operator(s) and loaded with** passengers or goods, should undergo a **cumulative trial mileage over 5,000 kilometres or a cumulative trial duration over 240 hours** on the designated route (for a batch of AVs, each AV should undergo a cumulative trial mileage of at least 500 kilometres or a cumulative trial duration of at least 24 hours on the designated route), or subject to TD's imposed testing requirements based on risk assessment of individual case; and there should be no irregularity (e.g. violation of the Ordinance, traffic accident with

responsibility or loss of vehicle control, etc.) during the test;

- (v) after completion of test in sub-paragraph (iv) above, the AV(s) may be considered for commercial use, but subject to the successful application of relevant licences or approvals required after the trial tests, whichever is appropriate and required, before the commercial operation of AV(s); and
- (vi) the number of AVs with a remote backup operator allowed for test run shall not be over 5 for the first application. The 6th one or any additional number of AVs may be permitted after the preliminary batch of AVs had completed a cumulative trial mileage over 1,000 kilometres or a cumulative trial duration over 48 hours on the target road;
- (vii) one remote backup operator could only control one AV at the beginning of the trial, but the ratio 1:1 may be relaxed after experience is accumulated and safety performance has been secured. Approval from the TD is required for the relaxation of such ratio.

3.4.4 Other Tests

If the AV(s) have undergone other tests, such as simulation/virtual tests or open road tests elsewhere, relevant reports or information should be included in the application for TD's assessment. TD may then consider whether the test requirements specified in paragraphs 3.4.2 and 3.4.3 would be adjusted accordingly on a case-by-case basis.

3.4.5 Requirements for Commercial Operation

As mentioned in paragraph 3.2.2, even though the pilot scheme is approved, the applicant shall still be required to obtain relevant licences or approval required, whichever is appropriate and required, before putting the AV(s) into commercial operation.

3.4.6 Flowcharts illustrating the work flows on application for trial and pilot use of AV(s) are shown in **Appendix 1** for reference.

3.5 Vehicle Examination Process

In general, the AV(s) proposed in the application will be required to go through a vehicle examination process (similar to the TD's Vehicle Type Approval process⁴ of conventional motor vehicles) to ensure that the construction of the vehicle complies with the relevant vehicle legislative requirements and safety standards of the concerned vehicle class. The applicant shall submit relevant documents / certificates to substantiate the compliance.

3.6 Safety Management Plan

- 3.6.1 A Safety Management Plan aims at identifying and outlining key safety risks of trial and use of AV(s), and how they will be mitigated or eliminated. The Safety Management Plan should include hazard analysis and risk assessment. The Safety Management Plan should be developed with reference to the latest national or international standards, such as ISO 26262-3:2018 or ISO 21448:2022 or equivalent. The proposed mitigation measures, e.g., fencing off arrangements, safety warning notices, training for backup operators, etc. should be devised and included in the plan.
- 3.6.2 For risk assessment and mitigation measures of trial and use of AV(s), the Safety Management Plan should identify:
- (a) possible system failures of the hardware and software, including vehicle, AV system, physical security, cybersecurity, software update, etc.;
 - (b) risky scenarios in the trial and use according to the operating conditions under which the AV system of the AV is specifically designed to function, including weather, road type, violation of traffic rules by other road users, etc.;
 - (c) risk from external dependencies, including communication, infrastructure, backup operator and the remote control centre, etc.;
- and

⁴ Website:

https://www.td.gov.hk/en/public_services/vehicle_typeapp_examination/index.html

- (d) safety risks in association with the trial and use procedures, including vehicle inspection and maintenance, etc.

3.7 Reportable Events and Reporting Mechanism

3.7.1 In accordance with section 36(6) of the Regulation, a reportable event in relation to a pilot AV, means:

- (a) an incident involving any defect in or malfunctioning of:
 - (i) the AV; or
 - (ii) any AV equipment or the AV system of the AV, that leads to suspension of the operation of the AV for more than one hour;
- (b) an accident that involves death or injury of any person, or damage to any property, caused by, or arising out of, the operation of the AV;
- (c) a collision of the AV with any object;
- (d) an incident:
 - (i) that undermines the safety of the AV or endangers any person or thing; or
 - (ii) that, if not remedied, would undermine the safety of the AV or endanger any person or thing; or

Examples—

Fire, malfunctioning of the braking system, trapping of any passenger for over 15 minutes and an incident leading to the summoning of emergency services.

- (e) any other incident of a type specified in the pilot conditions of the AV.

3.7.2 If a reportable event of a pilot AV happens, the pilot proprietor must, **within 24 hours after the event happens**, submit the C for T a written notice (a template is attached at **Appendix 2**) stating the particulars of the event which includes, but not limited to, the information below:

- (a) date, time and location of the reportable event;
- (b) description of injury, fatality and damage (if any);
- (c) brief description of the reportable event;

- (d) immediate follow-up actions taken; and
- (e) details of contact person of the pilot proprietor.

3.7.3 After receiving a notice given under paragraph 3.7.2, the C for T may by a written notice requires the pilot proprietor to deliver to the C for T, in a way and within the time limit stated in the C for T's notice, a report that includes, but not limited to, the following information:

- (a) detailed descriptions of the reportable event;
- (b) investigation results of the reportable event; and
- (c) remedial measures taken to avoid recurrence of the event.

3.7.4 The pilot proprietor should submit a periodic summary report to TD every 6 months. The periodic summary report should include summary of the following items:

- (a) the overall and monthly summary of the trial and pilot use of AV(s), including mileage, accident rate and takeover rate, etc.;
- (b) reportable events as defined in accordance with section 36(6) of the Regulation;
- (c) incidents related to communication and connectivity;
- (d) incidents related to cybersecurity;
- (e) failure in interaction between backup operator and the AV system;
- (f) incidents related to AV or AV system failure;
- (g) disengagements;
- (h) maintenance and repairs;
- (i) cases of being interfered or tampered;
- (j) identified safety defects;
- (k) user-related incidents, such as user errors and misuse; and
- (l) traffic offences as prosecuted by the Hong Kong Police Force.

3.7.5 The pilot proprietor should attend *ad hoc* or regular meetings as invited by TD regarding the trial and pilot use of AV(s) in relation to the reportable events.

3.8 Record Keeping and Protection

3.8.1 The pilot proprietor should designate a data administrator for the protection of data and records of the pilot scheme and the AV(s). The data administrator should ensure that the data and records are:

- (a) stored in a format to allow the transfer of such information to relevant stakeholders, including TD, to facilitate the investigation of reportable event under section 36 of the Regulation as well as any enforcement action(s) and traffic accident investigation to be taken by the Hong Kong Police Force if necessary;
- (b) kept up to date at all times; and
- (c) readily available for inspection by the TD or any person authorised by the TD as specified under section 35(2) of the Regulation.

3.8.2 Relevant records/information mentioned in paragraph 3.8.1 should include but not limited to:

- (a) Safety Management Plan;
- (b) pre-trial vehicle inspection records;
- (c) data stored in the journey recorder(s) of the AV(s);
- (d) operation logs of the AV(s) and backup operators;
- (e) inspection and maintenance records of the AV(s) throughout the period of trial and use;
- (f) vehicle alteration records;
- (g) software updating records;
- (h) reportable event records;
- (i) training records of the backup operator(s) and other participants;
- (j) updated contingency plan;
- (k) insurance documents;
- (l) employment contracts or signed responsibility documents of backup operators; and
- (m) other official documents related to the trial and pilot use of AV(s).

3.8.3 All relevant records/information should be kept for a period of time in

accordance with the section 35(1) of the Regulation, i.e. at least until the end of a period of 3 years after the expiry of the existing pilot licence.

3.8.4 All records and information should be protected from being altered.

3.9 Cybersecurity

3.9.1 The communication network for the AV(s) shall comply with the Telecommunications Ordinance (Cap. 106). The AV(s) and any associated backend control systems should have appropriate security measures to manage data security and the risks of unauthorised data access.

3.9.2 The pilot proprietor should establish a cybersecurity management system with reference to UN Regulation No. 155 and ISO/SAE 21434:2021 or equivalent national or international standards or provisions. The pilot proprietor should conduct assessment on the cybersecurity of the AV(s) and associated equipment and systems. The following documents should be kept for record:

- (a) documents describing the outcomes of the identified threats related to the AV(s) and their risk assessment in the following items:
 - (i) back-end servers related to AV(s) in the field,
 - (ii) communication channels,
 - (iii) update procedures,
 - (iv) cyber-attack caused by unintended human actions,
 - (v) external connectivity,
 - (vi) data/code, and
 - (vii) potential loopholes that could be exploited if not sufficiently protected or strengthened;
- (b) documents describing the mitigation measures to tackle the identified threats; and
- (c) documents describing the tests being conducted to verify the cybersecurity of the AV(s) and its systems, and the outcomes of those tests.

3.10 Privacy

- 3.10.1 Trial and use of AV(s) may involve collection, handling, and disposal of personal data. For example, image data collected by cameras fitted on the AV may give rise to the collection of personal data under the Personal Data (Privacy) Ordinance (Cap. 486). The pilot proprietor should ensure that their collection of data and information shall comply with the Personal Data (Privacy) Ordinance and shall follow the Six Data Protection Principles therein.
- 3.10.2 The pilot proprietor shall set out their data protection measures in the trial and use proposal (required in paragraph 3.2). If warranted, the pilot proprietor should consult the Office of the Privacy Commissioner for Personal Data and conduct a privacy impact assessment.
- 3.10.3 The pilot proprietor should ensure that all data are necessary and proportionate to the purpose for which it was collected. For personal information that is not necessary for safe operation of the vehicle but is collected incidentally, the pilot proprietor should either:
- (a) provide a written disclosure on how the unnecessary information will be properly kept/disposed, and obtain the written approval from the person whose personal information is to be collected; or
 - (b) anonymise the unnecessary information.

3.11 Insurance/Financial Responsibilities

- 3.11.1 A valid policy of insurance or a security in respect of third party risks in compliance with the requirements of the Motor Vehicles Insurance (Third Party Risks) Ordinance (Cap. 272) shall be provided.
- 3.11.2 In addition to the insurance requirements specified in the Motor Vehicles Insurance (Third Party Risks) Ordinance (Cap. 272), the C for T may, on a case-by-case basis, requires that there must be in respect of each pilot AV under the pilot scheme a valid policy of insurance or security that the C for T considers appropriate.
- 3.11.3 The requirement of additional insurance or security (if any) will be specified as a condition(s) of the pilot licence and the AV certificate.

3.12 Contingency Plan

- 3.12.1 The pilot proprietor should provide a copy of the contingency plan to the TD. The contingency plan should include information about how the participants of trial and pilot use of AV(s), law enforcement agencies and other first responders in the vicinity of the AV(s) should interact in case of emergency situations. For purpose of this section, “first responder” includes any member of the law enforcement agencies, such as the Hong Kong Police Force and Fire Services Department, etc.; and the vehicle recovery contractor and maintenance service provider, etc.
- 3.12.2 Emergency situations includes, but not limited to:
- (a) failures of the AV(s) and AV equipment, e.g. vehicle, AV system, cybersecurity and software, etc.;
 - (b) failures of external systems, e.g. communication, infrastructure, and the remote control centre, etc.;
 - (c) traffic accidents or public safety incidents, e.g., vehicle crash, fire, or hacking of the AV, etc.; and
 - (d) sudden absence of backup operator.
- 3.12.3 The contingency plan should include, but not limited to, the details and procedures in emergency situations, such as:
- (a) how to communicate with the backup operator(s);
 - (b) how to communicate with the first responders;
 - (c) how to obtain vehicle’s owner information, vehicle registration and proof of insurance in the event of traffic accident;
 - (d) how to evacuate passengers;
 - (e) how to safely remove the AV from road;
 - (f) how to identify whether the AV is in autonomous mode, and if possible, how to safely disengage the autonomous mode;
 - (g) how to ensure that the autonomous mode has been deactivated;
 - (h) if applicable, how to safely interact if the AV is an electric or hybrid vehicles;
 - (i) description of the operating conditions under which the AV system of the AV is specifically designed to function;

- (j) incident reporting procedures; and
 - (k) any additional information deemed necessary regarding hazardous conditions or public safety risks in the operation of the AV.
- 3.12.4 Details of the contingency plan should be discussed and agreed with the relevant authorities and the first responders prior to the trial and pilot use of the AV(s).
- 3.12.5 The pilot proprietor should review regularly and update if necessary the contingency plan, with a minimum frequency of once a year.
- 3.12.6 The pilot proprietor should submit the updated contingency plan to the TD once it has been updated.

Part 4 Backup Operator's Requirements

4.1 Licence and Driving Records

- 4.1.1 Depending on the registered vehicle class (i.e. one of those class specified in Schedule 1 of the Ordinance), the backup operator should hold a valid driving licence for the corresponding vehicle class. Depending on the nature of the pilot scheme, the C for T may, on a case-by-case basis, requires the backup operator to hold a valid full licence for the vehicle class of a private car under Schedule 1 of the Ordinance, for at least 1 year.
- 4.1.2 The backup operator should, **during the 5 years immediately before the commencement of the pilot scheme**, has not been convicted of any offence under section 4(2), 18(4), 36(1), 36A(1), 37(1), 39, 39A, 39B(6), 39C(15), 39J(1), 39K(1), 39L(1), 39O(1), 39S(1), 41 or 55(1) of the Ordinance.

4.2 Training

- 4.2.1 The pilot proprietor should ensure that the backup operator(s) have adequate and suitable training on operation of the AV(s). Regular refresher courses and trainings with respect to any update of the operation of the AV and its AV system should be provided to the backup operators.
- 4.2.2 The training plan and training materials for the backup operator(s) should include, but not limited to, the following:
- (a) Details of the characteristics and technical performance of the related AV(s), as well as the conditions stated in the pilot licence and AV certificate(s).
 - (b) Basic skills, include:
 - (i) operating conditions under which the AV system of the AV is specifically designed to function and the corresponding limitations;
 - (ii) basic vehicle operation;

- (iii) night operation of the AV (if applicable);
 - (iv) response to vehicle faults;
 - (v) emergency response, such as achieving a minimal risk condition;
 - (vi) response to adverse weather conditions;
 - (vii) handling procedures after vehicle collision;
 - (viii) transition between manual control and autonomous control;
 - (ix) minimize risk conditions and manoeuvres (e.g. remove the AV from active lanes before coming to stop); and
 - (x) hazard perception (e.g. aware of the change of road conditions).
- (c) Relevant skills for pre-trip inspection before the operation of AV:
- (i) inspection before trial; and
 - (ii) ensuring the proper operation of the data recording system.
- (d) Measures to prevent backup operator's fatigue/inattention/carelessness include:
- (i) anti-fatigue driving awareness;
 - (ii) avoiding distracted and careless techniques while driving; and
 - (iii) drug and alcohol impairment awareness, including regulated and non-regulated controlled substances.
- (e) Specific training for remote backup operator should cover the following, in addition to those in sub-paragraphs (a) to (d) above:
- (i) mitigation measures for any connectivity or control issues caused by network latency or loss of contact with the AV;
 - (ii) actions required after receiving the alert signal from the AV system;
 - (iii) actions required to maintain situational awareness during the remote monitoring of the AV performance during the trial and pilot use; and
 - (iv) fail-safe measures in place to prevent a hazard, incident or undesired event due to network or communication breakdown during the trial and pilot use of AV, and how to safely use any

hands-free short-range communications where required.

- (f) Driving training for backup operators
 - (i) For the road tests not carrying any goods and passenger, the in-vehicle backup operators should complete not less than 50 hours of in-vehicle training, including not less than 10 hours of training on the manual takeover of AV(s) under dangerous conditions.
 - (ii) For the pilot use of carrying goods and passengers, in-vehicle training hours should be not less than 50 hours, on top of the requirements specified in the sub-paragraph (i) above.
 - (iii) For the trial and pilot use without in-vehicle backup operator, the remote backup operator should complete not less than 100 hours of remote-control training.

4.3 Skills Test and Refresher Training

4.3.1 To maintain the competency of backup operators, the pilot proprietor should ensure that backup operators are subject to the skills test as part of the training programme. The results of the skills test should be documented and provided to the backup operators, along with the following:

- (a) criteria demonstrating good driving skills; and
- (b) any faults being identified during the skills test, as well as the reasons for failing the test.

4.3.2 The skills test should be designed to test the competency of the backup operators with the following elements:

- (a) hazard perception and response;
- (b) safe and effective handovers and interventions;
- (c) responses to unexpected vehicle performance;
- (d) responses to emergency and incident; and
- (e) ability to maintain concentration and situational awareness.

4.3.3 The skills test should be conducted safely in a controlled environment and

the testing environment should be similar to that of the trial and pilot use of AV(s).

- 4.3.4 The skills test should be conducted if the backup operator has not operated the AV for more than 3 months.
- 4.3.5 In addition to paragraph 4.3.4, the frequency of conducting the skills test should take the following factors into consideration:
 - (a) the number, nature and scale of changes of the trial and pilot use of AV(s), e.g., changes of the AV system;
 - (b) the scenarios for the trial and pilot use of AV(s); and
 - (c) the backup operator's mistakes or failures in the trial and pilot use of AV(s).
- 4.3.6 If the backup operator fails the skills test, refresher training should be provided by the pilot proprietor. The type of refresher training to be conducted should be based on the scenarios of the trial and pilot use of AV(s), such as the route, the risks of relevant stakeholders (e.g. other road users) and the skill status of the backup operators.
- 4.3.7 The refresher training should cover the correct processes/procedures and appropriate corrective actions in response to the mistakes made by backup operators during the skills test.
- 4.3.8 The result of skill tests of the backup operator after the refresher training should be documented in the training record (please refer to paragraph 4.4).
- 4.3.9 The duration of refresher training should be proportionate to the backup operators' role and the complexity of the trial and pilot use of the AV. The backup operators participating in the refresher training should pass the skills test before operating any AV in trial and pilot use.

4.4 Training Records

- 4.4.1 All training records should be properly documented, kept up to date with all the updates made after each training session, and kept readily available for submission to the TD for inspection as required.
- 4.4.2 The training records should include, but not limited to:

- (a) the description of training modules and methods being used, including dates, durations and test results of skills test given to each backup operator;
- (b) the result of skill tests of the backup operator;
- (c) the records of driver training and driving experience of the backup operators;
- (d) relevant training required under the pilot proprietor's occupational safety and health policy for the backup operators; and
- (e) the evidence of training on the awareness of operating conditions under which the AV system of the AV is specifically designed to function, vehicle control, interfaces, and safe working practices, such as interactions with any passengers or freight.

4.5 Performance Records

4.5.1 The pilot proprietor should record the performance of all backup operators engaged in the trial and pilot use of AV(s), with the record updated monthly. The performance records of the backup operators should include, but not limited to, the following items:

- (a) the exemplary performance and actions of the backup operator during each trial and pilot use of AV(s);
- (b) the hours of autonomous driving and/or monitoring for each trial and pilot use of AV(s); and
- (c) all fault records of the operation in each trial and use of AV(s), including failures to follow any operation procedures, incidents that occur during trial and pilot use of AV(s), together with the corrective actions taken to prevent future recurrence; and
- (d) the duration that the backup operator is absent from the AV (if any);

4.5.2 In addition, the information communicated with the backup operators should also be documented, includes but not limited to:

- (a) any changes to the operating conditions under which the AV system of the AV is specifically designed to function; and
- (b) any changes to the expected or unexpected performance of the AV.

4.6 Driving Hours

- 4.6.1 During operation, the backup operator should remain focused and be prepared to take over the AV when necessary.
- 4.6.2 To prevent fatigue, the maximum working hours per day, excluding the meal break, of the backup operator should not exceed 8 hours.
- 4.6.3 To further prevent fatigue, the continuous driving/operating time of the backup operator during the trial and pilot use of AV on roads should normally be limited to 2 hours, with a guaranteed break of at least 15 minutes. The continuous driving/operating time and break time may be adjusted based on the maturity of the AV system, operating conditions under which the AV system of the AV is specifically designed to function, usage, and overall complexity of the driving conditions.

4.7 Behaviour

- 4.7.1 The pilot proprietor should formulate standard behaviour guidelines for backup operators and ensure that the contents of these guidelines are easy to understand.
- 4.7.2 The backup operator should comply with all relevant legislative requirements related to driver's behaviour in Hong Kong, including road speed limits. Additionally, except for the purpose of controlling the AV operation, the backup operator is prohibited from using hand-held radio communication equipment while operating the AV, even if the AV is in autonomous driving mode.
- 4.7.3 The backup operator should be familiar with the signals indicating the functional status of the equipment and take necessary road safety measures (if required).
- 4.7.4 The backup operator should continuously monitor the running status and surrounding environment of the AV, and promptly take over control of the vehicle if necessary, such as when the AV is not suitable for autonomous driving or when receiving audible, visual, or haptic warnings.
- 4.7.5 The special characteristics of AV operation (e.g. driverless, in-vehicle backup operator facing backwards, etc.) may distract or confuse other road users. The in-vehicle backup operator should avoid unnecessary activities inside the vehicle, such as moving around, to prevent distraction

or confusion of other road users. The pilot proprietor should consider the potential negative impact on other road users, particularly when the vehicle is remotely controlled. Preventive measures (e.g. detailed description of the AV operation displayed with the warning sign mentioned in paragraph 6.1) should be considered.

4.7.6 Each remote backup operator is restricted to monitor only one AV, unless the following conditions are met:

- (a) the backup operator has adequate accumulative experience starting from 1:1 remote monitoring to a higher ratio with safety performance record, and with approval from the TD for the relaxation of the ratio has been obtained;
- (b) appropriate training has been provided to remote backup operators;
- (c) a risk assessment has been performed that justifies monitoring multiple vehicles simultaneously; and
- (d) approval has been obtained from the TD, with conditions specified in the relevant pilot licence and the AV certificate.

4.7.7 In case there is a need to increase the number of AVs to be monitored or driven simultaneously, the number of AVs should be increased only after sufficient experience is accumulated and TD is satisfied with the relaxation of number of AVs being safe.

Part 5 Vehicle Requirements

5.1 General Design and Construction

- 5.1.1 The technical requirements for AV(s) should meet the following aspects:
- (a) The construction of the AV shall conform to the requirements stipulated under the Ordinance and its subsidiary legislations of the concerned vehicle class;
 - (b) The AV should comply with relevant traffic rules and regulations when in autonomous mode;
 - (c) The AV should be so designed and constructed that it could be manually taken over or its automation could be disabled any time by the backup operator;
 - (d) The AV should be able to identify the need of manual takeover by the backup operator. The AV should prompt or alert the backup operator by using visual, auditory, or other perceptible signals before switching from autonomous mode to manual mode until the backup operator has properly and securely taken over the control of the AV;
 - (e) The AV should have cybersecurity and data security protection measures, as well as the capabilities to upgrade its software.
 - (f) In the event of network abnormalities or function failures due to cyberattacks, the AV should automatically switch to achieve minimal risk condition;
 - (g) The AV, through its sensors or the control of a backup operator, should respond appropriately to all types of road users and hazards encountered during the trial and pilot use;
 - (h) The AV should provide means for passengers to communicate with the remote backup operator through an audio and visual interface inside the AV, using unambiguous signs for the interface (e.g. ISO 7010 E004);
 - (i) Vision systems (e.g. cameras in accordance with Chapter 6 of ISO16505:2019) should be provided inside and outside the AV to allow the backup operator to assess the situation inside the occupant space inside the vehicle and the surrounding environment outside

the AV;

- (j) The remote backup operator should be able to open the power-operated door remotely;
- (k) The AV system should activate relevant vehicle systems when necessary and applicable (e.g. opening doors and activate wipers in case of rain); and
- (l) The AV should render warning signal if the backup operator is not available / ready to override the AV system.

5.1.2 If the trial and pilot use of AV(s) are conducted on any roads, the pilot proprietor should ensure that labels for each AV are made available and displayed in accordance with the Regulation. The adhesive labels shall be properly fixed and displayed in conspicuous positions at the front, back and both sides of each AV so that the labels are legible and can be easily distinguishable. The exact positions to display the labels should be proposed for TD's approval. The labels shall be reflective (in compliance with the visual performance requirements specified in BS EN 12899 (Class RA1), DIN 30710 or equivalent national or international standards), durable and water resistant for outdoor application. Please refer the specifications and requirements of the labels to TD's webpage (website: https://www.td.gov.hk/en/public_services/taoav/index.html).

5.1.3 Operating manual is required for each AV. The purpose of the operating manual is to ensure the safe operation of the AV through detailed instructions to the pilot proprietor, backup operator, transport service operator (if applicable) and relevant authorities. The content of the operating manual should include:

- (a) functional description of the AV system;
- (b) technical measures required for safe operation under AV mode (e.g. infrastructure requirements, vehicle and infrastructure inspection and maintenance requirements);
- (c) operational restrictions for safe operation under AV mode (e.g. speed limit and dedicated lane);
- (d) environmental conditions for safe operation under AV mode (e.g. no snow);
- (e) operational requirements for safe operation under AV mode (e.g. in-

vehicle backup operator or remote backup operator);

- (f) relevant information if the AV may operate under manual mode for maintenance or minimal-risk manoeuvre; and
- (g) instructions for passengers, transport service operator (if applicable), backup operators, and relevant authorities in case of failures and requests from the AV system.

The operating manual should be submitted to the TD at the time of the application for the AV certificate.

5.1.4 The following vehicles are not permitted to operate on open roads in autonomous mode under any circumstances, unless with permission by TD:

- (a) vehicles transporting dangerous goods as defined in the Dangerous Goods Ordinance (Cap. 295) and its subsidiary legislation;
- (b) vehicles carrying oversized or overweight goods, with an unladen weight of 4,500kg or more;
- (c) vehicles transporting liquids, such as tank trucks and concrete trucks;
- (d) vehicles transporting pipes, timber, or similar types of loose loads;
- (e) vehicles carrying livestock;
- (f) motorcycles;
- (g) vehicles that have been used for more than 10 years; and
- (h) other special purpose vehicles that have been assessed to pose significant safety risks.

5.2 Data Recording and Protection

5.2.1 A journey recorder, which must be installed on each pilot AV, should be capable of capturing journey data of the AV at all times when the AV is being used. Each piece of journey data captured by the recorder is stored in electronic form in a format specified in the relevant pilot conditions, and remains complete and unaltered, at least until the end of the storage period of the piece of data (i.e. a period of 3 years after the date on which the piece of data is captured as specified under section 34 of the Regulation). If a piece of journey data captured is video and is of a type specified in the relevant pilot conditions, it is to be stored for a

duration specified in those conditions. The pilot proprietor should provide support to the TD or the agent appointed by the TD to retrieve the record upon request.

5.2.2 The AV used in the trial and pilot use typically generates a large amount of data. Therefore, it is recommended that data recorders should capture the following key information at a minimum at 10Hz (if applicable):

- (a) timestamp;
- (b) geographic location of the vehicle (including latitude and longitude);
- (c) vehicle status, including driving mode, transition demand, and minimal risk manoeuvres;
- (d) vehicle speed;
- (e) vehicle longitudinal and lateral acceleration;
- (f) vertical acceleration of vehicle (e.g. vehicles passing through deceleration strips);
- (g) steering, acceleration, and braking commands;
- (h) operation commands of vehicle lamps and indicators;
- (i) vehicle ignition device operation (if applicable);
- (j) any intervention command by a backup operator;
- (k) vehicle remote control command (if applicable);
- (l) network parameters (e.g. data transmission delay and available bandwidth); and
- (m) vehicle fault and alarm information (if any).

5.2.3 In the event of a traffic accident, the AV should capture the following data **90 seconds before and 30 seconds after the accident** in addition to the key information mentioned in paragraph 5.2.2:

- (a) external environment perception data and response status (e.g. video of other road users and obstacle target data);and
- (b) video and voice monitoring in the vehicle reflecting the status of the backup operator and human-computer interaction.

5.2.4 If the journey recorder is unable to store additional data, the AV should come to a stable and in a safe condition, or other appropriate minimal risk

condition, which has been indicated during the application of AV certificate and approved by TD until the storage space is released and the data storage function returns to normal.

- 5.2.5 The journey recorder must be so designed to prevent tampering of its operation. The pilot proprietor shall propose measures to ensure the integrity of the journey recorder. If approved by TD, the measures would be specified as pilot conditions.

5.3 Switching Process between Autonomous Mode and Manual Mode

5.3.1 The switching process between manual control and autonomous mode is critical for ensuring safety of the trial and pilot use of AV. The driving mode switching system should fulfil, but not be limited to, the following requirements:

- (a) the vehicle manufacturer should declare the types of situations in which the vehicle will generate a transition demand to the operator and include them in the documentation package;
- (b) the driving mode switching mechanism should be easily understood by the backup operator. The demand to take over the vehicle should be delivered audibly, visually, or through haptic warning, and the feasibility of alarm operation should be considered;
- (c) the backup operator should clearly know whether the vehicle is in manual control mode or autonomous mode;
- (d) sufficient reminders should be provided to the backup operator to resume manual control if necessary. The backup operator should assess the potential hazards and parameters of trial areas when taking over the control;
- (e) the status of minimal risk conditions and manoeuvres should be provided to the backup operator;
- (f) the initiation of the transition demand should provide sufficient time for a safe transition to manual driving;
- (g) a transition demand should not endanger the safety of the passengers or other road users;
- (h) the backup operator should be able to take over the vehicle quickly

and easily;

- (i) if the backup operator fails to resume control of the AV during the transition phase, the system should perform a minimal risk manoeuvre that minimises risks to the safety of the passengers and other road users; and
- (j) in case of any failure affecting the operation of the system, the system should immediately initiate a transition demand upon detection.

5.3.2 Switching between manual mode and autonomous mode is an important measure to reduce vehicle safety risks. Before testing on public roads or other public areas, tests should be conducted in a closed road environment to verify the functions of the system.

5.3.3 A working procedure should be established for monitoring the backup operator and capturing the moment when the backup operator is distracted. There should be record for whether the driving mode switching is caused by the AV or the backup operator.

5.4 Failure Warning

In the event of a system failure during the trial and pilot use, the backup operator should be alerted with audible and visual warnings. The pilot proprietor should also consider additional methods to ensure the backup operator is aware of the system fault, such as haptic feedback. In an emergency:

- (a) for AV equipped with power-operated doors, the doors should unlock automatically when it is safe to do so; and
- (b) passengers should have a means to exit the AV, such as through the entrance door or using an emergency exit while the AV is stationary.

5.5 Vehicle Inspection and Maintenance

5.5.1 Before conducting the daily trial and pilot use, the backup operator or a dedicated person assigned by the pilot proprietor should conduct the following vehicle inspections and maintain inspection records by checking:

- (a) whether the journey recorder, LiDAR, camera, integrated navigation

system, and other sensors are functioning properly;

- (b) whether the AV system is functioning properly;
- (c) whether the autonomous driving terminal is displaying any failure warning;
- (d) whether the vehicle instrument panel displays any warning;
- (e) whether the lamps and direction indicators are functioning properly;
- (f) whether the braking system is functioning properly;
- (g) whether the steering system is functioning properly;
- (h) whether the tire pressure and condition are normal;
- (i) whether the oil level of the engine and gearbox (if any) is within the standard range and any oil leakage;
- (j) whether the rear-view mirror/ camera position is appropriate;
- (k) whether the safety belts function properly;
- (l) whether the vehicle's head lamps, rear lamps, and windows are clean; and
- (m) whether there is sufficient fuel or electricity for operation.

5.5.2 Regular maintenance of the AV should be conducted at least once a month or as recommended by the AV manufacturer/AV system manufacturer, whichever is more frequent, to ensure compliance with the relevant laws and regulations on vehicle safety in Hong Kong, including the Regulation, the Road Traffic (Construction and Maintenance of Vehicles) Regulations (Cap. 374A), and the Road Traffic (Safety Equipment) Regulations (Cap. 374F), etc.

5.5.3 Referring to the maintenance requirements in paragraph 5.5.2, the pilot proprietor should perform, but not be limited to, the following maintenance activities with proper maintenance records being kept:

- (a) Verify that the installation of LiDARs, cameras, other sensors and attached equipment /device are secure;
- (b) Verify that the signal and power connections of hardware systems, such as controllers and sensors, are reliable;
- (c) Calibrate the sensor position and attitude parameters of the perception system;

- (d) Verify that the drive-by-wire chassis is functioning properly;
- (e) Verify that the vehicle takeover function is operating properly; and
- (f) Verify that the function of the minimal risk manoeuvre switching is functioning properly.

5.6 Vehicle Fundamental Safety Test

5.6.1 Tests for Autonomous Driving

- (a) The AV(s) included in the same pilot scheme are required to go through Closed Road Test and Open Road Test as stipulated in paragraph 3.4. For Closed Road Test, the AV(s) would be tested through a set of realistic scenarios to evaluate the performance of the vehicle automation. The testing scenario includes, but are not limited to, the following:
 - (i) road traffic infrastructure and obstacles detection and response;
 - (ii) pedestrians and non-motor vehicles detection and response;
 - (iii) adjacent vehicle driving status detection and response;
 - (iv) automatic emergency escape;
 - (v) parking;
 - (vi) minimal risk manoeuvre; and
 - (vii) dynamic driving task intervention and takeover.
- (b) The AV(s) may also be tested in special weather conditions, such as rainy day, foggy day, night-time with low illumination, etc., depending on the operating conditions under which the AV system of the AV is specifically designed to function and the nature of the pilot scheme.

5.6.2 The AV(s) should also pass the dynamic driving task intervention and takeover test to ensure that the backup operator can take control of the vehicle quickly in an emergency. The test method and conditions for passing as specified in GB/T 41798-2022: Intelligent and Connected Vehicles-Track Testing Methods and Requirements for Automated Driving Functions, or equivalent national or international standards would be accepted. In addition, ensuring network connectivity and redundancy are essential for the operation of the remote backup operators. If there

is communication network failure or access to the communication network is limited, the vehicle should immediately switch to the minimal risk manoeuvre mode.

- 5.6.3 The AV(s) should pass the minimal risk strategy test to ensure that the vehicle can switch to the minimal risk operation mode if the backup operator does not respond to a takeover request in time. Under this situation, the vehicle should immediately be switched to the minimal risk operation mode. Test method and conditions for passing as specified in GB/T 41798-2022: Intelligent and Connected Vehicles-Track Testing Methods and Requirements for Automated Driving Functions, or equivalent national or international standards would be accepted.
- 5.6.4 The vehicle data record system of AV(s) should pass several tests, including data triggering condition test, data correctness test, data storage capacity test, storage coverage test, and power failure storage test, etc. The stored data should be readable and prevented from alternation, tampering, forgery, or malicious deletion. The test methods and conditions for passing are outlined in GB 39732-2020: Vehicle Event Data Recorder System, or equivalent national or international standards would be accepted.
- 5.6.5 Low-speed AV(s) operating on predefined routes should undergo fundamental safety testing according to ISO 22737:2021, or equivalent national or international standards would be accepted. Performance test procedures of low-speed AVs should include hazardous situation test for pedestrians and pedal cyclist, night-time and day-time operation tests, and operational tests in rainy conditions.

5.7 Vehicle Requirements for Software Update

- 5.7.1 Each AV should have effective authenticity and integrity protection mechanisms to ensure that only valid software upgrade packages can be executed.
- 5.7.2 If the AV uses software identification number, which is uniquely identifiable, the vehicle should allow the software identification number to be easily readable in a standardized way via the use of an electronic communication interface, at least by the standard interface (OBD port).

- 5.7.3 If the AV does not use software identification number, the vehicle should allow the software version(s) to be easily readable in a standardized way via the use of an electronic communication interface, at least by the standard interface (OBD port).
- 5.7.4 The AV should be capable of protecting its stored software identification number and/or software version against unauthorized modification.
- 5.7.5 If software upgrade fails or is interrupted, there should be measures to ensure that the original version is restored or the AV is placed in a safe state.
- 5.7.6 For over-the-air updates, the AV should be capable of executing software updating safely via technical means (e.g. AV cannot be driven during software updating).

Part 6 Infrastructure Requirements

6.1 General

Roads used for trial and pilot use of AV(s) should meet the following conditions:

- (a) Clear and easily understandable warning signs should be provided on the roads; and
- (b) A robust mobile network should fully cover the roads to meet the requirements for network data transmission.

6.2 High-definition Map Generation and Update

6.2.1 AVs using high-definition (HD) maps for autonomous driving should be equipped with HD maps that fully cover the trial and pilot use area. The HD maps are necessary to show features, such as road markings and lanes that may not be easily detected by on-board sensors, and to provide an alternative source of information when on-board sensors fail.

6.2.2 The HD maps should contain two types of pre-processed information:

- (a) The first category is road data, including lane information, such as lane line location, type, width, gradient and curvature; and
- (b) The second category is information about fixed objects around the lane, such as traffic signs, traffic lights, road edge types, roadside landmarks, and other infrastructure information.

6.2.3 Unless there is no change to the road conditions, the HD map should be updated at least once a month or more frequent to suit the road conditions. Should the pilot proprietor conducted the risk assessment showing that there is no change to the road conditions, he could declare to TD and no update of the HD map is required. The risk assessment document should be properly documented.

6.3 Control Centre / Remote Control Facilities

6.3.1 A control centre with real-time remote monitoring capability should be established if remote control is adopted for the AV(s).

- 6.3.2 The pilot proprietor should establish a remote platform with a takeover guarantee mechanism in the absence of an in-vehicle backup operator. It is essential to clearly define and document the operating conditions under which the AV system(s) of the AV(s) is specifically designed to function and the specific situations in which remote assistance is allowed or required.
- 6.3.3 The control centre should be equipped with display equipment capable of fully displaying and monitoring the running status and environment of the remote AV(s), as well as various perspectives inside and outside the AV(s).
- 6.3.4 The control centre should be equipped with ergonomic remote operation equipment.
- 6.3.5 The control centre should be established in a location that ensures good network communication with the AV(s), ensuring that the delay of data transmission meets the requirements of remote driving.
- 6.3.6 The pilot proprietor should formulate alcohol, drugs and fatigue prevention measures to ensure that the backup operator is in a sober driving state without alcohol consumption, influence of drugs or fatigue.
- 6.3.7 The control centre should be equipped with equipment that can monitor the working status of the remote backup operator and record the process of the operator remotely operating the AV(s).
- 6.3.8 The pilot proprietor should formulate measures in the control centre to prevent electronic equipment distraction and prohibit operators from using unauthorized electronic equipment while remotely operating AV(s).

6.4 Maintenance of Infrastructure

- 6.4.1 Before conducting network-related trial and pilot use of AV(s), the pilot proprietor should strictly check and monitor the transmission quality of the mobile communication signal and the communication status between AV(s), remote platforms, and backup systems to ensure normal operation of remote platforms and AV(s).
- 6.4.2 The pilot proprietor should develop a regular maintenance schedule for infrastructure that affects test safety in the trial and pilot use area.

Part 7 Miscellaneous Notes

7.1 Passenger Safety

To ensure the passenger safety during the trial and pilot use of AV(s), a guidance for passengers should be formulated including:

- (a) information about the trial and pilot use of AV(s) (e.g. routes, maximum vehicle speed, etc.);
- (b) details of the AV, such as indicators, vehicle buttons, and emergency call procedures;
- (c) a code of conduct for passengers during the ride; and
- (d) safety guidelines in case of AV breakdowns, traffic accidents, and emergencies.

7.2 Cargo Safety

To ensure the safety of the cargo during the trial and pilot use of AV(s), a guidance for cargo owners should be formulated including:

- (a) information of the trial and pilot use of AV(s) (e.g. routes, maximum vehicle speed, etc.);
- (b) details of the AV, such as the rated load and transportable items;
- (c) guidelines for goods packing, loading, and unloading; and
- (d) guidelines for handling AV breakdowns, traffic accidents, and emergencies.

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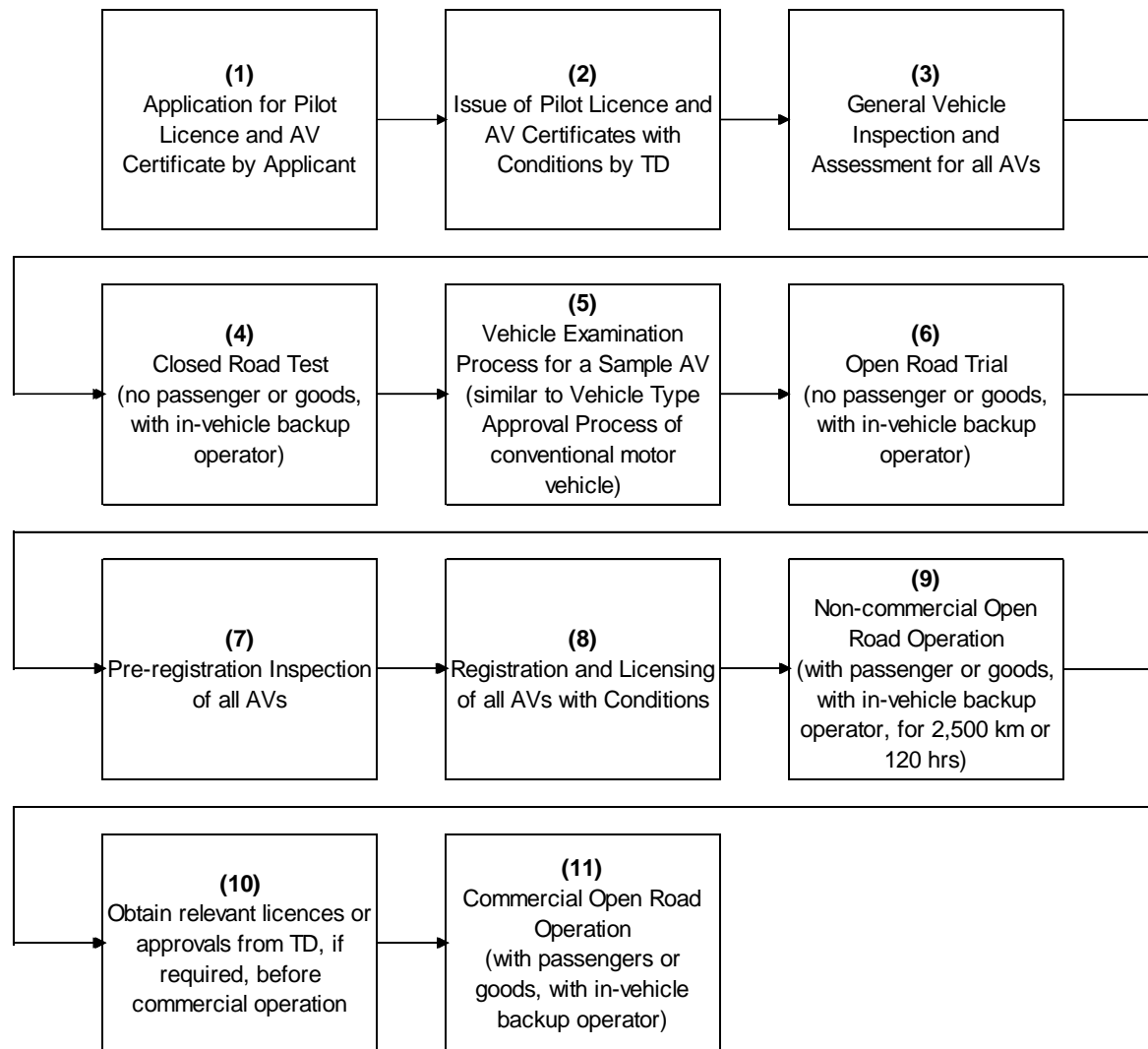
Part 9 Enquiry

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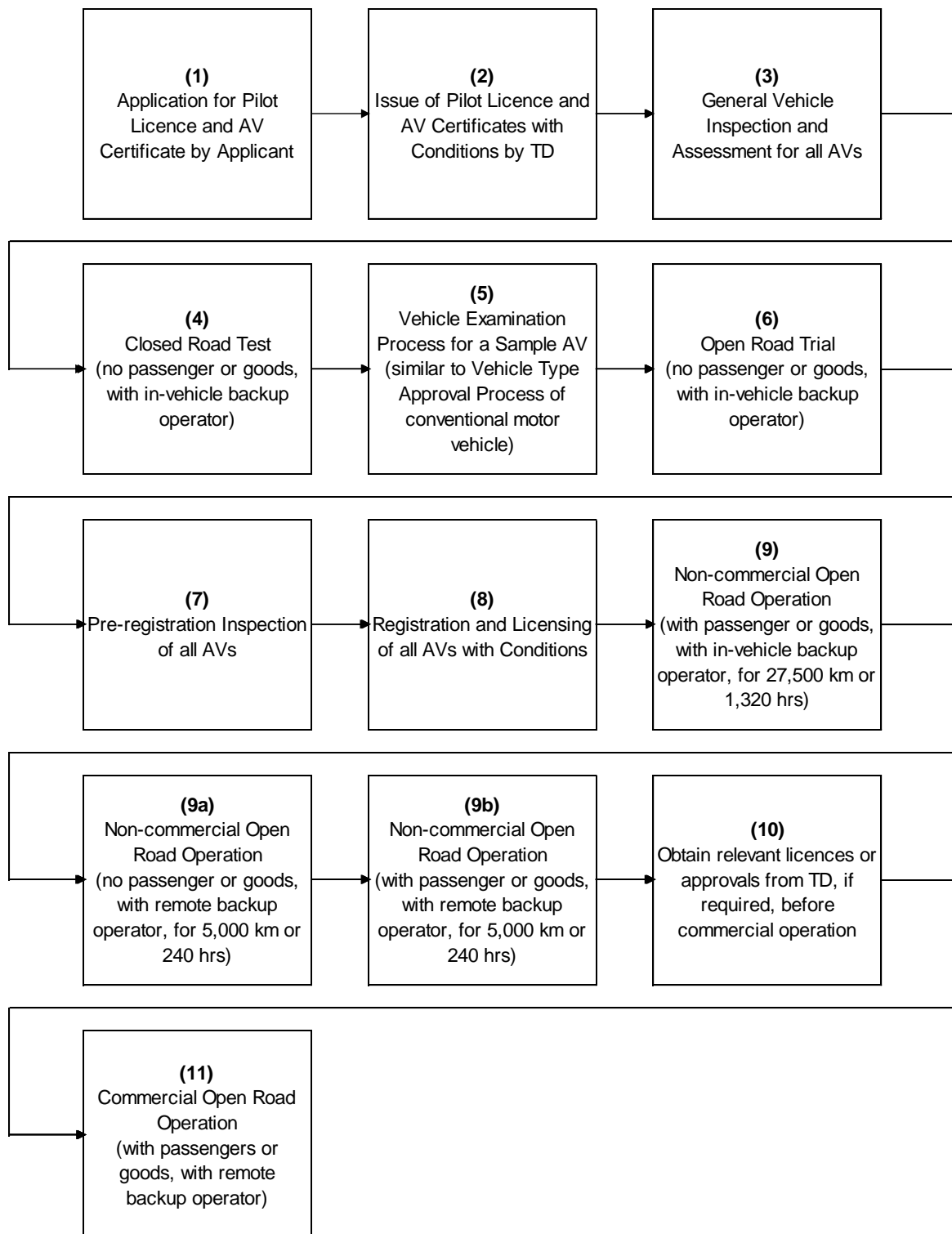
E-Mail : autov@td.gov.hk

Website : https://www.td.gov.hk/en/public_services/taoav/index.html

Work Flow on Application for Trial and Pilot Use of AV with In-vehicle Backup Operator



Work Flow on Application for Trial and Pilot Use of AV with Remote Backup Operator



Notification of Reportable Event

Reportable Event of Pilot AV	
From: (Pilot Proprietor)	To: Transport Department
Date:	E-mail: autov@td.gov.hk
Date and Time of the Event:	
Location of the Event:	
Pilot Licence/AV Certificate No.	
Description of Injury / Fatality / Damage (if any):	
Brief Description of the Event:	
Immediate Follow-up Actions Taken:	
Presence of HKPF and/or FSD:	
Presence of Media (name of media):	
Inquiry from Media (name of media):	
Contact Person of Pilot Proprietor (name, position, office/mobile no.):	



運輸署

Transport Department